The London School of Economics and Political Science

Indigestible, Disgusting, and Vile: The Development, Regulation, and Reception of Ersatz Food Products in Germany during the First World War

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Declaration

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Abstract

Ersatz (substitute) food products have long played a part in histories of the German food crisis during the First World War. From war bread, to turnips, to watery sausages, these foods have been used by historians to symbolize the desperation of the food crisis, particularly in the later years of the war, often valuing these foods more as anecdotal material than a phenomenon worth studying in their own right. Who was responsible for developing these wartime substitutes, and what nutritional impact did they have on the diet of German consumers? The historical record suggests that these food products were universally despised, using terms like 'indigestible', 'disgusting', and 'vile', but were these products—as a rule—really inferior to the foods they were replacing? Or did contemporary associations with class, culture, and the natural order influence consumers' perceptions of these much-maligned goods? Furthermore, how did the introduction of these goods affect the course of government food regulations? On all of these points, the historiography is largely silent. This thesis will address that gap by conducting a dedicated study of the role played by *ersatz* food products during the war, using previously unexamined primary sources to direct a critical lens onto these fascinating substitutes. Rather than being a mere symbol for deprivation, an empirical analysis of *ersatz* food products reveals how they helped to sustain the nutritional durability of the German home front, yet also eroded public confidence in the government's regulatory efforts—simultaneously contributing to the survival of consumers while hastening the collapse of their morale. By addressing the research questions above, this thesis argues that *ersatz* food products were a symptomatic response of a food system under incredible stress, and that by better understanding these substitutes, we can better understand the complex dynamics of the German food crisis itself.

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Abbreviations

Abbreviations used in the footnotes are as follows:

Published primary sources

BDFA	British Documents on Foreign Affairs

Archives

BArch	Das Bundesarchiv, Berlin-Lichterfelde
StaAH	Staatsarchiv Hamburg
BHStA, KA	Bayerisches Hauptstaatsarchiv, Kriegsarchiv, Munich
SächsStA	Sächsisches Staatsarchiv, Hauptstaatsarchiv Dresden
StadtAL	Stadtarchiv Leipzig
LAV NRW R Duisburg	Landesarchiv Nordrhein-Westfalen, Rheinland Department,

Organizations and Government Offices

KEA	Kriegsernährungsamt (War Food Office)
RGA	Reichsgesundheitsamt (Imperial Health Office)

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Introduction

In early 1918, Ernest Lionel Pyke, a British POW who had just left behind three and a half years of captivity at Ruhleben Prisoners' Camp on the outskirts of Berlin, wrote the following in his memoir, *Desperate Germany*: "I think, from the German point of view, one of the most dreadful burdens they have to bear is the swallowing of all those simply awful substitutes which their Government forces relentlessly upon them." [1] Having the misfortune of being on holiday in Germany when war was declared, Pyke was interned at Ruhleben for most of the war, where he was assigned the responsibility (or privilege) of being the camp's "Inspector of the Kitchens" by his captors.[2] From March 1915 until his release in the early part of 1918, he made between two and three trips per month, under escort, to Berlin to buy food for the camp kitchen.[3] Over the course of these visits to Berlin, which he described as "a city of the dead […] its pavements traversed slowly by a shabbily-dressed, enfeebled, and miserable people, pale-faced and shrunken, and always hungry," Pyke made note of conditions in the German capital, the morale of its residents, and the state of its food supply.[4] He accomplished this task through observation during his shopping trips, by speaking with fellow prisoners on work details outside the camp, and by discreetly questioning German officials he met in the city, or who visited the camp.[5] The ultimate goal of his sleuthing was—he hoped— to "break through the cloak of concealment which, during the past twelve months […] it has been the aim of the German Government to spread over the privations of her starving people."[6] What is most interesting about Pyke,

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[1] Ernest Lionel Pyke, *Desperate Germany* (London: Hodder and Stoughton, 1918), 13.
[2] Ibid, ix.
[3] Ibid, ix-x.
[4] Ibid, viii-ix.
[5] Ibid, x-xi.
[6] Ibid, vii-viii. This 'cloak of concealment' refers to the withdrawal of American journalists after their country's entry to the war, which removed an important source of information for Entente observers.

however, is not how he managed to gather this account of the German home front, but what he chose to emphasize as "the most dreadful burden" of the war: *ersatz* food.[7] Not the unrecoverable loss of millions of young men, nor the bitterness and distrust which crept into German society amid the collapse of the *Burgfrieden*, nor even the hunger itself, which by 1918 had grown pervasive as official rations fell to roughly 1,500 calories per person, per day.[8] But rather the consumption of *ersatz* beer, tea, coffee, and other "fearful substitutes" which he mentions in his exposé.

The context of Pyke's memoir was the German food crisis, a period of chronic food shortages from 1914-1919 which generated a flurry of public and private activity to secure the food supply, with varying levels of success. The precipitating cause of the crisis was the double blow dealt by the implementation of the Allied economic blockade against the Central Powers, and the disruptions to the German food system generated by military mobilization. Almost simultaneously with the declaration of war between Britain and Germany on 4 August 1914, the productive potential of the German Empire's vast merchant fleet was neutralized by the British Navy in the first strike of the Admiralty's long-awaited 'economic weapon': the blockade of the Central Powers.[9] Though relatively porous at first, by late 1916 the *Hungerblockade*, as it was termed by the Germans, had become quite comprehensive. Through a combination of a distant

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[7] *Ersatz* is a German word, meaning "substitute". It often holds a negative connotation and refers here to the efforts of German society to replace scarce items with alternatives.

[8] Alexander Watson, *Ring of Steel: Germany and Austria-Hungary in World War I* (New York: Basic Books, 2014), 336, argues that the *Burgfrieden*, the political and societal truce to put aside differences in the interest of wartime solidarity, collapsed as individual or family self-preservation rose in priority alongside hunger; Roger Chickering, *Imperial Germany and the Great War, 1914-1918*, 2nd ed., New Approaches to European History 27 (Cambridge: Cambridge University Press, 2004), 140, shows a table of the average daily calories provided by official rations, with the rations of fall 1918 at around 1,500 calories. See also Leo Grebler and Wilhelm Winkler, *The Cost of the World War to Germany and to Austria-Hungary* (New Haven; London: Yale University Press; Oxford University Press, 1940), 81, which shows 1,400 calories per day for standard rations in November 1917.

[9] Louis Guichard, *The Naval Blockade, 1914-1918*, trans. Christopher R. Turner (New York: D. Appleton and Company, 1930), 3-4, details how a huge portion of German merchant shipping was either detained in neutral ports, seized in Allied ports, or sunk or captured by the end of 1914.

blockade, the aggressive expansion of contraband lists, the blacklisting of uncooperative companies, and the strict rationing of trade with neutral powers to prevent the re-exportation of goods to Germany, the Admiralty attempted to throttle the German economy to hinder the Germans' conduct of the war.[10] This posed no small threat to the German nation, as its imports of agricultural products in particular were needed to sustain the nutritional needs of the population, due to a significant deficit in Germany's agricultural production. While the numbers vary slightly from account to account, it can be argued with relative certainty that on the eve of war Germany imported between one-fifth and one-third of its annual consumption needs to meet the deficit of its domestic agricultural production.[11] Broken down further, an estimated 19 percent of calories, 27 percent of needed proteins, and 42 percent of fats came to Germany from abroad, with the lion's share coming from Russia (now an enemy), or overseas (blocked by British interdiction efforts).[12]

In response to this dire situation, the German government first opted for a policy of optimistic ignorance, embracing the misguided belief that a quick, decisive end to the war, as envisioned by adherents of the Schlieffen-Moltke plan, would make long term planning for food security unnecessary.[13] Other attempts were made to downplay the

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[10] See Nicholas Lambert, *Planning Armageddon: British Economic Warfare and the First World War* (Cambridge, Mass.: Harvard University Press, 2012) for an analysis of the debates in the Admiralty which gave rise to the conception of the blockade as an effective economic weapon. See also Avner Offer, *The First World War, an Agrarian Interpretation* (Oxford: Clarendon Press, 1989), 270-317, for additional reading on British blockade planning prior to the war. For further reading on the blockade during the war, see Guichard, *The Naval Blockade*; W. Arnold-Forster, *The Blockade, 1914-1919, Before the Armistice: —and After* (Oxford: The Clarendon Press, 1939); or Archibald Bell, *A History of the Blockade of Germany and the Countries Associated with Her in the Great War, Austria-Hungary, Bulgaria, and Turkey, 1914-1918* (London: H.M. Stationery Office, 1937), which provide early, if contentious, accounts of the blockade.

[11] Belinda Davis, *Home Fires Burning: Food, Politics, and Everyday Life in WWI Berlin* (Chapel Hill: University of North Carolina Press, 2000), 22, offers the higher figure of one-third, whereas Grebler and Winkler, 9, provide the lower end of this range, based on an average of the years 1903-1913.

[12] Davis, *Home Fires Burning*, 22, and Offer, *Agrarian Interpretation*, 25.

[13] See Offer, *Agrarian Interpretation*, 335-53, for a discussion of economic preparations within Germany prior to the war. Refer also to George Abel Schreiner, *The Iron Ration: Three Years in Warring Central Europe* (New York: Harper & Brothers, 1918), 7, who describes witnessing defiant overconsumption of food in the fall of 1914. He explained this as being due to a feeling that to

severity of the situation, as with the infamous Eltzbacher Food Commission of 1914, which bravely proclaimed Germany's ability to overcome the difficulties imposed by the British 'Hunger Blockade'.[14] When a swift end to the war never materialized, and with the British blockade proving a devastating weapon which was tightening further with each passing month, the German government was forced to implement a wide range of interventions in order to secure the equitable distribution of the food supply.[15] These interventions—which came in the form of price-fixing, rationing, and the rapid proliferation of government monopolies and imperial offices charged with regulating and protecting the food supply—have received the most historical attention by far, and so no further time will be spent on them here.[16] Instead, this thesis will focus on one of the most contentious and least-understood aspects of the food crisis: Pyke's "dreadful burden" of *ersatz* food, and how a dedicated study of that subject might provide us with a deeper understanding of the pressures at work on the German home front during the First World War.

A phenomenon born out of the critical food shortages which plagued Germany during the food crisis, *ersatz* food products were substitute food products which aimed to either stretch the available food supply through adulteration (called *Streckung*, or 'stretching', as was done with the addition of potatoes to bread flour), to replace scarce products with similar products (e.g. replacing potatoes with turnips), or to replicate

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implement controls on food would mean putting a damper on war enthusiasm, which the German government wished to avoid.

[14] See W. J. Ashley, *Germany's Food Supply* (London: J. Truscott & Son, ltd., 1916), and E.B. Poulton, *Science and the Great War* (Oxford: The Clarendon Press, 1915), for contemporary rebuttals of the Eltzbacher Commission findings, as well as Davis, *Home Fires Burning*, 22-3, and Offer, *Agrarian Interpretation*, 25-6 and 45, for more recent criticism. The term 'Hunger Blockade' is taken from Holger H. Herwig, *The First World War: Germany and Austria-Hungary, 1914-1918* (London: Arnold, 1996), 288.

[15] This question of equitability was of paramount importance in shoring up the *Burgfrieden*, or fortress-truce, of the fractious Wilhelmine society. Davis, *Home Fires Burning*, provides an excellent overview of how interest groups wrestled fiercely over the 'correct' equitable distribution of scarce foodstuffs.

[16] For excellent histories of the German response to the food crisis, see Alexander Watson, *Ring of* Steel, and Herwig, *The First World War*.

scarce products using wholly unrelated ingredients (e.g. creating a 'coffee' product using roasted barley, oats, and coal tar).[17] While the word '*ersatz*' is simply translated as 'substitute', wartime experiences with substitute products have imbued the word with a negative connotation, implying that the substitute is inferior in quality to what it is replacing.[18] A product could even undergo multiple generations of substitution, which occurred when the ingredients used to make the first substitute became scarce, and thus had to be replaced with another round of substitution. Such was the case with certain *ersatz* coffee products described by George Abel Schreiner, an American journalist who covered the war from within Germany. When the roasted barley of early *ersatz* coffee was withdrawn to be better used elsewhere, roasted acorns and beechnuts were employed instead, resulting in "*Kaffee-ersatz-ersatz*."[19] There was also an undeniable element of fraud central to the story of *ersatz* food products, which certainly colored the public's perception of these items. As food became increasingly scarce, the potential for profiteering and fraud increased at inverse proportion. On top of that, many *ersatz* products looked little different from the adulterated foods of the late nineteenth century which drew so much scrutiny.[20] By war's end, more than 11,000 officially approved substitutes had appeared on the market, including substitutes for everything from sausages, eggs, and milk, to lemonade, honey, and soup—though the brunt of official effort was concentrated on just a few staple products: bread, jam, and animal fodder, with turnips also becoming very important after the failure of the potato crop in 1916.[21]

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[17] The coffee substitute here comes from Schreiner, *The Iron Ration*, 153.
[18] While the word has existed in common usage for centuries, Google's Ngram feature shows a sharp rise in the use of the word '*ersatz*' and '*Ersatzlebensmittel*' during the First World War, suggesting that it was during this time of hardship that its negative connotation was solidified. 'Google Books Ngram Viewer', accessed 17 February 2025, https://books.google.com/ngrams/graph?content=ersatz,+ersatzlebensmittel&year_start=1800&year_end=2019&corpus=de-2019&smoothing=3.
[19] Schreiner, *The Iron Ration*, 154.
[20] See Chapter 4 for an examination of pre-war food quality laws.
[21] August Skalweit, *Die deutsche Kriegsernährungswirtschaft* (Stuttgart: Deutsche Verlangsanstalt, 1927), 60-1, provides the number of approved substitutes. That the government focused on the

But while we definitionally understand what *ersatz* food products are, and that they were a product of wartime shortages and generally disliked, what else do we really know about them? Were they truly so bad as to warrant the vitriolic condemnations which Pyke levelled against them? One of the substitutes which Pyke criticized was simply a herbal tea made from dried mulberry leaves.[22] Was *Kriegsbrot* (war bread) really so "heavy, indigestible, and unsatisfying"?[23] Typical recipes for war bread usually describe bread baked with a combination of whole grain wheat, rye and potato flour—the type of product that today would look at home on the shelf of a health food store.[24] And at least some contemporary consumers seemed to think positively of the bread.[25] It was questions like these which first inspired me to pursue the study of *ersatz* food products when choosing a subject for my Master's dissertation at Columbia University in 2018, the first step in what would eventually become this PhD thesis.[26] That they seemed to touch so many fields of enquiry (questions of culture and taste, nutrition, legality, food policy, and the evolution of food science), yet received such cursory treatment in our histories of the First World War only deepened their mystery. They serve as symbols of German food shortages during the war, with colorful anecdotes

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listed products, and that bread, turnips, and animal fodder should be included in the study of *ersatz* products, is part of the intervention of this dissertation.

[22] Pyke, *Desperate Germany*, 14. He describes the tea as tasting, "really like nothing on earth I have ever tried before, and which leaves a taste in your mouth that makes you fear at first that you have been poisoned."

[23] Mary Elisabeth Cox, *Hunger in War and Peace: Women and Children in Germany, 1914-1924* (Oxford: Oxford University Press, 2019), 260. This quote was taken from a report by A. E. Taylor and V. L. Kellogg which was commissioned by Herbert Hoover and presented at the Supreme Economic Council in Paris in February 1919.

[24] W. G. Max Müller, "The Economic Situation in Germany during June 1916, being the Twenty-third Month of the War," *BDFA*, vol. 10, 174, describes a recipe of 50 percent wheat, 30 percent rye, and 20 percent potato flour for a standard loaf of war bread, milled to slightly less than whole grain extraction rates; ibid, "The Economic Situation in Germany during February 1917, being the Thirty-first Month of the War," *BDFA*, vol. 11, 55, gives the mandated extraction rate for bread grain as 94 percent.

[25] Schreiner, *The Iron Ration*, 8-9. Schreiner described the early (1914-1915) war bread as "in fact very palatable, it tasted best on its third day, and could be kept a week without going bad."

[26] Jonathan Slater, "Indigestible, Disgusting, and Vile: Ersatz Food Development and Regulation in Germany during the First World War" (Master's Dissertation, London : New York, London School of Economics - Columbia University, 2020). The first two paragraphs of this thesis were adapted from the Master's Dissertation, to pay homage to how far this project has come.

about bizarre *ersatz* recipes and people's experiences with them sprinkled throughout histories of the home front, food crisis, or the economic blockade, but only ever as items of peripheral interest compared with more important questions. Even in works which turn a more serious, critical eye to the topic of wartime substitutes, like Anne Roerkohl's *Hungerblockade und Heimatfront: die kommunale Lebensmittelversorgung in Westfalen während des Ersten Weltkrieges*, and Uwe Spiekermann's *Künstliche Kost. Ernährung in Deutschland, 1840 bis heute.*, give relatively short treatment to this incredibly rich subject.[27]

The aim of this dissertation is therefore to reverse this usual treatment by placing *ersatz* food products firmly in the center of a historical study of the experience of the German food crisis. In order to better understand the role played by these fascinating food products in the feeding of Germany during the war, this dissertation will grapple with the following research questions: First, who was involved in their creation, and what was their motivation for bringing those products to market? Pyke seems to insinuate that these products were forced upon consumers by the government, but food systems are complex networks which rely on the coordinated efforts of many actors to shepherd food from the field to the dinner plate. Second, what was the nutritional impact of *ersatz* food products on German consumers? Were all substitutes—as a rule—inferior to the foods they were replacing, as has been broadly suggested by so many historians? Building on the question of nutrition, this dissertation also asks how historians should interpret the overwhelmingly negative historical record of how *ersatz* foods were received by the public. Should this be interpreted to mean that *ersatz* food products were inherently inferior in terms of taste to the foods they replaced? Or were

[27] Anne Roerkohl, *Hungerblockade und Heimatfront: die kommunale Lebensmittelversorgung in Westfalen während des Ersten Weltkrieges* (Stuttgart: Franz Steiner, 1991); and Uwe Spiekermann, *Künstliche Kost. Ernährung in Deutschland, 1840 bis heute.* (Göttingen: Vandenhoeck & Ruprecht, 2018). Roerkohl's section on *ersatz* food, for instance, spans just fourteen pages.

perceptions of substitute foods influenced by the social and cultural contexts of German consumers? Finally, how (if at all) did the explosion of *ersatz* food products during the war intersect with or affect government food regulations? And did the experience with wartime substitutes noticeably impact the course of German food policy following the war? Through answering research questions, this thesis will provide the first dedicated study of *ersatz* food products to appear in the historiography of the First World War, and in so doing change our understanding of the role played by these products in keeping German consumers fed. Simply put, this thesis argues that the impact of *ersatz* food during the war has gone largely unexamined in the historiography, and that a greater understanding of how *ersatz* food products—how they were made, how effective they were as substitutes, how they were perceived by consumers, and how they affected government regulatory efforts—can help us to better understand the pressures endured by the German food system during the First World War.

Historiography

Within the historiography of the First World War, there are few subjects as contentious as the German food crisis. The questionable legality of the Allied blockade, the controversial decision to continue to blockade after the armistice, the deaths of hundreds of thousands of Germans due to malnutrition-related causes, and the role which the food crisis may have played in precipitating revolution in Germany in 1918, all combine to make the study of the crisis a highly political vein of research, with fault lines that remain active to this day.[28] For both those writing about the blockade and food

[28] German post-war estimates ranged as high as 800,000, though this figure has likely been inflated, Herwig, *The First World War*, 295-6; Cox, *Hunger in War and Peace*, 242-3, offers a brief but

crisis during the war, and for the generations of historians who followed them, the study of the food crisis has been charged with questions of responsibility—who was responsible for the deaths of hundreds of thousands of civilians in Germany? Was it the Allied powers for implementing a system of blockade, unprecedented in both its scale and scope? Was it the fault of German militarism, which dictated that the army would be supplied, no matter the cost to the civilians at home?[29] Or was the incompetent German bureaucracy ultimately to blame for its inability to manage an effective and equitable controlled economy? More radically, some have even raised doubts about whether famine levels were even reached in Germany at all—though recent scholarship has called these revisionisms into question.[30]

Complicating the literature on the food crisis is the fact that it sits on the intersection of multiple fields of research, each with their own research agendas and accompanying perspectives on the crisis. Historians of the blockade, for instance, tend to treat the food crisis as a measurement of the effectiveness of Allied economic warfare efforts, illustrating the damage done to Germany's war economy. In addition, blockade historians have often engaged strongly with the question of the blockade's legality, a debate with its roots in wartime propaganda efforts and wrapped up in the moral legacy of the blockade's death toll. Adopting a similar tack to the blockade historians, economic historians have approached the subject of the food crisis as a component piece

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excellent overview of mortality figures linked to the blockade. Official German estimates calculated by Max Rubner placed the death toll at 763,000, and this number has been repeated in the official British history of the blockade written by A. C. Bell. A lower figure of 424,000 was published by the *Reichsgesundheitsamt* (Imperial Health Office) in 1928, and the most recent mortality estimates, extrapolated from Berlin mortality rates, offers a death toll of 478,500. This final figure is the result of research by Jay Winter, described in Jay Winter, 'Surviving the War: Life Expectation, Illness, and Mortality Rates in Paris, London, and Berlin, 1914-1919', in *Capital Cities at War: Paris, London, Berlin, 1914-1919*, ed. J. M. Winter and Jean-Louis Robert, 1st pbk. ed. (Cambridge: Cambridge University Press, 1999), 517-8.

[29] Grebler and Winkler, *The Cost of the War*, 81, offers evidence that soldiers' daily rations were as much as 1,000 calories higher than the standard civilian ration in late 1917.

[30] Offer, *Agrarian Interpretation*, 52-53, calls into doubt the level of hunger. The challenge arises from Cox, *Hunger in War and Peace*, 130.

in the larger project of accounting for the costs of war. Meanwhile, historians of the German home front have tended to approach the food crisis as an explanatory factor in the erosion of public morale and faith in government authorities, with an eye trained on the collapse of the war effort and the subsequent revolution of 1918.

While these three fields—blockade, economic, and home front— have each produced important additions to the literature, an unfortunate side effect of their preoccupations is that our received history of the German food crisis is very much a history without a strong center. Rather, it is one which has been constructed carefully over the decades through an act of collage. To the knowledge of this author, there exists no systematic, dedicated study of the food crisis published in English, much less a study of *ersatz* food products. Even in German scholarship, the body of literature is strikingly small, and its component works remain limited in their geographic and temporal scope. Remarking on this lack of attention, Anne Roerkohl, author of *Hungerblockade und Heimatfront*, noted that the current understanding of the German war food economy was, surprisingly, still based on August Skalweit's volume in the Carnegie Endowment series published in 1927—marking a gap of more than sixty years at the time of her writing.[31] While there have since been some excellent entries to the literature, with particularly strong treatments of the crisis found in Holger Herwig's *The First World War: Germany and Austria-Hungary, 1914-1918*, and Alexander Watson's *Ring of Steel: Germany and Austria-Hungary in World War I*, and most recently with Holger Afflerbach's *On a Knife Edge: How Germany Lost the First World War*, these nevertheless remain general histories and cannot provide the level of detail possible in a dedicated monograph.[32]

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[31] Roerkohl, *Hungerblockade*, 18.

[32] Herwig, *The First World War;* Watson, *Ring of Steel*; and Holger Afflerbach, *On a Knife Edge: How Germany Lost the First World War*, Cambridge Military Histories (Cambridge, United Kingdom; Cambridge University Press, 2022).

As a result of this scattered treatment, there are still many aspects of the food crisis which we do not fully understand. Chief among these—and the subject of this review—is the role played in the crisis by *ersatz* food. This is somewhat surprising, since *ersatz* food has long served as a symbol of the deprivations suffered by German civilians during the food crisis. Few histories of Germany during the war can avoid discussing the introduction of *Kriegsbrot* (war bread) in the early war years; nor can they skirt the substitution of fodder turnips for potatoes during the infamous Turnip Winter of 1916/17. And yet we know very little about the role played by these foodstuffs. Who produced them? How big of a share of the average diet did they take up? How nutritious (if at all) were they? Most importantly, how were they received by those who consumed them? Were they universally reviled, as is sometimes insinuated, or were they occasionally embraced by those who ate them? What are the legacies of these substitute foodstuffs, and can we find evidence of them in the regional diet today? On all of this, the current body of literature remains silent.

But it does not need to remain that way. A focused study on the subject, covering the production, distribution, consumption, and regulation of *ersatz* food, would go far in providing a foundation for a new generation of histories of the German food crisis—one not filtered through the perspectives of adjacent fields, but centered on rigorous academic work grappling with an entirely new set of questions, perspectives, and research agendas. The first step in closing this gap is to conduct a thorough review of the identified fields of literature: what questions/debates they are concerned with, how they have approached the subject of the food crisis over time, and what treatment, if any, they provide of the role played by *ersatz* food. Through charting out the boundaries of this gap in the literature, I hope to illustrate both the necessity and the breadth of the work which must be done. This review will examine each identified field in turn (blockade, economic, and home front histories), proceeding chronologically within each

field, though I have grouped some works thematically when it proved more convenient and to aid in understanding.

The strain of the historiography which deals with the naval blockade is one which has its roots in the pre-war period. Anxieties over the use of economic warfare as the new ultimate weapon in a generalized conflict had been circulating in Europe for at least a decade before the First World War, in both public and governmental spheres.[33] Nicholas Lambert, for one, has argued in his book, *Planning Armageddon*, that the Admiralty envisioned the blockade as a lightning weapon which would cause the sudden collapse of Germany's financial system and cripple its war effort—bringing a quick victory at minimal cost.[34] Although this position has been strongly contested by other historians, the inability of the blockade to produce a noticeable impact in the early months of the war nevertheless elicited much consternation among British policymakers. This prompted a shift in focus towards examining Germany's ability to maintain its war effort in the face of accumulating food and resource shortages.[35] A succession of pamphlets, lectures, and commission reports from both German and English sources forwarded competing claims over the existing state of Germany's food supply at the outset of war and its perceived ability to resist the efforts of the blockade.[36] Of these, the W. G. Max Müller reports to the Foreign Office, found in four volumes as part of the *British Documents on Foreign Affairs* series, are perhaps the

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[33] Norman Angell, *The Great Illusion, 1933* (North Stratford, New Hampshire: Ayer Company Publishers, Inc., 2006). First published in 1908, Angell's popular book proposed that economies were so intertwined at the beginning of the twentieth century that any war would be quickly abandoned as the cost would be too painful to bear.

[34] Lambert, *Planning Armageddon*, 1.

[35] Lambert's arguments have been criticized by Matthew Seligmann, Christopher Bell, John W. Coogan, Stephen Cobb, Alan Kramer, and Samuël Kruizinga, largely over disagreement whether Britain actually *had* a grand naval strategy prior to the war. Matthew S. Seligmann, "Failing to Prepare for the Great War? The Absence of Grand Strategy in British War Planning before 1914," *War in History* 24, no. 4 (November 1, 2017): 414–37.

[36] See Paul Eltzbacher, *Germany's Food, Can It Last? Germany's Food and England's Plan to Starve Her Out; A Study by German Experts*, trans. Sydney Russell Wells (London: University of London Press, 1915); Hugo Schweitzer, *Can Germany Be Starved Into Submission?* (New York: German American Literary Defense Committee, 1915); and Ashley, *Germany's Food Supply*.

most important published primary source for understanding the British wartime understanding of the impact of the blockade on Germany over the course of the war.[37]

Emerging out of these wartime efforts to assess the impact of the blockade were the official and semi-official histories of Britain and France during the war, written by the government departments involved in its prosecution, or by individuals given access to their documents. This group of works is represented by Louis Guichard's *The Naval Blockade, 1914-1918* in 1930, followed by A.C. Bell's, *A History of the Blockade of Germany and of the Countries Associated with Her in the Great War, Austria-Hungary, Bulgaria, and Turkey, 1914-1918*, in 1937, and finally by William Arnold-Forster's *The Blockade, 1914-1919: Before the Armistice - and After* in 1939 (though Arnold-Forster's work was available before Bell's, which was not made publicly available until 1964).[38] Each of these works is similarly structured, with sections covering the development of the blockade apparatus during the war, the impact of the blockade on neutral powers under the scheme of import rationing, and the effect of the blockade on the war effort of Germany and its allies.[39]

Arguably, the primary goal of this generation of histories was to establish the moral and legal legitimacy of the Allied blockade during the war, as well as its impact on Germany's defeat—a goal which set the agenda for much of the literature that followed. As for their treatment of the food crisis, Guichard and Bell each provide a thorough overview of the explanatory factors which enabled the blockade to generate

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[37] Kenneth Bourne and D. Cameron Watt, eds., *British Documents on Foreign Affairs: Reports and Papers from the Foreign Office Confidential Print*, vol. Volumes 9-12, Part II, Series H (University Publications of America, 1989).

[38] Guichard, *The Naval Blockade*; Bell, *History of the Blockade*; and William Arnold-Forster, *The Blockade, 1914-1919: Before the Armistice - and After* (Oxford: Clarendon Press, 1939).

[39] For the history of the blockade after the armistice, the standard reading is provided by Suda Lorena Bane and Ralph Haswell Lutz, eds., *The Blockade of Germany after the Armistice, 1918-1919: Selected Documents of the Supreme Economic Council, Superior Blockade Council, American Relief Administration, and Other Wartime Organizations* (Stanford: Stanford University Press, 1942), which is largely concerned with the diplomatic negotiations around the easing of the blockade.

food shortages, including Germany's insufficient domestic agricultural production, and its reliance on foreign sources of fertilizer and animal fodder, without which its agricultural production greatly suffered. In addition, both Guichard and Bell cover in detail the levels of official rations over the course of the war, how consumption of particular foodstuffs varied over time, and the impact of the hunger on German civilians. Arnold-Forster, in contrast, concerns the bulk of his work with the Allied relief effort in Europe after the armistice. The treatment of *ersatz* food within these histories, however, is sporadic at best. Arnold-Forster makes a passing reference to the Turnip Winter, but nothing more, while Guichard provides only a few passing mentions of *ersatz* oil products, beer, and war bread.[40] In Bell, the subject goes practically unmentioned.

Following the official histories, the next entries to the field were Marion Siney's *The Allied Blockade, 1914-1916*, and Marjorie Farrar's *Conflict and Compromise: The Strategy, Politics and Diplomacy of the French Blockade, 1914-1918*, published in 1957 and 1974 respectively.[41] Siney's work, while more academic in its treatment of the blockade than the previous generation of works, suffers from a lack of access to the relevant archives, which were still unopened at the time it was written.[42] Farrar, on the other hand, shifts the attention to the role played by the French in the diplomatic efforts of the blockade—particularly as they relate to the case of Switzerland—but presents nothing new on the food crisis. The next significant addition to the field did not arrive

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[40] Arnold-Forster, *The Blockade*, 24, 32-40; Guichard, *The Naval Blockade*, 285 and 290.
[41] Marion Siney, *The Allied Blockade of Germany, 1914-1916* (Ann Arbor: University of Michigan Press, 1957); Marjorie Farrar, *Conflict and Compromise: The Strategy, Politics and Diplomacy of the French Blockade, 1914-1918* (The Hague: Martinus Nijhoff, 1974).
[42] Siney, *The Allied Blockade*, vi.

until 1985, with the publication of C. Paul Vincent's *The Politics of Hunger: the Allied Blockade of Germany, 1915-1919*.[43]

Vincent's work makes a forceful intervention in the debate over the legality and morality of the Allied blockade. Brushing aside the justifications of the official histories, Vincent argues not only that the Allied blockade was illegal, but also that the experiences of hunger and malnutrition may have had an impact on the mental development of the younger generations who would eventually sweep National Socialism into power.[44] Furthermore, Vincent contests that the British were aware well before the war of how badly the proposed blockade would affect the economy of Germany and the health of its inhabitants, though readers interested in this subject would be better served by Lambert's work on the pre-war planning process.[45] Rightly criticized for overreaching in some of his more forceful arguments, Vincent nevertheless brings the food crisis and how the blockade affected the lives of German citizens more fully into the center of the history of the blockade.[46] He also expands somewhat upon the coverage of *ersatz* food in the war food economy, though his treatment remains brief.[47]

Still more recently, Isabel Hull's *A Scrap of Paper: Breaking and Making International Law during the Great War*, has again broadly reasserted the legality of the blockade effort.[48] The attempts of the Allies to speak the language of international law, and to adjust legal justifications to fit new circumstances, helped them to win the war of

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[43] C. Paul Vincent, *The Politics of Hunger: The Allied Blockade of Germany, 1915-1919* (Athens, Ohio: Ohio University Press, 1985).
[44] Ibid, 162.
[45] Ibid, 29.
[46] Holger Herwig, "Reviewed Work: The Politics of Hunger: The Allied Blockade of Germany, 1915-1919 by C. Paul Vincent," *German Studies Review* 9, no. 3 (1986): 659.
[47] Vincent, *Politics of Hunger*, 45-46, includes quotes regarding the Turnip Winter.
[48] Isabel Hull, *A Scrap of Paper: Breaking and Making International Law during the Great War* (Ithaca: Cornell University Press, 2014).

opinion against a Germany who, she contends, largely rejected international law when it proved inconvenient.[49] Sadly, Hull's account of the blockade almost entirely removes its attendant effect on the food shortages in Germany. For further reading on the history of the blockade, readers would be well-served by the recent works of Paul Halpern, *A Naval History of World War I*, and Eric Osborne, *Britain's Economic Blockade of Germany, 1914-1919*, both of which offer an update to our history of the planning and implementation of the blockade, but only cursory treatment of *ersatz* products at best.[50]

Closely related to the blockade histories, the field of economic histories has been primarily engaged with quantifying the costs of the war to the belligerent powers—though of course the scope has been broadened here to include the entirety of the German war effort and wartime economy, and not just the measurable impact of the blockade. The relevant volumes in the Carnegie series largely remain the standard readings for the field. Following the war, the Carnegie Endowment for International Peace sponsored a series of works written by officials who held positions of responsibility for organizing the home fronts of the belligerent powers. The express goal of the series was to document how the war was waged at home, and how the war affected the lives of civilians; it gave particular interest to the administration of cities. As Jay Winter and Antoine Prost note in their historiographical review of the subject, however, the downside to this project was that it produced top-down histories by officials, which made it difficult to "scrutinize the claims of the author" to evaluate the

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[49] John Horne, "A Scrap of Paper: Breaking and Making International Law during the Great War. By Isabel V. Hull. Ithaca, NY: Cornell University Press, 2014. Pp. xvi1368. $45.00," *The Journal of Modern History* 88, no. 3 (2016): 655-6.

[50] Paul Halpern, *A Naval History of World War I* (Annapolis: Naval Institute Press, 2012); Eric Osborne, *Britain's Economic Blockade of Germany, 1914-1919* (London; New York: Frank Cass, 2004).

effectiveness of their policies, or investigate how their policies were received by the targeted populations.[51]

These works nevertheless remain important for the insights they provide on how the war affected nearly every aspect of life. The volumes of the German series most relevant to this review are those produced by August Skalweit (1927) on German food supply during the war, Friedrich Äreboe (1927) on the effect of the war on German agriculture, and the supplementary volume by Leo Grebler and Wilhelm Winkler (1940) on the cost of the war to the German economy.[52] In their approach to the food crisis, these histories were significant for providing the raw numbers which would become the basis for later analysis. The Skalweit volume, for instance, has remained the foremost foundational text for histories of the German food crisis, providing official figures for rationing, mass-feeding projects, price controls, *ersatz* regulation, and so on—covering nearly every aspect of the controlled food economy. Building on this, the Grebler and Winkler volume (a supplemental volume in English that was based on the untranslated volumes of the German series, including Skalweit and Äreboe), includes additional figures on yearly crop yields, livestock levels, annual trade, and industrial activity, to produce a holistic accounting of the damage wrought by the war on Germany's economy. While the volume is primarily concerned with heavy industry, the sections on agriculture remain important and illustrate the reduction of food production through the interaction between the depletion of labor, falling livestock levels, and soil exhaustion.

The volume does provide some treatment of *ersatz* products in Germany, but this is mostly confined to industrial *ersatz* products, rather than food.[53] Skalweit's volume

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[51] Jay Winter and Antoine Prost, *The Great War in History: Debates and Controversies, 1914 to the Present* (Cambridge: Cambridge University Press, 2005), 154.
[52] Skalweit, *Kriegsernährungswirtschaft*; Friedrich Äreboe, *Der Einfluss des Krieges auf die landwirtschaftliche Produktion in Deutschland* (Stuttgart: Yale University Press, 1927); Grebler and Winkler, *The Cost of the War*.
[53] Grebler and Winkler, *The Cost of the War*, 34-6.

offers the most detail on *ersatz* food products out of the three, but his coverage is relatively limited and lacking in detail. War bread receives the most serious discussion out of the substitutes, covering ten pages of the volume which are mostly concerned with early deliberations over the inclusion of dried potato as an admixture.[54] A further twelve pages is dedicated to the various *ersatz* foods which appeared during the war, but Skalweit seems content with just a brief sketch of the two *ersatz* boom cycles (the first in luxury *Liebesgaben*, or love gifts, for the troops in 1914-1915, and the second following the Turnip Winter of 1916-1917) and a few of the measures taken by the government to address these products, namely the implementation of new *ersatz* regulations in early 1918. A few illustrative examples are provided—focused mostly on coffee—but little else is included of importance other than a total provided for the number of approved substitutes which appeared by July 1919: more than 11,000 in all.[55] Ultimately, while Skalweit is very interested in documenting how the food crisis was perceived and reacted to by actors in the government, he is mostly uninterested in the food itself. In the absence of reliable statistics analyzing the costs of the war to the nutritional health of German citizens, Grebler and Winkler rely on the expertise of Max Rubner, Germany's preeminent authority on nutrition, who concluded that, "nutrition in the towns […] was not sufficient to maintain the population, and that for many underconsumption in 1914 to 1918 resulted in starvation […]."[56] On the topic of whether starvation occurred, Grebler and Winkler themselves remain silent, preferring instead to present figures demonstrative of food levels and leaving readers to decide for themselves.[57]

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[54] Skalweit, *Kriegsernährungswirtschaft*, 26-36.
[55] Ibid, 50-61.
[56] Grebler and Winkler, *The Cost of the War*, 80.
[57] Ibid, 79-83.

After the Carnegie series, new economic histories of Germany during the First World War largely ignored the topic of the food crisis until the late 1980s and Avner Offer's landmark text, *The First World War, An Agrarian Interpretation*. Part blockade history, part economic history, and part history of food policy, Offer's book is at times difficult to categorize. At its core, it argues that victory for Germany was never a possibility. The vulnerability of Germany's agricultural economy to a long war, coupled with the vast and interconnected Atlantic economic system of the Allies, meant that the failure of the 1914 offensives spelled inevitable doom for the German cause. Although the topic of *ersatz* food is again sidestepped entirely, Offer improves over previous accounts of the food crisis by employing nutritional science to analyze the German diet and determine its sufficiency. Utilizing a previously unexamined nutritional study of families in Leipzig from 1917-1918, Offer challenges the claims made by Max Rubner and others that Germans starved to death during the war. Contrary to those previous claims, Offer contends that famine conditions were never reached in Germany and food levels were on average sufficient to sustain the war effort.[58]

This position has not gone uncriticized by more recent scholarship. Mary Elisabeth Cox's masterful study, *Hunger in War and Peace: Women and Children in Germany, 1914-1924*, brings quantitative methods to bear on the anthropometric data used by Offer's analysis, alongside a number of other sources which had previously gone unexamined.[59] In her work, Cox reveals that the statistical sample of the Leipzig study suffered from a number of flaws, and that the averages generated from those figures concealed inequalities and suffering, both from household to household and even within the same family.[60] "Simply put," she writes, "if a rising caloric tide tends to

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[58] Grebler and Winkler, *The Cost of the War*, 53.
[59] Cox, *Hunger in War and Peace*.
[60] Ibid, 130.

float all boats by masking nutritional inequalities, then in bad times, as the tide goes out, the inherent inequities of the system are starkly revealed" through rising mortality rates among the most vulnerable members of society: women, children, and the sick and elderly.[61] The part of Offer's thesis concerning the inevitability of Germany's defeat has received additional support in recent times, however. Broadberry and Harrison's edited volume, *The Economics of WWI*, paints a stark portrait of the massive material imbalance which existed between the Allies and the Central Powers, and serves as an excellent entry point to the field of economic histories of the Great War.[62]

By far the most prolific field which deals with the German food crisis, the home front histories form a body of literature which has its roots in the social histories that categorized the 1960s and 70s—shifting from the political, elite histories of the earlier generation to examine how the war affected society on the home front.[63] Jürgen Kocka's 1973 study on class conflict in Germany during the war, *Facing Total War: German Society 1914-1918*, found that the impoverishment experienced on the home front led to a flattening of the class pyramid, with a deterioration of status among lower-middle class civil employees and members of the *Mittelstand*.[64] The food crisis seems to largely occur in the background of Kocka's study, though his assertion that the poorest segments of society were most affected by the shortages rings true and is supported by the findings of Cox's nutritional study.

Moving into the 1980s and 90s, scholars began to move from histories of the home front that were primarily social and economic in nature, to studies that were social

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[61] Cox, *Hunger in War and Peace*, 130.
[62] Stephen Broadberry and Mark Harrison, *The Economics of World War I* (New York: Cambridge University Press, 2005).
[63] Winter and Prost, *Great War in History*, 157. Winter refers to this as the "audit of war," quoting Corelli Barnett in *The Swordbearers. Supreme Command in the First World War* (New York: Signet Books, 1963).
[64] Jürgen Kocka, *Facing Total War: German Society 1914-1918* (Learnington Spa: Berg, 1984).

and cultural. This project is ongoing to this day and attempts to take stock of the beliefs and experiences of those on the home front, examining both the material culture and conditions of survival, and the war cultures generated by the conflict.[65] Multiple studies concerning the impact of the war on gender and familial relations were introduced to the field. Richard Wall and Jay Winter's edited volume, *The Upheaval of War: Family, Work and Welfare in Europe, 1914-1918*, stands as a monumental contribution and helped to pave the way for subsequent comparative studies of the home front.[66] Armin Triebel's chapter on class consumption patterns within Germany takes a quantitative approach to analyzing the household budgets of a number of families across the class spectrum—concluding that the average total expenditure in 1918 of all classes was below the expected amount necessary to purchase basic commodities, and thereby revealing a shared level of deprivation which was the "material reality of the war."[67]

Ute Daniel's chapter in the same volume on the role of women in industry and the family, meanwhile, reveals that contrary to previous assumption, the war did not "usher in an excessive growth in female employment," though it did shift the focus of women's work.[68] Broadly speaking, women did not rush into employment during the war, but those who were already employed switched from other industries to war industries, while those in non-industrial positions, such as domestic work, moved into industrial jobs. Part of the explanation for this, as Daniel finds, is that the amount of labor it took to care for a family rose considerably during the war as a result of the food crisis. In addition, the growing inability to purchase consumer goods (including food) as the war progressed meant that higher wages could not be utilized to improve one's

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[65] Winter and Prost, *Great War in History*, 159-72.
[66] Richard Wall and Jay Winter, *The Upheaval of War: Family, Work and Welfare in Europe, 1914-1918* (Cambridge: Cambridge University Press, 1988).
[67] Armin Triebel, "Variations in patterns of consumption in Germany in the period of the First World War," in *The Upheaval of War*, ed. Wall and Winter, 189.
[68] Ute Daniel, "Women's work in industry and family: Germany, 1914-1918," in *The Upheaval of War*, ed. Wall and Winter, 286.

position. In her monograph, which was published the following year, Daniel characterized the household economy of many German families during the war as one of "quasi-subsistence," in which increasingly greater expenditures of time and effort needed to be invested in order to secure the survival of the household.[69]

Daniel's treatment of the role of women on the home front was further supplemented by the arrival of Belinda Davis's work on the influence of women on Berlin's wartime food policies, *Home Fires Burning: Food, Politics, and Everyday Life in World War I Berlin*.[70] Davis seeks to explain the collapse of the German government in 1918 by highlighting the loss of legitimacy brought about by its mishandling of the food crisis. In this process, Davis emphasizes the role played by the "women of lesser means"—soldiers' wives, mothers, and working-class women gathering in ration lines to dance the *polonaise*—who used the question of the equity of food distribution to wrest new understandings of the state's responsibility to its citizens. When the government failed to fill the new role assigned to it, a general loss of authority followed. When coupled with the collapse of the consumer goods market in favor of black-market activities towards the end of the war, this process led to the disintegration of German society.[71]

Davis's book is especially important to the history of the food crisis because she takes the time to examine why certain government food policies failed to take hold. Broadly speaking, Davis found that the food crisis was exacerbated by the desire of the people not to eat wherever and whatever possible, but rather, to eat in a way which reinforced their idea of equity and which bolstered their identity as Germans. Mass feeding projects such as the public war kitchens were avoided for their association with

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[69] Ute Daniel, *The War from Within: German Working Class Women in the First World War* (Oxford: Berg, 1997), 290.
[70] Davis, *Home Fires Burning*.
[71] Winter and Prost, *Great War in History*, 158.

poor relief, whereas *ersatz* foods were despised because they undermined traditional eating habits. In this sense, the symbolic value of the food consumed was often a much greater consideration than either the price it carried or the nutrients it contained. Davis's inclusion of *ersatz* food in her analysis is largely limited to the popular reception of war bread, which faced widespread suspicion from a population accustomed to light, white bread, despite the efforts of the government to promote war bread's "german-ness".[72]

Departing from the predominantly urban focus of other histories in the field, the works of Robert Moeller (1986) and Benjamin Ziemann (1997) are among the few works which take up the examination of how the war was experienced in the countryside. Moeller's addition to the literature, *German Peasants and Agrarian Politics, 1914-1924: The Rhineland and Westphalia*, scrutinizes the politics of Westphalia's agrarian society in order to grapple with the question of why rural peasants seemed so eager to do away with the Weimar Republic and embraced National Socialism.[73] While his conclusions on this question reside beyond the scope of our inquiry, Moeller's study of the relationship between rural producers and urban centers in the Rhineland during the war provides invaluable insight into the history of the food crisis. Although they were privileged with higher levels of nutrition thanks to their status as "self-feeders", Moeller finds that rural producers were nevertheless resentful towards the government's implementation of a controlled economy which privileged the ungrateful consumers in the city, who, despite the backbreaking labor required to provide food for them, looked down on the peasants of the countryside as stupid, or otherwise inferior.[74]

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[72] Davis, *Home Fires Burning*, 28-30.
[73] Robert Moeller, *German Peasants and Agrarian Politics, 1914-1924: The Rhineland and Westphalia* (Chapel Hill; London: University of North Carolina Press, 1986).
[74] See Benjamin Ziemann, *War Experiences in Rural Germany, 1914-1923*, trans. Alex Skinner (Oxford; New York: Berg, 2007), 181-3, for further examples of this attitude towards "stupid peasants."

This was made worse by the government's constant interventions into the economic decisions of producers, dictating how to run their farms, what to plant, and when they could harvest—all while subjecting them to searches and fines for failure to comply. These factors combined to foster antagonism between producers and urban centers, which was not quick to disappear. Ziemann's work, *War Experiences in Rural Germany, 1914-1923*, covers much of the same terrain, though with an emphasis on the experiences of peasants in Bavaria, and particularly those of a Catholic background.[75] The command economy was deeply unpopular with Ziemann's subjects, who saw themselves as disadvantaged—forced to work twice as hard with less farm labor to produce food for the cities, all the while receiving continually less and less money and food for themselves. Neither Moeller nor Ziemann's works contain any substantial treatment of *ersatz* food, but they are each important for illustrating the urban-rural divide which was an important factor in the failure of the controlled economy.

In terms of general histories of the German home front, Holger Herwig's *The First World War: Germany and Austria-Hungary, 1914-1918*, published in 1997, and Alexander Watson's *Ring of Steel: Germany and Austria-Hungary in World War I*, which came out in 2014, each serve as standard reading on the subject. While these works cover the general history of the German experience during the First World War, they are notable for including expansive sections on the experience of the food crisis—including a greater emphasis on *ersatz* food than most previous works. Herwig's account of the subject is extensive and rather factual, though this is understandable as few historians before him have presented an overview of the food crisis in the English literature. Herwig covers the role of the Allied blockade in sparking the food crisis, the implementation of price controls and rationing, the experiences of the Turnip Winter of

[75] Ziemann, *War Experiences*, 181-3.

1916/17, public food kitchens, and the public's engagement in black-market activities, such as hoarding and "hamstering" (purchasing food directly from producers in the countryside). While Herwig argues that the Allied blockade effort was "illegal" and was the root cause of the food crisis, he also spends a significant part of his analysis in criticizing the bumbling efforts of the German bureaucracy, which proved utterly incapable of managing the controlled food economy.[76]

Herwig's characterization of the German government's food policies as failures is one which is eminently supported by Watson's contribution to the subject. Differentiating himself from Herwig's treatment of Germany and Austria-Hungary in parallel, Watson envisions the two as an entwined partnership that should be addressed as a whole. Watson again covers the broad history of the food crisis, from its roots in the naval blockade to the efforts of the German and Austro-Hungarian governments to manage the quickly shrinking food supply. In reference to the latter, Watson spares no criticism in labelling the food policies of the two governments as unqualified failures. "Uncoordinated local controls, a focus on ensuring that food was affordable for consumers rather than incentivizing production, and a total failure to understand the complex system of agriculture had damaged output and created new shortages."[77] While this excerpt referred to only the first eighteen months of the war, the failure of the government to ensure adequate food supplies only deteriorated as the war progressed. Indeed, as Watson argues, the social solidarity on which the war effort was based had splintered by the end of 1916, largely thanks to the competition over scarce food resources.

The role of *ersatz* food in the food crisis is covered similarly by both Herwig and Watson: once shortages of raw materials and foodstuffs began to be felt in the fall of

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[76] Herwig, *The First World War*, 285-8.
[77] Watson, *Ring of Steel*, 348-9.

1914, government, industrial, and private efforts turned to the development of *ersatz* goods that could fill the gap. Both authors make note of a much wider array of *ersatz* foods than the standard war bread and turnips of previous histories, including mentions of *ersatz* coffee, sausages, soup stock, chocolate, and cooking oil, among other things.[78] Furthermore, both Herwig and Watson have included a rough estimate of the number of *ersatz* products patented during the war, citing a 1937 work by Marie Elisabeth Lüders, *Das unbekannte Heer; Frauen kämpfen für Deutschland, 1914-1918*.[79] Unfortunately, while we know that these sources took the form of official patents, further efforts by this author to locate this potentially rich source on *ersatz* products have so far been met with disappointment.[80] In terms of the nutritional quality of these food products, Herwig contents himself with a passing mention to Princess Blücher's "Ersatz illness," whereas Watson places much heavier emphasis on the possible negative effects of their consumption.[81]

For additional general histories of the German home front and the experience of the war, readers will be well-served by the following works: *Lebenswelten im Ausnahmezustand: die Deutschen, der Alltag und der Krieg, 1914-1918*, a collection of essays edited by Flemming, Saul, and Witt; as well as Thomas Flemming's *Heimatfront: zwischen Kriegsbegeisterung und Hungersnot, wie die Deutschen den Ersten Weltkrieg erlebten*.[82] Furthermore, for comparative studies of the German war food economy

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[78] Herwig, *The First World War*, 288; Watson, *Ring of Steel*, 334.
[79] Marie Elisabeth Lüders, *Das unbekannte Heer; Frauen kämpfen für Deutschland, 1914-1918* (Berlin: E.S. Mittler & Sohn, 1937), 75-6.
[80] Searches on the patent database of the German patent office did not turn up positive matches, and emails with the office likewise failed to locate the patents in question. It is possible these documents no longer exist, that they are known under a different name, or are held in the files of another organization.
[81] Herwig, *The First World War*, 289. Blücher's *ersatz* illness was in reference to substitute food and tea she was consuming at the Esplanade Hotel in Berlin, claiming that all the chemicals in the food were making her sick. See Evelyn Blücher, *An English Wife in Berlin: A Private Memoir of Events, Politics, and Daily Life in Germany Throughout the War and the Social Revolution of 1918* (New York, NY: E.P. Dutton and Company, 1920), 122; See also Watson, *Ring of Steel*, 334.
[82] Jens Flemming, Klaus Saul, and Peter-Christian Witt, *Lebenswelten im Ausnahmezustand: die Deutschen, der Alltag und der Krieg, 1914-1918* (Frankfurt am Main: PLang, 2011); Jens Flemming,

between the First and Second World Wars, readers may turn to either Arnulf Huegel's *Kriegsernährungswirtschaft Deutschlands während des Ersten und Zweiten Weltkrieges im Vergleich*, or Alice Weinreb's recent work, *Modern Hungers: Food and Power in Twentieth-Century Germany*. However, it should be cautioned that the section detailing the First World War in Weinreb's work is perhaps the weakest section in her analysis; it primarily focuses on the Second World War and the postwar period.[83] For more recent general histories of the First World War, which include substantial sections on the German food crisis, please see Holger Afflerbach's *Auf Messers Schneide: wie das Deutsche Reich den Ersten Weltkrieg verlor* and Jörn Leonhard's *Pandora's Box: A History of the First World War*—though their treatment of *ersatz* food is fundamentally similar to their predecessors in the field.[84]

Finally, the field of home front histories has benefitted from the addition of numerous regional and local histories which examine the experiences of the war on different cities and regions in Germany. Belinda Davis and Thierry Bonzon's contribution to Jay Winter and Jean-Louis Roberts' edited volume, *Capital Cities at War: Paris, London, Berlin, 1914-1919*, for instance, offers a comparative study of the provisioning of Paris, London, and Berlin.[85] Brief treatment is given to the seeking of food substitutes in all the capitals, with the argument made that substitutes (though less pervasive) were more readily embraced by consumers in London and Paris than in

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Heimatfront: zwischen Kriegsbegeisterung und Hungersnot, wie die Deutschen den Ersten Weltkrieg erlebten (München: Bucher, 2014).

[83] Arnulf Huegel, *Kriegsernährungswirtschaft Deutschlands während des Ersten und Zweiten Weltkrieges im Vergleich* (Konstanz: Hartung-Gorre, 2003); Alice Weinreb, *Modern Hungers: Food and Power in Twentieth-Century Germany* (New York: Oxford University Press, 2017).

[84] Afflerbach, *On a Knife Edge*; and Jörn Leonhard, *Pandora's Box: A History of the First World War* (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 2018).

[85] J. M. Winter and Jean-Louis Robert, eds., *Capital Cities at War: Paris, London, Berlin, 1914-1919*, 1st pbk. ed. (Cambridge: Cambridge University Press, 1999).

Berlin.[86] The German literature provides treatment of other major cities, including Volker Ullrich's 1982 history, *Kriegsalltag: Hamburg im ersten Weltkrieg*, which covers the wartime experiences of the northern port city.[87] Martin Rackwitz provides a similar history for the city of Kiel, while Dominik Geppert contributes the corresponding account of Bonn during the war.[88] All of the preceding sources discuss the effect of the food supply on these cities, but again serious treatment of the role of substitutes is lacking.

The project embodied by this group of literature is amply demonstrated by Roger Chickering in his big book on Freiburg, *The Great War and Urban Life in Germany: Freiburg, 1914-1918*.[89] Chickering's study of the university town of Freiburg, near the Western Front, is identified as a test case for his proposition that "total war requires total history."[90] Distilling the experience of the war (including the food crisis) from the general experience down to the specific setting of Freiburg, Chickering succeeds in presenting the totality of the war's influence on everyday life. Covering a wide range of topics suitable for a history professing to be a "total history", Chickering gives extensive treatment to the food crisis and the experience of *ersatz* food in Freiburg. Refreshingly, Chickering has taken the time to discuss the origins of many of these foodstuffs, drawing attention to education programs such as those run by the Working Committee for Popular Nutrition in Wartime (*Arbeitsausschuss für Volksernährung in der Kriegszeit*), which sponsored public lectures and offered courses

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[86] Belinda Davis and Thierry Bonzon, 'Feeding the Cities', in *Capital Cities at War: Paris, London, Berlin, 1914-1919*, ed. J. M. Winter and Jean-Louis Robert, 1st pbk. ed. (Cambridge: Cambridge University Press, 1999), 323-4.
[87] Volker Ullrich, *Kriegsalltag: Hamburg im ersten Weltkrieg* (Köln: Prometh, 1982).
[88] Martin Rackwitz, *Kriegszeiten in Kiel: Alltag und Politik an der Heimatfront 1914-1918* (Kiel: Ludwig, 2013); Dominik Geppert, *Der Erste Weltkrieg in Bonn. die Heimatfront 1914-1918* (Bonn: Stadt Bonn, Stadtarchiv und Stadthistorische Bibliothek, 2016).
[89] Roger Chickering, *The Great War and Urban Life in Germany: Freiburg, 1914-1918* (Cambridge: Cambridge University Press, 2007).
[90] Ziemann, "Reviewed Work(s): The Great War and Urban Life in Germany: Freiburg, 1914-1918 by Roger Chickering," *The American Historical Review* 113, no. 3 (2008): 931-2.

at schools in the city to teach housewives how to cover their shortages through *ersatz* recipes.[91] A similar effort undertaken by the Baden Women's Association (*badisches Frauenverein*) resulted in the Badenese War Cookbook (*badisches Kriegskochbüchlein*), which promised to provide "many kinds of noteworthy hints for housewives."[92] Chickering then goes on to describe how the recipe for war bread evolved over the course of the war, and the difficulties which bakeries had with baking the new loaves. Likewise, Chickering describes the experience of *Kriegsmus* (war purée, also known as war jam or war marmalade) which smelled of "boot polish", the inspiration for which—one customer remarked—must have come from a professor or well-to-do woman who created recipes that they would never eat themselves, hinting at an antagonism which may have existed between the producers of *ersatz* food and its consumers.[93]

There are limitations in Chickering's approach to the subject, however. While he provides a surprising amount of detail on how consumers reacted to eating *ersatz* food, including anecdotes and quotes on how different foodstuffs tasted and smelled, he does not offer much in the way of analysis. Reactions to *ersatz* food are provided in abundance, usually negative, but he does not attempt to answer why consumers were repulsed by the foods, nor does he examine if those foods were nutritious and beneficial to the consumer, or if they lacked any compensating advantages. In approaching a deeper understanding of *ersatz* food during the war, Chickering's work remains short of the mark, though he does provide a stellar example of how deeply one can plumb local archives.

Of much greater relevance to the question of the food crisis on the German home front, Anne Roerkohl's monograph on the subject, *Hungerblockade und Heimatfront:*

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[91] Chickering, *Freiburg*, 264.
[92] Ibid, 264.
[93] Ibid, 267.

die kommunale Lebensmittelversorgung in Westfalen während des Ersten Weltkrieges, is perhaps the most important work to come out of this group of regional and local histories. Centered on the German state of Westphalia, Roerkohl's study is the closest we have yet received to a general history of the German food crisis. The structure of her study covers all the essential topics: the influence of the blockade on food production, the implementation of price controls and the rationing system, state nutritional propaganda, mass feeding program, among others, as well as providing entire sections on *ersatz* development efforts, collection campaigns, and efforts to expand the bread supply.[94] The central thrust of Roerkohl's argument is aimed at the cause of the food crisis, which she finds to be not the Allied blockade but the failure of the German government. Had the authorities succeeded in creating a functioning war economy, subsistence levels could have been maintained for the population, regardless of the duration of the blockade.[95]

In her section on *ersatz* products, Roerkohl identifies the production of *ersatz* food as fulfilling one of the two slogans of the war economy: *Streckung und Ersatz* (stretching and substitution).[96] While the official efforts to expand the food supply were well-intentioned, Roerkohl finds them to be of little benefit to the nutritional status of the consumer. Making matters worse, official efforts were overtaken by unofficial efforts to cash in on the extreme demand for food products as the crisis deepened. Many fraudulent *ersatz* products were sold on the market whose price was far out of line with both the amount of food sold and its nutritional content. Roerkohl also turns her attention to the advertising methods used to market these goods, noting the patriotic appeals which were often made in the names and slogans of these largely worthless

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[94] Roerkohl, *Hungerblockade*, 51-7, 94-104, and 216-30.
[95] Ibid, 317.
[96] Ibid, 216.

products.[97] In response to this widespread fraud in *ersatz* food, Roerkohl gives excellent treatment to the development of regulatory regimes aimed at curbing the worst excesses—though as with most policies adopted by the German government, it was met with only limited success.[98]

In all, Roerkohl's study is a major contribution to the history of the food crisis, and of *ersatz* food's role within it. However, it is not without its faults. Its limited geographic scope prevents us from generalizing too much, as the situation in the densely populated Rhineland was often different from that in the more sparsely populated east, for instance, or the cities along the coasts, which were very reliant on outside trade and fishing. Moreover, her chapter on *ersatz* food focuses primarily on the unofficial process which exploded in scale after the winter of 1916—far less attention is given to official *ersatz* initiatives, how they were run, and what impact they had on the food supply. Furthermore, Roerkohl acknowledges contemporary understandings of the nutritional content of various *ersatz* products, but she does not compare these to our present understanding of nutritional science. That said, *Hungerblockade und Heimatfront* is the most complete history of the German food crisis to be published thus far, making it an invaluable source for this thesis.

Lastly, the field of food history would seem to be the field most suited for tackling the German food crisis, but thus far it has produced the smallest body of literature on the subject—though this trend seems to be turning around. By far the youngest of the bodies of literature discussed so far, the first identified entry to the field was an edited volume by John Burnett and Derek Oddy entitled *The Origins and Development of Food Policies in Europe*, which was published in 1993.[99] Although

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[97] Roerkohl, *Hungerblockade*, 216-7.
[98] Ibid, 227.
[99] John Burnett and Derek Oddy, *The Origins and Development of Food Policies in Europe* (London: Leceister University Press, 1993).

lacking a chapter on Germany's food supply during the war, Hans Teuteberg's chapter on food adulteration and food legislation in late nineteenth-century Germany has proven invaluable in placing the phenomenon of *ersatz* food development (arguably a form of adulteration in many of its examples) within a broader context of anxieties over food quality. Teuteberg describes a decades-long effort by German authorities to eliminate adulterated goods from the market, such as watered-down milk and sausages stretched with sawdust.[100] This is important for the history of the food crisis, as these same tactics would be utilized anew during the war, but now with tacit government approval. Even more important is the possible linking of wartime efforts to regulate *ersatz* goods with similar regulatory efforts aimed at adulterated goods—providing a measure of continuity between the food crisis and government efforts prior to the war.

Next to appear was another edited volume, *Food and Conflict in Europe in the Age of the Two World Wars*, edited by Frank Trentmann and Flemming Just.[101] Published in 2006, the contributors to the volume envisioned food in the First World War as "the site of a dynamic rearrangement between states and new demanding groups in society."[102] This was found in the protracted battles over entitlements in Germany, among others, with interest groups such as soldiers' wives, new mothers, and workers in war industries all engaging with the government over what could be considered an "equitable" distribution of available food supplies.[103] While this volume lacks an appropriate entry on the German food crisis as well, the chapter by Uwe Spiekermann on the politics of German whole grain bread in the interwar period is insightful. Whereas increases to the milling percentage of bread led to consternation among

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[100] Hans Teuteberg, "Food adulteration and the beginnings of uniform food legislation in late nineteenth-century Germany," in *The Origins and Development of Food Policies in Europe,* ed. Burnett and Oddy, 147-9.
[101] Frank Trentmann and Flemming Just, *Food and Conflict in Europe in the Age of the Two World Wars* (Basingstoke: Palgrave Macmillan, 2006).
[102] Ibid, 3.
[103] See Davis, *Home Fires Burning*.

consumers and nutritionists during the war, Spiekermann's work points to possible connections between the experience of war bread and the German diet in the interwar period.[104]

More recently, a notable crop of edited volumes has been published that furthers the examination of Germany's relationship with food during the war—a promising development that suggests growing interest in the field. The first is *Food and War in Twentieth Century Europe*, an edited volume from Zweiniger-Bargielowska et al. (2011) that contains another chapter by Hans Teuteberg concerning efforts by the Germans to develop *ersatz* food to fight the hunger they were experiencing.[105] The next is a collection of essays edited by Paul Collinson and Helen Macbeth titled Food in *Zones of Conflict: Cross-Disciplinary Perspectives* (2017).[106] One of the chapters in this volume, written by Tania Rusca, details the memory of food problems portrayed in propaganda posters after the war and may be useful for tracing the legacies of *ersatz* products through the interwar period. Finally, the recently released volume by Heather Benbow and Heather Perry, *Food, Culture and Identity in Germany's Century of War* (2020), is perhaps the most relevant work written to date on the cultural history of food during the First World War.[107] With chapters covering the subjects of gender, food, and health; the experiences of soldiers during the food crisis; and the use of public kitchen systems in Berlin, this volume is likely to become standard reading within this body of literature.

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[104] Uwe Spiekermann. "Brown Bread for Victory: German and British Wholemeal Politics in the Inter-War Period," in *Food and Conflict in Europe in the Age of the Two World Wars*, ed. Trentmann and Just.
[105] Ina Zweiniger-Bargielowska, Rachel Duffett, and Alain Drouard, *Food and War in Twentieth Century Europe* (Farnham; Burlington, VT: Ashgate, 2011).
[106] Paul Collinson and Helen Macbeth, *Food in Zones of Conflict: Cross-Disciplinary Perspectives* (New York: Berghahn Books, 2017).
[107] Heather Benbow and Heather Perry, *Food, Culture and Identity in Germany's Century of War* (Cham: Palgrave Macmillan, 2020).

In addition, Mary Elisabeth Cox's intervention into the history of nutrition during the war and the immediate postwar years also stands as standard reading within the field, as we have previously seen. Moving from the specific to the general, a number of works addressing the topic of food in history may prove useful to the interested reader looking to understand the relationship between food, taste, and culture. The relevant essays in the *Cambridge World History of Food* serve as an excellent starting point for such an endeavor.[108] Likewise recommended are the volumes, *Food: The History of Taste* edited by Paul Freedman (2007), and *The Taste Culture Reader: Experiencing Food and Drink*, edited by Carolyn Korsmeyer (2005).[109] Each of these collections provides essays on a wide array of topics, with Freedman's volume offering a more-or-less chronological overview of the development of food practices throughout human history, whereas Korsmeyer's collection includes forays into philosophy, the subject of food in literature, and the relationship between both food and religion, and food and cultural identity. For a more general history of food in Germany, with relevant chapters on the two world wars, readers would be well-served by Ursula Heinzelmann's *Beyond Bratwurst: A History of Food in Germany*.[110] Finally, Uwe Spiekermann's recent book, *Künstliche Kost. Ernährung in Deutschland, 1840 bis heute.*, a mammoth study of the history of food development in Germany, contains a substantial section on the First World War, with examinations of the role of food scientists, government rationing policies, popular nutrition, and substitution.[111] His treatment of *ersatz* products remains relatively brief and general, however, with the overarching mission of the book

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[108] Kenneth Kiple and Kriemhild Ornelas, *Cambridge World History of Food* (Cambridge; New York: Cambridge University Press, 2012).
[109] Paul Freedman, *Food: The History of Taste* (Berkeley: University of California Press, 2007); Carolyn Korsmeyer, *The Taste Culture Reader: Experiencing Food and Drink* (Oxford; New York: Berg, 2005).
[110] Ursula Heinzelmann, *Beyond Bratwurst: A History of Food in Germany*, Foods and Nations (London: Reaktion Books, 2014).
[111] Spiekermann, *Künstliche Kost*.

being concerned with the development of the German food industry throughout its modern history.

As can be seen from this review of the field, food history has perhaps the most to say about the German food crisis and yet it has said the least. Nearly every work within this body of literature has been an edited volume, with only one (Cox, 2019) completed as a monograph. This is due in part to the relatively recent entry of food historians into the historiography of the First World War. However, the recent surge in activity within the field bodes well for the future, with Cox's well-received entry standing as a shining example for how histories of the food crisis can and should be done. What is now required is a full-length study dedicated to that central character of the food crisis, which has been missing in the historiography up to now: the food itself.

Writing a literature review on the German food crisis in the First World War is a challenging task. An enormous amount has been written on the subject, but the literature is fragmented, pulled in different directions by opposing research agendas. Any scholar of the subject must piece together information from a number of fields, and even then, the finished work is full of gaps—places where the borders of fields do not quite match up. Here is what we know: we have an excellent understanding of the state of the food supply before the war, and how the blockade of imports of food, fertilizer, and fodder affected domestic food supply during the war. We possess robust accounts of the price control systems, purchasing companies, rationing systems, and mass feeding programs implemented by the German government—and their failures. We have been provided with a detailed account of the food crisis's effect on standards of living and public health, which undoubtedly deteriorated as the war progressed. Social histories have contributed their analysis of the ways in which the food crisis impacted German society, class conflicts, and the role of women on the home front.

Through Roerkohl, we receive an excellent account of the boom in fraudulent *ersatz* products and the subsequent attempts to regulate their abuses. Meanwhile, multiple sources have presented their accounts of the turn away from the official controlled economy. These have convincingly documented the increasing black-market activities of the German people as their faith in the government's effectiveness waned and society disintegrated into selfishness and criminality in the face of hunger. Making a late entrance to the field, food histories have begun to contribute their own perspective on the crisis, though this has proceeded on a piecemeal basis. What then remains to be done?

For one, a general history on the subject is essential, synthesizing the important contributions of these disparate specialisms into a work which is easily accessible, and which lays out the roadmap for subsequent research. To make such a work possible, however, we must first get to work filling in the significant gaps which exist in the story—one of which my thesis aims to address: the role of *ersatz* food in the food crisis. Roerkohl's work remains the closest thus far, but its geographic scope is too narrow, and would benefit from novel approaches to the subject, such as those utilized by Cox in her nutritional study of the war. The application of cultural history approaches might also be beneficial to this topic, particularly as it pertains to the acceptance (or rejection) of wartime food. Nearly every account of *ersatz* food in the literature is negative: commenting on the vile, disgusting, or indigestible nature of the food in question. No history on the subject has interrogated these accounts of *ersatz* food to understand why Germans were so averse to them. Is it simply because they *were* disgusting and vile? This is possible. However, deeper examinations would reveal a more complicated picture—it may be that Germans were tired of the monotony of their diet as options diminished, or that at a time of heightened patriotism in wartime, perhaps they were

reluctant to embrace foods which differed from a diet that reinforced their 'German-ness'.

Furthermore, the nutritional understanding of *ersatz* food is noticeably lacking in current accounts. Much of the literature relies on contemporary attributions that *ersatz* food was of inferior nutritional quality—often reproducing these views uncritically as a given which need not be examined. Nutritional science has advanced a great deal since the First World War, and our tastes have progressed as well. Reluctance to embrace whole grain bread during the war because of the bran's indigestibility is an attitude that seems preposterous from a modern viewpoint, and yet historians have not undertaken a reevaluation of the nutritional quality of these foodstuffs which we encounter in the sources. Even if they were inferior nutritionally, were they better than nothing? Did they have a net-positive or a net-negative effect on the nutritional state of the German people during the war? These questions remain to be answered.

While the proposed work is undoubtedly not a simple undertaking, its need is pressing. It could change the way in which historians of the crisis approach their sources and encourage greater understanding of the beliefs, preferences, and aversions which underpinned the war food economy as a whole. Food is an emotional subject for human beings. We encounter it daily, we express our identity through its consumption, and incorporate it into cultural and religious rituals. Deprived of it, we are also deprived of our health, and eventually our life. What is proposed is for historians to directly place the question of food (whether substitutes, or otherwise) at the center of our history of the German food crisis.

Methods, Sources, and Terminology

This thesis takes the form of an empirical study, engaging with underutilized archival and published primary sources (like the Max Müller reports) to provide a new perspective on the role of *ersatz* food products in Germany during the war. The periodization of this thesis covers the duration of the food crisis, beginning with the outbreak of war in 1914 and ending with the resumption of trade and the introduction of relief efforts in early 1919. Brief forays are also made into the periods directly preceding and following the chosen dates as necessary, to cover the course of government food regulation prior to the war (c. 1870-1913), as well as the lasting effects of the food crisis into the interwar period (1924 is commonly marked as the return to pre-war consumption patterns).[112] Geographically, the scope of the thesis encompasses multiple regions of Germany to reflect the high levels of variation between regional diets, as well as between rural and urban communities. Sources from Berlin form the bulk of the material, simply because that is where most of the material is, but efforts were also made to draw in a variety of regional sources as well. Archival material from Hamburg was included due to its position as a major trading city along the coast, with access to more seafood and trade than the interior of Germany. The Munich archives have also been included to get a sense of the different experience with *ersatz* food in Bavaria, due to its ability to maintain a more stable food supply than Prussia or the industrial centers along the Rhine. Leipzig and Dresden have been included to bring in the experiences of the Kingdom of Saxony, which have thus far not received serious attention outside of the anthropometric data which was analyzed by Offer and Cox. The inclusion of Leipzig was also helpful from a research perspective,

[112] Joe Lee, 'Administrators and Agriculture: Aspects of German Agricultural Policy in the First World War', in *War and Economic Development: Essays in Memory of David Joslin*, ed. J. M. Winter (Cambridge: Cambridge University Press, 1975), 233.

as the branch of the *Deutsche Nationalbibliothek* there contains many important published primary sources not found elsewhere in the same concentration. Finally, archival material was collected from Nordrhein-Westfalen to include the perspective of the Ruhr industrial region, which not only represented the greatest concentration of Germany heavy industry, but also served as an important hub for supplying the Western Front.

In terms of sources, this thesis draws upon a wide variety, both published and archival. The bulk of the archival research was conducted using the files of the *Kriegsernährungsamt* (War Food Office, abbreviated KEA) and the *Reichsgesundheitsamt* (Imperial Health Office, abbreviated RGA), which are held at the *Bundesarchiv* in Berlin-Lichterfelde. The files from the KEA include documents concerning the membership and work of the KEA's expert advisory board, as well as efforts to counter the distribution and sale of *ersatz* recipes in periodicals. The relevant files of the RGA provided background information on efforts to combat fraudulent substitutes in the pre-war period, and an enormous level of coverage concerning the introduction of war bread and the chemical and nutritional analysis of *ersatz* food products throughout the war. Supplementary archival research was then conducted in state and city archives of the previously listed regions, with material gathered from the *Staatsarchiv Hamburg* in Hamburg*, bayerisches Hauptstaatsarchiv Abt. IV Kriegsarchiv* in Munich, *Sächsische Staatsarchiv - Hauptstaatsarchiv Dresden* and *Stadtarchiv Leipzig* in Dresden and Leipzig respectively, and *Stadtarchiv Duisburg* in Nordrhein-Westfalen. Documents gathered from these archival trips include regional efforts to organize the food supply, complaints regarding the purchase of spoiled products, efforts to supply POW camps with food in Bavaria, and in the case of Hamburg, detailed files on the passing of *ersatz* regulations and the establishment of testing and approval offices. A wealth of published primary materials, including war cookbooks, pamphlets,

lecture series, and reports were also accessed through the *Deutsche Nationalbibliothek* in Leipzig, which has proven an invaluable resource for this work.

Extensive use was also made of the British Foreign Office reports which were published as part of the series, *British Documents on Foreign Affairs*, the use of which must be explained here. Written primarily by W. G. Max Müller, the reports contained within Volumes 9-12 of the series represented a concerted effort by the Foreign Office to chart the economic situations of Germany and Austria-Hungary throughout the war. Submitted monthly, the reports were collated from an immense range of German sources (newspapers and periodicals, interviews with neutral travelers and POWs, published reports, lectures, government announcements, and intercepted letters, among others) to construct a kaleidoscopic image of the Central Powers' wartime economy and food supply. The great strength of these reports, from the perspective of this thesis, is that they offer a month-by-month digest of the evolution of the food crisis, charting its tides and covering all aspects of the government's response (including *ersatz* products). In addition, despite initial concerns over their suitability as a source for this thesis, the Max Müller reports have proven to be very reliable. They are written with level-headedness and caution, resisting the excitability of some of his colleagues who wished to foresee the Germans' collapse in every little setback that was reported. Rather, Max Müller takes every opportunity to counsel patience and reasonability, taking pains to debunk what he perceives to be rumor or propaganda, and only making claims which can be substantiated by multiple points of evidence—sometimes over the course of several months' worth of reports. That said, caution has still been exercised in the mobilization of these reports if they cannot be substantiated by cross-referencing with the German archives.

Regarding interdisciplinary sources—particularly those which have been used to assess the nutritional impact of *ersatz* food products—efforts have been made to include

current research from the field of nutritional science, including university textbooks on nutrition and dietetics, and research articles in relevant scientific journals. In order to help make sense of this material, interviews have also been conducted with Soeng Ha Liu, a Registered Dietitian in the National Health Service in London. Where those interviews have influenced the arguments made in this thesis, citations have been provided. Online resources for baking techniques, beer brewing terms, and nutritional data for various food items have also been included where appropriate.

A brief mention must also be made here regarding terminology. The meaning of the word '*ersatz*' is often difficult to nail down, with different authors and sources employing more or less broad applications of the term. It is telling, for instance, that August Skalweit does not talk about *ersatz* products and war bread in the same section of his volume, whereas Alexander Watson talks about the stretching of bread and the creation of *ersatz* products in the same side-by-side with seemingly no differentiation.[113] The ambiguous definition of *ersatz* extends to the primary sources as well; the German government did not provide an official definition for *ersatz* until 7 March 1918, just a few months from the end of the war. The wording stipulated by that Bundesrat Order defined '*ersatz*' as the following: "A 'food substitute' is defined as an article intended to serve instead of a particular foodstuff in respect of particular properties of that foodstuff."[114] In simpler language, a substitute is anything which both replaces another object, and is meant to serve a similar form and function to the object it is replacing. A strict interpretation of this definition might say that the following scenario is *not* considered *ersatz*:

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[113] Watson, *Ring of Steel*, 334.
[114] Max Müller, "The Internal Situation in Germany during April 1918, being the Forty-Fifth Month of the War," *BDFA*, vol. 12, 178.

> You are in the habit of spreading honey on your morning bread, but a lack of honey prompts you to use strawberry jam, instead. (The jam performs a similar function, but is not attempting to inhabit a similar form).

Whereas the following *is* considered *ersatz:*

> Instead of your usual honey, which has run out, you instead reach for a jar of artificial honey made from beet sugar syrup, additives, and coloring. (The artificial honey performs a similar function, and is attempting to inhabit a similar form).

This works for most *ersatz* items which the government was attempting to regulate in 1918, but presents a grey area when discussing certain war foods like turnips (replacing potatoes) or a hunted crow (replacing any other meat). At a glance, these might not pass the definition; the turnips and the crow are both performing a similar function in the diet (carbohydrates and protein, respectively), but they might not always be attempting to inhabit a similar form. You could substitute turnips for potatoes in your favorite soup, or you could eat them in an entirely unfamiliar way, divorced of any connection to your previous consumption of potatoes. You could dress up the crow as a partridge, or you could consume the crow without pretense to an illusion.[115] Arguably, however, it was the reality of the war economy which motivated the consumption of these products, not the simple action of consumer choice. Therefore, this thesis will apply the broadest possible definition for *ersatz* food products when discussing their role in the German food crisis—war bread, turnips, foraged food, and fraudulent products alike are all considered.

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[115] Piete Kuhr's diary includes a similar anecdote in which her grandmother cooked a crow and the children at first assumed it was a partridge. Jo Mihaly, *There We'll Meet Again: A Young German Girl's Diary of the First World War*, trans. Walter Wright (Great Britain: W. Wright, 1998), 200.

As is discussed in Chapter 2, a similar difficulty is encountered with the use of the word ‘turnip’. Primary and secondary sources alike consistently use the terms ‘turnip’, ‘cabbage-turnip’, ‘swede’, ‘rutabaga’, and ‘kohlrabi’ interchangeably when discussing the substitutes for potatoes which became increasingly common during the Turnip Winter of 1916/17. These terms collectively reference three different vegetables, and all of them were mobilized to feed hungry Germans depending at different times and in different places. Etymological issues and different naming conventions between regional dialects further compound this confusion. To sidestep this issue, this thesis will adopt the use of ‘turnips’ as a catchall term for this family of root vegetables, but will use the more specific terms where and as necessary. Regarding the use of various terms in circulation to describe flour made by milling the whole bread grain (whole meal, wholegrain, whole grain, etc.), the use of ‘whole grain’ has been adopted. Finally, American spelling and grammar conventions have been applied throughout this thesis to the greatest possible degree of consistency.

Chapter Outline

Each chapter in this thesis focuses on a specific aspect of the *ersatz* food products during the war, including their development and production, their nutritional impact, how they were perceived by consumers and how they affected consumer morale, and finally, how their consumption was influenced by (and influenced in return) government regulatory efforts. The conclusions drawn from these chapters are occasionally contradictory and highlight the complexity of competing pressures inherent within the food crisis that ultimately proved impossible for the government to reconcile. The chapters in this thesis are organized thematically, but within the chapters the

subsections are organized and proceed in chronological fashion wherever possible. The first chapter offers the widest overview of *ersatz* products during the war, while the final chapter offers the most complete chronological account of the government's response to *ersatz* food products.

Chapter 1. Ersatz development efforts within the German food system

The development of *ersatz* food products during the war was an incredibly complex process, involving the input and cooperation of multiple groups of actors within the German food system. This chapter envisions the food system—the network of producers, regulators, transportation, researchers, labor, consumers, etc. which shepherds food from field to table—as an engine searching for more fuel as the tank runs low. In this conception, *ersatz* products are not just the result of a government hoping to secure the food supply, or entrepreneurs hoping to profit from hunger, but rather are the result of a host of actions made across the food system, sometimes in cooperation, sometimes in opposition. By framing *ersatz* development this way, this chapter increases our understanding of the motivations and decision-making process behind specific *ersatz* food products, as well as providing a model for understanding how food systems act under stress.

Chapter 2. Indigestible? New perspectives on the nutritional value of ersatz food products

That *ersatz* food products were nutritionally inferior to the foods they replaced is truism which has long been repeated by historians of the food crisis. But was this actually the case? This chapter attempts to answer that question by examining two

important staple *ersatz* food products: war bread and turnips. By critically examining the complaints of contemporary experts over their inclusion in the diet, and comparing those complaints against advances in the field of nutritional science which have occurred since the First World War, this chapter argues that these two products have been underestimated by historians. A comparative nutritional analysis of war bread versus white bread, and turnips vs potatoes, highlights that these substitutes could—in theory—have been adequate replacement foods when ideal conditions were met. Through challenging how historians think about historical concepts of nutrition, this suggests that war bread (and to some extent, even turnips) was one of the great successes of German food policy, perhaps even helping to explain how Germany was able to sustain its war effort for so long.

Chapter 3. Becoming like pigs: explaining popular reactions to ersatz food

The historical record is overwhelmingly negative in its treatment of *ersatz* food products. In primary sources, they are widely reviled for any number of reasons: they taste bad, they taste of nothing at all, they made people sick, they were not nourishing enough, they did not quell one's hunger, they were not 'German' enough, they remind one of animal food, etc. Historians of the food crisis have for decades replicated these reactions in their histories, with very little in the way of questioning the social and cultural dimensions of this disgust. The aim of this chapter is to turn a critical lens to the popular reception of *ersatz* food products and ask: were they all this bad? The hypothesis put forward in this chapter suggests that there is a bias towards the entry of 'bad' experiences into the historical record, over the entry of 'neutral' or 'good' experiences. After all, one is much more likely to record in their diary a bad experience with food than one which is run-of-the-mill or mundane. This chapter thus encourages

historians to rethink their approach to these sources, and consider that exterior factors could influence perceptions of quality (inferiority or superiority), other than an inherent property, like taste.

Chapter 4. Ersatz regulation and the paradox of government intervention

The final chapter of this thesis is an examination of the intersection between *ersatz* food products and government regulation. With the introduction of the first food quality law in 1876, the imperial German government began a process which increasingly envisioned the government as a guarantor of food quality and safety. Throughout the late-nineteenth century successive efforts to combat adulteration and fraud in food products cemented the government's role as a food regulator in the eyes of the public. This trajectory was turbocharged by the war, with food shortages and the development of dubious *ersatz* food products prompting the government to respond by becoming more involved in the food supply than ever before. The paradox of the government's position, however, was that wartime necessities also made the stretching of the food supply part of government policy: war bread, turnips instead of potatoes, and *ersatz* animal food were all products of government intervention. How then to square this paradox between the government as guarantor, and the government as an *ersatz* producer? This chapter argues that these two competing impulses placed the German government in an impossible position, which tainted public perceptions of the government's management efforts and perhaps contributed to the acceleration of the collapse of the controlled economy between 1917 and 1918.

Chapter 1: *Ersatz* development efforts within the German food system

Introduction

"It was not easy to forego the pleasures of the full stomach, since in the past it had been overfilled. But, as the Germans say, 'When in need, the devil will eat flies.'"[1] Written by the American journalist George Abel Schreiner in his book, *The Iron Ration*, an account of his experiences in Central Europe during the first three years of the war, this observation was intended as a criticism of Allied war planners who naively believed that famine would stalk Germany after just six months of war. All of the calculations of Allied politicians and economists, Schreiner argued, relied on peacetime production and consumption figures and ignored one crucial detail: Germany was a nation of overeaters. Germans' appreciation for the "pleasures of the full stomach" meant that estimations of Germany's susceptibility to economic warfare were overdrawn and failed to recognize that a "determined people, whose complete discipline lacked but this one thing—economy in eating—would soon acquire the mind of the ascetic."[2] In the event, Schreiner's criticism proved equal parts true and false. While the nutritional gains to be made through economizing the German diet were ultimately insufficient to completely make up for the loss of imported food sources, the war economy measures implemented by the German government did prevent the prophesied famine from becoming a reality. As Avner Offer asserted in his landmark book, *The First World War, an Agrarian*

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[1] Schreiner, *The Iron Ration*, 33. The phrase is a nineteenth-century proverb (*in der Not frisst der Teufel Fliegen*), which can be translated as "beggars can't be choosers" or "desperate times call for desperate measures."

[2] Ibid. See Chapters 2 and 3 for a longer discussion of German eating habits before and during the war.

Interpretation, to some controversy, "The German people were often cold and hungry. But, whatever their complaints, they did not starve."[3]

In selecting the proverb, 'when in need, the devil will eat flies', Schreiner was trying to convey that the German people would (and did) do what was necessary to meet the challenge of the economic blockade, namely by cutting back on overconsumption and sacrificing luxury items. However, the proverb also proved surprisingly appropriate in that it reflected the most symbolic war economy measures adopted in Germany: *Streckung* (stretching) of the food supply through adulteration and substitution, which resulted in the introduction of *ersatz* food products. Over the course of the First World War, more than 12,000 *ersatz* food products were patented and appeared on the market for consumption.[4] From the ubiquitous staple foods of *Kriegsbrot* (war bread), *Kriegsmarmelade* (war jam), and swedes, to the flood of nutritionally questionable and even fraudulent goods which appeared in 1917 and 1918, the development of *ersatz* products to stretch the available food supply was a key strategy of the German government struggling against an ever-worsening food crisis. Although flies were never literally on the menu, in times of need the German government, and to a lesser extent its people, demonstrated that they were willing to resort to lower quality and unpalatable foods in order to survive.[5]

Because they are so symbolic of the suffering on the German home front, and also for their immense anecdotal potential, *ersatz* food products have long played a role in our histories of the First World War—particularly those which treat the German perspective. Women 'dancing the Polonaise' in the cold streets of Berlin while waiting

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[3] Offer, *Agrarian Interpretation*, 53. Offer's argument here is not to dispute the number of dead due to malnutrition related causes, but rather to assert that nutrition in Germany never sank to that of a true famine.

[4] Lüders, *Das unbekannte Heer*, 75-6.

[5] The question of the relative quality of *ersatz* food products is addressed in greater detail in Chapter 3.

for their ration of war bread, or letters and diary entries bemoaning the consumption of turnips and war marmalade are frequent appearances in the historiography.[6] We know that sausages were stretched with bread or filled out with water, and we know that the bread was dense, moist, and unpalatable to a population grown used to fluffy, white wheat bread.[7] We know that bread flour was adulterated with a myriad of strange and unfamiliar ingredients, presented to illustrate to the reader just how desperate officials were to maintain the bread ration.[8] We know that various leaves were tried out as tea substitutes, and that coffee either reverted to earlier chicory concoctions or else was diverted entirely into weak, roasted turnip, acorn, or even wood beverages.[9] We even know that a parade of scientific experiments was conducted to find increasingly bizarre solutions to make up for shortages in animal fodder, to safeguard Germany's meat, milk, and cheese production.[10] We know a surprising amount about how hunger was managed in Germany during the food crisis: how price controls were implemented and mismanaged, how the rationing regime functioned, and all the ways in which consumers attempted to circumvent food controls through hoarding, smuggling, and 'hamstering'.[11] All that said, we know surprisingly little about how these foods were actually made, who was responsible for their development and production, and how they were organized and popularized across the country. So often food products like war bread and turnips play a starring role in our histories and yet we find ourselves knowing little about them, beyond that they appeared and were consumed.

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[6] Watson, *Ring of Steel*, 332; and Chickering, *Freiburg*, 275.
[7] Chickering, *Freiburg*, 268; Weinreb, *Modern Hungers*, 20-1.
[8] Herwig, *The First World War*, 288.
[9] David Welch, *Germany, Propaganda and Total War, 1914-1918: The Sins of Omission* (London: The Athlone Press, 2000), 120; Freedman, *Food*, 247; Heinzelmann, *Beyond Bratwurst*, 241; and Cox, *Hunger in War and Peace*, 83.
[10] Welch, *Propaganda*, 120.
[11] Wall and Winter, *Upheaval*, 143; Watson, *Ring of Steel*, 336-7; and Ziemann, *War Experiences*, 201-2.

This chapter addresses this gap in our understanding of *ersatz* food products by investigating the processes by which such foods appeared on consumers' plates. Previous accounts of the introduction of *ersatz* foods have tended to focus on the actions of just two groups of actors: 1) the government, through its regulations and decrees which mandated that producers adulterate their products in specific ways, and 2) the entrepreneurial class, who sought to profit from scarcity by selling substitutes of dubious quality, and often at grossly inflated prices. While the picture of *ersatz* food development which arises from this interpretation is not incorrect, it fails to capture the complexity and dimension of the 'food systems' which existed in Germany during the First World War.[12] The creation of a single *ersatz* product could be a very dynamic process involving an entire ecosystem of actors working together to shepherd the product from conception to consumption. Academics, both government-employed and independent, were consultants and advisors to government food policy and regularly conducted experiments which tested new ingredients and recipes. The producers of *ersatz* food themselves, the butchers, bakers, and millers of Germany, were also integral to the development of new *ersatz* products, serving as practical test beds and laboratories for new ingredients and recipes. The government might mandate the ratios of flour or meat products which went into war bread and sausages, but it was up to the bakers and butchers to successfully interpret government regulation and academic testing into commercial production.

We must also add to this cast of actors the educators, women's associations, and housewives who labored to collect, translate, and disseminate new *ersatz* recipes and wartime cooking practices to the population at large. As important as developing new

[12] 'What Are Food Systems? | World Food Programme', 14 January 2025, https://www.wfp.org/food-systems. The World Food Programme defines a food system as the network needed to produce and transform food, and ensure that it reaches consumers.

ersatz recipes and products was the necessity of teaching millions of households how to incorporate these unfamiliar ingredients and recipes into their cooking, lest wastage due to mistakes undo the gains made by utilizing substitutes in the first place. Finally, we must take into account the many foraging, hunting, and waste collection efforts organized at every level of government. These efforts, which were instrumental in the creation of tea, coffee, fat, and animal fodder substitutes, placed hunters, housewives, and schoolchildren directly in the *ersatz* creation process. By expanding the focus to a wider range of actors involved in the development of *ersatz* food products, our previous understanding that *ersatz* food was simply imposed upon the German people by government fiat, or put on the market by money-hungry profiteers is shown to be too simplistic. Rather, the development of *ersatz* food products throughout the war was a result of diverse array of actors within a complex food system reacting to the shocks imposed by war, economic or otherwise. Whether they were acting alone, or in tandem with other groups, the appearance and consumption of *ersatz* food during the war depended on the acceptance and participation of large swathes of German society—a communal effort colored by patriotism and a sense of duty, but anchored in base terms of survival. Simply put: people need to eat, they want to eat in ways familiar to them, and the actors in the food system want to continue as normal, with producers, merchants, and distributors needing to earn a living. All of these factors encouraged the pivot towards substitutes when external, alternative sources were no longer available.[13]

This chapter will be organized thematically into six sections. The first four sections will cover the main groups of actors involved in *ersatz* development, including the German government, academics, entrepreneurs and producers, and the educators and

[13] For comparisons to another important instance of *ersatz* food development in response to economic blockade, see Mary Elizabeth Massey, *Ersatz in the Confederacy* (Columbia: University of South Carolina Press, 1952).

disseminators who helped to bring war cooking to the individual household. These sections will examine the role each group played in *ersatz* food development, their motivations, and how their actions intersected with those of other groups, using a number of case studies including war bread, war jam, and substitute fodder. The final two sections will address important aspects of *ersatz* food development which defy easy categorization into one of the actor groups. The first of these sections is focused on the role played by hunting, foraging, and waste collection, each of which required the mass cooperation of thousands (if not millions) of individuals who were not normally participants in Germany's food system. At times, this even entailed role-reversal on the part of consumers through the collection of their kitchen waste for fodder and fat recycling efforts. The final section of this chapter will shift focus to the feeding millions of Allied prisoners of war divided between camps near the front and those scattered throughout the home front. While POWs were increasingly instrumental in Germany's agricultural efforts as the war progressed, and thus indirectly related to *ersatz* development through their agricultural labor, the focus of this section is primarily on their consumption of *ersatz* food products, and more specifically on how many *ersatz* foods were originally intended for feeding POWs before circumstances forced their adoption by the general population.

The government as sponsor, organizer, and regulator

In the story of *ersatz* food development, no one played a more fundamental role than the German government, which was involved in the introduction of *ersatz* food products at nearly every level of the development cycle; from the sponsorship of academics and research institutes who tested new ingredients and recipes, to the

mandates and decrees which forced producers to participate in the adoption of new substitutes, and to the funding of new factories to facilitate the creation of key ingredients, like dried potato flakes for baking war bread. The government was also instrumental in organizing collection and foraging efforts, as well as providing support to education efforts which sought to teach households how to incorporate new foods and cooking practices into their diets—both of which will be discussed in greater detail later in this chapter. Finally, the government was responsible for the pricing and rationing regimes which directly shaped the production, distribution, and consumption of *ersatz* food products, and as the war progressed became increasingly involved in the regulation of which privately developed substitutes would be allowed on the market.[14] It is important to note as well that these interventions in the food supply occurred at every level of government, and not just at the level of the imperial ministries and offices. Municipal, local, and state governments were equally involved in efforts to bolster the food supply, and these lower tiers of government often took the lead in activities like organizing game hunts, collection drives, or promoting alternative substitutes. Konrad Adenauer, for example, as First Deputy Mayor of Cologne, was praised for encouraging the experimentation with and production of an alternative war bread in early 1915 which made exclusive use of rice, corn, and barley as ingredients, all of which Cologne had ample supplies of and which were not yet subject to rationing. As a result, this Cologne war bread could, for a time, be purchased by consumers in amounts above what was permitted by standard war bread rations.[15]

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[14] See Chapter 4 for a detailed examination of the relationship between *ersatz* food and government regulation.

[15] "Ein neues Kriegsbrot," *Kölnische Volkszeitung*, Nr. 263, 30 March 1915, BArch R 86/2144; See also W. G. Max Müller, "The Economic Situation in Germany during April 1915, being the Ninth Month of the War," *BDFA*, vol. 9, 155. The price of the Cologne bread at its introduction was 75 pfennigs for a 3 lb. loaf, making it more expensive than the standard loaf. For comparison, the average price of a mixed wheat and rye loaf in Prussia in the same month was reported as only 59 pfennigs for a 3 lb. loaf. See ibid, "The Economic Situation in Germany during May 1915, being the Tenth Month of the War," *BDFA*, vol. 9, 198.

Before diving into the specifics of government intervention in the food supply with *ersatz* food products, we must briefly discuss why such interventions were viewed as necessary in the first place. The outbreak of the Great War was a devastating shock to Germany's food system. Not only was the country's agricultural output insufficient to cover annual domestic consumption, but many of its most important agricultural imports, notably the large quantities of wheat and animal fodder from Russia, came from countries it was now at war with.[16] In total, the average domestic production of Germany's agricultural sector between 1903 and 1913 accounted for only 75-80 percent of total calorie consumption, with nearly 27 percent of annual protein consumption and 42 percent of fat consumption coming from imported sources.[17] Nor could these external sources of food be easily replaced, thanks to the efforts of the Allied economic blockade, which rapidly moved to designate foodstuffs as absolute contraband, and clamped down on German trade through neutral ports by applying the 'continuous voyage' doctrine, which meant contraband goods could be seized on neutral shipping if they were suspected of being destined for secondary trade with Germany.[18] This left just the few neutral countries along Germany's border (Denmark, the Netherlands, and Switzerland) and on the North and Baltic Seas (Norway and Sweden) which Germany could turn to for trade, or to exploit as gaps in the Allied blockade, but even these gaps were filled in by late 1916 as neutral rationing agreements took effect.[19]

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[16] Ashley, *Germany's Food Supply*, 4.
[17] Grebler and Winkler, *The Cost of the World War*, 9; and Offer, *Agrarian Interpretation*, 25.
[18] See Osborne, *Britain's Economic Blockade*, 64; and David Stevenson, *1914-1918: The History of the First World War* (London: Allen Lane, 2004), 247.
[19] Arnold-Forster, *The Blockade*, 20; See also Cox, *Hunger in War and Peace*, 19. In short, Britain signed consignment agreements with Denmark, Norway, and the Netherlands which prevented them from importing more than they required for their own consumption needs, therefore preventing re-export to Germany. See also Albrecht Ritschl, 'The Pity of Peace: Germany's Economy at War, 1914-1918 and Beyond', in *The Economics of World War I*, ed. Stephen Broadberry and Mark Harrison (New York: Cambridge University Press, 2005), 58, for a table demonstrating the collapse of German imports from 1916-1918.

Further compounding these losses inflicted by the economic blockade were the disruptions to the German food system caused by the demands of military mobilization. As millions of men were mobilized into the army, alongside nearly one third of the nation's draft animals, and foreign seasonal workers could no longer be relied upon, Germany's agricultural sector found itself drained of the labor required to till and harvest crops.[20] Scarcer labor, and potentially less experienced labor as farmers were mobilized and left their farms to be managed by their wives, children, or neighbors, also meant that less land could be planted, and often less efficiently than compared to peacetime. Combined, these factors meant that wartime Germany's annual agricultural yields were likely to be lower than those harvested in the prewar period, painting an even bleaker forecast of the country's food security, and this was confirmed when the 1914 harvest saw an 11 percent decrease from the harvest in 1913.[21] The challenge posed to the German government was thus: how to close the nutritional gap between domestic production and annual consumption as much as possible, with fewer options for foreign trade, and at minimal disruption to military mobilization?

The government's response to this problem, as outlined in the findings of the infamous Eltzbacher Commission published in the early months of 1915, was a two-pronged strategy which aimed to economize on Germany's food system and the diet of its citizens wherever possible. Simultaneously, it sought to maximize the food supply through any attainable means, including, ultimately, the introduction of substitute food products.[22] The government's efforts to extend the war economy to the country's food

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[20] Watson, *Ring of Steel*, 314; See also Eltzbacher, *Germany's Food*, 16-7; and Theo Balderston, 'Industrial Mobilization and War Economies', in *A Companion to World War I*, ed. John Horne, Blackwell Companions to World History (Chichester, U.K.; Malden, MA: Wiley-Blackwell, 2010), 227.

[21] Ritschl, "The Pity of Peace," 46.

[22] Established shortly after the start of the war to research Germany's vulnerability to the blockade, the Eltzbacher Commission was composed of Germany's leading nutritionists, physiologists, agricultural experts, and economists. The use of the word 'infamous' here refers to the overly rosy prognostications of the commission, which predicted that Germany could easily close the

system is perhaps the most written about and well understood aspect of the German food crisis, and thus will only be briefly mentioned here. These efforts included the introduction of price controls, rationing, and the establishment of government monopolies over specific food items, all of which began in fits and starts during the first year of the war before rapidly expanding to cover nearly every element of the food system. As the level of intervention in this quasi-command economy grew over the course of the war, so too did the number of offices and war companies responsible for organizing this colossal effort. By war's end, some 200 *Kriegsgesellschaften* (war companies), employing 33,000 people, had been established to direct the pricing, purchasing, and distribution of virtually every food product, and an entirely new government office in the form of the *Kriegsernährungsamt* (War Food Office) was formed under the aegis of the Ministry of the Interior to impose order upon the bureaucratic chaos.[23] The results of these efforts have been well documented by historians of the First World War, with excellent coverage of the topic in books by Alexander Watson, Holger Afflerbach, Avner Offer, Holger Herwig, and Anne Roerkohl, among others.[24] Where these efforts were influential in the course of *ersatz* food development, they will be covered in the following sections, but otherwise these subjects will be left in the capable hands of the aforementioned authors.

Turning now to the introduction of substitute food products, the first tool available to the government was the ability to direct and sponsor academic and scientific experimentation regarding the viability of various substitutes and ingredients. When it became clear in the fall of 1914 that Germany's hopes for a conclusive and

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nutritional gap by following the suggestions of the report. In reality, the report ignored several key factors which worked against the success of its recommendations. See Chapter 4 for a more detailed analysis.

[23] Grebler and Winkler, *The Cost of the War*, 52.

[24] Watson, *Ring of Steel*; Afflerbach, *On a Knife Edge*; Offer, *Agrarian Interpretation*; Herwig, *The First World War*; and Roerkohl, *Hungerblockade*. For further discussion on the expansion of government bureaucracy and regulations, see Chapter 4.

quick victory had failed, and that securing the food supply to fight a long war under the pressures of the blockade was of paramount importance, the personnel of several institutions sprang into action to research ways to increase the food supply. In these early days of the war, these efforts were primarily focused on increasing the ever-important supply of bread flour, though they would eventually expand to include other items like animal fodder and the processing of recycled fats. To use bread as an illustrative example, early experiments conducted at the behest of the government were instrumental in guiding the creation of what came to be known as *Kriegsbrot* (war bread). On 30 November 1914, Deputy Chancellor Clemens von Delbrück presented a report to the Reichstag written by the *Reichsgesundheitsamt* (Imperial Health Office), regarding the usability of potato products in the baking of bread. The practice of adulterating rye and wheat flour with potato flakes, the report argued, already had precedence in existing baking practices, whereby potato flakes would be added in ratios of 10-12 percent to lower quality bread flour in order to increase the flour's ability to absorb water, thereby resulting in a higher quality loaf.[25] Aside from this practical application, the report noted that commercial bakeries in areas where potatoes were plentiful would often include larger quantities of raw or boiled grated potatoes in rye bread in order to produce a cheaper loaf for sale, sometimes in quantities of up to 30 percent of the mixture (11 percent by dry content, as potatoes contain a large amount of water). The Imperial Health Office itself conducted experiments into the feasibility of baking this style of rye-potato bread as early as 1893, and reported that a "light, tasty bread was obtained."[26]

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[25] "Gutachten des Kaiserlichen Gesundheitsamts über die Verwertbarkeit von Kartoffelerzeugnissen zur Brotbereitung," BArch R 86/2144.
[26] Ibid.

The precedence for the adulteration of bread grain with potatoes being established, it remained for the Imperial Health Office to determine if such practices could be carried out at national scale and with minimal harm to consumers. A series of experiments was conducted using the help of three test bakeries, designated in the report as Bakery A, B, and C. In these experiments, loaves of pure rye bread were baked by each bakery as a control, against which rye loaves adulterated with potato products of various types and in various ratios were baked. Dried potato flakes, rolled potato flour, and potato starch were the admixtures used in these experimental loaves, in combinations of ratios which amounted to between 10 and 20 percent of the bread mixture, in order to determine which potato products and ratios worked best. All of the loaves, control and experimental, then underwent chemical analysis to determine their water content, calorie, protein, and nitrogen content in order to determine their suitability as substitutes. The results of these experiments found the following: 1) from a food chemistry perspective, there was no significant objection to including potatoes in the baking process; 2) with appropriate baking practices, it was possible to bake rye bread containing up to 20 percent potato products that was "not inferior to pure rye bread in appearance, color, consistency, smell and texture […]"; 3) the best combination of admixtures was an equal ratio of potato flakes and starch, or rolled flour and starch; and 4) the nutritional content of the adulterated rye bread was found to be only slightly lower than that of pure rye bread.[27] In all cases, the report concluded, potato bread was to be regarded as an "almost complete substitute" for rye bread, noting only that the potato products' ability to absorb water might lead to instances of bakers adding more water to increase the bread weight as a means to disadvantage consumers.[28]

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[27] "Gutachten des Kaiserlichen Gesundheitsamts über die Verwertbarkeit von Kartoffelerzeugnissen zur Brotbereitung," BArch R 86/2144.
[28] Ibid.

The influence of the findings of these experiments on the trajectory of war bread during the war cannot be overstated. The report's conclusions were immediately put into practice by the imperial authorities, who began issuing decrees regarding the mandated adulteration of bread in the closing months of 1914. Already by October, a month before the findings of the report were published, government regulations stipulated that all bread would be "mixed bread", with wheat loaves containing at least 10 percent rye flour, and rye bread at least 5 percent potato flour, though up to 20 percent potato content would be allowed to bakers.[29] Furthermore, it seems that this guiding principle that 20 percent potato content in bread resulted in an acceptable loaf was one which was largely adhered to throughout the many iterations of war bread during the war.[30] The rare exception to this rule appears to have only occurred when supplies of potatoes became exceedingly scarce, as was the experience during the *Kohlrübenwinter* (Turnip Winter) of 1916/1917, during which the potato content was—out of necessity—replaced with turnip meal, chestnut flour, or any other 'floury' substances which could conceivably fill the role.[31] The consultation of expert advisors regarding government bread policy appears to have been a continuous practice throughout the war as circumstances demanded a change in the recipe for war bread. The implementation of new bread regulations in January 1915, which imposed admixtures of 30 percent rye flour to wheat loaves, and a minimum of 10 percent potato content in rye loaves, only

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[29] Valentine Chirol, "The Economic Situation in Germany during the Third Month of the War," *BDFA*, vol. 9, 20.

[30] While exact ratios of wheat, rye, and potato flour (or other ingredients) in the standard war bread loaf constantly fluctuated in response to changing supplies, the rule of 20 percent for the third ingredients seems to have served as an upper limit and was rarely exceeded. Examples of war bread recipes in 1916 and 1917 corroborate this. See Max Müller, "June 1916," *BDFA*, vol. 10, 174; and ibid, "February 1917," *BDFA*, vol. 11, 55, respectively; ibid, "The Economic Situation in Germany in November 1917, being the Fortieth Month of the War," *BDFA*, vol. 12, 35, likewise shows that the Imperial Health Office continued to advocate for this 20 percent mark in the final year of the war. Outside of the standard war loaf, the potato content was permitted to be higher, as with the rye bread in 1916 which contained up to 30 percent mashed potatoes. See ibid, "June 1916," *BDFA*, vol. 10, 174.

[31] Max Müller, "The Economic Situation in Germany during July 1917, being the Thirty-Sixth Month of the War," *BDFA*, vol. 11, 253.

went forward after a 15 January conference with bakers' representatives, presumably to canvas their opinions on the change.[32] We will return again to the efforts of academics and scientists to develop *ersatz* products in a later section.

Building on the Government's ability to direct and organize research initiatives into viable substitutes was the ability to pass regulations, decrees, and prohibitions (again at all levels of local, state, and imperial government, but here focused mainly on the imperial level) which not only directly shaped the form of *ersatz* products entering the market, but also shaped the efforts of other actors in the food system to fill shortages. This was perhaps the most wide ranging and impactful of the government's actions in addressing the food crisis, and even where regulatory efforts were aimed at non-substitute foods, the increasingly closed nature of the German food system under blockade meant that interventions in one part of the system generated change or reaction in another. A classic example of this was the relative failure of the price control system which was applied to the market in an effort to insulate consumers from wartime inflation. The problem with this decision was its implementation: price controls were levied in a reactive fashion to jumps in prices, and were applied on a piecemeal basis, which allowed producers to shift their production to products which were not yet under price control, or which benefitted from higher price ceilings. Rather than incentivizing production to encourage producers to bring goods to market, the government regulations resulted in regulators and producers playing a game of economic whack-a-mole, with producers chasing profit where possible through their decisions.[33]

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[32] Max Müller, "The Economic Situation in Germany during January 1915, being the Sixth Month of the War," *BDFA*, vol. 9, 90. The organization being represented in the conference is undisclosed, but is likely the Berlin Bakers' Guild.

[33] For examples of this phenomenon, see Chickering, *Freiburg*, 165-6; and Moeller, *German Peasants*, 45-7.

In the same manner, each decree, mandate, or prohibition prompted reactions in the development of *ersatz* food products. Chapter 4 of this dissertation covers this in greater detail, but in short government regulations tended to fall into prescriptive (e.g. mandating the inclusion of potato flour in war bread) or proscriptive categories (e.g. banning the use of bread grains as animal fodder). In the former case the effect on *ersatz* food development was easy to see; mandating that bread had to be baked with admixtures, or ruling that potato rations could be replaced with turnips, directly shaped the form and consumption of *ersatz* products encountered by consumers.[34] The latter was less direct in its effect on the use of substitute foods. When producers were prohibited from using bread grains as animal fodder, that portion of the animal's diet then had to be made good with another item, prompting producers to search for something to take its place. Price controls and government monopolies engendered a similar, if slightly more distant reaction, by economically incentivizing producers towards unregulated products—expanding the search for substitutes within the closed system.

Let us briefly return to the example of war bread before moving on to other products. Perhaps more than any other *ersatz* product during the war, the constantly evolving form of war bread was the direct result of the government shaping food by decree. The content of the standard war loaf was subject to constant change. Early ratios of war bread flour saw just small portions of rye being mixed into wheat flour, but there was a rapid expansion of the rye admixture, as well as the inclusion of potato products or other ingredients in what was ostensibly still a 'wheat' loaf. The most common proportion of flours was settled on by June 1916 with a recipe that mandated 50 percent

[34] Max Müller, "The Economic Situation in Germany during December 1916, being the Twenty-ninth Month of the War," *BDFA*, vol. 11, 21. Double the amount of turnips replaced potatoes in official rations in Prussia, with a similar measure being suggested for other German states.

wheat flour, 30 percent rye, and 20 percent potato flour or "some other floury substance," though changes in availability could see drastic deviations from this formula, with one recipe from February 1917 mandating 55 percent rye, 35 percent wheat, and 10 percent other materials—likely due to the collapse of potato supplies that winter.[35] The extraction rates of the milling process for bread grains were another common target of government intervention, with shrinking stockpiles of bread flour prompting the government to mandate higher extraction rates for wheat and rye, up to a high of 94 percent in February 1917, where it stayed for the remainder of the war.[36] The higher extraction rates, coupled with fluctuating flour ratios which were often higher in water content than originally planned for by the testing of the Imperial Health Office, contributed to war bread's reputation for being dense, sticky, and coarse, though it should be noted that this description cannot be generalized to all war bread. Bakers and regulators alike strived to produce the highest quality loaves possible, given the circumstances, and war bread did gain a level of grudging acceptance among consumers.[37]

In terms of how the government's power to prohibit the use of certain foods or ingredients affected the course of *ersatz* development, the most prolific example can be found in the battles which raged over what could and could not be fed to the nation's livestock. From the outbreak of the war, anxieties plagued experts and regulators alike over the competition between humans and animals for a limited food supply under the economic blockade. The experts of the Eltzbacher Commission, for instance, recommended a blanket ban on using edible grains as fodder, and even suggested a culling of the nation's herds by nearly 9 million hogs and 1 million milk cows to reduce

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[35] Max Müller, "June 1916," *BDFA*, vol. 10, 174; ibid, "February 1917," *BDFA*, vol. 11, 55. Common admixtures in place of potato flour included peas, barley, oats, maize, and turnips, among others.
[36] Ibid, "February 1917," *BDFA*, vol. 11, 55. For discussion on the implications of higher extraction rates, please see Chapter 2.
[37] Schreiner, *The Iron Ration*, 8-9.

this competition.[38] This call to safeguard the edible food supply for human consumption was adopted by the government with enthusiasm. The Ministry of Agriculture announced in September 1914 that no cereals suitable for human consumption were to be used as animal fodder, with the government instead encouraging the use of potatoes, and later sugar beet, as alternatives given the large supply of those products at the outset of the war.[39] However, given that nearly 6 million tonnes of fodder was previously imported by Germany annually, it was an impossible task to completely replace these missing fodder supplies through potatoes and sugar beet, especially given their increasing importance to the human diet. Having their supply to traditional sources of animal feed throttled in this way, producers scrambled to find the means with which to sustain their livestock, attempting to stay one step ahead of relentless bans and prohibitions, and marking animal fodder as one of the most chronically scarce sources of nutrition throughout the war.[40]

As the official food supply continued to contract, more items which were typically associated with animal fodder began to be mobilized for human consumption, resulting in them being withdrawn from the available pool of animal feed. Skimmed milk, for example, was previously given to pigs after its fat had been extracted for other products, but shortages of milk and fats prompted the government to recommend its use

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[38] Elztbacher, *Germany's Food*, 231-2. Such calls paved the way for the disastrous *Schweinemord* (pig murder) of 1915, which saw an initial glut of meat on the market before the supply crashed and prices skyrocketed. See Afflerbach, *On a Knife Edge*, 138.

[39] Chirol, "The Economic Situation in Germany during the Second Month of the War," *BDFA*, vol. 9, 12; Chirol, "The Economic Situation in Germany during the Fourth Month of the War (November 1914)," *BDFA*, vol. 9, 33.

[40] The lack of animal fodder and its effects on the weight of livestock and their ability to produce milk is a constant refrain in the historical record. The Max Müller reports are full of such references, as are the newspapers, diaries, and economic histories which followed the war. Grebler's accounting after the war shows that the average weight of slaughtered cattle fell by nearly 40 percent between 1912 and 1918, while the weight of slaughtered hogs fell by more than half. Grebler and Winkler, *The Cost of the War*, 84. Furthermore, the falling weight of livestock translated into less manure to replace missing supplies of fertilizer, and less labor which could be extracted from draft animals. Cox, *Hunger in War and Peace*, 70.

in the human diet instead.[41] The precariousness of the supply of bread flour likewise resulted in a ban on farmers' use of waste corn (i.e. ears which are broken or crushed during threshing) as a source of fodder, it being requisitioned instead by the Imperial Grain Office from February 1916 onward.[42] Chicory joined the list of prohibited fodders in May 1916, as stockpiles of coffee seized from the docks in Hamburg slowly dwindled and coffee drinking reverted to the substitutes of previous decades.[43] By February 1918, it was almost faster to list the items which were still free to be used as animal fodder than to list the banned items. Wheat, rye, spelt, peas, beans, vetches, lentils, buckwheat, millet, potatoes and potato products, sugar beet, kohlrabi, and beechnuts were all banned from this use, though interestingly, maize grown by farmers on their own land could be used without restriction, as could the bran from their bread corn if they were designated a *Selbstversorger* (self-supplier).[44] Other forms of self-grown or gathered fodder, such as fodder turnips, horse-carrots, acorns, chestnuts, hay, and straw could also be used without restriction, though in the case of hay and straw, only an amount could be used which did not interfere with delivery quotas to the relevant war companies.[45] Of non-self-grown fodders, use was tightly regulated, with only 40 percent of the barley harvest being turned over for livestock, while oats could only be used up to the official rations for horses, bulls, and oxen.[46] For a time, even supplies of the lowly

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[41] Max Müller, "The Economic Situation in Germany during February 1915, being the Seventh Month of the War," *BDFA*, vol. 9, 126.
[42] Ibid, "The Economic Situation in Germany during February 1916, being the Nineteenth Month of the War," *BDFA*, vol. 9, 417.
[43] Henry Crofton Lowther, "(B.)—Monopoly of Tea and Coffee in Germany," *BDFA*, vol. 10, 111; Skalweit, *Kriegsernährungswirtschaft*, 54.
[44] Max Müller, "December 1916," *BDFA*, vol. 11, 19; and ibid, "The Economic Situation in Germany and Austria-Hungary. Part I.—Germany. The Internal Situation in Germany during February 1918, being the Forty-Third Month of the War," *BDFA*, vol. 12, 109.
[45] Ibid, "February 1918," *BDFA*, vol. 12, 109.
[46] Ibid, "December 1916", *BDFA*, vol. 11, 19. These figures do not come up again in the Max Müller reports, nor have they surfaced in the archival documents gathered for this project, so it is unknown if these allowances changed in the last year and a half of war. Perhaps further research will shed light on this.

turnip were threatened, as the desperation of the Turnip Winter necessitated its detested inclusion in human rations.[47]

The picture of the government's intervention in the animal fodder supply was not wholly negative, however, as intensive efforts were made to try and replace prohibited fodders with new substitutes. While producers pressed more and more fringe fodders into service out of economic necessity, the German government supplemented these efforts by encouraging more research into experimental fodders and organizing the collection of alternative sources of fodder throughout the country—both from natural sources and from by-products of the human food system. Shortages of hay in 1916 prompted the government to purchase large quantities of heather from the moors of North Schleswig and Denmark, which were delivered by the trainload to factories to be processed into heather meal which was promised to be akin to a medium quality hay.[48] Efforts to manufacture compressed fodder from cocoa husks, yeast, distiller's wash from potatoes, and beetroot seeds were undertaken, while in the German wine country, attempts were made to produce oil cakes from the grape pips, wine lees, and husks.[49] Collection programs were also organized to help mobilize and recycle food waste back into the food supply through animal digestion. Households were encouraged from the earliest months of the war to collect their kitchen waste to extract fats or serve as fodder, while other common waste products like coffee grounds, animal bones, and other by-products of animal processing (hooves, horns, offal, etc.) likewise had collection programs established over the course of the war.[50] A special Bundesrat Order issued on

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[47] Max Müller, "December 1916", *BDFA*, vol. 11, 21.
[48] Ibid, "The Economic Situation in Germany during March 1916, being the Twentieth Month of the War," *BDFA*, vol. 10, 39.
[49] Ibid, "The Economic Situation in Germany during April 1916, being the Twenty-first Month of the War," *BDFA*, vol. 10, 80.
[50] Chirol, "November 1914," *BDFA,* vol. 9, 58; Max Müller, "June 1916," *BDFA*, vol. 10, 175; and ibid, "The Economic Situation in Germany during May, 1917, being the Thirty-fourth Month of the War," *BDFA*, vol. 11, 176.

17 August 1917 sought to compel the even fuller utilization of animal carcasses for processing into fodder by ordering all possessors of animals who had died to deliver the carcasses to the relevant authorities.[51] After processing, these animal by-products could be manufactured into *ersatz* fodder products like compressed gelatine fodder, compressed bone fodder, blood meal, and even fodder comprised of the animal's stomach and muscles.[52] The Imperial Meat Office, whether extracting fats from them, pulverizing them into sausages, or processing them into animal-based fodder, utilized every part of the animal so thoroughly that, "like the Chicago stock yards, nothing escapes economic employment 'except the squeal.'"[53]

The employment of these animal products as fodder for their fellows might strike us as macabre, but it was part of a full-throttled effort to claw as much nutrition from the surrounding environment as possible, while simultaneously attempting to provide a substitute for the prohibited fodder goods. There was a sound operating logic to these efforts as well. Humans may be limited to a relatively narrow range of digestible foods in our environment, but there is a wealth of organic matter which could potentially be converted into fat and protein—and therefore calories—through the metabolic processes of livestock. Literally, transforming the inedible into the edible. Through this lens, the collection of reeds, seaweed, and even starfish all seem like promising new sources of nutrition.[54] The fundamental flaw in these efforts, however, was that they simply did not scale up to become economically feasible. It was both labor and time intensive to collect all of these materials, in a time when labor was already scarce, which meant that *ersatz* fodder was inherently more expensive than

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[51] Max Müller, "The Economic Situation in Germany in August 1917, being the Thirty-seventh Month of the War," *BDFA*, vol. 11, 297.
[52] Ibid, "December 1916," *BDFA*, vol. 11, 20.
[53] Ibid, "February 1918," *BDFA*, vol. 12, 112.
[54] Ibid, "June 1916," *BDFA*, vol. 10, 175; ibid, "December 1916," *BDFA*, vol. 11, 20; and ibid, "The Internal Situation in Germany during March 1918, being the Forty-Fourth Month of the War," *BDFA*, vol. 12, 146.

traditional fodders, relative to its nutritional content.[55] Furthermore, it simply could not be collected in large enough amounts to meaningfully impact the deficit left by the loss of imports and the loss of remaining sources to human consumption. Over the course of 1916, fewer than 57,000 tonnes of compressed *ersatz* fodder derived from straw, heather, grape-skins, and reeds had been delivered—a veritable drop in the bucket compared to the vastness of the demand.[56]

The final tools wielded by the government to affect the development and adoption of *ersatz* food products were its power to both organize and subsidize the efforts of others (e.g. industrial interests), as well as its power to influence public perception of these new substitutes, whether successfully or not, through propaganda, newspapers, and spokespersons and educators. Returning to the example of war bread and its adulteration with potato products, the aforementioned Imperial Health Office report made it clear that the high water content of raw potatoes precluded their inclusion in the breadmaking process, as the dough would become too soft to work with. Thus, it was necessary to utilize dried, "low-water long life" products, like potato starch which had been used in the past for such purposes, or the newer and more effective rolled potato flour or dried potato flakes.[57] To produce these products, new technology and food processing techniques needed to be employed. Potato flakes were obtained from the following process detailed in the report:

> […] cleaned potato tubers are treated with steam, which causes the starch to gelatinize. The resulting pulp is dried on rotating rollers heated with steam, and

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[55] Max Müller, "March 1918," *BDFA*, vol. 12, 146, shows that concentrated bullrush and reed fodder cost between 8-10 and 10-12 M. per 100 kilograms, respectively. Compare this to oats, which in November 1917 cost 40 M. per 100 kilograms (nearly four times as expensive), but which weight-for-weight contained roughly ten times as many calories as bulrush. See ibid, "November 1917," *BDFA*, vol. 12, 36.

[56] Ibid, "December 1916," *BDFA*, vol. 11, 20.

[57] "Gutachten des Kaiserlichen Gesundheitsamts über die Verwertbarkeit von Kartoffelerzeugnissen zur Brotbereitung," BArch R 86/2144.

> the finished product is scraped off of these in the form of paper-thin flakes of varying size, and pale yellow to grey-yellow in color. Depending on the method of production, the flakes contain either large or small amounts of [potato] peelings; only the varieties with little peelings are suitable for human consumption.[58]

From these potato flakes, potato flour was earned through repeated chopping and sieving them to remove as much of the remaining peel as possible, resulting in a yellowish, medium-fine powder. The waste products of both of these processes could then be collected and utilized as animal feed.[59]

Although the food processing techniques to obtain these ingredients were already understood, the existing production capacity was woefully inadequate to meet the demand generated by mandating the inclusion of these products in war bread. To meet this new demand, the German government, working through the Berlin-based *Spirituszentrale* (Central Spirits Office) in collaboration with various associations organized under the Institute for Fermentation Industry, announced in September 1914 the funding and imminent construction of 200 new factories which would devote themselves to the production of dried potato flakes and potato flour. That the planning for these factories could be accomplished in such a short span of time was thanks to years of groundwork laid by the Association of German Spirit Manufacturers and the Association of German Potato Growers, who had planned on utilizing these new

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[58] "Gutachten des Kaiserlichen Gesundheitsamts über die Verwertbarkeit von Kartoffelerzeugnissen zur Brotbereitung," BArch R 86/2144. Interesting to note that the peel is designated as unsuitable for consumption, as modern nutritional advice recommends consuming potatoes with their peels due to their vitamin and mineral content. This is an example of how our understanding of nutritional science has advanced since the early-twentieth century.

[59] Ibid. As an aside, mention is made in the same document of turning potatoes into dried potato chips (similar to the modern snack food, but air dried and not fried) to be used primarily as animal feed. This was a means by which to preserve potatoes for feed by extending their durability. See Schweitzer, *Can Germany Be Starved*, 12.

techniques in the production of distilled spirits.[60] Funding for this construction was provided through the Prussian state government in the form of advantageous loans to farmers, distilleries, starch manufacturers, and cooperatives interested in setting up new drying facilities. Meanwhile, potato farmers were encouraged to deliver as much of their harvest as could be accepted to existing drying facilities and new ones as they came into operation, with interstate railway tariffs even being paused to facilitate delivery to facilities further afield if the local capacity was already exceeded.[61] Of course, seeking to expand the capacity of drying facilities was also an attractive prospect in preserving more of the harvest against spoiling. By storing more of the potato harvest in dried form, the potatoes were made less susceptible to mold or rot, which was an unfortunate occurrence that occasionally afflicted stores of potatoes during the war—usually in cases where local municipalities did not have adequate storage facilities for holding potatoes prior to distribution, as well as incidents where potatoes spoiled in transit due to delays or confusion in transportation.[62] By October 1917, the number of drying facilities had surpassed 800, prompting advocates to call for more of the potato crop to be processed to prevent unaffordable spoilage. Despite the clear logistical benefits to drying the potato crop, however, it seems that the Imperial Potato Office was reluctant to commit more of the potato crop than was necessary to meet flour demands for war bread—perhaps wary of further alienating German consumers.[63] The processing of potatoes into dried products was to remain the domain of war bread, fodder, and spirits, and not the dinner table.

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[60] "Kartoffelverwertung zur Broterzeugung. Errichtung von 200 Fabriken," *Berliner Lokal Anzeiger*, 10 September 1914, BArch R 86/2144.
[61] "Zur Hebung der Kartoffelverwertung," *Meissner Tageblatt*, 13 September 1914, BArch R 86/2144.
[62] Max Müller, "April 1915," *BDFA*, vol. 9, 155; Cox, *Hunger in War and Peace*, 76.
[63] Max Müller, "The Economic Situation in Germany in October 1917, being the Thirty-ninth Month of the War," *BDFA*, vol. 11, 411.

Instruction on how to properly use new substitutes, and the recommendation of substitutes that fell outside of rationing and price controls, was another important function of the government regarding *ersatz* food products. Following the Imperial Health Office's report on potato flour in war bread, for instance, it was announced that master bakers, selected by the Berlin Bakers' Guild, would set up educational courses in Berlin for bakers across the country to come and learn how to properly incorporate dried potato products into the war bread.[64] Regarding the adoption of *ersatz* ingredients and war cooking into the households of average consumers, the government was also instrumental in sponsoring and supporting the efforts of housewives' associations, lecturers, and educators, providing them with printed materials, spaces in which to host lectures, and other such forms of support. (These efforts will be examined in more detail in another section.) As for recommending the use of additional substitutes outside of centralized control, examples can be found in the January 1915 recommendation of mixing molasses with available fodder supplies to fortify their nutritional value to livestock, and an August 1917 recommendation to the public that acknowledged the lack of sugar for making jam and suggested instead the use of benzoic or formic acid to preserve stores of fruit.[65] Such suggestions, however well-intended, were unlikely to result in major nutritional gains, but did nonetheless contribute to the expansion of potential substitutes in the public consciousness.

Finally, the role of the government in popularizing the consumption of certain *ersatz* products is an element of this story which cannot be ignored. After all, identifying and developing new substitute foods for consumption was only half the equation if consumers could not be convinced to adopt them into their diets. Even in

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[64] "Brot aus Roggen und Kartoffeln," *Deutsche Tageszeitung*, 16 September 1914, Barch R 86/2144. Adding new ingredients to bread requires some experimentation and training to be successful. See further discussion in Chapter 2.

[65] Max Müller, "January 1915," *BDFA*, vol. 9, 91; and ibid, "August 1917," *BDFA*, vol. 11, 299.

cases where the consumption of specific products was obligatory (e.g. war bread, or swedes during parts of 1916-1917), it was in the interests of the government that an amount of public buy-in be achieved. This consideration was important for a few reasons. First, by imbuing the consumption of *ersatz* products with elements of patriotism, it was possible to turn the consumption of previously undesirable food products into a demonstration of dutiful sacrifice, of communal solidarity with the war effort which both reflected and acknowledged the brave sacrifices of soldiers at the front. This was the so-called "potato-bread spirit" referred to by Lloyd George to describe the resilience of the German home front in the face of shortages which endured for much of the first half of the war.[66] Regular propaganda reminded consumers that their communal sacrifice was integral to safeguarding the country against the blockade. The *Norddeutsche Allgemeine Zeitung*, a periodical which functioned as a government mouthpiece, ran the following in December 1914: "Eat war-bread. It is marked with a K. It satisfies and nourishes just as much as any other bread. If everybody will eat it, we need have no fear of not having bread all the time."[67] The *Sächsische Staatszeitung*, meanwhile, warned its readers in the same month that "anyone who uses bread grains as fodder is sinning against the Fatherland!"[68] By attaching the consumption of official *ersatz* food products to patriotic duty, the government attempted to bolster morale, while simultaneously undercutting potential disquiet over the gradual introduction of substitutes into the diet.

Effort was also made to link the consumption of *ersatz* food products to a historical sense of German identity. The disdain which many consumers held for

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[66] Afflerbach, *On a Knife Edge*, 146. See Afflerbach's chapter, "'Potato-bread Spirit': The German Home Front in 1914-1916," for a more detailed discussion of morale on the German home front.
[67] Chirol, "The Economic Situation in Germany during the Fifth Month of the War (December 1914)," *BDFA*, vol. 9, 58.
[68] "Aufschnitt aus Nr. 297 *Sächs. Staatszeitung*," 23 December 1914, SächsStA, 10736 Ministerium des Innern, 16619, p. 1.

substitute foods was due in part to the perception that they represented a back-sliding in German socioeconomic progress. The protein and fat rich diet of the German people in 1914, and their love of fluffy white wheat bread, were the products of multiple decades of growing prosperity, while coarse, dark bread and root vegetables were foods relegated to a best-forgotten dietary past.[69] To counteract these perceptions, some government propaganda attempted to recast these foods as belonging to a 'traditional' or 'old' (i.e. good) German diet. The Medical Association of Frankfurt, with the approval of the authorities, issued a statement in December 1914 calling on consumers to drink milk or vegetable soup for breakfast "in the good old German way," to relieve the strain on stores of tea, coffee, and cocoa.[70] In addition, to help ease the transition to eating bread made with potato flour, numerous efforts were made to remind consumers of the historicity of using potatoes in German bread. The *Deutsche Tageszeitung* published a letter to the editor in September 1914, which came from a reader whose father had worked as a baker's assistant in the 1860s, when the "good old custom of so-called home baking was still in force."[71] It was common, he reminded the reader, that families would incorporate potatoes or pumpkin into their bread to augment the flour, and such a practice resulted in a tasty, high-quality bread. "It would be advisable and praiseworthy," the letter concluded, "if we returned to this old, good method of making bread today, because it would significantly improve the nutritional quality of families."[72]

The most difficult challenge in popularizing *ersatz* food products came in the attempts to convince the public about foods which bore connotations with vermin or animal fodder, or which were just too alien to the German diet of the day. Extensive

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[69] See Chapter 3 for further discussion.
[70] Chirol, "Fifth Month," *BDFA*, vol. 9, 58.
[71] "Ein beachtenswerter Vorschlag," *Deutsche Tageszeitung*, Nr. 475, BArch R 86/2144.
[72] Ibid.

efforts were made, for example, to push for the inclusion of more oats in the diet after their use as an animal fodder became restricted, but these efforts do not seem to have got very far.[73] Additional efforts were made to try and popularize the eating of rabbits, which were regarded by some as vermin, as well as the eating of mussels imported from fisheries in the Netherlands.[74] Unlike with war bread, which was able to earn a measure of grudging acceptance amongst consumers, not all substitutes were so willingly accepted.

Academics, scientists, and the researching of new possibilities

As has already been demonstrated with the studies conducted under the direction of the Imperial Health Office regarding war bread, academics, scientists, and other experts played a crucial advisory role to government policy on expanding the food supply through *ersatz* food products. During the first half of the war, when the government's response to the food crisis suffered from a decentralized and piecemeal implementation, this advisory role appears to have been performed on an *ad hoc* basis. As and when it became necessary to update policy regarding specific *ersatz* products (notably with altering the composition of war bread), experts from that field would be consulted to weigh in on the proposed changes or to suggest their own. This dynamic would eventually be formalized after the establishment of the War Food Office in May

[73] Max Müller, "The Economic Situation in Germany during October 1916, being the Twenty-seventh Month of the War," *BDFA*, vol. 10, 346. Recipes including oats were a relative rarity in war cookbooks. The *Badisches Kriegskochbüchlein*, for instance, contains only three such recipes out of ninety-six—all variations of oatmeal or soup. Emma Wundt, *Badisches Kriegskochbüchlein* (Karlsruhe: C.F. Müllersche Hofbuchhandlung, 1915).
[74] Max Müller, "January 1915," *BDFA*, vol. 9, 92; and ibid, "The Economic Situation in Germany during November 1916, being the Twenty-eighth Month of the War," *BDFA*, vol. 10, 389. It is unclear if the mussels were not consumed normally by coastal consumers, or if this popularization campaign was targeted at inland communities.

1916, whose mission to rationalize official efforts to secure the food supply included centralizing the efforts of disparate advisors under the Advisory Board of the War Food Office (*Beirat des Kriegsernährungsamts*) in July. Envisioned as a representative body of the entire German food system, the advisory board was composed not just of academics and scientists with expertise in the field of nutrition, but also representatives from "larger and smaller towns, rural districts and counties, trade unions, consumer associations, wholesale and retail trade, agriculture and industry, [and] the food industry […]," among others.[75] Due to its large membership of over a hundred representatives, this advisory body was unable to gather frequently enough to provide weekly guidance to the War Food Office, but instead served as a communicative instrument to organize the efforts of the food system around government policy, as well as providing a standing body of experts which could be called upon for consultations as required.[76]

But aside from their advisory role to government efforts at developing substitutes, academics and scientists were very active throughout the war in directly researching or experimenting with new *ersatz* products—either to pitch to governing authorities, or for some to patent and sell on their own terms. The impact of these new experimental substitutes is difficult to pin down. On the one hand, they can be viewed

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[75] "Verhandlungen des Beirats des Kriegsernährungsamtes," *Mitteilungen aus dem Kriegsernährungsamt Nr. 198, Nachrichtendienst für Ernährungsfragen*, 13 July 1916, BArch R 3601/29, p. 10.

[76] While the full advisory body did not meet frequently, individual special committees formed from body members were involved in frequent activity outside of scheduled meetings. "Der Ernährungsbeirat des Reichstags und der Beirat des Kriegsernährungsamts," *Mitteilungen a. d. Kriegsernährungsamt, Nr. 3*, 17 January 1917, BArch 3601/29, p. 45. Experts and representatives from various associations which could be called for consultations were organized under the category D. list of advisory board members, headed by Professor Dr. Abel, the Privy Senior Medical Councilor in Jena, though a letter to the President of the War Food Office frustratedly pleaded that consultations from the advisory board be given precedence over outside consultations, suggesting an amount of territoriality over their role as advisors. Letter to the President of the War Food Office, P I 4939, 7 November 1916, BArch 3601/29, p. 40. The protest resignation of Dr. Abel from the advisory board just a few weeks later further suggests frustrations over how seriously the expert opinions of the advisory board were considered by the KEA. "Zum Austritt Prof. Dr. Abels aus dem Beirat des Kriegsernährungsamts," *Mitteilungen a. d. Kriegsernährungsamt, Nr. 248*, 28 November 1916, BArch 3601/29, p. 41.

as operating on the bleeding edge of chemistry and food science, not only expanding the number of potential substitutes which could be put into production, but also by developing new food processing techniques and technology with applications beyond their immediate association with wartime substitutes. There was a sort of scientific optimism which colored public perceptions of *ersatz* development efforts early in the war, which arose from pride in the achievements of Germany's chemical and industrial sectors. The rising popularity of margarine at the turn of the century, as well as earlier innovations, like Justus von Liebig's stock cubes of the 1870s, suggested an advancing modernity of food which could offer a resolute answer to the Allied *Hungerblockade*.[77] Schreiner alluded to this optimism by writing that "For decades food in tabloid form has interested the men in the chemical laboratories."[78] Max Müller's reports to the Foreign Office also noted that "waves of enthusiasm for substitutes" passed over Germany frequently in the opening years of the war, for the potential relief they promised.[79]

On the other hand, these series of experiments also furnish us with the most bizarre and unsettling examples of substitutes during the war, giving rise to the popular perception of scientists and academics being out of touch with the realities of both food economy and food culture. The proposed adoption of unorthodox flour for bread baking in the Czech lands (e.g. chemically treated straw, hay, tree bark, etc.), for example, was lambasted by consumers as the "invention of the lunatic minds of German scholars."[80] Schreiner likewise poked fun at the aspirations of these German academics, whose goals seemed too implausible to ever be achieved. "Some of them [scientists], have asserted

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[77] See Skalweit, *Kriegsernährungswirtschaft*, 52; and Heinzelmann, *Beyond Bratwurst*, 188-9.
[78] Schreiner, *The Iron Ration*, 150.
[79] Max Müller, "April 1915," *BDFA*, vol. 9, 155.
[80] Martin Franc, 'Bread from Wood: Natural Food Substitutes in the Czech Lands during the First World War', in *Food and War in Twentieth Century Europe*, ed. Ina Zweiniger-Bargielowska, Rachel Duffett, and Alain Drouard (Farnham; Burlington, VT: Ashgate, 2011), 75. Though this example comes from the Czech lands of Austria-Hungary, Franc shows that inspiration was drawn from the work of German scientists like Max Rubner, who conducted research on the plausibility of using ground birch bark as flour.

that man could be fed chemically. Theoretically that may be done; in practice it is impossible. If the intestinal tracts could be lined with platinum men might be able to live on acids of almost any sort. Such is not the case at present, however."[81] Regarding the promise of experiments with fringe substitutes for bread flour, Schreiner glibly remarked, "I read some very learned articles on that subject. But there was always an *if*. If this and that could be overcome, or this and that could be done, the thing would be successful. It never was, of course."[82] Such pessimism was slightly overstated, as many achievements were made during the course of these experiments, but its core message—that optimism about the German scientific community's ability to meet this challenge would fall short of its promises—remained valid.

The attempted creation of new types of bread flour admixture did indeed occupy the attention of many academics during the war, being one of the most common subjects of research alongside animal fodder and fat extraction. Adenauer's previously mentioned Cologne war bread of early 1915 was one example of an early success by academics in creating a workable and palatable substitute for wheat and rye flour, though its price at 75 pfennigs for a 3 lb loaf made the *ersatz* bread an unaffordable luxury item for many in comparison to the standard war loaf.[83] It was late in the war, however, where the most striking examples of such experiments can be found. In August 1918, Professor Graebner of the Berlin Botanical Gardens gave a lecture regarding his research on various plants from which flour could be obtained for bread baking, including "bulrushes, water-lilies, snake root, wild arum, bracken, acorns, horse-chestnuts, and various kinds of pulses, and from the seeds and fruits of numerous plants rich in starch and protein."[84] Whether or not any consideration was given to the

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[81] Schreiner, *The Iron Ration*, 150.
[82] Ibid, 152.
[83] Max Müller, "April 1915," *BDFA*, vol. 9, 155. See footnote 15.
[84] Ibid, "The Internal Situation in Germany during August 1918, being the Forty-ninth Month of the War," *BDFA*, vol. 12, 336.

feasibility of harvesting these sources at scale is unclear. In the same month, a new process called the Gross Method, by which it was claimed bread dough could be created from corn without the use of the milling process, became the subject of much conversation in Germany. Its supporters claimed that producing bread in this way would result in a 10 percent increase in bread yield from the same amount of grain, while costing approximately 25 percent less to produce.[85] Counter experiments by the consulting experts of the War Food Office, however, found that these claims could not be substantiated, and that dough made by pulping wet bread grains could not make good bread, marking it as "totally unfit for consumption."[86]

Perhaps representing a reluctance to cross certain boundaries in human consumption, the realm of animal fodder research was where the most extreme examples of new products could be found. A patent secured by Dr. Alex Claasen of Aix-la-Chapelle in the early months of the war, for instance, described a new and improved chemical process which sought to transform wood and other cellulose-rich materials into an *ersatz* fodder by converting the cellulose into glucose.[87] Interestingly, though this process did not see much utilization during the war (perhaps due to cost or scaling issues), it was based on sound science which is now being revisited as a means to produce biofuel.[88] Another early experiment conducted by a Dr. Friedenthal to find a means of converting straw into an edible straw-meal was originally aimed at providing an alternative bread flour, but was deemed by the authorities to contain chemicals

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[85] Max Müller, "August 1918," *BDFA*, vol. 12, 336.
[86] Ibid. Likely it was labelled as unfit for consumption because the dough would be too waterlogged to rise properly, or else artificially increased the bread weight per loaf through water content. This would thereby decrease its nutritional value relative to its purchasable weight under the rationing regime.
[87] Chirol, "Fourth Month," *BDFA*, vol. 9, 32.
[88] Ahmad Galadima, Ahmad Masudi, and Oki Muraza, 'Conversion of Cellulose to Glucose and Further Transformation into Fuels over Solid Acid Catalysts: A Mini Review', *Microporous and Mesoporous Materials* 336 (1 May 2022): 111846, https://doi.org/10.1016/j.micromeso.2022.111846.

"deleterious to human beings," which resulted in the straw-meal being relegated to cattle fodder.[89] The *Deutsche Landwirtschaftliche Presse* published, in May 1917, a detailed description of various experiments into "the digestibility of wood fibre and sawdust" for animal feed, the collective result of which was the proposal to begin the manufacture of concentrated wood fodder in the same fashion as concentrated straw fodder. The issue with such fodder, however, was that although it was technically edible by livestock, its nutritional content could not match the fodder it was meant to replace, meaning oxen could produce less labor and cows produced less milk.[90] As a final example, the use of twigs and leaves as a fodder source was the subject of much attention. A *Hamburgischer Correspondent* article from April 1918 extolled the merits of concentrated twig fodder made from poplar, ash, elm, lime, aspen, alder, hazel, willow, or beech trees, which it claimed could be given to animals in amounts of up to eight to ten pounds per day. Furthermore, the article asserted, the experiments which identified these fodder sources also determined that "82 kilog. of leaf fodder or 125 kilog. of twig fodder are equivalent to 100 kilog. of good meadow hay."[91]

Attempting to address the crippling shortage of fats was another prominent avenue of research for German scientists during the war. The lack of fats, which was the macronutrient most impacted by the economic blockade, was of concern for two compelling reasons. Firstly, glycerine derived from fat was an important component of explosives for the munitions industry.[92] Secondly, and with a much greater impact on German citizens, though it was not well-understood at the time, fat is a vital nutrient for several bodily functions, without which we begin to suffer. Several important vitamins are fat-soluble and require fat stores to be incorporated into the body, and the proper

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[89] Max Müller, "April 1915," *BDFA*, vol. 9, 155.
[90] Ibid, "May 1917," *BDFA*, vol. 11, 170.
[91] Ibid, "April 1918," *BDFA*, vol. 12, 179. I find this number to not be convincing, given that wood has lower digestibility compared to hay even after chemical treatment.
[92] Ibid, "May 1917," *BDFA*, vol. 11, 176.

functioning of our brains is severely hindered by a lack of fat, resulting in shortened attention spans and mood swings, among other symptoms.[93] On top of these other functions, fat was also a rich source of calories and helped to increase the palatability of foods and aided in the cooking process. In October 1915, Professor Hans Neu, working at the University of Bonn, published a research report which suggested the extraction of oils from acorns, chestnuts, walnuts, hazelnuts, linseed, sunflower seeds, grape, and other fruit pips.[94] Professor Nathan Zuntz, a well-known physiologist, meanwhile recommended that people replace the missing fat in the diet as far as possible with honey, jam, and preserved fruits, though this advice quickly became obsolete as these products also fell into scarcity.[95] The most unsettling recommendations for alternative fat sources came in the form of recycling sewer and animal waste. Writers for *Chemisch-Technische Wochenschrift* in October 1917 reported that, with proper organization, "sufficient edible fat could be obtained from the utilization of boiled bones to supply 2,250 tons of margarine a month."[96] Perhaps even more stomach-churning were the suggestions, even from the early months of the war, that "margarine could be obtained from the bodies of dead horses," and that "fats could be extracted from the sewage of our towns."[97] Given such serious recommendations from leading academics in the country, it is no wonder that distasteful rumors swirled around fats being harvested even from the bodies of dead soldiers.[98]

Efforts to derive new *ersatz* food products from scientific experimentation were not always so desperate, however. Tea and coffee likewise attracted a fair amount of

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[93] Max Müller, "February 1918," *BDFA*, vol. 12, 98.
[94] Ibid, "The Economic Situation in Germany during October 1915, being the Fifteenth Month of the War," *BDFA*, vol. 9, 306.
[95] Ibid, "October 1915," *BDFA*, vol. 9, 312.
[96] Ibid, "October 1917," *BDFA*, vol. 11, 414.
[97] Ibid, "October 1915," *BDFA*, vol. 9, 306.
[98] Ibid, "The Economic Situation in Germany during March 1917, being the Thirty-second Month of the War," *BDFA*, vol. 11, 77.

academic attention, and their results were far more often at least reasonable, if not always to consumers' tastes. A lecture given in Berlin in June 1917 presented the most common coffee and tea substitutes which had been identified thus far. For coffee, roasted concoctions of sugar beets, fodder beets, potatoes, carrots, dandelion roots, rye, barley, oats, couch grass, acorns, beech nuts, and asparagus seeds, served as caffeine-less and weak roasted beverages, but at least provided consumers with their "daily warm drink."[99] Tea, meanwhile, could be brewed using any number of flowers, leaves, or fruit, but the lecture identified "strawberry, raspberry, and blackberry leaves" as being the most satisfactory.[100] Milk, being another drink of great concern to the German diet (particularly in relation to the feeding of children), was also the subject of new scientific research during the war. Aside from the usual milk *ersatz*, which was often simply watered down after the fats were removed (the removal of fat is what results in skimmed milk), many efforts were made to find ways to dehydrate milk and yogurt into powdered or tablet form. Experiments conducted in Berlin by the Milk Drying Society using a technique known as the Krause process were typical of these efforts. The eventual goal of these experiments in Berlin was to expand the process to a milk drying facility in Schleswig-Holstein which could distribute powdered milk to heavily industrialized regions, like the Rhineland, where chronic milk shortages persisted.[101] In theory, the creation of dehydrated milk held many potential benefits, including greatly extending its durability and allowing it to be more easily transported longer distances.

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[99] Max Müller, "The Economic Situation in Germany during June 1917, being the Thirty-fifth Month of the War," *BDFA*, vol. 11, 198; and ibid, "April 1916," *BDFA*, vol. 10, 87; Gustav Junge, *Unsere Ernährung. Eine Nahrungsmittellehre für die Kriegszeit. Für Schule und Haus.* (Berlin: O. Salle, 1918), 82, confirms that while *ersatz* coffee did not contain caffeine, by means of roasting ingredients an approximate taste and smell could be achieved, which lent to their popularity.
[100] Max Müller, "June 1917," *BDFA*, vol. 11, 198. In essence, *ersatz* tea was often simply an herbal tea, which may have lacked the stimulating effects of caffeine from the tea plant, but would otherwise have been a pleasant beverage.
[101] Ibid, "The Economic Situation in Germany in September 1917, being the Thirty-eighth Month of the War," *BDFA*, vol. 11, 343.

In practice, however, these dried milk products, once rehydrated, often resulted in a thin and watery liquid which failed to excite expectations.[102]

While the lofty hopes early in the war for the academic and scientific community to create food out of nothing failed to bear fruit, the actions of this group of actors were of crucial importance to the search for new substitutes. Research and laboratory testing on how to incorporate new ingredients into food products, or on how to process hardier plants and other organic material into *ersatz* fodder, expanded the options available to the German food system. Through their role as advisors and expert consultants, they helped to shape government food policy regarding the mandating of admixtures and higher milling rates for bread, as well as providing nutritional guidance on the suitability of new *ersatz* products. In time, they would even become an integral part of the government's regulation efforts to curb the worst of the abuses in fraudulent *ersatz* products.[103] Though many of their more desperate efforts were scorned by consumers, their successes (particular in shaping war bread) informed the efforts of the German food system to secure the food supply.

Profiting from hunger? Producers and entrepreneurs in *ersatz* development

In the triumvirate of *ersatz* food product development which existed between the government (which charted and regulated the course of *ersatz* production), researchers (who expanded the horizon of possibility for new products), and the producers, who

[102] Memo to the Medical Office of the City of Berlin from the Chemical Department regarding the testing of 'Ei-ersatz' and 'Milku', "Zu den Schreiben vom 25. Januar u.8.Februar 1916," 22 February 1916, BArch R 86/2175, 'Milku', a powdered milk product, was rejected for being too thin and also too expensive relative to its nutritional value. See Chapter 3.
[103] See Chapter 4.

were directly responsible for growing, baking, butchering, and processing the new substitutes, it is this last group whose role is the most difficult to grapple with. For starters, this is perhaps one of the largest and most diverse groups of actors described in this chapter, encompassing everyone from bakers, butchers, and fishmongers, to farmers, factory owners and brewers. In addition to the wide array of actors within this category, there is also a fairly wide range of motivations which guided their actions. For instance, if a factory owner contacted the government in 1914 to pitch the use of their factory to manufacture dried potato flakes, was this an altruistic example of earnest patriotism, attempting to do their duty by helping expand the food supply? Or was it perhaps a shrewd business calculation, with a nose towards future profits which would be generated from the hunger of a nation? Certainly as the war dragged on and the number of fraudulent food products began to rise, this question would become much more difficult to answer. This section will cover the role played by producers and entrepreneurs in the development of *ersatz* food products—how their cooperation with government efforts and academic research helped to bring *ersatz* food into being, and additionally, how they themselves shaped *ersatz* food through entrepreneurialism, fraudulent practices, and profit-seeking.

Let us begin with an examination of public-private cooperation between producers and government efforts, once again using the baking of war bread as an illustrative example. The most basic dynamic at play here is that of a pseudo-command economy, where the authorities dictated the terms of production by decree and, in theory, punished deviations from those decrees. For example, if the War Food Office declared that war bread could only be baked using a ratio of 50 percent wheat, 30 percent rye, and 20 percent potato flour (a typical recipe from June 1916), the owners of local and commercial bakeries had no choice but to comply with the decree or risk being fined or potentially imprisoned. That their key resource for baking bread—the

flour itself—was centrally controlled by means of monopolistic purchasing companies organized under the *Reichsgetreideamt* (Imperial Grain Office), only reinforced this dependence on government policy.[104] Similar dynamics existed for most of the major staple foods under centralized control: millers producing flour, butchers making sausage, the brewing of beer, dairy farmers extracting fats from milk, etc.

However, outside of this basic dynamic which came to animate a large portion of public-private cooperation in the food system, there was still ample opportunity for the pursuit of self-directed business opportunities for those with the capital and assets to contribute to the war economy. In fact, the development of new *ersatz* food products seems to have encouraged waves of entrepreneurial business activity to capitalize on the creation of new markets—or changes within pre-existing ones. An excellent demonstration of this phenomenon can be witnessed in the excited jostling of producers which occurred around the publishing of the Imperial Health Office report on the inclusion of dried potato products in bread on 30 November 1914. Months before the report was even released, newspaper articles discussing the focus of its research started to appear across the country, drawing the attention of factory owners to the new opportunity at hand: that is, the vast amounts of dried potato products which would be needed to meet the demands of baking this new war bread. One letter, addressed to the Imperial Health Office, arrived from a company in Saxony called Pieschel & Hoffmann, which specialized in the production of plate glass. However, in one of their facilities they possessed a large drying facility which they proposed could be put to use in the

[104] This is somewhat of a simplification, as the supply was split between self-suppliers (farmers, producers, etc.) and residents of self-supplying communities on one side, and the remaining consumers (urban dwellers, mostly) on the other. The Imperial Grain Office, directed shipments of grain from producers (minus the amount they needed to feed themselves) to various local authorities for distribution, relying on fixed maximum prices to guide transactions. For a breakdown of how the system functioned in greater detail see Max Müller, "The Economic Situation in Germany during June 1915, being the Eleventh Month of the War," *BDFA*, vol. 9, 224-5; and ibid, "October 1915," *BDFA*, vol. 9, 306-7.

production of potato flakes for war bread. As a result of the "chaos of war," the company stated that this facility was sitting idle, with only one-sixth of the company's workforce remaining after military mobilization.[105] The company therefore requested information from the office on how to produce potato flakes, as well as how those flakes could be incorporated into bread, including a paternalistic appeal that, "Under today's conditions, an industrialist has to be on the move and seize every opportunity that presents itself to possibly employ people who have lost their jobs."[106] The request was politely declined, pending the final results of the testing, and the company directed instead to the offices of the Research Institute for Grain Processing (*Versuchsanstalt für Getreideverarbeitung*) in Berlin.[107]

Another company from Zittau, going by the name of Zittauer Maschinenfabrik und Eisengiesserei Aktiengesselschaft, likewise submitted a letter to the Imperial Health Office in September 1914, but rather than offering an existing production facility which could be used to make potato flakes, they instead pitched the use of the "Rapid Channel Drying Apparatus 'S.K.'" manufactured by their company as the machine of choice to outfit new drying facilities (See Figure 1.1).[108] This apparatus, they claimed, was "suitable for drying potatoes in any form," and furthermore had already generated interest with American companies seeking to use it for similar purposes. The letter came with an attached picture and sales brochure for the machine, though notably the brochure appears to advertise the purpose of the machine as a means to dry linen,

[105] Letter from Pieschel & Hoffmann to the Imperial Health Office, 18 September 1914, BArch R 86/2144.
[106] Ibid.
[107] Letter to Pischel & Hoffman, 25 September 1914, BArch R 86/2144.
[108] Letter from Zittauer Maschinenfabrik to the Kaiserliches Gesundheitsamt, 21 September 1914, BArch R 86/2144.

cotton, wool and other fabrics. Nowhere in the brochure is the drying of food mentioned as a potential function of the machine, which casts some doubt on its usefulness.[109]

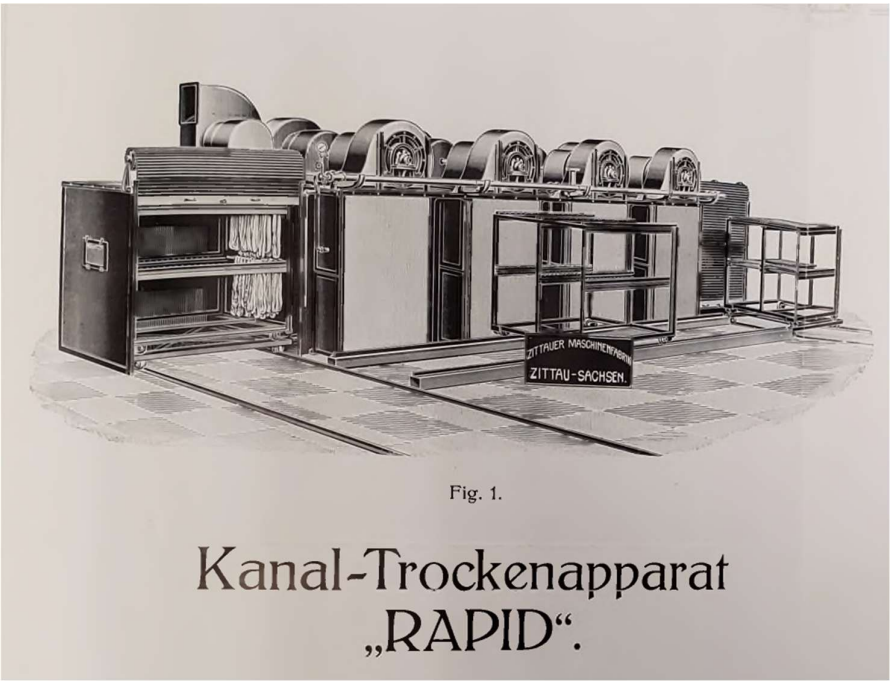

Figure 1.1 Rapid Canal Dryer, model "SK"

Some producers took a different tack entirely and made complaints to the Imperial Health Office regarding what they perceived to be a massive mistake in the direction of the country's nutrition. A bread manufacturer and miller from Berlin, named Theodor Schlüter, wrote a letter to the President of the Imperial Health Office, Dr. Franz Bumm, castigating him for conducting research on the use of potatoes in bread. In the interest of safeguarding "economics and hygiene," Schlüter insisted that "the suggestion to add 10% potato starch or potato flour to the bread in order to extend the bread flour is wrong," and that "it is absolutely impossible to use 20% potato starch in commercial bread production."[110] He conceded that such attempts might be possible in a small laboratory (as was then being proven through the Office's tests), but that it would prove

[109] Brochure, "Neuester Kanal-Trockenapparat 'SK' für Leinen-, Baumwoll- und Wollgarne loses Material, Copse, Kreuzspulen Strohgeflechte etc. etc.," BArch R 86/2144.
[110] Letter from Theodor Schlüter to President Bumm, 26 October 1914, BArch R 86/2144.

incredibly difficult for bakers to accomplish at large scale production. Aside from misgivings about its practical application, Schlüter opposed the use of potatoes on health grounds. Modern white bread, he maintained, already contained too many carbohydrates and not enough nitrogen or nutritional salts, and since potatoes were made up mostly of carbohydrates, it would be a "sin" against public health to allow the addition of potatoes to the bread. "The more the addition, the more serious the sin."[111] Instead of this unforgivable path, Schlüter advocated that milling rates for bread flour simply be increased to more fully incorporate bran into the final product—otherwise known as whole grain bread. This bread, he continued, would not only save the country bread grain; it would also improve the nutrition of the bread itself. Luckily, he mused, "Such a bread has been known for years as 'Schlüterbrot' and has already achieved sales due to its advantages alone, as can be seen in the attached list."[112] The list, pasted to the back of the letter, proudly proclaimed over 200 million pounds of Schlüterbrot consumed since 1907, with the slogan, "sustained success is the surest proof of the quality of the cause!"[113] (See Figure 1.2). Whether Schlüter sincerely believed in his message, or if the letter was a cynical attempt to draw attention to his pre-established product is unclear, and no response to the letter is found in the archival documents. In the event, however, the government the government disregarded his advice on avoiding admixtures, and instead pursued both courses of action—increased milling rates and admixtures were defining features of war bread in the latter half of the war.

[111] Letter from Theodor Schlüter to President Bumm, 26 October 1914, BArch R 86/2144.
[112] Ibid.
[113] Ibid.

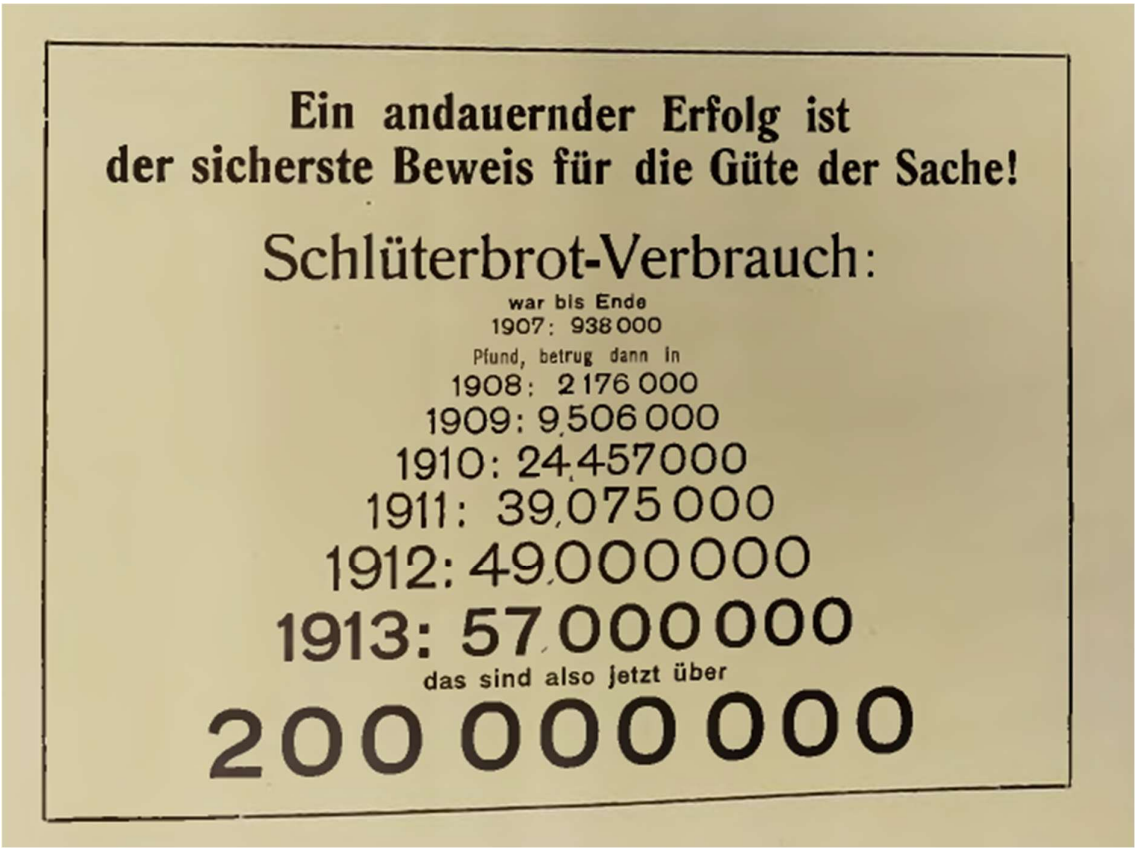

Figure 1.2 Consumption figures for Schlüterbrot in pounds since 1907.

In some cases, producers who contacted the Imperial Health Office about war bread were entirely uninterested in the production of potato products, but instead viewed the experiments on incorporating potatoes in bread as an open invitation to consider other admixtures for bread flour—specifically ingredients which were waste products of their primary business. In a February 1915 letter addressed to the Ministry of the Interior (*Ministerium des Innern*), the director of Societätsbrauerei Waldschlößchen in Dresden, Ludwig Froning, informed the Ministry, "in the public interest," that he had carried out experiments to replace part of the rye flour in loaves of rye bread with spent brewer's grains, composed of the barley or wheat which was leftover after the brewing process had extracted their sugars in the mash tun.[114] By

[114] Letter from Ludwig Froning to the Ministry of the Interior, 13 February 1915, BArch R 86/2144.

following his instructions, Froning promised savings of 10 percent of rye flour in the baking of rye bread, and claimed that the use of brewer's grains resulted in a loaf which was "very light, and therefore easy to eat," and that it was "undoubtedly much more nutritious, as the protein content of the spent grain […] is three times higher than that of all types of cereals."[115] In practice, tests conducted by the Research Institute for Grain Processing following Froning's instructions found that, while it was possible to bake the loaves with a 10 percent addition of spent brewer's grain, the resulting bread contained much more crude fiber, but only half as many carbohydrates as rye flour. And while the "smell and taste of the bread were acceptable […] the content of the husks and the husks of the malt proved to be very disturbing."[116] In conclusion, the Health Office could not support the use of brewer's grains as an admixture, as doing so would remove an important source of animal feed "without providing a corresponding benefit for human nutrition."[117] Furthermore, the report remarked in closing that were conditions ever to become so severe as to require the inclusion of brewer's grains in bread, the grains would be better utilized directly in the bread making process and cutting out their first use in beer production altogether—a judgment which was surely unideal from Froning's perspective.[118] A similar suggestion was made to the Imperial Health Office by a Master Butcher, Paul Schulzensohn, of Berlin, concerning the incorporation of bone meal (derived from boiled, dried, and ground up beef, veal, and pork bones) into war bread, which was also summarily dismissed.[119]

In addition to these attempted and actual public-private efforts which followed the direction of government food policy, the actions of producers were also heavily

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[115] Letter from Ludwig Froning to the Ministry of the Interior, 13 February 1915, BArch R 86/2144.
[116] Memo by Dr. Auerbach, "Verwendung von Biertrebern zur Brotbereitung," 4 March 1915, BArch R 86/2144.
[117] Ibid.
[118] Ibid.
[119] Letter from Paul Schulzensohn to the Imperial Health Office, 15 March 1915, BArch R 86/2144.

influenced by the market forces of supply and demand under the pressures of the economic blockade. Scarcity was obviously a powerful driver for new substitutes, not just as low supplies and high demands allowed for the greater extraction of profits (a cynical reading which was not always justified—producers were just as interested in avoiding famine as anyone else), but also for the more prosaic reasoning that extreme scarcity necessitated the finding of new sources of food to simply stay in business. In response to the pressure which brewers felt after more and more of their barley was removed from brewing by government decree, permission was granted them to loosen the constraints of the *Reinheitsgebot* (beer purity laws) which had governed brewing since the 16th century. Not only were smaller and smaller beers being brewed (in terms of alcohol content), but also "mixed" beers obtained by adulterating lager with beer brewed using caramel, or other sugars, as a cheap replacement for sugars normally derived from the malt.[120] Later experiments in brewing *ersatz* beer with turnips and beets were banned in Prussia, however.[121] Some boundaries, it seems, were clearly held as too sacred to cross even in times of great want.

Factories responsible for the manufacture of war jam (a mixture of preserves made using any fruit or vegetables at hand), as well as edible oil producing factories, likewise went to extreme lengths to procure new raw materials to manufacture their goods. Shortages of fruit, which produced the best tasting jam, resulted in factory procurement agents scouring the countryside for overlooked sources of fruit before turning to the large-scale purchasing of carrots for lack of a better alternative.[122] Regarding the production of oil, insufficient supplies of domestically grown or gathered oil-rich plants led many factories to turn to the few remaining overseas markets to fill

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[120] Max Müller, "The Economic Situation in Germany during May 1916, being the Twenty-second Month of the War," *BDFA*, vol. 10, 134. For small beer brewing, see Chapter 4.
[121] Ibid, "February 1918," *BDFA*, vol. 12, 110.
[122] Ibid, "October 1916," *BDFA*, vol. 10, 348.

their needs. “Seeds of various weeds, such as thistles, wild cabbage, teazles, corn-flowers, etc.,” were purchased in large quantities from neutral Sweden for export to Germany, where they were processed into oil.[123] Other businesses simply took advantage of the shortages to pivot their products into a new role in the food system. In response to shrinking supplies of sugar for fruit preserving in the household, a well-known chemical manufacturer in Darmstadt, E. Merck, introduced the new “Gedropan” preserving tablet, which they claimed could keep fruit and fruit syrups in good condition without the use of sugar. Marketed as innocuous and flavorless, they were sold for 25 pfennigs a tablet, which E. Merck claimed could preserve up to one kilogram of fruit.[124]

The shortage of meat sources to fill rations, particularly after the disastrously managed livestock culling of 1915, similarly pressured butchers, slaughterhouses, and sausage factories into searching for alternatives. In addition to increased imports of fish, an effort was made in March 1916 by the management of the Hamburg State Fisheries to popularize salted fish roe (cod, haddock, and salmon) as an alternative source of protein, which would be made available at fishmonger’s shops in Hamburg alongside recipes for their preparation.[125] Sausages, meanwhile, were increasingly filled using portions of the animal which would have been avoided in better times, and a much wider variety of animals in general started making their way into sausage links alongside the usual pork. Sausages made from the flesh of horses, goats, rabbits, or poultry provided, according to historian Ralph Lutz, “both in quantity and quality, an insufficient and relatively expensive substitute.”[126] The demand for horsemeat

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[123] Max Müller, “October 1916,” *BDFA*, vol. 10, 352.
[124] Ibid, “June 1917,” *BDFA*, vol. 11, 214. While the source did not say how it achieved preservation, it possibly made use of an acid, similarly to the other mentioned preservation methods. See ibid, “August 1917,” *BDFA*, vol. 11, 299.
[125] Ibid, “March 1916,” *BDFA*, vol. 10, 43.
[126] Ralph Haswell Lutz, ed., *The Causes of the German Collapse in 1918: Sections of the Officially Authorized Report of the Commission of the German Constituent Assembly and of the German*

specifically became a major issue later in the war, as the trade in horses for eating became so brisk that it risked making this important animal more valuable as food than as a source of labor, prompting tighter restrictions on its trade.[127] The demand for new sources of meat became so intense as the war dragged on, that it even encouraged the purchasing of exotic forms of meat from producers in neutral countries. It was reported that offal from "almost every beast killed in Denmark is exported to Germany," where it was processed to extract valuable fats, and that imports were also being made of whale and seal meat for human consumption, with both seal and walrus meat appearing on the menu for a canteen at a Krupp's factory in April 1917.[128] Dutch newspapers also frequently contained references to a brisk trade in cat and dogs between the Netherlands and Germany, both for oil extraction and for consumption—a story which Max Müller suspected might be true given the appearance of German newspaper advertisements regarding the slaughter of dogs in March 1917, but which may be apocryphal.[129]

Perhaps one of the most interesting alternative meat sources that producers turned to were the large quantities of mussels which were harvested off the coast of the Netherlands. A letter written by a Dutchman to his relative in New York detailed the extent to which life in Harlingen revolved around the trade of mussels to Germany:

> The whole village is now a factory. Everybody is cooking mussels, which are sold at 32 cents per kilogramme, salted and packed in barrels containing 100 kilog., which are sent off to Germany. There are no mussels left in Zeeland now, for all the other villages, Alkmaar, Texel, &c., are doing the same thing.[130]

Reichstag, 1919-1928, the Selection and the Translation Officially Approved by the Commission, trans. W.L. Campbell (Stanford: Stanford University Press, 1934), 182.

[127] Max Müller, "The Internal Situation in Germany during June 1918, being the Forty-seventh Month of the War," *BDFA*, vol. 12, 252.

[128] Ibid, "July 1917," *BDFA*, vol. 11, 237; ibid, "March 1917," *BDFA*, vol. 11, 75; ibid, "December 1916," *BDFA*, vol. 11, 23; and ibid, "June 1917," *BDFA*, vol. 11, 197.

[129] Ibid, "March 1917," *BDFA*, vol. 11, 75.

[130] Ibid, "December 1916," *BDFA*, vol. 11, 23.

In November 1916, the Dutch newspaper, *Nieuwe Rotterdamsche Courant*, reported that as many as four million kilograms of mussels were landed in the area for processing, with nearly the entire amount consigned to Germany.[131] The extent of this trade is corroborated in a letter from a merchant in Hamburg, which noted that he possessed stores of 40,000 pounds of salted mussels imported from the Netherlands, which he sold to slaughterhouses in Berlin in large quantities for the manufacture of *ersatz* black pudding and liver sausages.[132]

Finally, any discussion of the role played by producers and entrepreneurs in *ersatz* development has to include the explosion of 'worthless' or 'fraudulent' products which appeared alongside sincere efforts at substitution. Anecdotes about these products, which were present at all stages of the war, but which ballooned in number after the experiences of the Turnip Winter, are the typical source material of historians seeking punchy quotes to illustrate the deprivation and the breakdown of social and moral norms which characterized the German home front from 1917-1918. Chapter 4 of the dissertation provides a more detailed account of how government authorities attempted to address this boom in fraudulent products, but suffice to say, the scarcity of many foods central to the German diet during the war provided fertile ground for unscrupulous producers to profit from desperation.

Ersatz salad oils proved particularly susceptible to frauds or price gouging, as liquids were relatively easy to adulterate. One such example, which appeared on the market in early 1916, consisted of a watery solution dyed yellow with coloring additives. It presented visually as a run-of-the-mill salad oil, but was found to contain 98.6 percent water content, with 1.4 percent dry stuff in suspension. The price of this 'oil', at 1.4-1.6 M. per liter, far exceeded what little nutritional worth it might have

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[131] Max Müller, "December 1916," *BDFA*, vol. 11, 23.
[132] Ibid, "March 1917," *BDFA*, vol. 11, 94.

provided, which was doubly harmful to the consumer as the cost of living was so dear.[133] Another common fraud was the treating and dressing up of mineral oils as oil suitable for cooking or consumption. In April 1917, articles began to appear in newspapers boasting that a new chemical process had been found which could prepare mineral oils for kitchen use. This chemical process, the articles asserted, made it possible to do away with mineral oil's strong taste and smell, thereby making it fit for eating. The periodical, *Drogenhändler*, however, issued a warning against such products, writing that whether they could be made palatable was not the issue, but rather that they contained practically no nourishment and that their consumption could be injurious to one's health.[134]

One article in the *Frankfurter Zeitung* from 6 March 1916 referred to cases of cheap sausages which contained indigestible cattle products and butter substitutes which consisted of sour milk curds and yellow dye additives.[135] Further articles in the *Deutsche Tageszeitung* later that month stated that multiple cases of tinned meat, preserved fish, and milk preparations (likely milk powder) had been exposed to the public as fraud, while one item sold as an egg substitute consisted primarily of potato flour and maize flour, with bicarbonate of soda and dry milk powder.[136] While these types of 'complete' *ersatz* products were permitted, they had to be clearly labelled as such and could not pass themselves off as containing the genuine article, which may offer a clue as to why the item listed in this article drew such ire. Egg substitutes, for example, were restricted in what words and symbols they could use in their marketing if they did not contain any actual eggs in their ingredients.[137] Misrepresenting products

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[133] H. A. G. Watson, "Inclosure in Doc. 2. Notes on Germany," *BDFA*, vol. 10, 20.
[134] Max Müller, "The Economic Situation in Germany during April 1917," *BDFA*, vol. 11, 134.
[135] Ibid, "March 1916," *BDFA*, vol. 10, 38. See page 214 for the full quotation.
[136] Ibid.
[137] "*Richtlinien zur Begutachtung der Ersatzlebensmittel*," 27 June 1919, BArch R 86/2174. See Chapter 4 for more discussion.

was an issue which also affected the sale and consumption of horsemeat, with cases of horsemeat sausages being passed off as goat meat or even reindeer sausages later in the war.[138]

War bread was also the target of fraudulent practices, even in the opening months of the war before the food crisis reached serious levels. In addition to obvious cases of bread adulteration which sometimes occurred during the baking process (e.g. cutting bread flour with sawdust or chalk), which were largely motivated by greed on the part of the baker, bread manufacturers themselves could become the victim of fraudulent practices. In March 1915, multiple bread factories in Essen were deceived into purchasing potato pulp (a waste product used as animal feed) from companies who assured them that it was a suitable and permissible ingredient for baking war bread. To substantiate their claims, the sellers provided statements that many other bread manufacturers had already purchased the product and were happy with its performance, submitting multiple reorders. In reality, this was a ruse, as potato pulp was clearly not suited as a substitute for potato flour or potato flakes in baking bread—consisting mainly of the peel, fiber, and water content of potatoes processed for other purposes.[139] When confronted over these illegal activities, the sellers feigned ignorance, claiming "that they did not sell potato pulp as suitable for baking, but that they did not care what the buyer did with the potato pulp."[140] Such tactics were easily refuted, however. "It is certain," reads the announcement regarding these cases, "that a company in Essen still wanted to sell potato pulp to bread factories when it knew without a doubt that it was not a baking agent, but animal feed."[141] Bread manufacturers affected by the deception

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[138] Max Müller, "The Internal Situation in Germany during September 1918, being the Fiftieth Month of the War," *BDFA*, vol. 12, 379.
[139] "Warnung vor dem Ankauf von Kartoffelpülpe und deren Verwendung zur Brotbereitung," BArch R 86/5441.
[140] Ibid.
[141] Ibid.

of these sellers were therefore permitted to contest their purchases of this fraudulent product in court.

In some cases of fraud, physical food products never even needed to change hands. Such was the case with the sale of "proven" recipes for substitute products, which became a major issue in 1917-1918. Alongside the flood of countless other *ersatz* food products which appeared during this period, advertisements for *ersatz* recipes began to appear in newspapers and periodicals across Germany. A typical example of this could be found in the advertisement of "Proven Secret Recipes and Instructions" in the pages of the Braunschweig-based *Gemüse- und Obst- Anzeiger* on 28 December 1916 (see Figure 1.3). The advertisement was taken out by a company called "Perozon," a chemical factory in Senftenberg, and promised its readers the delivery of a number of *ersatz* recipes derived from practical experience, and requiring only simple manufacturing processes without the use of industrial machinery—thus offering anyone with an enterprising spirit the opportunity to establish their own *ersatz* manufacturing business in exchange for a small sum of money.[142] Upon writing to the company, a catalog of recipes would be mailed to the interested party, which included recipes for sixty-five *ersatz* products, as well as the addresses of trusted supplies from which materials could be sourced (see Figure 1.4). The recipes on offer included such items as meat extracts, soup seasonings, salad oil substitutes, goulash sauce powder, artificial powdered jam, egg substitutes, and artificial honey.[143]

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[142] "Bewährte Geheim-Rezepte und Vorschriften," *Gemüse- und Obst- Anzeiger*, 28 December 1916, BArch R 3601/750, p. 2.
[143] Brochure, *Geheime Fabrikations-Rezepte und Herstellungs-Vorschriften "Aus der Praxis, für der Praxis"*, BArch R 3601/750, pp. 8-14.

Figure 1.3 Advertisement for substitute recipes

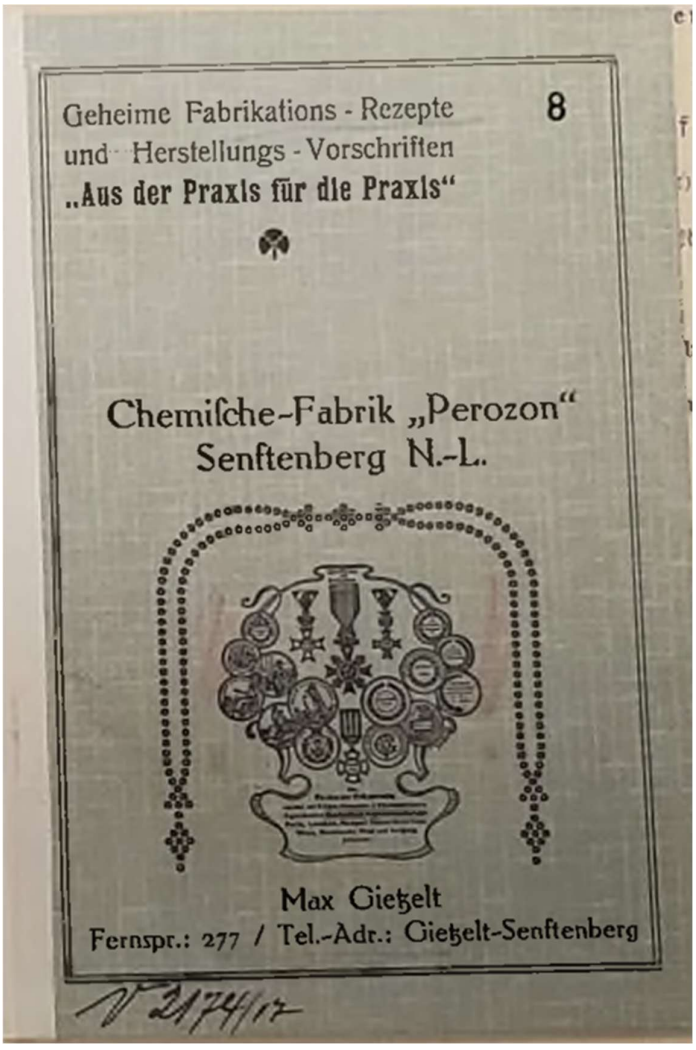

Figure 1.4 Substitute recipe brochure

Descriptions of the available recipes also helpfully provided estimates of the costs associated with producing the product, as well as recommended sales prices, with some recipes promising up to a fifty percent return on investment. The description for recipe No. 27. 1a. "Artificial Honey in a solid, lard-like consistency," is reproduced here to illustrate how the recipes were marketed:

> This is the best artificial honey recipe there is. This artificial honey has an impeccable taste and is a first-class national food. The recipe comes directly from a large artificial honey factory. The goods are sold in 1 pound packages. 100 pounds produced for approx. 20-25 M. Sales price 36-38 M. per 100 pounds. Recipe fee 25 marks.[144]

Other recipes, like the recipe for artificial meat extract, appealed to the potential buyer through testimonials to its success. This recipe, the brochure claims, "comes from a 20-year-old factory, whose owner retired after making a fortune with it."[145] This proven track record, along with the promise that hotels, military canteens, and restaurants frequently purchased this product in large quantities, served to justify the recipe's eye-watering price tag at 100 M.[146] In regard to the purchasing of recipes once they were selected, the brochure instructed the buyer that the instructions would only be dispatched against advanced payment and that orders could not be rescinded. Furthermore, customers were warned that due to the large selection of recipes on offer, no samples of individual recipes could be provided, though continued customer service was promised to be provided to valued customers through mail correspondence.

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[144] Brochure, *Geheime Fabrikations-Rezepte und Herstellungs-Vorschriften "Aus der Praxis, für der Praxis"*, BArch R 3601/750, p. 13.
[145] Ibid, p. 10.
[146] Ibid.

"Recipes are a matter of trust," reads the brochure's foreword, "and I guarantee the success of my recipes up to the amount of the fee."[147]

The number of these recipes which were appearing in papers following the experiences of the Turnip Winter greatly alarmed the authorities. A memo from the Lübeck branch of the Central Office for Combating Fraudulent Companies (*Zentralstelle zur Bekämpfung der Schwindelfirmen*) to the Economics Department of the War Food Office (*Volkswirtschaftliche Abteilung des Kriegsernährungsamts*), dated 24 July 1917, urgently requested the Economics Department to pay attention to the damage done by such recipes and take steps against their free distribution.[148] "Not only are customers being charged a lot of money for processes that are mostly completely worthless or well-known," the memorandum reminded its readers, "but large quantities of raw materials are also at risk of being spoiled by the use of these useless recipes."[149] Aside from the damage done to customers' pocketbooks, the widespread distribution of *ersatz* recipes and the products they created posed a threat to the stability of the food supply by encouraging the slow erosion of raw materials or ingredients that could be put to better use elsewhere. To combat this trade in recipes, the Ordinance on Trade in Food and Animal Feed and on Combatting Chain Trade, which came into effect on 24 June 1916, was extended in July 1917 to prohibit the advertising and sale of *ersatz* recipes without prior state approval.[150]

From these examples, it is clear that producers and entrepreneurs played a central role in development of *ersatz* food products during the war. While the

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[147] Brochure, *Geheime Fabrikations-Rezepte und Herstellungs-Vorschriften "Aus der Praxis, für der Praxis"*, BArch R 3601/750, p. 10.
[148] Memo from the Central Office for Combating Fraudulent Companies to the Economics Department of the War Food Office, 24 July 1917, BArch R 3601/750, p. 26.
[149] Ibid.
[150] Memo from the Economics Department of the War Food Office to the Central Office for Combating Fraudulent Companies, July 1917 (unclear date), Barch R 3601/750, p. 27.

government may have guided the overall direction of the country's efforts to ensure the food supply, the actual manufacturing of such products would not have been possible without the close cooperation and buy-in of producers in the food system. The question, however, of whether producers participated in the development of these substitutes out of an altruistic desire to support the war effort, or if they were simply lured by the promise of money, is one which remains difficult to definitively answer. The efforts of some producers to actively contact the government with suggestions for new products could be interpreted as an earnest desire to do good, just as easily as they could be interpreted as cynical profit-chasing by more extensively exploiting the resources at their disposal. The ample evidence of fraudulent or nutritionally dubious *ersatz* production during the war certainly highlights the ample opportunities for abuse, but even those producers may have believed in the potential value of their activities. In the end, the conditions created by the food crisis allowed room for both

Educators, housewives, and the dissemination of *ersatz* food

The final, and perhaps most widespread group of actors involved in the development of *ersatz* food products were the lecturers, educators, and various housewives associations and other agricultural and household associations which were mobilized from the beginning of 1915 to help bring the government's food policy to millions of households scattered across Germany. A number of reasons motivated the organization of these efforts. First, the government's strategy for securing the food supply, as outlined in the findings of the Eltzbacher Commission, relied on the adoption

of wartime economy measures across the entire population.[151] Their overly optimistic projections were predicated on the slashing of overconsumption across the population, particularly in the categories of protein and fat, which the report's authors concluded were over-represented in the German diet.[152] Recommendations were further made in the report that large savings in nutrition could be gained through the recycling of cooking fats and oils, as an incredible amount of fat was calculated to be lost through the sewers on a daily basis.[153] Second, the development of new *ersatz* food products—particularly war bread baked with potatoes—but also the introduction of unfamiliar meat, plants, and root vegetables into the diet, necessitated some level of instruction on how to correctly prepare meals with them in order to avoid costly mistakes which might lead to food waste. The emphasis on war bread here is due to the fact that in 1914, many households outside of the urban centers still relied on home baking to obtain their daily bread.[154] The same logic which motivated the training of professional bakers to account for the inclusion of new ingredients thus held true for households as well, providing an additional incentive for the establishment of an education program. Lastly, it was also a matter of some importance to morale that these new items not be incorporated slapdash into the diet, but rather as dishes which were familiar and fitted into the food culture, a consideration which clearly influenced the writing of war cookbooks as part of this process.

The foundation stone of the education scheme was the organization of a six day conference in Berlin, which ran from 18-23 January. Hosted in the ballroom of the House of Representatives, this conference, which bore the lengthy title "War Course for Agricultural Home Economics and Itinerant Teachers and for Housewives and

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[151] For details on the findings of the Eltzbacher Commission, see Chapter 4.
[152] Eltzbacher, *Germany's Food*, 187-8.
[153] Ibid, 209.
[154] Max Müller, "April 1915," *BDFA*, vol. 9, 154.

Daughters in Rural Areas," was organized through the efforts of eleven women's associations from across Germany, under the sponsorship of the Minister of Agriculture, Dr. Freiherr von Schorlemer-Lieser.[155] Notable organizing associations included the Agricultural Housewives' Association, represented by Elisabeth Boehm-Lamgarben (the founder of the rural women's movement and future chairwoman of the Reich Federation of Agricultural Housewives' Associations), the Refeinsteiner Association for Economic Women's Schools, represented by Ida von Kortzfleisch in one of her final engagements in a long career of promoting the education of women in the countryside, and the Association for the Improvement of Women's Home Economics, headed by the impressive Hedwig Heyl—a member of the Eltzbacher Commission, future founder of the German Housewives' Association, and future member of the Advisory Board of the War Food Office.[156] Attendance at the training course was free for recognized home economics teachers and land managers, with all other attendees being required to pay a fee of 5 M. to cover expenses, though the Minister for Agriculture agreed to provide a limited number of subsidies for rural itinerant teachers to attend the course, with 20 M. each being offered to cover travel and lodging expenses for the week.[157]

The mission statement of the training course, as expressed in both its brochure and the report on the course's activities which was submitted following its completion, was:

> to make agricultural home economics and itinerant teachers, farmhands, housewives and daughters in the country familiar with the special demands that war places on economic conditions and in particular on domestic affairs in the countryside and in small towns […] to work toward the greatest economy in the

[155] Pamphlet, "Krieg-Lehrgang für landwirtschaftlife Haushaltungs- und Wanderlehrerinnen und für Hausfrauen und Töchter auf dem Lande," n.d., SächsStA, 10736 Ministerium des Innern, 16619.
[156] Ibid.
[157] Ibid.

> nutrition of the people and in the use of feedstuffs relevant to the maintenance of livestock.[158]

The opening speech, delivered by Countess von Schwerin-Löwitz of the Evangelical Women's League and attended by Kaiserin Auguste Viktoria, reinforced the role which women and housewives would play in advancing the efforts of the government's food policy. In a particularly impassioned section of her speech, she declared, "The call for 'women to the front,' which has been addressed to us in the press for some time, should not go unheard. Yes! We are grateful for this wake-up call! And the lectures of the war course should show us how we women can and must help to support and maintain the economic military power of our people."[159]

Each day of the war training course was chaired by one a representative of one of the organizing women's associations and included a series of lectures by visiting experts which were then followed by practical demonstrations organized around Berlin. To provide a sample program for one of the days, the first day began in the early morning with an introduction to the tasks and objectives of the course given by Elisabeth Boehm-Lamgarben. From 9:30 to 10:30 AM, the participants were given a lecture by the Privy Medical Councilor, Professor Max Rubner, entitled "The Nutrition of the German People in Peace and in War." From 10:45 to 11:45 AM, Rubner's lecture was followed by two further lectures entitled, "How should the household kitchen and cellar be organized during the war?" and "Emergency kitchen," delivered by Klara Schleker and Hedwig Heyl, respectively. After a brief pause for lunch, the course resumed with afternoon visits to Lette-Haus (a technical school for girls) and

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[158] Report, "Zur Erinnerung an den Kriegs-Lehrgang für landwirtschaftliche Haushaltungs- und Wanderlehrerinnen und für Hausfrauen und Töchter auf dem Lande," 16 February 1915, SächsStA, 10736 Ministerium des Innern, 16619, p. 4. Agricultural home economics was a combination of agriculture and home economics, to educate rural and framing households how to more efficiently and rationally manage their households.
[159] Ibid, p. 10.

Pestalozzi-Fröbel-Haus (a cooking and home economics school) from 3 to 5 PM for practical demonstrations of the material covered in the lectures. Finally, a break for dinner was followed by an hour and a half of discussion regarding the day's topics from 8 to 9:30 PM.[160] Other lecture topics during the six day course included talks on fruit and vegetable cultivation in wartime, the raising and feeding of poultry and livestock, the cultivation and fertilization of field crops, and a series of instructive lectures on navigating insurance, credit and loans, and the marketing and sale of agricultural products once they were harvested. Further visits were organized to sites such as Bolle Dairy, the Royal Gardening Institute in Dahlem, and the Research Institute for Grain Processing, among others.[161] The lessons learned from these lectures and demonstrations were of great importance to German housewives and the food system as a whole—not only in terms of the economy measures which reduced household consumption, but also in educating the wives and daughters of farmers on how to manage their farms in the absence of mobilized men. Given the extensiveness of military mobilization, it is not exaggerating to say that the success of Germany's wartime agriculture hinged on the education and support of these women.[162]

The visit to the Research Institute for Grain Processing was of particular importance for encouraging the adherence of home baking to government bread policy. There, a lecture was given by the director of the institute, Dr. Max Paul Neumann, who explained to the attendees how to properly incorporate the use of dried potato products into bread baking at home. Focusing on the differences between the various potato products available to consumers (starch, rolled potato flour, potato flakes, and the much

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[160] Report, "Zur Erinnerung an den Kriegs-Lehrgang für landwirtschaftliche Haushaltungs- und Wanderlehrerinnen und für Hausfrauen und Töchter auf dem Lande," 16 February 1915, SächsStA, 10736 Ministerium des Innern, 16619, p. 12.
[161] Ibid, pp. 12-7.
[162] Ziemann, *War Experiences*, 3. "From 1914 to 1918 around half the soldiers in the Bavarian army and about a third of those in the German army as a whole worked in agriculture in civilian life."

rarer dried flour from raw grated potatoes) Neumann described how each product would affect the water absorption of the dough, and offered tips on how to prepare the dough, baking temperatures, and timing in order to produce the highest quality loaf. Most importantly, Neumann's lecture expressed the importance of reiterating to home bakers that even bread loaves baked in the home must be baked in accordance with existing law regarding the inclusion of potato products (at the time, a minimum of 10 percent content by weight, or higher than 20 percent if properly labeled for sale), with appeals to the "duty of the housewife" to encourage adherence to the law in a space where enforcement was impractical, if not impossible.[163] To this end, additional instruction was provided on how listeners could prepare their own potato admixtures from supplies on hand if commercial produced sources were unavailable, including a brief mention of flour derived from turnips which presaged the direction that war bread would later take in the war.[164]

Finally, the training course offered a forum for the organization of subsequent training courses throughout the countryside, with resources and suggested itineraries and lecture topics provided to attendees to take back to their communities. Almost 650 participants attended the course (192 recognized educators and land managers, and 458 other participants), and the intention was for the Berlin course to serve as the nucleus for a vast network of secondary war training courses which would then be organized using the lessons learned in Berlin.[165] In the organizing which took place around the training course in Berlin, the women's associations submitted multiple requests to the Minister of Agriculture and the Minister of the Interior regarding next steps in the education of the countryside. The first was to establish advisory centers in all rural

[163] "Zur Erinnerung an den Kriegs-Lehrgang," SächsStA, 10736 Ministerium des Innern, 16619, p. 42-4.
[164] Ibid, p. 44.
[165] Ibid, p. 56.

communities of the empire. In theory, the district administrators would appoint "a person of trust" for each locality, such as an experienced farmer, who would be obliged to provide "expert and selfless advice" to women who ran their farms in lieu of their husbands, on all professional issues that might arise. These persons of trust would also serve as mouthpieces for government communication, informing the women in their community if changes in regulation occurred and could intercede on their behalf with the newly forming war company monopolies. The establishment of these advisory offices would therefore "create a link between the farmers' wives and the Chamber of Agriculture, the cooperatives, etc., and with those bodies that can most effectively represent their economic interests."[166] The second request, as was previously alluded to, was for the creation and sponsorship of short training courses throughout the countryside through the various undersigned associations, who "through their provincial and branch associations and individual members, [are in a position] to carry out effective advertising for the recommended measures in rural communities […]"[167]

Submitted alongside the aforementioned requests were two sample itineraries for how these secondary courses might be organized: one as a three-day condensed course, and the other as a much longer six-day course, more akin to the one delivered in Berlin. Both courses began with a lecture which discussed the importance behind these wartime economy measures and reinforced the patriotic duty of women to safeguard the Fatherland through their practice.[168] The main difference between these secondary training courses and the Berlin course was that the rural courses more strongly emphasized practical demonstrations of cooking wartime dishes, with particular effort being directed towards advocating and demonstrating the use of the *Kochkiste* (cooking

[166] "Zur Erinnerung an den Kriegs-Lehrgang," SächsStA, 10736 Ministerium des Innern, 16619, p. 49.
[167] Ibid, p. 50.
[168] Ibid, pp. 53-4.

box). This device was a low-tech predecessor to modern slow cookers, and could be made from any wooden box with a tight-fitting lid, into which a pot or two could be packed surrounded by straw, fabric, or some other insulating material. The idea behind this device was that a dish could be cooked halfway through and then the pot would be placed inside the box, where the insulation would trap its heat and slowly continue the cooking process while preserving cooking fuel. This device would become a symbol of wartime cooking, with its description and instructions for use appearing in multiple war cookbooks, as well as in the demonstrations of various training courses.[169] Dishes which were to be demonstrated in these secondary training courses included multiple potato and vegetable-based soups and pulse dishes which all could be cooked in a *Kochkiste*, as well as demonstrations of bread baking with additives, and also on how to prepare dishes using skimmed milk (an unfamiliar inclusion in the diet) and artificial honey.[170] To provide further support for these efforts in organizing secondary training courses, organizers in Berlin also provided a list of nine war cookbooks already in publication (including one written by Heyl herself), as well as a directory of sixteen respected agricultural home economics and itinerant teachers and land managers who participated in the Berlin course and who could be contacted as required.[171]

Organizers planned to hit the ground running and announced the establishment of new training courses, model kitchens, and advisory centers from February 1915 onwards. Women's associations around the country urged municipal governments to set up their own model kitchens and advisory centers, whereas Heyl and other organizers remained active in Berlin, hosting additional lectures and exhibitions on how to cook using various types of unfamiliar oil which were appearing on the market. Authorities in

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[169] "Kriegskochbuch. Anweisungen zur einfachen und billigen Ernährung," Hamburg 1914, SächsStA, 10736 Ministerium des Innern, 16619.
[170] Ibid, p. 53.
[171] Ibid, p. 57.

Hamburg, meanwhile, organized groups of educators who could visit the estates of wealthy Germans to instruct entire household staffs on the new practices of war economy.[172] By October 1915, the scale of the effort had become apparent even to observers in the British Foreign Office, who remarked on the "Travelling lecturers […] being trained at the Ministry of the Interior to discourse on 'the people's food in war time,'" and noting the creation of information bureaus, model kitchens, the distribution of weekly menus, and finally the creation of cheap 'people's restaurants' where food could be efficiently produced and cheaply obtained.[173] The effort and attention given to the issue of educating the population (mainly housewives) on wartime economy was directly proportional to the influence which these individuals held over the success of the government's food policy. Heather Perry is rather correct in her essay, "Onward Kitchen Soldiers! Gender, Food, and Health in Germany's Long Great War," in asserting that "The blockade was making daily decisions about food *matter* in unprecedented ways and the nation's very survival depended upon the *household skills* of Germany's women,"—a reality which Hedwig Heyl and her fellow organizers clearly realized.[174]

In addition to this extensive education which relied on in-person instruction, a great deal of effort was also poured into communicating wartime economy and *ersatz* cooking skills through written media. Cookbooks, leaflets, and newspaper articles could be printed *en masse* and had the potential to reach a much larger audience than any amount of in-person training could achieve, despite the benefits of hands-on instruction which the training courses allowed. From the end of 1914 onward, women's associations, municipalities, and enterprising individuals all participated in the

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[172] Heather R Perry, 'Onward Kitchen Soldiers! Gender, Food and Health in Germany's Long Great War', in *Food, Culture and Identity in Germany's Century of War*, ed. Heather Merle Benbow and Heather R Perry (Cham: Palgrave Macmillan, 2020), 29.
[173] Max Müller, "October 1915," *BDFA*, vol. 9, 306.
[174] Perry, "Kitchen Soldiers," 29.

publication of war cookbooks, with multiple avenues of approach. Some war cookbooks, published early on in the war, were simply a repackaging of earlier cookbooks catering to lower income households and utilizing cheap recipes from Germany's poorer, more agrarian past that were given new life in the context of wartime economy measures. Such was the case with one of the cookbooks listed in by the Berlin training course, *People's Cookbook: detailed instructions for cooking cheap, hearty and tasty meals; for use in home and school*, published in 1912 by Ida Rudolph and Martha Riemschneider.[175] Others were purpose-written projects which came prepackaged with introductions explaining the strategic and economic position of Germany during the Great War and appealing to readers to commit themselves to the struggle of securing the food supply through their own economizing measures. Such books, like the Hamburg-published *War Cookbook* of late-1914, were primarily focused on achieving the wartime economy goals through suggesting recipes and weekly menus which made greater use of vegetables and potatoes, and less use of fats and proteins. Many of the provided recipes were soups or otherwise made with pots in order to make use of the provided instructions for cooking with a *Kochkiste*. Further instructions were also provided to educate readers on how to rehydrate and prepare klippfish and stockfish (salted and unsalted dried cod, respectively), a cheap protein sourced from the neutrals along the North and Baltic Seas which was suggested as a substitute for the scarcer, more expensive beef and pork.[176]

Then there were the war cookbooks which came later in the war and expanded their treatment on the use of *ersatz* food products in the kitchen. Such cookbooks, like *The New Rutabaga War Cookbook*, published by Ida Keller in 1917 in response to the

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[175] Ida Rudolph and Martha Riemschneider, *Volks-Kochbuch: ausführliche Anleitung billig, kräftig und schmackhaft zu kochen ; zum Gebrauch in Haus und Schule*, 3., verb. und verm. Aufl (Salzungen: Scheermesser, 1912).

[176] "Kriegskochbuch. Anweisungen zur einfachen und billigen Ernährung," Hamburg 1914, SächsStA, 10736 Ministerium des Innern, 16619.

experiences of the Turnip Winter, included multiple versions of recipes including these unfamiliar ingredients in an attempt to inspire housewives who were forced to incorporate them into their cooking.[177] Keller's book, which enticed readers with a sneak-peak on the cover for a 'turnip-flesh extract' ("What many people don't know! By boiling the water from boiled turnips, or the juice pressed out from them, an excellent turnip meat extract can be obtained which is suitable for dipping in roasts."[178] Figure 1.5), contained 50 new recipes for cooking swedes organized around regional flavors and ingredients, which was helpful for housewives who suddenly found their potato rations being replaced almost entirely with swedes and turnips during that hard winter. Beyond the recipes themselves, the book also contained an introductory primer to the root vegetable, preservation and storage techniques, as well as general nutritional information for the vegetable and other commonly consumed products to aid housewives in planning their family's nutrition.[179]

[177] Ida Keller, *Neues Kohlrüben-Kriegskochbuch* (Chemnitz: Robert Friese, 1917).
[178] Ibid.
[179] Perry, "Kitchen Soldiers," 32.

Figure 1.5 The text inside the box gives a preview of one of the fifty recipes contained inside.

Even more so than cookbooks, however, leaflets and newspaper articles came to provide the primary means by which to communicate new instructions, new recipes, and new regulations to individual consumers throughout the country. The reasoning is quite simple: new leaflets could be issued with up-to-date information far faster than new cookbooks or training courses could be put together, and in the case of newspapers, in a form of media which was already present in many households, or at least accessible on a frequent basis. While training courses and cookbooks remained an important repository of skills and information, leaflets and articles could individually target points of interest

or concern.[180] Posters and flyers circulated by the National Women's Service (*Nationaler Frauendienst*) provided information on how to best recycle kitchen waste, suggested new uses for potato peels, and gave instructions on how to dry out one's ration of swedes.[181] Another pamphlet, published by Max Stoll in Leipzig in 1915, contained a point-by-point examination of where nutritional value was lost in the kitchen and how to better prepare foods to preserve their value (avoid boiling milk, never desalt klippfish in cold water, always cook potatoes with the peel on unless you have animals to feed the peels to, etc.)[182] Leaflets could also quickly be distributed to warn consumers against the purchase of fraudulent or nutritionally worthless *ersatz* food products, as happened with a notice published by the Women's Advisory Board of the War Food Office (*Frauenbeirats des Kriegsernährungsamts*) on 8 October 1918, which called on housewives to only purchase official approved *ersatz* products. "Housewife," the notice pleaded, "buy only officially approved foodstuffs! Please ask for proof of official authorization when purchasing. If you think something is wrong, contact the police! […] become as ruthless towards experienced fraudsters as they were towards you before!"[183]

It was through this combination of training courses, cookbooks, and other published materials that educators and women's associations (with government support) attempted to weld housewives and their kitchens to government food policy. Although not exclusively concerned with *ersatz* food products, such efforts were inextricably tied

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[180] See Heinzelmann, *Beyond Bratwurst*, 240-1.
[181] Perry, "Kitchen Soldiers," 33.
[182] Leaflet, "Die Entwertung unserer Nahrungsmittel durch Eiweißvergeudung in der Küche," January 1915, SächsStA, 10736 Ministerium des Innern, 16619.
[183] "Deutsche Hausfrau! Üb' Vorsicht beim Einkauf von Ersatzlebensmitteln!," 8 October 1918, BArch R 86/2174. See Chapter 4 for a more detailed discussion about official efforts to combat *ersatz* fraud in 1918.

to the popularization of those products, and supplied consumers with the know-how required to successfully incorporate them into their diets.

Hunting, foraging, and self-sufficiency: *ersatz* from nature

The typical image of an *ersatz* food product portrayed in histories of the First World War is one of an ultra-processed 'Franken-food'—adulteration with strange ingredients, chemical treatments in order to make the item edible, or frauds with vanishingly little nutritional value are what the word '*ersatz*' conjures to the mind. Even swedes, which functioned as a 'complete' one-for-one substitute for potatoes seem to carry an air of wrongness about them—laden as they are with contemporary perceptions of the vegetable as being fit only for fodder. Such an image of *ersatz* food, however, is an incomplete picture overly concerned with the word's connotations of artificiality and inferior quality. In reality, a much more expansive definition of the term, simply as a substitute for typically consumed food products due to shortage, sees our purview of the development of *ersatz* food products widen into the activities of animal rearing, foraging, and hunting. All of these activities have the potential to elevate the consumer to the role of *ersatz* producer, extracting substitute foods from nature. Hunting game, foraging for mushrooms, and milking goats thus becomes an integral part of the story of *ersatz* food.

Directly related to the efforts of educators and training courses previously discussed, and encouraged by government circles at all levels, the keeping of small animals and tending of garden allotments became an important means by which households could bolster their diets. Cats and dogs, formerly the favored companions of

humans, suddenly became an unaffordable drain on household resources as scarcity set in, being replaced instead by pets of the edible variety which could supplement the meager meat rations of later war years. Rabbits, ducks, hens, and geese became popular additions to the household, and while the numbers of large livestock like cattle and pigs declined drastically during the war, the number of goats grew by nearly a million—thanks in part to their ability to subsist on very little.[184] Goats were not important just for their meat, but also as a means of obtaining milk after that product became very difficult to acquire. In April 1916, the *Norddeutsche Allgemeine Zeitung* began a campaign to encourage the rearing of goats, encouraging the poorer classes to "guard themselves against a milk famine by keeping a goat," and the Minister of Agriculture introduced a series of subsidies to support this practice.[185] Support for this effort remained high throughout the war, with the Central Committee of the Red Cross encouraging the keeping of not only goats, but also sheep for milking purposes in May 1918.[186] In addition to the food provided by these small animals, acute periods of hunger occasionally prompted the slaughter of more exotic fare. In May 1917, during the height of hunger caused by the failure of the 1916 potato harvest, an advertisement appeared in a Berlin newspaper from a menagerie offering "wild beasts for sale to be slaughtered for human consumption."[187] A year later in May 1918, the falling nutritional fortunes of the Blücher estate in Krieblowitz prompted Evelyn Blücher to confess the following in her diary:

> Food is growing scarcer from day to day, and we have been reduced to killing and eating our kangaroos. They have been kept here as a great curiosity and

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[184] Watson, *Ring of Steel*, 337-8. See also Grebler and Winkler, *The Cost of the War*, 83-4. The number of pigs decreased by 60 percent, cattle by 15 percent, and poultry by more than 20 percent by the end of the war.
[185] Max Müller, "April 1916," *BDFA*, vol. 10, 86.
[186] Ibid, "The Internal Situation in Germany during May 1918, being the Forty-Sixth Month of the War," *BDFA*, vol. 12, 221.
[187] Ibid, "May 1917," *BDFA*, vol. 11, 155.

> rarity for years past. Yesterday my husband received a letter from one of our provision-dealers in Breslau, saying he would give any price my husband liked to mention if he would sell him a kangaroo.[188]

The keeping of vegetable gardens was another common means of supplementing the food of a household. The Blücher family, benefitting from the ample land of their estate, was not only able to provide vegetables for the estate and its staff, but also to turn a tidy profit through the selling of vegetables in town which were superfluous to their needs.[189] Urban gardens and allotments were also set up wherever there was space. One school in Stuttgart, for example, turned a nearby empty field into a large garden to help feed the school children. Such urban gardens, however, were often limited by the amount of available space and furthermore could only supplement the diet through produce in the summer months.[190] Outside of the cities, forage offered households another option for supplementing the diet—particularly through the forage of edible mushrooms and tea substitutes. In June 1915, it was reported that "elaborate" instructions were being issued to organizations in the countryside to help identify wild vegetables and mushrooms which could be gathered and safely consumed.[191] An example of these instructions can be found in a poster published by the company Werner & Winter in Frankfurt in October 1916, which was aimed at educating consumers to recognize edible and poisonous mushrooms in the hope that this would cut down on the amount of accidental poisonings which had been occurring.[192] Titled "Information on Mushroom Harvesting", this large poster included numerous detailed

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[188] Blücher, *An English Wife*, 225. The kangaroos, which were also kept at Blücher family properties in the Channel Island of Herm, were introduced by Evelyn's father-in-law, Gebhard Leberecht Blücher von Wahlstatt, who reared them as a curiosity. See Blücher, vii.
[189] Ibid, 184.
[190] Cox, *Hunger in War and Peace*, 83.
[191] Max Müller, "June 1915," *BDFA*, vol. 9, 208.
[192] Letter from Werner & Winter to the Director of the Department of Industry, Agriculture & Trade in the Royal Ministry of the Interior in Dresden, 21 October 1916, SächsStA, 10736 Ministerium des Innern, 16620.

pen and ink illustrations and diagrams of the various mushroom families, describing which characteristics to look out for to differentiate between edible and non-edible varieties. For instance, cup fungi and truffles were cleared as all being safe for consumption, whereas 'Stomach' fungi and puffballs were listed as being safe to eat when young and uniformly white inside, but "Inedible and partly poisonous if the inside is yellowish, brownish or black, slimy, loose or dusty."[193] The lower third of the poster, printed in full color, was an illustration of several deathcap mushrooms (*Amanita phalloides*) growing on the forest floor, with a strict warning against the consumption of this deadly fungus (see Figure 1.6). Finally, the foot of the poster prominently lists the "ten commandments" of the mushroom picker, offering practical advice on locating, identifying, harvesting, and preparing various types of edible mushrooms.[194] While gathered mushrooms certainly did not have a huge impact on the nutritional deficit, they were a free and tasty means by which to supplement an otherwise bland breakfast for consumers in the countryside, as described by Piete Kuhr who excitedly wrote about "gorgeous" tasting fried deer's feet and morel mushrooms gathered from the nearby woods.[195]

[193] Poster, "Aufklärung zur Pilzernte," n.d., SächsStA, 10736 Ministerium des Innern, 16620.
[194] Ibid.
[195] Mihaly, *There We'll Meet Again*, 219-20.

Figure 1.6 Color illustration of deathcap mushrooms in their environment. The full-color illustration depicting their contextual environment was meant to aid in immediately identifying these deadly mushrooms.

Tea substitutes were another commonly foraged item and, in fact, already had a long history in the diet of Germans as herbal teas and remedies. As stockpiles of foreign-sourced 'true' tea began to vanish in the early years of the war, these tried-and-true substitutes staged a large comeback, and in many cases performed consistently better as *ersatz* tea than the many attempts at creating substitute coffee. By May 1916, a number of suitable replacements for tea had been identified, and lists of the best substitutes appeared in newspapers to guide foraging efforts. The most common substitutes listed included leaves from the following plants and trees: strawberry, whortleberry, cranberry, bilberry, blackcurrant, raspberry, cherry, birch, elm, willow, mountain ash, holly, and blackthorn. To obtain the tea, the leaves need only be plucked (the younger the better), dried, and chopped before steeping in hot water as normal.[196] It need not be said that the berries produced by these plants were also of importance to foragers, making those plants doubly valuable to consumers who knew where to find them. Blackberry leaves were said to be the best tasting among the tea substitutes, with

[196] Max Müller, "May 1916," *BDFA*, vol. 10, 138.

Gustav Junge claiming that blackberry leaves came very close in taste to Chinese tea.[197] Linden flower tea, which Junge recommended as it tasted sweet without the use of sugar, was another popular choice, and Schreiner likewise recommended this tea when paired with beech buds.[198] Chamomile and peppermint teas, previously used as home remedies, also stepped into the gap, as did multiple iterations of tea derived from dried apple or pear peels for a lightly sweet, fruit tea.[199]

Directly related to the individual foraging of wild foodstuffs was the large-scale collection of natural products directed by the state to supply various *ersatz* products, particularly for substitute animal fodder and alternative sources of oil. That these campaigns are included in this section and not the previous section on government-directed efforts at *ersatz* development is because these campaigns frequently relied on the labor of consumers (often school children) to collect the desired materials—directly recruiting consumers into the role of *ersatz* producers. The shortage of oil prompted the introduction of such campaigns early in the war, focusing on the collection of nuts and fruit stones which would be otherwise thrown away. Posters published by the War Committee for Oil and Fats advertised to residents of Merseburg, Berlin, and other areas that they could earn "10 pf for every kilo of cherry, apricot, and plum stones they turned in or even 35 pf for each one of lemon or orange."[200] While these campaigns arguably yielded enough oil to make them worth the effort, reliant as they were upon volunteerism, the amount produced paled in comparison to that yielded by the

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[197] M. T. H. Sadler, "The Economic Situation in Germany during July 1918, being the Forty-eighth Month of the War," *BDFA*, vol. 12, 289; and Junge, *Unsere Ernährung*, 83.
[198] Junge, *Unsere Ernährung*, 83; and Schreiner, *The Iron Ration*, 154.
[199] Junge, *Unsere Ernährung*, 83; and Alfred Maylander, 'Food Situation in Central Europe, 1917: Compiled and Translated by Alfred Maylander. [U.S. Bureau of Labor Statistics Bulletin No. 242. Miscellaneous Series. April, 1918.]', Bulletin, Miscellaneous Series (Washington, DC: U.S. Bureau of Labor Statistics, 1918), 46.
[200] Perry, "Kitchen Soldiers," 33. Collection points for these materials were often located at women's finishing and training schools, which also served as nodes for the previously discussed training courses.

cultivation of oil plants and was insignificant in terms of the oil deficit Germany was attempting to cover. Official statements by the Food Committee of the Reichstag in mid-1917, revealed that increased oil plant cultivation yielded approximately 23,000 tons in 1915, over 40,000 tons in 1916, and an expected 80,000 tons for 1917, whereas the collection of "fruit kernels, beech nuts, and other nuts," in 1916 resulted in just 600-700 tons of oil.[201]

Much greater energy was focused on the collection of leaves and foliage to try and meet some of the country's pressing fodder needs. Gathering steam in early 1918 as desperation for new sources of fodder took hold, a new Leaf Fodder Office was founded within the War Food Office to help organize the expanding collection efforts.[202] In July 1918, rumors circulated that the summer holidays of school children in Saxony and Prussia would be made conditional on the gathering of stipulated quotas of leaf fodder for army horses, and the organized gathering of foliage by school children was likewise introduced in Bavaria in the same month. The going rate for leaf foliage offered by the military authorities was four marks per hundredweight for fresh leaves, and 18 marks per hundredweight for leaves which had been dried and pressed.[203] Captured German Army orders from April and May 1918 show that the issue of fodder was so pressing for military leaders (bad crops of straw and hay reduced what was typically available for horses), that even soldiers were pressed into the collection of reeds, leaves (green and dried), and other foliage from occupied territories to use as fodder.[204] Leaves from lime, oak, and elder trees were common targets of these efforts, as was the collection of duckweed from ponds and the baiting, collection, and drying of cockchafers, which were identified as being suitable for pig fodder.[205] As a result of these leaf collecting

[201] Max Müller, "May 1917," *BDFA*, vol. 11, 177.
[202] Ibid, "August 1918," *BDFA*, vol. 12, 338.
[203] Sadler, "July 1918," *BDFA*, vol. 12, 271 and 284.
[204] Max Müller, "August 1918," *BDFA*, vol. 12, 338.
[205] Ibid, "May 1918," *BDFA*, vol. 12, 218; and Sadler, "July 1918," *BDFA*, vol. 12, 285.

efforts, it was reported in the newspapers in July 1918 that over 21,000 tons of green leaves had thus far been delivered, alongside 3,250 tons of 'leaf-hay' flour and over 2,000 tons of leaf fodder-cakes—though as observers in the Foreign Office wryly remarked, these numbers were hardly equal to the deficit which Germany faced.[206]

The hunting of wild game was the final means by which consumers attempted to extract further nutrition from their environment. Depending on their proximity to good hunting grounds, many of these products, like game fowl, deer, and rabbits, were already an established part of regional diets. For city-dwellers, however, and for those who consumed the more exotic fare which resulted from increasingly wide-ranging hunting efforts, the appearance of game on the dinner table was just as foreign as dark war bread and artificial honey. For the wealthy elite and aristocracy, who might possess large estates with woodland for hunting, such measures for stretching the larder were easy to implement. At the Blücher estate in Krieblowitz, for instance, Evelyn Blücher described in July 1918 how they lived, "in a patriarchal way, the whole house being dependent on the results of my husband's shooting—at present wild duck and roe-buck."[207] For most other consumers, however, game entered their diet through large-scale hunts organized by the government to increase the supply of meat and thereby reduce its unaffordable prices. In April 1916, the Prussian Minister of Agriculture ordered that "crows, starlings, sparrows, storks, and also roe-deer and goats shall be killed to swell the amount of meat available for human food."[208] The following month, a notice was printed in the *Tägliche Rundschau* that for every sparrow which was delivered to the public slaughterhouse in Bochum, the authorities would pay 3 pfennigs.[209] Squirrels were reported by the *Berliner Lokal-Anzeiger* to be sold at a shop

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[206] Max Müller, "August 1918," *BDFA*, vol. 12, 338.
[207] Blücher, *An English Wife*, 235.
[208] Max Müller, "April 1916," *BDFA*, vol. 10, 62.
[209] Ibid, "May 1916," *BDFA*, vol. 10, 117.

on Potsdamer Strasse for 2.25 M. apiece, while fishing activities in the North and Baltic Seas expanded to include the hunting of harbour porpoise, which was described as being similar to beef in texture, but having a strong flavor similar to game.[210] Falling outside the realm of typical game, disturbing reports by the *Leipziger Volkszeitung* in June 1917 claimed that in Köthen, dogs were being kidnapped by outsiders to be taken to the larger cities, where they were slaughtered and served at restaurants specializing in dog meat.[211]

In theory, these hunting expeditions were meant to be conducted in an organized fashion which fairly distributed the spoils of the hunt between those who participated or owned the land, and an even split of the remaining game delivered to the local community and to supply the large towns. The Prussian Minister of Agriculture, for instance, issued an order to establish a district game office in every rural district, which would work with local hunting societies to supervise the hunting, delivery, and purchase of wild game.[212] In practice, however, the chaos of massed hunting expeditions across the country paved the way for abuse through poaching, as it was difficult to determine if a hunting party was officially sanctioned or not. This problem was colorfully illustrated by Evelyn Blücher, who wrote at length about one such incident in October 1917:

> The other day a very fine field-grey military motor car appeared on our place, and its four occupants began shooting to their hearts' content. Nobody disturbed them, or asked on what authority they were there, for people took it for granted that they had been sent by the Government. After having satisfied their needs

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[210] Max Müller, "April 1917," *BDFA*, vol. 11, 133; Maylander, "Food Situation," 27-8.
[211] Ibid, "June 1917," *BDFA*, vol. 11, 215.
[212] Maylander, *Food Situation*, 26.

> they departed, and it was only discovered a day afterwards that they were poachers pure and simple, who certainly had a glorious time.[213]

However, even without these incidents of poaching, which did cut into the amount of game which could be brought to market, it is unlikely that these organized hunting efforts would have resulted in a meaningful reduction of hunger. Aside from providing a novel experience—such as Piete Kuhr's first experience of eating a crow, which her grandmother had disguised as a partridge—and an occasional supplement to regular rations, the hunting and consumption of game was simply too inefficient and too expensive compared to livestock rearing to have any meaningful impact on the meat supply.[214] Much like the other efforts to increase foraging, gardening, and fodder collection discussed in this section, the expansion of hunting was not a realistic solution to Germany's hunger—it was merely the symptom of a food system under immense stress.

Prisoners of war and *ersatz* development

This final section of the chapter will provide a very brief overview of the interaction between prisoners of war and the development, production, and consumption of *ersatz* food products. The treatment of POWs during the First World War is a topic which has increasingly drawn the attention of historians in recent years, with particular attention being given to the experience of Allied POWs in the German camp system. The formation of labor companies on the Western Front, and Germany's growing

[213] Blücher, *An English Wife*, 180-1.
[214] Mihaly, *There We'll Meet Again*, 200.

reliance on the forced labor of POWs to prop up its industrial and agricultural sectors have all been given treatment, as has the massive provisioning of British, French, and Belgian POWs in the form of parcel deliveries.[215] Given that POWs constituted such a huge number of consumers (around 2.4 million POWs were captured by Germany during the war), and that so many POWs were directly employed as producers within the German food system (nearly one million POWs were employed as agricultural labor by the end of the war), it is only natural that any study of *ersatz* development should consider the contributions of these unfortunate actors.[216]

The first and most obvious part played by POWs in the production of *ersatz* food products was through their labor. In order to fill the void left by millions of men being called up to the front, the German government early on authorized the forced employment of prisoners of war in key sectors of the economy—namely mining, heavy industry, and agriculture. The agricultural sector in particular suffered from a lack of labor, as not only farmers were mobilized, but also their draft animals, leaving the tall task of planting and harvesting largely in the hands of farmer's wives and daughters, as well as the young and elderly. The employment of prisoners of war as farmhands was thus landed on as the ideal solution by the German authorities, which also benefited the nutrition of the selected POWs as being close to food production often resulted in privileged consumption—returning POWs regularly reported eating very well while assigned to farms.[217] While deployed in this way, to both farms and factories, Allied POWs would have provided the labor which fueled *ersatz* production, obscured behind

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[215] See Heather Jones, *Violence against Prisoners of War in the First World War: Britain, France, and Germany, 1914-1920*, Studies in the Social and Cultural History of Modern Warfare 34 (Cambridge ; Cambridge University Press, 2011); and Uta Hinz, *Gefangen im Grossen Krieg: Kriegsgefangenschaft in Deutschland 1914-1921*, 1. Aufl., Schriften der Bibliothek für Zeitgeschichte ; n. F, Bd. 19 (Essen: Klartext, 2006), for recent treatment of the subject.
[216] Heather Jones and Uta Hinz, "Prisoners of War (Germany)," *1914-1918-Online (WW1) Encyclopedia* (blog), accessed 5 January 2025, https://encyclopedia.1914-1918-online.net/article/prisoners-of-war-germany/; and Chickering, *Imperial Germany*, respectively.
[217] Max Müller, "March 1917," *BDFA*, vol. 11, 77; and ibid, "May 1917," *BDFA*, vol. 11, 157-8.

the words of all the examples which have been discussed in this chapter. The harvesting of swedes to replace potatoes, the cultivation of oil plants, the collection of substitute fodders—all iconic symbols of the *ersatz* story—were accomplished, in part, through the labor of POWs.[218] In factories as well, prisoners of war would have been part of the workforce involved in the production of substitute products. One British POW, for example, who escaped captivity in September 1918, recalled being employed the previous winter in the manufacture of a type of war jam for soldiers at the front. Using sixteen hundredweight of turnips and mangelwurzels (also known as field or fodder beets), the factory he was employed at produced 260 pounds of sticky, dark glucose syrup to use as substitute jam, which "had a sweet, sickly taste, and resembled black treacle."[219]

More important than their role as *ersatz* producers, however, was the way in which POWs were targeted as consumers of *ersatz* food products. Although the feeding of POWs was theoretically linked to the same level of nutrition as consumers on the home front, multiple sources suggest that dips in food quality and quantity typically hit prisoner populations before the average German citizen. A Danish informant in May 1916 reported that German purchasing officers were buying up pigs' lungs to feed to prisoners, a full year before the previously mentioned report concerning the sale of Danish waste products to fat extraction factories.[220] Meanwhile, turnips and beets were likewise reported to have shown up in the rations of British and French POWs in Bajstrup as early as March 1915. These cheap root vegetables, then considered to be fit mostly for animal fodder, were thus being used to feed POWs over a year and half

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[218] For example, prisoners were mobilized to collect used coffee grounds, which would be chemically treated and processed into *ersatz* fodder. Ibid, "June 1916," *BDFA*, vol. 10, 175.
[219] Max Müller, "September 1918," *BDFA*, vol. 12, 377.
[220] Lowther, "Inclosure in Doc. 10. Notes on the Economic Conditions in Germany," *BDFA*, vol. 10, 110; and Max Müller, "July 1917," *BDFA*, vol. 11, 237.

before the Turnip Winter would force the same on German consumers.[221] Regarding the adoption of potato-adulterated war bread in late 1914, an article by the *Deutsche Tageszeitung* callously advocated the immediate replacement of more expensive rye flour with abundant and cheap potato flour in bread baked for prisoners of war in order to spare the rye for other uses—a near opposite reaction to most articles written in response to the introduction of potato products.[222] Continuing this pattern, at a meeting held between POW camp inspectors in the Bavarian War Ministry on 29 April 1915 to review the provisioning of camps, a consulting expert, Professor Backhaus, noted that 40,000 hundredweight of 'field beans' were available for purchase which he suggested would be an excellent stock of food to draw upon for supplying camps in Bavaria. Confused by the name 'field beans', the men present asked him what he meant, to which he explained, "by field beans he meant the so-called horse beans or broad beans. He only did not choose these terms so it could not be said that the prisoners were given 'cattle feed'. The field bean is very nutritious and tasty."[223] Here again we see the feeding of traditional fodder products to prisoners of war, long before they appeared in the diets of average German consumers.

Even with the relatively small sample size gathered here, there seems to be an emergent pattern which suggests that POWs were viewed as the perfect consumers for food products which were deemed too unsavory for the general public to eat. In a similar way to how the development of *ersatz* food products can be characterized as the frontier of the German food system, slowly advancing and pulling in more and more edible matter from the environment to fuel the machine, POWs (alongside the poorest

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[221] Hans Peter Hanssen, *Diary of a Dying Empire*, ed. Mary Schoefield, Ralph Hasswell Lutz, and Oscar Osburn Winther (Bloomington: Indiana University Press, 1955), 101.
[222] "Zur Ernährung der Kriegsgefangenen," *Deutsche Tageszeitung*, Nr. 480, 22 September 1914, BArch R 86/2144.
[223] "Meeting minutes for a meeting between POW camp inspectors," 29 April 1915, BHStA, KA, M Kr. 6547, p. 5.

classes in German society) might be seen as the frontier of consumption, being the first groups to consume these unpalatable products until necessity inevitably enforced their adoption by the whole. More work must be done here to further excavate and articulate the relationship between prisoners of war and *ersatz* food products. Hopefully, this brief treatment can serve as both invitation and starting point for future lines of inquiry on this subject.

Conclusion

As this chapter has demonstrated, the development of *ersatz* food products during the war is a process which defies easy characterization. The introduction of foods to the diet like war bread, war jam, substitute coffee, and artificial honey relied on a complex series of interactions between multiple groups of actors making both willing and unwilling decisions in response to one undeniable truth: that there simply was not enough food to go around to keep the food system running as normal. Whether a slim sense of food security could have been obtained had the government managed a more competent response to the food crisis, as some historians have argued, is ultimately irrelevant to the appearance of *ersatz* products on the market.[224] The German food system has been likened to an engine several times in the course of this chapter, and that engine requires fuel (in this case, digestible organic matter) in order to function and the stakes for failing to feed that engine were unspeakably high—each sputter results in lower nutritional standards with a corresponding spike in mortality. When that fuel

[224] Watson, *Ring of Steel*, 359, provides a representative example.

becomes scarce, or simply too expensive, economy measures must be taken, alternatives must be found.

This is the essence of the *ersatz* development story. While each of these groups might have been driven by different motivations and objectives, abstracted as a whole, the search for substitutes was the food system's response to hard times. The belt was tightened and the system expanded to include the consumption of secondary or even tertiary sources of food, previously eschewed for reasons of taste, culture, or efficiency, in order to sustain itself. Each component part of the food system had its role to play in this process. The government, responsible to its citizens and with the ability to shape the course of the food system's efforts through regulatory decree, stood at the helm and attempted to safeguard the most important staple foods: bread, potatoes, meat, and fodder. Academics and advising experts influenced government through their recommendations, but also shaped the form of *ersatz* foods and led the charge on researching new possibilities. Producers of all stripes, meanwhile, were the greatest drivers of *ersatz* production, whether inspired by a patriotic sense of duty or mercenary self-benefit. Educators, disseminators, and social organizations contributed by popularizing the use of *ersatz* products (and other economy measures) among individual consumers, as well as mobilizing popular support behind the government's efforts. Finally, individual consumers contributed to the development of substitutes through the countless individual actions made for the sake of survival; hunting, gardening, foraging, and collecting all added to the diversity of substitutes on the table.

This massive, collective effort by the entirety of the German food system to expand the food supply through substitutes undeniably illustrated the truth of the proverb "*in der Not frisst der Teufel Fliegen*."[225] The question for the following

[225] Schreiner, *The Iron Ration*, 33.

chapters, however—from the perspective of nutrition, morale, and government legitimacy—is whether this effort was enough.

Chapter 2: Indigestible? New perspectives on the nutritional value of ersatz food products

Introduction

In September 1917, the Health Officer of Berlin, Professor Weber,[1] and a group of like-minded physicians gathered to draft a petition to the *Kriegsernährungsamt* (War Food Office), the government office responsible for organizing Germany's food supply in the latter half of the First World War. The aim of the petition was to end a practice which they collectively viewed as dangerous to the health of German consumers, and even worse, needlessly wasteful of the country's precious bread supply: the milling of whole grain flour for use in baking war bread. The Allied blockade of the Central Powers, which became increasingly effective from 1916 onwards, severely hindered Germany's ability to purchase wheat on the international market to cover deficits in domestic production. When this was coupled with a struggling agricultural sector, strangled by the demands of military mobilization, the government was forced early in the war to stretch its national bread supply through rationing and state-mandated adulteration. The refined, white wheat loaves popular in Germany before the war were replaced with *Kriegsbrot* (war bread), primarily baked using a combination of wheat, rye, and potato flour.[2] However, when these steps alone proved insufficient in ensuring enough bread flour to cover consumption needs, the state was forced to increase the flour supply through mandating higher extraction rates of bread grain at the nation's flour mills.

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[1] First name unknown.

[2] *Kriegsbrot* was also variously known as *K-Brot,* or *Kartoffel-Brot,* though this is usually in reference to the earliest iterations of war bread which introduced admixtures of dried potato products. *Kriegsbrot* will be used as a general term for war bread.

The basic logic motivating this course of action was that by including more of the roughage of the grain, the output of flour would be expanded. Pre-war extraction rates of 50 to 70 percent quickly gave way to extraction rates as high as 94 percent by 1917, with ever increasing amounts of fiber-rich bran (the rough shell coating the grain) making its way into bread flour to stretch the supply.[3] While these efforts were indeed successful in expanding the available supply of flour for consumption, it was precisely this higher proportion of bran in the new war bread which so worried Weber and his associates. Previously sold off to be used as animal fodder, bran was viewed as a by-product of the milling process with little nutritional value to human consumers, and was even viewed as being potentially harmful if consumed in large quantities. Weber and the others worriedly proclaimed "that the bread made from flour milled to 94 per cent. contains a quantity of bran which remains undigested in the intestines with injurious results," and they therefore argued for "the reduction of the milling percentage much below 94 per cent., probably as low as 80 per cent."[4] Imagine seeing nutritional advice like that today!

To the modern reader, this aversion to whole grain bread may seem odd given our current understanding of nutrition (to say nothing of modern German bread culture and its love of whole- and multi-grain bread), but to the physicians, physiologists, and nutritionists of the early twentieth century, grain extraction rates were part of an ever-evolving debate surrounding the fundamentals of human nutrition. Aspects of nutrition as basic as daily calorie, fat, and protein requirements were battled over and incessantly revised during the later decades of the nineteenth century. Taking protein requirements as an example, German physiologists Carl von Voit, Jacob Moleschott, and Max Rubner

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[3] Vernon L. Kellogg, "The Food Problem," in *The New World of Science: Its Development During the War*, ed. Robert M. Yerkes (New York: The Century Co., 1920), 271-2, provides the lower figure of 50 percent, though Lutz, *German Collapse*, 184, suggests a figure of 70 percent as being typical in pre-war Germany.

[4] Max Müller, "September 1917," *BDFA*, vol. 11, 338-9.

mirrored the meat-rich diets of German consumers at the turn of the century by favoring a high protein requirement of between 100 and 130 grams per day, whereas the prominent American physiologist, Russell Chittenden, claimed the body could function on as little as 60 grams per day.[5] For the record, Chittenden was nearer to the mark than his German peers.

These differences in the estimates of daily nutritional requirements would not begin to narrow until the meetings of the Inter-Allied Scientific Food Commission at the close of the war, which proposed the first international nutritional standards.[6] Other elements of essential nutrition, such as the role played by vitamins and minerals, would not be discovered until well after the war's conclusion, in the 1920s and 30s, and sparked still more fierce debate over the ideal diet.[7] Even less was understood during the war about the role of dietary fiber in human nutrition, and indeed this remains an evolving field in nutritional research to this day.[8] Given the contested nature of nutritional science in the period, it is understandable why these German physicians might question the wisdom of increasing extraction rates so dramatically. Without an understanding of the value of dietary fiber or the mechanics of vitamin and mineral absorption from bran, but clearly perceiving that it passed through the digestive tract undigested and occasionally caused painful bloating, to doctors at the time raising extraction rates must have appeared as a potentially risky course of action.[9]

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[5] Offer, *Agrarian Interpretation*, 41-2; Carol Helstosky, "The State, Health, and Nutrition," in *Cambridge World History of Food*, ed. Kenneth Kiple and Kriemhild Coneè Ornelas (Cambridge; New York: Cambridge University Press, 2012), 1578.
[6] Helstosky, "The State," 1578.
[7] Ina Zweiniger-Bargielowska, "Introduction," in *Food and War in Twentieth Century Europe*, eds. Ina Zweiniger-Bargielowska, Rachel Duffett, and Alain Drouard (Farnham; Burlington, VT: Ashgate, 2011), 3.
[8] Jim Mann and A. Stewart Truswell, eds., *Essentials of Human Nutrition*, Fourth Edition (Oxford: Oxford University Press, 2012), 28, shows that an internationally agreed upon definition of dietary fiber was only established in 2009 as the Codex Alimentarius, and that there remains no internationally agreed method for measuring dietary fiber at present.
[9] In addition to the potential dangers which higher milling rates posed to consumers, contemporary experts simply believed that the roughage of the bread grain could be more efficiently converted to

The challenge this poses for historians of the First World War, and any who rely on sources of an interdisciplinary nature, is that it is easy to assume the accounts of contemporary experts like Professor Weber are accurate, when in fact they are predicated on outdated knowledge. Nowhere is this more apparent than in the treatment of *ersatz* food products, the iconic yet detested substitute foods which symbolized hardship for millions of German consumers as the war progressed. *Ersatz* food products, like *Kriegsbrot* and the infamous turnips of the 1916/17 *Kohlrübenwinter* (Turnip Winter), have been widely accepted in both contemporary sources and secondary literature as representing a deterioration in both taste and nutritional quality over the foods they replaced. Personal accounts, newspaper articles, academic lectures, and official reports from the period all bemoan the diminishing quality of nearly all food available for consumption, while histories of the German home front have been quick to repurpose these accounts to demonstrate the deteriorating quality of life during the war. This understanding has become so commonplace in the historiography that it even occasionally escapes citation—to describe *ersatz* food as 'indigestible', 'disgusting', or 'vile' is merely to reflect established fact.[10]

The problem with this understanding is twofold: first, *ersatz* foods existed on a wide spectrum, ranging from the largely acceptable *Kriegsbrot*, which sustained the nation for the duration of the war, to the nutritionally worthless and even fraudulent products which littered store shelves in 1917 and 1918.[11] They simply cannot all be

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human food through their metabolism by animals. See Spiekermann, "Brown Bread for Victory," 144.

[10] The example of 'indigestible' comes from Welch, *Propaganda*, 125; 'disgusting' from Chickering, *Freiburg*, 267; and 'vile' also from Chickering, 270.

[11] 'Worthless' and 'fraudulent' were often used to describe *ersatz* food which appeared in the second half of the war. One such example can be found in a memo from the *Zentralstelle zur Bekämpfung der Schwindelfirmen* (Central Office for the Control of Fraudulent Businesses) to the *Volkswirtschaftlich Abteilung des Kriegsernährungsamtes* (Economics Department of the War Food Office) on 24 July 1917, that blames "worthless" *ersatz* recipes for wasting money and materials. BArch R 3601/750, 26; See also Roerkohl, *Hungerblockade*, 218, for a good discussion on the boom in fraudulent products.

painted with the same nutritional brush, and yet they are often treated in secondary sources as being largely interchangeable. Second, historians of the First World War have long been reliant upon the accounts of contemporary nutritional experts like Professor Weber or Max Rubner to explain the nutritional quality of *ersatz* foods, without taking account of advances in the field of nutritional science since those sources were written. Much of the science upon which our histories of the German food crisis are based is quite simply out of date, and historians have been slow in reacting to this fact.[12]

Compounding these issues is the question of evolving German tastes at the turn of the twentieth century. As part of Germany's rapid economic rise during the second half of the 1800s, increasing numbers of people were moving to urban centers, and a general rise in affluence had gradually shifted eating habits in the country. A diet previously dominated by coarser brown breads, porridge, and root vegetables was increasingly replaced by a diet rich in animal fats and protein, and fluffy white, finely-milled bread.[13] German weight gain as a result of this richer diet was regularly commented on by other European observers. George Schreiner, an American journalist in Germany during the first years of the war, recorded in his memoirs the story of an Englishman who viewed the Germans as "a nation of gluttons," possessing far more food than was good for them.[14] This overconsumption was readily acknowledged in Germany. Leading nutritionist Max Rubner argued that Germans before the war had grown too accustomed to overeating and typically ate out of habit rather than hunger, recommending that consumers practice mindfulness in their eating habits to cut back on this waste.[15] Overeating was even used by some to downplay Germany's vulnerability

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[12] Dariush Mozaffarian, Irwin Rosenberg, and Ricardo Uauy, "History of Modern Nutrition Science—Implications for Current Research, Dietary Guidelines, and Food Policy," *BMJ* 361 (June 13, 2018): k2392, https://doi.org/10.1136/bmj.k2392, provides a brief overview of the advances in nutritional science since the First World War.
[13] Heinzelmann, *Beyond Bratwurst*, 166,186, and 195.
[14] Schreiner, *The Iron Ration*, 4.
[15] Perry, "Kitchen Soldiers," 22-3.

to the Allied blockade, by quipping that deficits in domestic agricultural production might by covered by reductions in overconsumption.[16]

For many German consumers, the advent of rationing and food substitution marked a significant regression in eating habits, more akin to the diets of one or two generations before. The demoralizing effect these changes had is most evident in the expansion of turnips into the diet after 1916; due to their previous use as animal fodder, their consumption often engendered feelings of dehumanization.[17] Other efforts to economize, such as repurposing dried apple peelings—a waste product in better times—as an *ersatz* tea, or the many campaigns to collect kitchen waste to extract usable fats, oils, and animal fodder certainly contributed to an embittering sense of impoverishment as well.[18] It therefore comes as no surprise that *ersatz* food products were regarded with such disdain by those who consumed them, for they were a symbolic and visible symptom of Germany's sinking fortunes. The intense emotional reaction to *ersatz* food products, however, often serves to cloud the important role these foods played in maintaining nutritional standards, and our histories of the First World War have yet to critically disentangle these conflicting aspects of the food crisis. The basic question that requires answering is this: were all *ersatz* food products as 'bad' as the historical record suggests? If not, how can we reckon with the huge number of sources which describe *ersatz* food products in such negative terms?[19]

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[16] Schweitzer, *Can Germany Be Starved*, 14, mentions that Germany consumed more meat per capita than Britain at the outset of the war, and that the wastage of fats used in German kitchens was "excessive."
[17] Max Müller, "April 1917," BDFA, vol. 11, 117.
[18] Junge, *Unsere Ernährung*, 83; Max Müller, "May 1917," *BDFA*, vol. 11, 176; and ibid, "September 1917," *BDFA*, vol. 11, 340.
[19] This is a two-part question. This chapter focuses on the nutritional aspect of *ersatz* food products. For an examination of the social and cultural factors which underpinned negative emotional reactions to *ersatz* foods, see Chapter 3.

The aim of this chapter is to shine a light on this challenge in the historiography by reexamining the question of *ersatz* food's nutritional value. It will place the assumptions of contemporary experts under a critical lens and utilize current understandings of human nutrition to complicate the prevailing narrative that *ersatz* foods were, as a rule, of inferior nutritional value. This is not intended to minimize the vast suffering endured by German consumers, many thousands of whom would not survive the war due to malnutrition-related causes, but rather to highlight issues in the way historians approach these interdisciplinary sources.[20] It is also intended to shed further light on how Germany was able to stave off defeat for so long, despite expectations by British planners that the country would face starvation or economic collapse after just a few months of blockade.[21] If staple *ersatz* food products were more nutritious than previously thought, it might help to explain the durability of the German war effort. As it would be impossible to examine the nutritional impact of each of the thousands of *ersatz* food products developed during the war, this chapter will instead focus on the two most ubiquitous *ersatz* products: *Kriegsbrot* and turnips (turnips could refer to a wide range of root vegetables, but usually meant swedes). These two food products could be found in every German household during the war, and would have been consumed on an almost daily basis, making them natural case studies.

Regarding the source base utilized in this chapter, a good portion of the English primary sources come in the form of a series of monthly reports on the economic situation in Germany, written by W. G. Max Müller for the Foreign Office and

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[20] German postwar estimates ranged as high as 800,000 dead, though this figure has likely been inflated, Herwig, *The First World War*, 295-6; Wall and Winter suggest a more reasonable estimate of 300,000 excess civilian deaths, Wall and Winter, *Upheaval*, 30.

[21] Lambert, *Planning Armageddon*, makes the argument that the British Admiralty viewed the potential blockade as a lightning economic weapon, though this has been challenged in recent years. Lambert's argument is in line with popular beliefs at the time that European economies were so intertwined at the beginning of the twentieth century that any war would be quickly abandoned as the cost would be too painful to bear. See Angell, *The Great Illusion*.

published as part of the *British Documents on Foreign Affairs* (BDFA) series in four volumes.[22] These are especially useful in tracking changes in the millings rates and ingredients of war bread over the course of the war, and also provide detailed coverage of the emergency transition to turnips in late 1916. These sources are supplemented by archival material collected from KEA documents held by the *Bundesarchiv* in Berlin-Lichterfelde, as well as other published reports, pamphlets, and lectures. Finally, my analysis of the nutritional value of *ersatz* food is informed by interviews with Soeng Ha Liu, a Registered Dietitian in the National Health Service, with supplementary references provided by nutritional science textbooks, published journal articles, and nutritional information taken from the United States Department of Agriculture.

Kriegsbrot

As the primary staple food for all classes of society, but of particular importance to urban workers, bread was unsurprisingly the first food item to receive significant attention from the state.[23] In the decades leading up to the First World War, increasing numbers of Germans had developed a fondness for "perfectly white wheat bread" which was typically baked using highly-milled, pure-wheat flour.[24] What was left of the grain after the milling process, known as the 'roughage' or 'offal', which contained most of the fiber of the grain, was then sold as bran to livestock owners for use as animal fodder.[25] This practice was perceived by the wartime government as an unacceptable

[22] Bourne and Watt, eds., *British Documents on Foreign Affairs*.
[23] Davis, *Home Fires Burning*, 26.
[24] Schweitzer, *Can Germany Be Starved*, 11; Lutz, *German Collapse*, 184, provides the more conservative figure of 70 percent; Kellogg, "The Food Problem," 271-2, provides the lower figure of 50 percent.
[25] Kellogg, "The Food Problem," 271; Max Müller, "September 1917," *BDFA*, vol. 11, 339.

use of available grain supplies, for two reasons. First, the excessive milling of bread grain to achieve the fine, white flour desired by consumers represented a significant loss in the volume of flour produced. (And though they could not have known at the time, this also resulted in a measurable loss of vitamins, minerals, and dietary fiber present in the bran).[26] Second, the use of even a part of the wheat grain for the feeding of animals in a time when the population's food security was under threat was a source of fierce contention between German farmers and consumers, the latter seeing themselves as being in competition with livestock over access to scarce food resources.[27]

Thus, when the supply of affordable bread began to show signs of being under stress, the government moved swiftly to safeguard this staple. Regulations were passed banning the use of cereals (and other edible foods) as animal fodder, and the use of admixtures to stretch the supply of available flour began to appear.[28] The first appearance of what came to be known as *Kriegsbrot* occurred after 28 October 1914, when the Imperial Bundesrat mandated the adulteration of rye bread and 'gray' bread (a mixture of rye and wheat) with up to 5 percent potato content.[29] This introductory measure was rapidly expanded as the war progressed, with the failing supply of wheat being continuously supplemented through the use of an increasing number of federally-mandated admixtures in the flour. Because the recipe for *Kriegsbrot* was continuously subjected to revision in the light of the changing availability of resources throughout the harvest year, along with regional differences in the availability of resources, it is

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[26] Schweitzer, *Can Germany Be Starved*, 11; Interview with Soeng Ha Liu, April 2020.
[27] Schreiner, *The Iron Ration*, 14. This was also an unfortunate side-effect of piecemeal price control efforts, where farmers would shift their efforts into the products with the highest price ceilings. For example, feeding grain to livestock as fodder when meat prices were higher than grain prices. See Afflerbach, *On a Knife Edge*, 139.
[28] Multiple decrees by the government throughout the war forbade the use of cereals, vegetables, and other sources of human nutrition for animal fodder. See Chirol, "Second Month," *BDFA*, vol. 9, 12; and Max Müller, "December 1916," *BDFA*, vol. 11, 19, for examples.
[29] Davis, *Home Fires Burning*, 28.

impossible to pinpoint a 'general' *Kriegsbrot* recipe.[30] A sizable proportion of wheat, rye, and potato flour was always present in the recipe, but the use of additional admixtures to stretch the supply ranged wildly—at varying points in the war, consumers could expect to find corn meal, barley, lentils, ground beans, peas, chestnuts, soya beans, clover, oats, buckwheat, manioc and tapioca meal, turnip meal, rice, beets, sago, and even the pollen of reedmace, among other things, in their daily bread.[31]

Another method by which the government sought to stretch the supply of flour was through mandating higher milling percentages for bread grains. In response to unsatisfactory grain harvests, milling percentages were first raised to 72 and then 75 percent in the first months of the war, before being raised further to 80 percent, 82 percent, and finally, to an unprecedented 94 percent which was maintained throughout much of the second half of the war.[32] Through the introduction of these modifications to milling percentages alone, the government was able to expand the volume of flour production by as much as 20 to 30 percent, according to contemporary estimates.[33] While these higher milling percentages of 80, 82, and 94 percent may seem extreme when viewed out of context, it is important to note that these figures sit below the 100 percent milling level of actual whole grain bread, which makes it surprising that the authorities never mandated the use of whole grain flour despite the increases to yield it

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[30] This is illustrated by the near monthly updates on *Kriegsbrot* composition published in the *British Documents on Foreign Affairs*. See Max Müller, "June 1916," *BDFA*, vol. 10, 174, for a representative example.
[31] Herwig, *The First World War*, 288; Chickering, *Freiburg*, 266; Watson, *Ring of Steel*, 334; Schreiner, *The Iron Ration*, 153; Lutz, *German Collapse*, 184; Max Müller, "June 1916," *BDFA*, vol. 10, 174; ibid, "September 1917," *BDFA*, vol. 11, 338; and Sadler, "July 1918," *BDFA*, vol. 12, 284.
[32] Lutz, *German Collapse*, 184; Chickering, *Freiburg*, 266; Otto Blum, *Die Ernährungsverhältnisse der Kleinstädtischen und Ländlichen Bevölkerung während der Kriegszeit* (München: Grassl, 1917), 9-10. The mandated milling percentage, like with admixtures, fluctuated as resources permitted. See Max Müller, "February 1916," *BDFA*, vol. 9, 417, for a representative example.
[33] Max Müller, "September 1917," *BDFA*, vol. 11, 339.

might have provided—a 6 percent increase applied over millions of tons of flour would be no small number, after all.[34]

One of the biggest hurdles facing this drive to increase extraction rates was lack of popular acceptance. The deep attachment to the finely milled white bread of peacetime by the German people necessitated an extensive propaganda effort by the government, not only to sell the new war bread through patriotic appeals, but also on the basis of its nutritional content.[35] The various bodies of government responsible for the regulation and rationing of *Kriegsbrot* were therefore quick to proclaim the new bread as a healthful alternative to its predecessor. In an address to the German University League in New York City given in early 1915, Dr. Hugo Schweitzer parroted these calls to move away from the ever-popular white bread. Drawing from the findings of the Eltzbacher Commission, a commission of experts formed in 1914 to investigate Germany's economic vulnerability to the blockade, Schweitzer bemoaned the recent adoption by the German people of "perfectly white wheat bread, which as regards nutritive properties is greatly inferior to bread made from the darker whole wheat flour or from rye flour. The reason for this is that the bran and gluten, which contain the highly nutritious albumen, have been removed on account of their dark color."[36] One article, from the "highly official" *Norddeutsche Allgemeine Zeitung* from December 1914, issued a call for citizens to "Eat war-bread. It is marked with a K. It satisfies and

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[34] Kellogg, "The Food Problem," 271, gives mention of whole wheat flour as an established practice during the war years, suggesting it was a known option to the German government, which then chose not to implement it. This could perhaps represent a compromise position to ensure some bran remained to use as fodder.

[35] Davis, *Home Fires Burning*, 28-9, describes how the rejection of white bread was treated as a mark of "true Germanness."

[36] Schweitzer, *Can Germany Be Starved*, 11; The Eltzbacher Commission was formed from a group of food supply experts who were appointed at the outbreak of the war. Its aim was to study the vulnerability of Germany's food supply to the blockade, and in its findings, it boldly claimed that if Germans adjusted their eating habits, they would be able to withstand the blockade almost indefinitely. Alan Kramer, "Naval Blockade (of Germany)," *International Encyclopedia of the First World War*, January 22, 2020, https://encyclopedia.1914-1918-online.net/article/naval_blockade_of_germany. See also Eltzbacher, *Germany's Food*, 197-8.

nourishes just as much as any other bread. If everyone will eat it, we need have no fear of not having bread all the time."[37] Additionally, when an increase in the proportion of potato flour was introduced in November 1917, the Imperial Health Office declared that "an admixture of potato products up to 20 per cent. has no bad effect on the quality of the bread, and that potato bread retains its freshness longer, has a good flavour, and is nutritious and digestible."[38]

Despite these efforts, the gradual transition from finer white bread to bread which approached being whole grain (to say nothing of the numerous admixtures which found their way into its composition) sparked fierce debate among physiologists and nutritionists regarding the nutritional benefits of the new bread. Much of this criticism was centered on the ever-increasing mandated milling percentages of the bread grain and their effect on the body's ability to absorb nutrients from the bread. Returning to the concerns of Professor Weber and his associates, there was a belief that the presence of high quantities of bran in the digestive tract might cause injury to the intestines, and it was this perceived danger which prompted them to recommend a 'safer' extraction rate of below 80 percent.[39] Similarly, an opinion piece by a physician which appeared in the *Münchner Neueste Nachrichten* boldly claimed that while the high milling percentages might have increased the volume of flour production by 20 to 30 percent, they also had the adverse effect of *diminishing* the extent to which the bread could be digested by 30 to 40 percent, resulting in a net loss in nutrition.[40] "Instead of increasing the quantity of food," it was claimed, "the effect of the regulations is actually to diminish the amount of digestible food, and at the same time to increase complaints of the digestive organs."[41]

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[37] Chirol, "Fifth Month," *BDFA*, vol. 9, 58.
[38] Max Müller, "November 1917," *BDFA*, vol. 12, 35.
[39] Ibid, "September 1917," *BDFA*, vol. 11, 338-9.
[40] Ibid, 339.
[41] Ibid.

This belief, that the amount of bran and other roughage from highly milled wheat flour interfered with nutritional absorption, was also shared by medical authorities outside of Germany. The Inter-Allied Scientific Food Commission, composed of leading food and nutrition experts from America, Great Britain, France, Belgium, and Italy who met between 1918 and 1919, reached similar conclusions. "Taking into account all of the knowledge available from scientific experiment," the Commission agreed that, "for the sake of the general health of the whole population it is advisable not to use a higher extraction rate for wheat than 85 per cent […]"[42] Furthermore, a report by the U.S. Department of Labor, entitled *Food Situation in Central Europe, 1917*, compiled by Alfred Maylander, reported that a large number of cases of intestinal catarrhs (inflammation of the gastro-intestinal tract) were appearing in northern German towns. The report attributed the increase in cases partially to spoiled fruit and "deleterious" foodstuffs, but also noted that the general opinion was that "bread, badly milled and badly baked, was the cause."[43] Nor was the Maylander report alone in attributing gastrointestinal distress to the new war bread. In late 1917, the National Food Association in Germany addressed a formal complaint on the matter to the War Food Office on the grounds that "indigestible" matter contained in the bread was responsible for illness and hindered the body's ability to utilize the nutrition of not only the bread itself, but of all other ingested foods as well.[44]

Exemplifying the debate which raged around such issues at the time, it is important to note that not every contemporary expert agreed with this perception of bran as a hindrance to the digestive process. Max Rubner, the chair of the Physiology Department at the University of Berlin during the war and Germany's foremost

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[42] Kellogg, "The Food Problem," 271-2.
[43] Maylander, *Food Situation*, 56.
[44] Max Müller, "The Economic Situation in Germany in December 1917, being the Forty-first Month of the War," *BDFA*, vol. 12, 70.

nutritional expert, had already proven in the early 1880s that bran could be partially absorbed by humans—though the rate of absorption was lower than that of livestock animals, such as pigs. He therefore had argued that it made more sense to reserve white bread for human consumption, while converting the nutrients in bran to protein and fat by feeding it to livestock which could then be slaughtered and consumed.[45] During the war years, however, the fierce competition between humans and livestock over scarce nutrients prompted a revision of this position, and Rubner lent his voice to calls for the slaughter of millions of pigs to remove that competition: the ill-advised *Schweinemord* (pig murder) of 1915. In response to the continued scarcity of bread flour, Rubner even urged a much higher rate of extraction of up to 96 percent for barley and rye to use as admixtures.[46] Such contradictory advice from medical professionals and academics only serves to further confuse the historical record's treatment of nutrition during the war.

In addition to the concerns which arose over the high milling percentages of war bread, there was an equal amount of distress over the stretching of bread flour with admixtures—invariably giving rise to countless reports of low-quality or "bad bread." Roger Chickering recounts in his study of Freiburg that the bread which appeared in the city in 1917, made from spoiled rye and musty potatoes, was hailed only by the municipal Office of Information as being of high quality. "This judgment," he writes, "was shameless; it was belied by near universal complaint. Bread of all descriptions was disagreeable, if not dangerous, to consume; unpleasant in smell, taste, and sight, it posed a struggle both to eat and digest."[47] Similarly, Ralph Lutz, author of the Reichstag report on the causes of the German collapse in 1918, wrote, "the flour which had been almost completely ground out and mixed with foreign ingredients was unusually

[45] Spiekermann, "Brown Bread for Victory," 144.
[46] Perry, "Kitchen Soldiers," 23.
[47] Chickering, *Freiburg*, 267.

difficult to bake, so that complaints that the bread was doughy, hard to chew, ill-flavored, too sour, or *difficult to digest* [emphasis original] were constantly heard during the whole course of the war."[48] Another account comes from an officer who fled Germany in June 1917, who informed the British Foreign Office that "the bread he got was so heavy that a finger stuck into it left an impression as it would in clay […]"[49] Furthermore, the use of admixtures was directly linked to a decline in the bread's quality, as noted in Dobson's book on Leipzig, "[the quality of bread] deteriorated after the authorities decided to save on grain by mixing increasing amounts of filler (*Erstreckungsmittel*) into the dough."[50] Similar conclusions are reached by Roerkohl, who states that use of additives not only affected the taste of the bread, but caused a sharp decline in nutrition as well.[51]

We will return to the question of admixtures in war bread in a moment. First, let us respond to the question of the impact of higher milling percentages on the nutritional value of *Kriegsbrot*. Although contemporary experts examining war bread were correct in their assessment that a large quantity of bran from the higher extraction rates would have remained undigested in the digestive tract, those who assumed that this organic matter was injurious to the body or otherwise impeded the absorption of nutrients were not. Whole wheat and whole grain bread are indeed more difficult to digest, and it does take longer for our bodies to properly digest this variety of bread, but there is no evidence that the presence of increased fiber in the diet inhibits the absorption of nutrients from ingested food.[52] Quite to the contrary, the bran and other roughage

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[48] Lutz, *German Collapse*, 185.
[49] Max Müller, "June 1917," *BDFA*, vol. 11, 194.
[50] Sean Dobson, *Authority and Upheaval in Leipzig, 1910-1920: The Story of a Relationship* (New York: Columbia University Press, 2001), quoted in Cox, *Hunger in War and Peace*, 103.
[51] Roerkohl, *Hungerblockade*, 216.
[52] Interview with Soeng Ha Liu, April 2020. See Samantha K. Gill et al., "Dietary Fibre in Gastrointestinal Health and Disease," *Nature Reviews Gastroenterology & Hepatology* 18, no. 2 (February 2021): 101–16, for a breakdown of the different kinds of dietary fiber and how they are incorporated in the diet. Wheat bran is a low-fermentable, insoluble fiber and is therefore less

included in whole grain bread contain additional vitamins and minerals which are absorbed by the body during digestion, and there is strong evidence that the introduction of more fiber to the diet helps to cultivate healthy gut bacteria.[53] In addition to a healthier gut biome, the introduction of insoluble fiber found in whole wheat flour and bran can help to normalize bowel movements and aids in the prevention of hemorrhoids.[54] What is more, the slower digestion process of fiber-rich bread helps to bulk out the diet of those consuming it, helping them to stay fuller for longer—something of no small value to the German consumer trying to get by with a significantly reduced food intake.[55]

These benefits appear to stand in stark contrast to the complaints regularly levelled against the supposed indigestibility of *Kriegsbrot*. It is possible that contemporary experts were confused by the presence of undigested matter in the stool of those who had consumed war bread, and drew hasty conclusions which were unsupported by evidence. It is also possible that the sudden increase in fiber in the average diet may have spurred the production of uncomfortable intestinal gas and abdominal bloating in consumers who were unaccustomed to high-fiber diets.[56] These symptoms would certainly cause some concern among those who did not anticipate them and may be the cause for Professor Weber's allegations of war bread's "injurious results" upon the digestive organs.[57] Luckily for consumers of *Kriegsbrot*, it takes only

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easily processed in the colon than high-fermentable, soluble fiber, but is nonetheless found to be important for promoting better health outcomes. The authors also mention that some studies suggest increased fiber intake helps improve vitamin absorption, though these findings remain inconclusive.

[53] Interview with Soeng Ha Liu, April 2020. See also "How to Add More Fiber to Your Diet," Mayo Clinic, January 6, 2021, https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/fiber/art-20043983, and Thomas M. Barber et al., "The Health Benefits of Dietary Fibre," *Nutrients* 12, no. 10 (October 21, 2020): 3209.

[54] "How to Add More Fiber to Your Diet," Mayo Clinic.

[55] Ibid.

[56] Gill et al., "Dietary Fibre," 108. Higher amounts of insoluble fiber, like wheat bran, have been found to exacerbate symptoms of Irritable Bowel Syndrome (IBS) and multiple health organizations therefore recommend avoiding these fibres for individuals who suffer from this condition.

[57] Max Müller, "September 1917," *BDFA*, vol. 11, 338-9.

a few weeks for an individual's gut biome to react to the introduction of higher levels of dietary fiber, and therefore these complaints would not have lasted indefinitely (assuming that the pains in question were indeed caused by large amounts of fiber in the bread and not some other, unidentified source).[58]

This is not to say that the calls for more finely milled flour were entirely without basis, however. In Lutz's report, he noted that "bread baked with [bran] is difficult to digest and disagrees particularly with persons with weak digestive organs," and there is some truth in that.[59] In special cases of people who are ill, or who suffer from digestive disorders, the benefits of more finely milled flour—its ease of digestibility and the speed with which the body absorbs its nutrients, providing the necessary energy for a quicker recovery—become apparent.[60] Responding to the complaints in May 1917, the Imperial Grain Office (*Reichsgetreidesamt*) began to allow for a certain amount of finely-milled flour to be produced for invalids, who were permitted to purchase the white loaves after presenting a medical certificate proving their need.[61] This important exception aside, it becomes clear that many of the expert medical opinions against the use of high extraction rate *Kriegsbrot* were operating on an incomplete understanding of the role of fiber in the diet. If the increased level of fiber in war bread did not result in a significant decrease in nutrient uptake (to say nothing of the 30 to 40 percent decrease claimed by the previously mentioned physician), then the increase in the volume of flour afforded by higher milling percentages can be viewed as an unqualified success of government policy.

Returning now to the problem of introducing admixtures to *Kriegsbrot* and whether this affected its nutritional content, we must first settle on which iteration of

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[58] "How to Add More Fiber to Your Diet," Mayo Clinic.
[59] Lutz, *German Collapse*, 184.
[60] "How to Add More Fiber to Your Diet," Mayo Clinic.
[61] Max Müller, "May 1917," *BDFA*, vol. 11, 170.

war bread to examine. As was mentioned previously, the official requirements for *Kriegsbrot* underwent numerous changes in response to the fluctuating availability of supplies. For the purposes of this analysis, we will avoid the more extreme examples of war bread recipes, such as the experiments conducted with straw or wood-shavings, bread baked with turnip-meal, or with the pollen of reed mace.[62] These ingredients were used when there was no other choice (or in the process of scientific testing for new alternatives) and it is apparent they were quickly abandoned for conventional ingredients when availability improved. Instead, we will examine a recipe for *Kriegsbrot* required by the regulations of the Imperial Grain Office from June 1916, which called for a ratio of 50 percent wheat flour, 30 percent rye flour, and 20 percent potato starch or "some other floury substance."[63]

This recipe is ideal for our purposes because it comes roughly at the midpoint of the war and thus benefits from the previous two years of experimentation in war bread recipes. In addition, it comes just before the catastrophic harvests of 1916 and the deepening of the food crisis which followed in their wake, prompting the inclusion of a greater variety of admixtures. Thus, a *Kriegsbrot* recipe from mid-1916 could be taken as somewhat representative of an 'ideal' war bread which most Germans would have encountered at one point or other. Though the sources are unclear on how highly milled these flours would have been in June 1916, it is likely they would have been milled at close to 94 percent, as both Chickering and Lutz report that milling at this percentage persisted for "much of the latter half of the war."[64] However, for practical purposes, this idealized *Kriegsbrot* loaf will be treated as if the flour were milled at 100 percent, to

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[62] Hans Teuteberg, "Food Provisioning on the German Home Front, 1914-1918," in *Food and War in Twentieth Century Europe*, eds. Ina Zweiniger-Bargielowska, Rachel Duffett, and Alain Drouard (Farnham; Burlington, VT: Ashgate, 2011), 63; Sadler, "July 1918," *BDFA*, vol. 12, 284; and Max Müller, "July 1917," *BDFA,* vol. 11, 253.
[63] Max Müller, "June 1916," *BDFA*, vol. 10, 174.
[64] Chickering, *Freiburg*, 266; Lutz, *German Collapse*, 184.

make things easier to calculate. For comparison, we will assume a pre-war loaf of white bread with a milling rate of around 70 percent, which is the average modern extraction rate for white bread flour.[65] As one final disclaimer, the following nutritional analysis will be based on values for the flour itself prior to baking, because it is impossible to ensure the uniformity of baked loaves of bread. Restricting the analysis to flour itself circumvents this problem and ensures a level of consistency in the comparison.

[65] Sorangel Rodriguez-Velazquez, "2.3: Milling of Wheat," Chemistry LibreTexts, October 1, 2017, https://chem.libretexts.org/Bookshelves/Biological_Chemistry/Book%3A_Chemistry_of_Cooking_(Rodriguez-Velazquez)/02%3A_Flour/2.03%3A_Milling_of_Wheat.

Nutritional information for the four varieties of flour used in the comparison are presented below, provided by the United States Department of Agriculture website, *FoodData Central*.[66]

	Wheat flour, bread, unenriched (~70%) (100 g)	% daily value	Wheat flour, whole-grain (100 g)	% daily value	Rye flour, dark (100 g)	% daily value	Potato starch (100 g)	% daily value
Calories	361 kcal	-	332 kcal	-	325 kcal	-	357 kcal	-
Fat	1.7 g	2 %	2 g	3 %	2.2 g	3 %	0.3 g	0 %
Carbohydrates	73 g	24 %	74 g	24 %	69 g	23 %	83 g	27 %
Dietary fiber	2.4 g	9 %	13 g	52 %	24 g	96 %	6 g	24 %
Protein	12 g	24 %	10 g	20 %	16 g	32 %	7 g	14 %
Misc. vitamins and minerals	Iron Calcium Magnesium Potassium	4 % 1 % 6 % 2 %	Iron Calcium Magnesium Potassium Vitamin B6	20 % 3 % 29 % 11 % 10 %	Iron Calcium Magnesium Potassium Vitamin B6	27 % 3 % 40 % 20 % 20 %	Iron Calcium Magnesium Potassium Vitamin B6 Vitamin C	7 % 6 % 16 % 28 % 40 % 6 %

Table 1. Per cent Daily Values are based on a standard 2,000 calorie diet as calculated by the USDA. Figures will change from person to person.

[66] "Wheat Flours, Bread, Unenriched," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/168913/nutrients; "Wheat Flour, Whole-Grain, Soft Wheat," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/168944/nutrients; "Rye Flour, Dark," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/168885/nutrients; "Potato Flour," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/168446/nutrients.

In February 1917, authorities in Berlin mandated that bread loaves would be baked in two standard sizes: a 1000g loaf and a larger 1900g loaf, suggesting that these loaf sizes were common at the time of the mandate.[67] If we use the more manageable 1000g loaf as our example and apply the ratios of flours which made up a loaf of *Kriegsbrot* in June 1916, we arrive at the following nutritional values for each loaf (in terms of its dry flour content), prior to baking.

	Wheat bread (~70%) (1000 g)	% daily value	*Kriegsbrot*, June 1916 (1000 g)	% daily value
Calories	3,610 kcal	-	3,348 kcal	-
Fat	17 g	20 %	17.2 g	20 %
Carbohydrates	730 g	240 %	743 g	242 %
Dietary fiber	24 g	90 %	149 g	596 %
Protein	120 g	240 %	110 g	224 %
Misc. vitamins and minerals	Iron Calcium Magnesium Potassium	40 % 10 % 60 % 20 %	Iron Calcium Magnesium Potassium Vitamin B6 Vitamin C	196 % 36 % 298 % 172 % 190 % 12 %

Table 2. Per cent Daily Values are based on a standard 2,000 calorie diet as calculated by the USDA. Figures will change from person to person.

Although this form of analysis is an imperfect substitute for real laboratory analysis, we can see even from these rough figures that a hypothetically perfect loaf of

[67] Max Müller, "February 1917," *BDFA*, vol. 11, 55.

Kriegsbrot baked in June 1916 was an adequate substitute for pre-war white bread, and even surpassed it in some areas. While slightly lower in terms of calories and protein than its counterpart, the loaf of *Kriegsbrot* maintained similar levels of fat and carbohydrates, while vastly outstripping the white loaf in its levels of dietary fiber, iron, magnesium, potassium, and Vitamins B6 and C. One can clearly see as well how many Germans might have fallen victim to abdominal pains following the adoption of *Kriegsbrot* over pre-war bread, as it would have been difficult to adapt to the much higher levels of dietary fiber. Now, it is important to stress that this type of analysis is not without its flaws: it relies on nutritional information for modern food products, which might be based on different varieties of grain from those used in the baking of war bread during the war, and possibly influenced by modern fertilizers or genetic modification. It is also likely that quality standards are higher today than they were at the beginning of the twentieth century—there may have been much greater levels of variation between batches of flour in wartime Germany, which again would confound the variables. However, an analysis of this nature does prove that there was sound logic behind the decision to stretch the food supply through the adoption of higher-milling percentages and admixtures in bread. When implemented correctly, *Kriegsbrot* was likely successful in its purpose of maintaining nutritional standards while also expanding the food supply to cover shortages produced by the circumstances of the food crisis.

If the nutritive quality of *Kriegsbrot* was higher than previously thought, how then can we account for the multitudes of negative accounts regarding the bread that litter the historical record? Part of the answer lies in the fact that these negative accounts form an incomplete picture, with numerous counterexamples existing that challenge the notion that war bread, as a rule, represented a deterioration in quality. George Schreiner found the K-bread of 1915 to be “very palatable,” while noting that “the potato elements

in it prevented its getting stale rapidly. It tasted best on its third day, and could be kept a week without going bad."[68] This is further supported by Müller's report for May 1915, in which he criticizes statements by Sir James Wilson, the British delegate to the International Institute of Agriculture in Rome, who claimed that Germany's attempts to create a palatable and digestible war bread had failed; thus a bread famine could be expected to grip Germany within the next four months. Responding to Wilson's undue optimism, Max Müller retorts, "This statement can hardly be said to have been borne out by the developments of the past two months, and my information, derived direct from persons who have eaten the German 'Kriegsbrot' leads me to differ from Sir James' opinion that the bread is both unpalatable and indigestible."[69] In addition, Heather Perry has found evidence to argue that *Kriegsbrot*—though rejected initially for being dry and unappetizing—was eventually embraced by consumers as they realized that these qualities enabled the bread to remain fresher and last longer than white loaves.[70] So, what then is responsible for the proliferation of negative reports of 'bad bread'? Broadly speaking, I contend that many of the accounts of poor bread quality can be attributed to one of three factors: spoiled ingredients, improper baking, and a general antipathy linked to the challenge posed by *Kriegsbrot* to established eating practices.

For starters, the use of spoiled ingredients was a surefire method to produce a substandard loaf of bread. One of the most damning criticisms of the German government's response to the food crisis during the war was its highly publicized failures in preventing critical stores from spoiling. The unprecedented scale of the food crisis and the required system of administration and infrastructure necessary for the centralized control of the food supply was something the German state was ill-prepared

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[68] Schreiner, *The Iron Ration*, 9.
[69] Max Müller, "April 1915," *BDFA*, vol. 9, 152-3.
[70] Perry, "Kitchen Soldiers," 23.

for.[71] While in peacetime, spoiled wheat, rye, or potatoes would have been an inconvenience, but not necessarily devastating, in times of war there was no recourse but to use the stocks available—even when they had gone bad—or risk widespread famine.[72] Bread in Freiburg which had been made with spoiled rye and potatoes was reported as smelling musty or even reeking of ammonia.[73] Alexander Watson, meanwhile, relates the effects of bread made with rotten flour on one Bulgarian woman in 1918, who told relatives, "I have been vomiting. I feel burning from my mouth to my chest as if there is a fire and I feel heaviness as if there is a stone inside."[74] Wherever bread was made whose flour came from spoiled ingredients, it inevitably generated complaints as to the poor, or even injurious, quality of the bread available.

Improper baking was another likely culprit by which negative experiences with war bread were consistently generated—and was perhaps the most common mistake associated with war bread. One of the benefits of *Kriegsbrot*, as argued by an article taken from the *Dresdner Anzeiger* (date unknown, but likely 1915), was that "The use of the potato products for bread preparation does not require the usual dough preparation, dough fermentation and the usual baking process to be alienated."[75] This, however, was likely far from the truth. Simply moving from the use of white flour to whole grain flour requires an entirely different approach to the baking process.[76] One problem which hinders the easy substitution of whole grain flour for white flour is that

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[71] See Watson, *Ring of Steel*, 348-59, for the troubles which plagued the German response to the food crisis.
[72] Max Müller, "The Economic Situation in Germany during September 1916, being the Twenty-sixth Month of the War," *BDFA*, vol. 10, 303, tells of bakers forced to used damp rye as no other stocks could be acquired; see also Lutz, *German Collapse*, 184.
[73] Chickering, *Freiburg*, 267. See page 210 of this dissertation for more detail.
[74] Watson, *Ring of Steel*, 334.
[75] Pamphlet subsection entitled "*Verschiedenes*," published by Dr. A. Schneider, Dresden, BArch R 86/2175.
[76] Alastair Bland, "What Makes Whole-Grain Bread So Hard to Bake?" *Smithsonian Magazine*, accessed April 28, 2020, https://www.smithsonianmag.com/arts-culture/what-makes-whole-grain-bread-so-hard-to-bake-63878/.

"[The] germ and bran also add weight to the dough, which can impede its capacity to rise, leading to loaves almost as dense as French cobblestone."[77] Adjustments to the baking process, therefore, would likely be necessary with every alteration and adulteration to the composition of the flour used to bake the bread.[78] Furthermore, Ursula Heinzelmann argues in her book, *Beyond Bratwurst: A History of Food in Germany*, that domestic grain available to bakeries had a higher water content than pre-war, imported varieties, adding to the weight of all wartime bread and making it more difficult to work with.[79]

This increased water content posed another difficulty to bakers which occasionally reared its head during the warm summers. A statement from the Experimental Institute for Grain Preparation found in Maylander's report notes the rise in 'ropy' bread in August 1917:

> This peculiar bread disease […] occurs almost every year in particularly hot spring days and at the height of summer. When cut, the bread emits a peculiar smell, which is at first almost fruity […] but afterwards grows sharper, and finally becomes overpowering and offensive. The crumb of such bread is first somewhat moist, then becomes sticky, more or less yellow to yellow-brown in color, and when cut or broken hangs together in long, sticky, tough threads, whence its name of 'ropy' bread. Such bread, since it causes nausea and is otherwise not innocuous, is not to be eaten but must be burned immediately. The

[77] Bland, "What Makes Whole-Grain Bread So Hard to Bake?"
[78] To clarify this, while most bakers would know how to adjust water or flour depending on the consistency of the dough, the greater the adulteration of the flour, the harder it would be to account for these changes in the baking process, making a consistent product less likely. This challenge is demonstrated by P.J. Hamel, "How to Substitute for Potato Flour," King Arthur Flour, accessed May 15, 2020, https://www.kingarthurflour.com/blog/2017/11/17/how-to-substitute-for-potato-flour.
[79] Heinzelmann, *Beyond Bratwurst*, 238.

> causes of the bread disease are fungi, the so-called hay or potato bacteria, which are found in almost all kinds of flour, particularly the dark flour.[80]

Because the bacteria which cause ropy bread tend to proliferate in warm and humid conditions, the increased moisture content of the flour going into *Kriegsbrot* may have contributed to an increase in the instances of infected bread loaves—which again, would not have been easily parted with under conditions of scarcity.[81] The inclusion of potato starch in war bread recipes may also have unwittingly contributed to these cases, as the inclusion of "cheap" starches in bread, like potato starch, are believed to increase the risk of rope infection.[82] Loaves with a moist crumb, or those that are underbaked, are also likely to be susceptible to rope infection, due to insufficient heat reaching the center of the bread to deactivate dormant fungal spores.

A report from the Hamburg Institute of Hygiene in April 1915 illustrates how difficult it was for German authorities to find a solution to the problem of ropy bread. It was well understood that the heat of the summer months posed a risk for infection, and that using flour infected with the so-called "potato bacteria" would almost certainly result in ropy bread since the spores were resistant to the baking process. The obvious preventative solution endorsed by the report was to enforce stricter hygiene policies on the bakeries themselves, as well as instructing trade inspectors to observe bakeries more closely during the warmer months. In the interest of reducing bread waste, the report also recommended that changes be made to the existing regulations regarding the sale of bread. Previously, bakers were required to wait twenty-four hours after baking before selling their bread, to give the dense, moist loaves time to dry. However, since bread

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[80] Maylander, *Food Situation*, 19.
[81] Nicola Pacher et al., "Ropiness in Bread—A Re-Emerging Spoilage Phenomenon," *Foods* 11, no. 19 (January 2022): 3021
[82] "Don't Suffer Ropey Bread | Baking Recipes and Advice," BakeryBits, December 18, 2019, https://www.bakerybits.co.uk/resources/dont-suffer-ropey-bread/.

infected with rope took between twenty-four and thirty-six hours to develop the sticky strands which rendered it inedible, the authors of the report urged the authorities to allow bread to be sold immediately after baking during the summer months, before it had a chance to spoil.[83] The logic is understandable, but shortsighted—it meant asking customers to purchase substandard loaves of bread, which, if not eaten within two days' time, would quickly become inedible or make them ill if unknowingly consumed.

Finally, in addition to the increased weight of the dough and the increased risk of ropy bread, some bakers had further difficulties in getting the different ingredients to bind together during the baking process. Chickering notes that complaints arose in Freiburg in the summer of 1915 regarding "unpleasant striations in their bread, which had resulted from the incomplete binding among ingredients of different consistencies."[84] Whether or not bakers were given explicit instructions on how to properly bake the *Kriegsbrot* with each iteration of its recipe is unknown to this author and will require further research. However, it is not unreasonable to assume that flour ratios were simply decreed by the government and bakers were expected to accommodate these regulations in their baking, with regular inspections (in theory, at least) ensuring that the rules were adhered to. We do, however, know that model bakeries were established with the help of bakers' guilds to provide practical education in baking war bread, and that baking advice was published in printed form, but these efforts relied on volunteerism on the part of interested bakers.[85] This process of accommodating new ingredients likely required a large degree of trial and error, and bakers likely shared their techniques and baking tips with one another to help improve the quality of war bread over time. Regardless of these quality improvement efforts,

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[83] Copy of a report on ropy bread from the Food Inspection Department of the Hamburg Institute of Hygiene on 1 May 1915. BArch R 86/5441.
[84] Chickering, *Freiburg*, 266.
[85] See Chapter 1 for a longer discussion on public-private cooperation in baking war bread.

mistakes by bakers could and did increase the number of negative accounts associated with *Kriegsbrot*. Evidence from Chickering references bread which was "frequently wet because bakers had underbaked it or sold it (in violation of ordinances) right out of the oven. Unless they were dried out in individual slices, these loaves remained inedible for days […]"[86] Even if it was possible to bake a 'perfect' loaf of war bread which—although dark and coarse—was nourishing and palatable, when mistakes like these occurred, consumers could not easily replace the bad loaves with good due to the limitations of the rationing regime, and this understandably sparked discontent with the product.

The picture of *Kriegsbrot* which emerges from this discussion is one which differs greatly from its conventional portrayal in the historiography. As we have seen from the nutritional debates which surrounded the milling percentages of bread grain, much of the criticism of the bread by contemporaries can be questioned due to their incomplete understanding of nutritional science, which has developed significantly in the period since the First World War. The introduction of greater amounts of fiber in the bread, though unpalatable to contemporary tastes, which favored the "crispiness of a white loaf," may have actually been beneficial to the health of the average consumer.[87] It also served the dual purpose of significantly expanding the yield of flour produced from bread grain, which helped to ensure that—though rations often fluctuated—bread could be purchased throughout the war. Finally, if we also accept that at least some of the many examples of 'bad bread' can be attributed to the use of spoiled ingredients and improper baking, this suggests that the current treatment of *Kriegsbrot* in the historiography is flawed and worthy of revision. Rather than just a symbol of

[86] Chickering, *Freiburg*, 267.
[87] Watson, *Ring of Steel*, 334.

deprivation and desperation, we might also discover a *Kriegsbrot* that can be upheld as an example of successful government intervention in the food supply.

Turnips and their derivatives

If *Kriegsbrot* represented the foremost government effort at *ersatz* food production, then the second most iconic symbol of wartime food shortage would have to be the replacement of potatoes with turnips during the infamous *Kohlrübenwinter* (Turnip Winter) of 1916/17. Following an unusually cold and wet autumn which destroyed approximately half of the crucial potato crop in the fall of 1916, the German government was faced with a nutritional crisis of monstrous proportions. [88] Alongside bread, potatoes represented the most important source of nourishment for the average German citizen—especially after animal fats and proteins had vanished from the market or had become prohibitively expensive.[89] Germany's large domestic supply of potatoes had meant that the government relied almost exclusively on the potato harvest as the means by which to overcome the lack of imported foodstuffs imposed by the blockade. Dr. Hugo Schweitzer's address to the German University League in New York City in 1915, which sought to reassure his American-German audience that Germany would not be starved out, echoed the government's position by urging the end of "prejudice against potatoes as a general food. This material, of which an almost *limitless supply* [emphasis original] is on hand, is a most digestible and valuable article of diet."[90] While this belief in the inexhaustibility of the potato stock proved overly optimistic at best, the large

[88] Watson, *Ring of Steel*, 331.
[89] Max Müller, "April 1916," *BDFA*, vol. 10, 61. See also Roerkohl, *Hungerblockade*, 293, for graphic representations of the share of the diet held by bread and potatoes during the war.
[90] Schweitzer, *Can Germany Be Starved*, 12.

domestic supply of potatoes was used liberally throughout the war to expand the food supply for human consumption, often at the expense of their alternative roles as animal fodder or ingredients in the production of spirits.[91]

The increased importance of potatoes for the maintenance of wartime nutrition becomes apparent when looking at potatoes' growing share of the daily diet. Although potatoes had long served as an important source of food for the poor and a hedge against famine, reaching back to the end of the eighteenth century, their consumption during the war years soared to unprecedented levels.[92] One enquiry in Charlottenburg, conducted in November 1915, reported that the average household consumption of potatoes had increased by as much as 70 to 80 percent over peacetime figures. Writing in 1918, Ralph Lutz estimated in his report on the German collapse that potatoes and bread alone had accounted for up to 70 percent of the average German's diet by the end of the war.[93] In another example, the municipal government of Freiburg responded to a grain shortage in 1915 by calling on its citizens to include boiled potatoes at both the mid-day and evening meals, "to the complete exclusion of bread."[94] What bread was available for consumption was likewise largely dependent on the use of potato meal as an admixture to stretch the supply of flour. In addition, of ninety-six recipes found in the *Badisches Kriegskochbüchlein* (Baden War Cookbooklet), published by the Baden Women's Association in 1915, more than half called for the inclusion of potatoes.[95] Furthermore, a nine-day sample menu for "simple households", found in the cookbook's

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[91] This is illustrated by numerous government regulations banning or restricting the use of potatoes for these purposes. Chirol, "Third Month," *BDFA*, vol. 9, 20; Max Müller, "February 1915," *BDFA*, vol. 9, 124; and ibid, "December 1916," *BDFA*, vol. 11, 19.
[92] Ellen Messer, "Potatoes (White)," in *Cambridge World History of Food*, ed. Kenneth Kiple and Kriemhild Coneè Ornelas (Cambridge; New York: Cambridge University Press, 2012), 191.
[93] Max Müller, "The Economic Situation in Germany during November 1915, being the Sixteenth Month of the War," *BDFA*, vol. 9, 345; Lutz, *German Collapse*, 183.
[94] Chickering, *Freiburg*, 269.
[95] Wundt, *Kriegskochbüchlein*; Chickering, *Freiburg*, 264.

appendix, included only five dishes which did not require potatoes, out of a total of eighteen recipes.[96]

It is therefore impossible to overstate the central importance of the potato crop to the wartime diet of the German people, as well as the scale of the disaster presented by the failure of the potato harvest in 1916. In order to avert the looming threat of famine, the German government was forced to seek an alternative for the dwindling supplies of potatoes and found that replacement in the form of the lowly turnip, which had served previously as a cheap source of animal fodder and was readily available.[97] These hardy root vegetables, which first appeared as a supplement to the dwindling potato ration in November 1916, eventually became the sole occupants of the plate throughout much of Germany as the meager potato crop was exhausted.[98] By the following month, the official ration of potatoes in Prussia was reduced to 3 lb. per person weekly (down from an average of 5 lb. weekly), with the deficit being made up by at least double the quantity of turnips and radishes.[99] Stepping almost completely into the role formerly occupied by potatoes, turnips permeated the German diet during the harsh opening months of 1917. They were stuffed into dumplings, served as cutlets, used to stretch sausages, pickled into sauerkraut, tossed into salads, cooked into marmalade, reduced to a sickly-sweet syrup, and even replaced potato flour at one point as one of the primary admixtures in *Kriegsbrot*.[100] While nutritional levels in Germany sank to dangerous lows during this period, it is not far from the truth to say that the quick introduction of

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[96] Wundt, *Kriegskochbüchlein*, 47.
[97] Chickering, *Freiburg*, 269-270, notes that turnips (*Kohlrübe*) were grown as fodder crops primary in northern Germany.
[98] Chickering, *Freiburg*, 269-70; Max Müller, "November 1916," *BDFA*, vol. 10, 386.
[99] Max Müller, "December 1916," *BDFA*, vol. 11, 21.
[100] Chickering, *Freiburg*, 270-1; Blücher, *An English Wife*, 163; Max Müller, "June 1917," *BDFA*, vol. 11, 194; ibid, "July 1917," *BDFA*, vol. 11, 257; and ibid, "September 1918," *BDFA*, vol. 12, 377.

turnips as a stopgap substitute for potatoes was responsible for preventing the widespread starvation of Germany's population.[101]

Despite their success in staving off complete nutritional collapse, the turnips which invaded daily life in the first half of 1917 were one of the most widely reviled food items during the war. Similarly to *Kriegsbrot,* turnips received an enormous amount of criticism from both nutritional experts and the general public, directed at their perceived nutritional inferiority compared to potatoes, as well as for their "vile" and "repugnant" taste, smell, and texture.[102] Herr Hoff, a member of both the Reichstag and the Prussian Lower House, contended that "cabbage-turnips cannot by any means be reckoned as a complete substitute for potatoes. They contain far less nourishment, as they are composed largely of water […]"[103] Max Rubner, meanwhile, claimed to have ascertained that "4 lb. of cabbage-turnips contain the same amount of nourishment as 1 lb. of potatoes, though they cost the same as 4 lb. Moreover, it is almost impossible for any one to consume more than 4 lb. of cabbage-turnips."[104] While these criticisms cast a shadow over the nutritional value of turnips as a replacement for potatoes, they also provide a launching point to discuss one of the stranger historiographical issues which inhibits our understanding of the turnip's nutritional role: that is, the considerable etymological ambiguity in the historical record regarding the word 'turnip'.

Although most historians simply refer to 'turnips' when writing about the Turnip Winter, there were actually two distinct vegetables which were used as substitutes for potatoes during the period—with very different nutritional values, respectively. These two vegetables were the *Kohlrübe* (also called *Steckrübe*), which we know as swedes or

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[101] Official rations in the summer of 1917 amounted to just 1,100 calories daily, compared to the 2,500 calories recommended today, Watson, *Ring of Steel*, 352. For a more complete picture of the impacts of malnutrition during the war, see Cox, *Hunger in War and Peace*.
[102] Chickering, *Freiburg*, 270.
[103] Max Müller, "December 1916," *BDFA*, vol. 11, 21.
[104] Ibid, "February 1917," *BDFA*, vol. 11, 56-7.

rutabagas, and the *Kohlrabi*, sometimes referred to in English as German cabbage turnips. To say there is massive confusion in the historical record between these two vegetables would be an understatement, and much of it centers on the use of the word *Kohlrübe*. While *Kohlrübe* and *Steckrübe* can be used interchangeably as synonyms, *Kohlrübe* is also used to describe *Kohlrabi* in some regional dialects, notably in Austrian German.[105] Furthermore, *Kohlrübe* are known in Sweden as *kålrot*, in Denmark as *kålroe* and *kålrabi*, while in Norway they are called *kålrabi* or *kålrot*, and in Dutch they are known as *koolraap*—all of which are strikingly similar to the German *Kohlrabi*, an entirely different vegetable.[106] In order to avoid any further confusion, for the remainder of this chapter I will use the term *Kohlrübe* to refer to swedes only, while *Kohlrabi* will strictly refer to the vegetable commonly known by the same name.

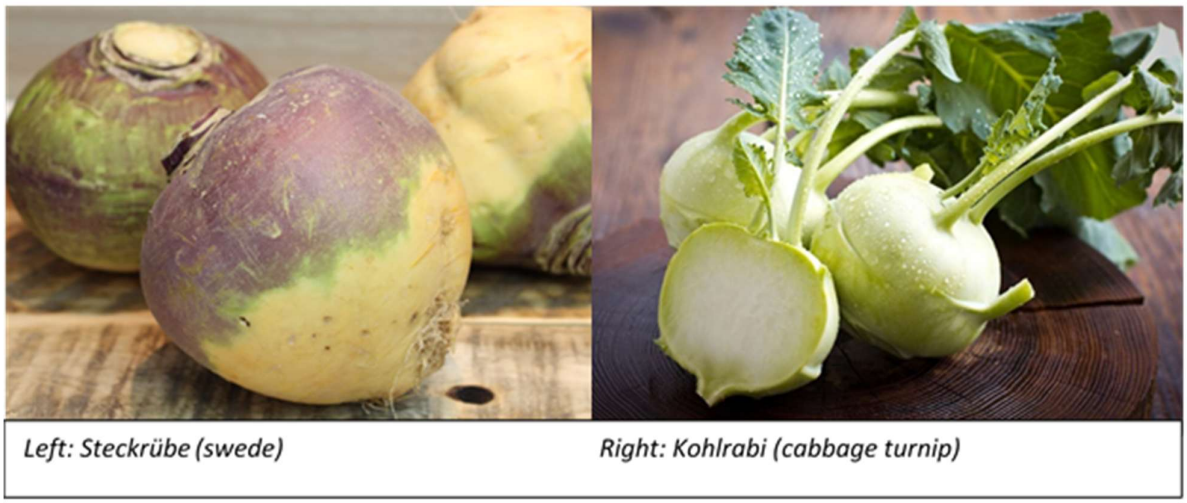

Figure 2.1 Color photograph of swedes and kohlrabi

This confusion between the two vegetables extends even into the primary sources. In 1917, a new war cookbook written by Ida Keller was published to instruct

[105] "Rutabaga," Wikipedia, s.v. last modified, May 24, 2021, 10:03, https://en.wikipedia.org/wiki/Rutabaga; "Duden | Kohlrübe | Rechtschreibung, Bedeutung, Definition, Herkunft," Duden, accessed June 1, 2021, https://www.duden.de/rechtschreibung/Kohlruebe.
[106] "Rutabaga," Wikipedia, s.v.

housewives in the proper preparation of the new turnip rations. The *Neues Kohlrüben-Kriegskochbuch* (New Swede War Cookbook) not only included recipes for fifty swede-based dishes—ordered around regional flavors and ingredients—but also included a brief history of the vegetable, commented on its nutritional content as understood at the time, and offered a guide on how to dehydrate it, preserve it, and store it once cooked.[107] The confusion comes in the opening paragraph of the introduction to the vegetable, which reads as follows:

> The *Kohlrübe* is also known as the *Steckrübe, Unterrübe, Wruke*, *Dorsche* or *Unterkohlrübe*. The French know it as *chou-navet*, the English as the cabbage turnip or turnip-rooted cabbage, with the Latin name *Brassica Napus rapifera*.[108]

While the German terms, the French term, and the Latin classification all refer to swedes, the included English term clearly does not, as cabbage turnips are the closest English translation for *Kohlrabi*, while rutabaga or swede is the preferred term for *Kohlrübe*.

Encyclopedia articles, both historic and modern, likewise accomplish little in the way of clearing up the etymological confusion between the two vegetables. The 1970 edition of the *Brockhaus Enzyklopädie* lists the two names as synonyms and offers the unhelpful distinction of *Oberkohlrabi* (top kohlrabi) and *Unterkohlrabi* (under Kohlrabi) as additional terms of differentiation.[109] Making matters worse, the 1882 *Brockhaus' Conversations-Lexikon* applied the term *Kohlrabi* to the *Brassica oleracea* plant (kohlrabi), the term *Kohlrübe* to *Brassica campestris* (an old term for *Brassica Napus*, the swede), while applying the term *Steckrübe* to two separate plants (*Brassica*

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[107] Perry, "Kitchen Soldiers," 32.
[108] Keller, *Kohlrüben-Kriegskochbuch*, 5. Translation mine. [Die Kohlrübe, auch große Steckrübe, Unterrübe, Wruke, Dorsche, Unterkohlrübe genannt. Der Franzose nennt sie *chou-navet*, der Engländer *cabbage turnip* oder *turnip rooted cabbage* und der Lateiner nannte diese *Brassica Napus rapifera*.]
[109] "Kohlrübe," and "Kohlrabi," in *Brockhaus Enzyklopädie* (Wiesbaden: F. A. Brockhaus, 1970).

campestris and *Brassica rapa*, the latter associated with white turnips).[110] It seems clear that, depending on the region, turnips/kohlrabi/swedes were described interchangeably using catchall terms, much to the headache of those trying to parse which vegetables are which in the historical record.

This ambiguity in the sources between *Kohlrübe* and *Kohlrabi* makes the job of analyzing their nutritional impact particularly difficult. On the one hand, most (but not all) of the sources in German seem to refer to swedes when discussing their consumption of turnips.[111] On the other hand, the Max Müller reports in the *British Documents on Foreign Affairs* only use the term 'cabbage turnips', though it is highly unlikely that they are only referring to *Kohlrabi* in doing so.[112] Since we cannot always be sure which vegetable a source is talking about, and since it is likely that turnips of all descriptions were mobilized to make up shortfalls in the potato harvest, we will simply side-step the confusion between the two entirely, by examining both for their nutritional content compared to the potatoes they were replacing.

Let us begin by listing the nutritional content of potatoes, kohlrabi, and swedes side-by-side as the basis for our examination. All figures shown are again provided by the United States Department of Agriculture database, *FoodData Central*, and represent the nutritional value of the products, unpeeled and raw.[113]

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[110] "Brassica," in *Brockhaus' Conversations-Lexikon* (Leipzig: F. A. Brockhaus, 1882).
[111] Mihaly, *There We'll Meet Again*, 227, provides a concrete example of this. Ida Keller provides additional evidence.
[112] Max Müller, "November 1917," *BDFA*, vol. 10, 386, first introduces the phrase "cabbage turnips" followed by the German word "*Kohlrüben*" in parentheses. However, further down that same page, in a table listing the maximum prices for root vegetables, "Turnips" and "Swedes" are listed separately, implying a difference. Thereafter, Max Müller and the rest refer only to 'turnips' or 'cabbage-turnips', with little else to distinguish which root vegetable is being addressed, thus adding to the confusion.
[113] "Potatoes, Flesh and Skin, Raw," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/170026/nutrients; "Rutabagas, Raw," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/168454/nutrients; "Kohlrabi, Raw," U.S. Department of Agriculture, Agricultural Research Service, April 1, 2019, https://fdc.nal.usda.gov/fdc-app.html#/food-details/168424/nutrients.

	Potatoes (100 g)	% daily value	Swedes (100 g)	% daily value	Kohlrabi (100 g)	% daily value
Calories	77 kcal	-	38 kcal	-	27 kcal	-
Fat	0.1 g	0%	0.16 g	0%	0.1 g	0%
Carbohydrates	17 g	5%	9 g	3%	6 g	2%
Dietary fiber	2.2 g	8%	2.3 g	9%	3.6 g	14%
Protein	2 g	4%	1.1 g	2%	1.7 g	3%
Misc. vitamins and minerals	Calcium Magnesium Iron Vitamin C Vitamin B6	1% 5% 4% 32% 15%	Calcium Magnesium Iron Vitamin C Vitamin B6	4% 5% 2% 41% 5%	Calcium Magnesium Iron Vitamin C Vitamin B6	2% 4% 2% 103% 10%

Table 3. Per cent Daily Values are based on a standard 2,000 calorie diet as calculated by the USDA. Figures will change from person to person.

As we can see from the above table, the nutritional value of both swedes and *Kohlrabi* is outstripped by that of potatoes—with the exception of their Vitamin C content. The important distinction to make, however, is the relative extent of their inferiority. *Kohlrübe* appear to be roughly half as nutritious as potatoes, whereas *Kohlrabi* are roughly a third as nutritious. Taking these numbers into account, it thus seems likely that Max Rubner's criticism of cabbage turnips (that they are a quarter as nutritious as

potatoes) is indeed in reference to *Kolhrabi* and not *Kohlrübe*—extending the confusion between the two.[114]

For those who could not get their hands on scarce potatoes during the winter of 1916/17, it is clear that *Kohlrübe* represented the next best choice, despite their unsavory reputation as animal feed. As we saw previously, when weekly potato rations in Prussia were cut from 5 lbs to just 3 lbs, the deficit was made up with double the number of turnips or radishes.[115] Assuming that supplies held out and consumers were actually able to purchase those goods allowed by their ration cards, then swedes would have been largely sufficient to maintain the levels of nutrition previously offered by potatoes in that ration. The same, unfortunately, cannot be said for *Kohlrabi*—if consumers were offered only cabbage turnips in the place of their now absent potato rations, then nutrition would have suffered to a much greater extent.

What is unavoidable in this change of diet is that consumers would have needed to eat a higher volume of food in order to maintain their previous level of nutrition. This leads directly to one of the primary complaints when it comes to the turnips, which was the extreme monotony of consumers' diets. As is suggested by the plethora of recipes in the *New Swede War Cookbook*, as well as evidence presented in Chickering's work on Freiburg, the consumption of turnips took on a terrifying ubiquity as existing stocks of potatoes continued to diminish.[116] A poem from Freiburg, dedicated to the turnips, read, "The turnips, ah, the turnips/ They have driven me out./ Had my mother cooked meat/ I would have stayed at home," while another 'recipe' jested that the flavor of swedes would be much improved if they were cooked in castor oil.[117] This monotony was

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[114] Max Müller, "February 1917," *BDFA*, vol. 11, 56-7.
[115] Ibid, "December 1916," *BDFA*, vol. 11, 21.
[116] Chickering, *Freiburg*, 270-1; Blücher, *An English Wife*, 163; Max Müller, "June 1917," *BDFA*, vol. 11, 194; ibid, "July 1917," *BDFA*, vol. 11, 257; and ibid, "September 1918," *BDFA*, vol. 12, 377.
[117] Chickering, *Freiburg*, 270-1.

further compounded by the knowledge that, prior to the war, turnips had served primarily as animal fodder fit only for livestock, with one letter found on a German prisoner voicing dismay that "All cattle fodder must now become human food."[118]

The monotony of the diet, their negative connotation as animal feed, and the loss of the familiar potato all worked against the popular embrace of turnips as a valued food source during the war, and likely contributed to their negative image in primary source documents later used by historians. We must be cognizant of these forces at play in accounts of turnip consumption, as they may obscure the reality of the key role played by turnips in maintaining wartime nutrition. Despite the scores of accounts decrying the awful taste of these root vegetables, there do exist counter-examples which suggest the opposite. Piete Kuhr, a young girl living in eastern Germany, recorded in her diary that she enjoyed eating swedes, despite consumers' widespread dislike of them.[119] Likewise, for those who could consistently obtain the foods permitted by the official rations, the turnip diet of spring 1917 seems in some cases to have been sufficient to maintain health, regardless of criticisms levelled against its nutritional value. One Norwegian doctor who served in a Berlin hospital in the spring of 1917, for example, reported that, "He has himself lived on the German rations, and, in spite of the fact that he lived upon turnips for a considerable time this spring, his health did not suffer."[120]

This is not meant to belittle the suffering endured by millions of German citizens during the Turnip Winter, by suggesting that all of the food was nutritious and that cases of malnutrition and its related ailments did not occur. The preponderance of evidence against that suggestion, especially as outlined in Mary Cox's groundbreaking work on malnutrition in First World War Germany, does not permit such a stance.[121] However,

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[118] Max Müller, "April 1917," *BDFA*, vol. 11, 117.
[119] Mihaly, *There We'll Meet Again*, 227. See page 196 of this dissertation for more detail.
[120] Max Müller, "September 1917," *BDFA*, vol. 11, 326.
[121] Cox, *Hunger in War and Peace*, 367-72.

our brief nutritional analysis of potatoes, *Kohlrübe*, and *Kohlrabi* hopefully shows that the policy of replacing potatoes with turnips (especially when rations allowed for double the amount of turnips, and when *Kohlrübe* were used over *Kohlrabi*) was a rational decision that, in theory at least, promised to maintain the nutritional levels previously afforded by potatoes in the diet. Therefore, it is necessary for historians to revisit the way in which they evaluate the role played by turnips during the winter of 1916/17. It is not that they were nutritionally inferior products (just different), or even necessarily that their taste was inferior to that of potatoes (a subjective value), but simply the fact that, due to their previous role as animal fodder and the extreme monotony of fare presented, they were not as welcome on the dinner table.

Conclusion

Whilst being careful not to gloss over the real nutritional deficiencies which plagued the German home front throughout the war and beyond, the findings of this examination clearly contest our received wisdom on the nutritional value of staple *ersatz* food products like *Kriegsbrot* and turnips. Many worthless products did exist in large quantities. This fact is attested to by the hundreds of pages of reports found in the *ersatz* testing offices established by the War Food Office in 1918 to wrestle with the thousands of poor substitutes flooding store shelves.[122] Even staple goods could be ill-prepared, made with spoiled ingredients, or improperly stored, contributing greatly to the level of human misery. Yet the fact remains that certain *ersatz* products, widespread

[122] Lüders, *Das unbekannte Heer*, 75-6, is the oft cited source in recent historiography for numbers of *ersatz* products. Lüders, in turn derives these numbers from Skalweit, *Kriegsernährungswirtschaft*, 60-1.

in their distribution and consumption, were likely of higher nutritional value than we previously thought.

This discrepancy might be explained through a number of reasons. First, many of the claims regarding the inferior nutrition of war bread were based on an outdated understanding of nutritional science. The health benefits of fiber (previously unknown), and the nutritive value of our hypothetical loaf of 1916 war bread compared to a pre-war loaf of white bread show us that the government policy-making was sound—the bread supply could be extended through various means without greatly reducing its relative nutritional value. Second, in regard to the consumption of turnips, ambiguity between *Kohlrabi* and *Kohlrübe* in historical sources may have hindered our analysis of the nutritional value of turnips versus the potatoes they replaced. While *Kohlrabi* were only a third as nourishing as potatoes, *Kohlrüben* were roughly half as nutritious. Examination of the nutritional value of turnips during the Turnip Winter shifts drastically depending on which vegetable is being discussed. If we take *Kohlrüben* as the norm, then their replacement of potatoes can be accepted as a reasonable policy, so long as the government was able to offer them at double the rate of potatoes removed. In reality, available rations often fell short of this ideal, with some regions cutting turnip rations to just one pound per week—far less than would have been required to compensate for the decline in potato rations.[123] Nevertheless, it is clear that *Kohlrüben*, when sufficient supplies could be had, constituted an important source of nutrition which helped Germany through the difficult early months of 1917, and should be recognized for its contributions to wartime nutrition. Even the *Kohlrabi* would have been important for what calories it could provide, as well as for its excellent Vitamin C content in the absence of fresh fruits and vegetables.

[123] Teuteberg, "Food Provisioning," 64.

A brief word must be said here regarding malnutrition and death in the context of the German food crisis. In the past, there has been much doubt expressed over the extent of the deaths that can be linked to the food crisis caused by the Allied blockade. The post-war figure of 800,000 estimated excess deaths provided by German authorities is hotly debated. Malnutrition, a rise in tuberculosis rates, the coming of the Spanish Flu, and a severe lack of coal for heat all contributed to a rise in civilian deaths over peacetime figures, masking the impact of food shortages on numbers of deaths.[124] Avner Offer, in his landmark book on agriculture in the First World War, even went so far as to say that since rations were sufficient on average to maintain industry and health, although the German people were often cold and hungry, they were not subject to actual starvation.[125] However, recent work done by Mary Elisabeth Cox, which examines overlooked anthropometric data from multiple case studies, casts doubt on Offer's argument by highlighting the statistical evidence that malnutrition did indeed take a toll on the population, and will likely become standard reading on the subject moving forward.

This chapter continues in this trend towards fleshing out our understanding of the German food crisis through novel approaches to the sources. The intention is not to reach a revisionist conclusion that *ersatz* food was a tasty and healthful superfood, and thus understate the very real human suffering endured during the conflict. Rather, it is simply to draw attention to the problems in our approach to *ersatz* food as a historical subject and to note that, for all the hatred directed towards them, eating *Kriegsbrot* and turnips likely saved many lives. We can no longer blindly assume that *ersatz* foods were indigestible, disgusting, or vile as has been done in the past, content with uncritically utilizing them for their value as colorful anecdotes to sprinkle in our histories of the

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[124] Grebler and Winkler, *The Cost of the War*, 78.
[125] Offer, *Agrarian Interpretation*, 53.

First World War. Instead, we must be more diligent in our questioning of the primary sources, and what biases or inaccuracies they may hold. Only by doing so can we improve our understanding of the role of *ersatz* food products in the maintenance of wartime nutrition in Germany, and more broadly, the role played by substitute food products in maintaining nutrition in times of conflict, famine, or socioeconomic hardship worldwide.

Chapter 3: Becoming like animals? Explaining popular reactions to ersatz food

Introduction

Following her exile from Britain at the start of the war for being married to a German aristocrat, Evelyn Blücher spent much of the first half of the war ensconced within Berlin's luxurious Hotel Esplanade on Potsdamer Platz. While there, she continued to practice the life of a socialite as far as was possible, attending luncheons, tea times, and other gatherings, even after the food crisis placed the traditional fare of such events beyond reach. Her post-war published diary thus contains a wealth of information on the perspective of the German elite towards the developing severity of the food crisis within the capital—providing a continuous commentary on the scarcity of foodstuffs and the pain which must have been felt by the working classes struggling to put food on the table. By March 1916, after *ersatz* food products had become a commonplace staple in the diets of German consumers, she recorded the following lamentation about the quality of the food being served to guests in the hotel:

> I have been in bed with what people say is influenza, but I feel inclined to call it "Ersatz" illness. Every one is feeling ill from too many chemicals in the hotel food. I don't believe that Germany will ever be starved out, but she will be poisoned out first with these substitutes![1]

Returning to a figure from the introduction of this thesis, Ernest Lionel Pyke, reflecting on his experiences in the Ruhleben POW camp not far from Blücher on the outskirts of Berlin, remarked that, "I think, from the German point of view, one of the most dreadful burdens they have to bear is the swallowing of all those simply awful

[1] Blücher, *An English Wife*, 122.

substitutes which their Government forces relentlessly upon them."[2] He claimed that the much-maligned British government beers were the "nectar of the gods compared with the bitter-tasting swill that the German has to put up with," and that the tea on offer in Berlin, a "fearful substitute" made of dried mulberry leaves, "leaves a taste in your mouth that makes you fear at first that you have been poisoned […]"[3] His treatment of other *ersatz* food products, from margarine to coffee, continues in much the same manner. Meanwhile, in nearby Charlottenburg, a colorful account by Bruno Haase, reacting to the authorities' decision to forbid the baking of white bread rolls in favor of the new war bread is relayed to us by Keith Allen:

> "The intention of the city government to do away with the white bread rolls horrifies me. For health reasons, I have been a white-bread eater all of the 53 years of my life. If the city goes ahead with its plans for the introduction of a 'standard loaf,' there is no way I will ever be able to satisfy my hunger pangs again.[4]

Haase's reactions here are presented as being representative of public sentiment regarding the loss of the popular breakfast rolls from the diet.

In the bleak months of early 1917, the Committee for Consumers' Interests in Berlin likewise sounded the alarm over what they considered to be an unacceptable lack of quality in preserved foods reaching German consumers. Detailing a few examples of the alleged abuses, "tinned fish has been officially described as 'refuse', tins of vegetables have been found to be full of dirt and stones, and the artificial syrup is said to look and taste like grease."[5] As was demonstrated in the previous chapter on *ersatz*

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[2] Pyke, *Desperate Germany*, 13.
[3] Ibid, 13-4.
[4] Keith Allen, "Sharing Scarcity: Bread Rationing and the First World War in Berlin, 1914-1923," *Journal of Social History* 32, no. 2 (1998): 371–93, https://doi.org/10.1353/jsh/32.2.371, 374.
[5] Max Müller, "April 1917," *BDFA*, vol. 11, 117.

and nutrition, anxieties over the milling percentages of war bread similarly contributed to the belief that the quality of everyday food items was deteriorating, with potentially negative impacts on the health of consumers who had no choice but to eat what was available to them. This belief in the declining quality of food products and its connection to the health of consumers was held not just amongst experts in Germany, but crossed borders as well. Alfred Maylander's report to the U.S. Bureau of Labor Statistics in 1917 on the state of the food situation in the Central Powers, drawing on the information gathered by the exodus of Americans leaving the country prior to the United States' entry into the war, was adamant in its insistence that "bread, *badly milled* and badly baked [emphasis added]," was the cause behind a rash of cases of intestinal distress in northern German towns.[6]

For readers of histories of the German home front during the First World War, the inferior quality of foodstuffs, and especially of *ersatz* foodstuffs, is a familiar refrain. Newspaper articles, archival records, personal letters, postcards, and diaries are all replete with examples of consumers frustrated with the lack of quality of the foods they were consuming, be they fraudulent *ersatz* products aimed at playing on their hunger and ridding them of their money, or life-sustaining staples like war bread and turnips. Due to this abundance of evidence at our disposal, historians of the German home front have long employed accounts of consumer experiences with *ersatz* food to represent the declining material fortunes of the German state as the war progressed. Not only was food scarcer in absolute terms as the Allied blockade tightened its iron grip over international trade, but the quality of the food on offer continued to decline in both subjective and objective terms, in a grim reflection of the erosion of popular morale as the revolutions of 1918 drew near. Historians employ these accounts because they offer

[6] Maylander, *Food Situation*, 56.

an insight into the harshness of life on the home front during the war, but also because accounts like these frankly make for colorful anecdotes and exciting reading. After all, what better way to illustrate the desperation some families faced in their search for protein than to use quotes like those from Evelyn Blücher's diary which mention the slaughtering of the family's pet kangaroos on their estate in Krieblowitz?[7] Or, for that matter, the sale and consumption of *Kriegswurst* (war sausage) which was bloated with water and looked like "little packages of slime, sometimes the size of an egg, and at 70 grams, light enough to be weighed on a postage scale."[8]

While there is nothing disingenuous about employing the historical evidence to these ends, one unfortunate result is that the treatment of *ersatz* food products in the historiography has become inflexible and rote. To say that *ersatz* food products were of inferior quality is simply to reflect established fact, and need not be examined further. One good example of this can be found in Roger Chickering's magisterial book on the home front in Freiburg, in which he describes the quality of bread during the war in the following manner: "Bread of all descriptions was disagreeable, if not dangerous, to consume; unpleasant in smell, taste, and sight, it posed a struggle both to eat and digest."[9] Presented without referencing, this line is largely representative of the over-generalizing tendency common amongst historians when discussing the quality of German food substitutes during the First World War, in terms of their nutritional value and their taste. The problem with such generalization is that it assumes the conventional wisdom regarding wartime food substitutes holds true, and fails to critically examine the popular reception of these controversial foodstuffs. Were *ersatz* foods, as a rule, unpalatable, difficult to digest, and viewed as disgusting by those who ate them?

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[7] Blücher, *An English Wife*, 225.
[8] Chickering, *Freiburg*, 268.
[9] Ibid, 267.

Furthermore, what exterior factors might have influenced the public's overwhelmingly negative response to these products? Is there perhaps a unique challenge in gauging the subjective quality of foodstuffs using historical records that has previously gone unrecognized?

The goal of this chapter, as with the previous chapter on the nutritional value of *ersatz* food products, is to critically engage with the following question: was *ersatz* food truly of inferior quality to the foods it was replacing? In contrast Chapter 2, however, which focuses on more easily quantifiable data points such as the nutritional content of a given food item, this chapter will be focusing on the more subjective quality of 'taste' and the emotional, social, and cultural dimensions which influenced consumers' reactions to the wartime foods which appeared on their dinner tables. While there are many potential influencing factors which might shape a consumer's reaction to a given food product, the following seem to have had the largest impact on German consumers during the war. The key influencing factors were the negative associations carried by many of these food products (including associations with socioeconomic class and assumptions about the natural order between humans and animals), the symbolism of *ersatz* food products, and how they related to Germany's declining economic fortunes during the war. In addition, questions of variety and the monotony of diets, and how these might have affected morale, also seem to have had an effect on how *ersatz* products were received. Finally, it was an inescapable reality that many of these foods simply *were* of lower quality than the pre-war foods they replaced—be it through worse ingredients, faulty preparation, ill-fated experimentation, or brazen fraud.

This chapter will be divided into three sections to cover the aforementioned aspects of *ersatz* food products' reception by German consumers. The first section will take the form of a literature review in miniature, providing examples of how consumers reacted to experiences with *ersatz* food products, using both primary and secondary

sources to highlight how substitute foods are currently portrayed in the historiography of the First World War, and offering suggestions on how to improve our understanding of these products. The second section will focus on the influence of emotional and sociocultural associations held by *ersatz* food products to explain why it was so difficult for consumers to embrace these products. Perceptions of an upending of the natural order through substitutes' associations with animal fodder are also explored in this section, as are perceptions that *ersatz* food products symbolized the declining fortunes of Germany. The adoption of certain substitutes suggested that Germany was regressing to an earlier, agrarian consumption pattern which several decades of progress had supposedly left behind. The final section of the chapter grapples with the fact that some *ersatz* food products were just plain 'bad'. While some of the provided examples of bad substitutes can be attributed to mistakes in storage, transportation, or preparation, many, many more belonged to a class of fraudulent substitutes, which offered little to the consumer other than a chance to waste their money.

Because the subject matter of this chapter is subjective in nature, this has made it one of the most difficult chapters to research and write. Aside from a scattering of diaries, letters, and newspaper articles, there are not many sources which directly speak to consumers perceptions of *ersatz* products—what they liked, or did not lot, and crucially, whether they thought a particular item was a worthwhile substitute. And certainly no one was going around Germany during the war and conducting consumer satisfaction surveys. As a result, efforts have been made to glean as much as possible from the material collected for this thesis, and to draw conclusions from an oblique reading of these sources. Certain sources and passages have been duplicated here from elsewhere in the thesis, but with the intention of interrogating them from a different perspective, with different questions in mind. Rather than being the final word, consider

this chapter to be a suggestive starting point for a new discourse on the perception and representation of *ersatz* products in the historical record.

As a final note before beginning the examination of these influencing factors, it is important to note that while this argument is—by its nature—revisionist, it is not the goal of this chapter to discount or discredit the perceived experiences of German consumers during the war. To do so would be to swing the needle too far in the opposite direction, and claim that *ersatz* foods were tasty, healthy, and accepted, which simply cannot be supported by the available evidence. That said, a critical examination of why German consumers held these foods at arm's length would do much to increase our understanding of how sociocultural, emotional, and political pressures shaped what was acceptable to consume. Despite the potential promise of *ersatz* food products to fill gaps in the food supply, in reality it was a massive challenge to overcome the gravity of familiarity, taste, and the sociocultural perceptions of German consumers.

Representations of *ersatz* food in the literature

It is inherently difficult, from the perspective of a historian, to definitively describe subjective qualities in the human experience. While we can accurately report what people wrote or said about these experiences, and can thus draw some generalizing conclusions about the representativeness of those experiences, it nonetheless remains a daunting and delicate task. Such is the case with questions of 'taste' and 'quality' as they relate to the consumption of *ersatz* products in Germany during the war—especially since perceptions of what is 'good' or 'bad' shift not only from person to person, but also from culture to culture, and even across time within the same

geographic, cultural contexts. The adoption of potatoes into the European diet, for instance, faced decades of reluctance before they were grudgingly accepted onto the dinner plate, marking a sea change in Central European cuisines.[10] With this in mind, how best should we characterize *ersatz* food? By far the most common viewpoint has been to see the adoption of substitutes during the war as a lessening in the quality of foodstuffs, and this is amply supported by the primary evidence. Ralph Haswell Lutz, the author of a report to the Reichstag detailing the causes of the German collapse at the end of the war, wrote that with the food deficits caused by the war, "there came the deterioration in the quality of the bread and flour […] the baking of pure wheaten bread, and in particular the well-flavored and easily digested rolls, had to be abandoned almost entirely after a few months of war, and the only bread which might be baked was gray bread made of a mixture of rye flour and wheaten flour or rye flour alone […]"[11] From 'pure' bread to 'gray' bread is incredibly evocative language—one can immediately visualize the implied degradation.

Anxiety over the 'quality' of food defined public discourse surrounding substitutes, even from the earliest and most restrained *ersatz* efforts. In response to the publishing of the November 1914 Imperial Health Office (*Reichsgesundheitsamt*) report on the incorporation of dried potato products into bread baking, a scathing letter that was submitted by the *Soziologischer Verlag* (Sociological Publishing House) demanded that the office walk back on the findings of its report that "deviate so far from the truth."[12] By allowing the introduction of dried potato products into the bread, the letter argued that "There is no doubt that such extensive legal adulteration of surrogacy of rye bread will soon open the door to the lies and deception that are more prevalent in the

[10] See Messer, "Potatoes (White)," 187–201, for a brief discussion on the adoption of potatoes in Europe.
[11] Lutz, *German Collapse*, 184.
[12] Letter from *Soziologischer Verlag* to the Imperial Health Office, 4 December 1914, BArch R 86/2144. The names of the authors of the letter have been redacted in the archival documents.

food trade in Berlin than anywhere else in the Reich."[13] To the authors of the letter, the assurances of the Imperial Health Office that such adulterations were harmless amounted to little more than "to throw sand in the eyes of the plebs,": they claimed that consumers were being made to eat fodder potatoes, that the Office was already well aware that potatoes only possess "an extremely low nutritional value," and that nutritional and physiological studies had already shown that potato-heavy diets had a harmful effect on the people's nutrition.[14] The letter ended with a warning to the Imperial Health Office that this fraud would be made public in the *Soziologischer Verlag*'s monthly magazine, "Because you know that by falsifying information to such an extent, two of the most important essentials during the war [wheat and rye bread] must not only be made worse but also considerably more expensive."[15] Though perhaps not as dramatically as the authors of this letter, Lutz also placed blame for 'bad' bread on the decision to adulterate bread with potatoes, which resulted in its nutritive value being "perceptibly decreased."[16] When combined with the introduction of higher milling rates for flour, this proved to Lutz to be a losing formula for bread quality. "The flour," he argued, "which had been almost completely ground out and mixed with foreign ingredients was unusually difficult to bake, so that complaints that the bread was doughy, hard to chew, ill-flavored, too sour, or difficult to digest were constantly heard during the whole course of the war."[17]

The perceived decline in the quality of German food was also greatly remarked upon by outside observers during the war. Reports of disgusting, fraudulent, or low-quality food was a preoccupation of many of the Max Müller reports, and the Allied

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[13] Letter from *Soziologischer Verlag* to the Imperial Health Office, 4 December 1914, BArch R 86/2144.
[14] Ibid. See Chapter 2 for a more detailed discussion on how changing understandings of nutritional science might affect our reading of primary sources from this period.
[15] Ibid.
[16] Lutz, *German Collapse*, 185.
[17] Ibid.

reports on the nutritional condition of Germany conducted during the armistice period also chose to highlight the perceived poor quality of foods in the German diet.[18] In May 1916 an Anglo-American bank manager in Hamburg requested that a monthly parcel of food be sent to support him as, though he was happy to remain at his post there, the food was "of a very inferior and unsatisfying description."[19] In the same month it was recorded that doctors "have busied themselves with investigating both the quantity and the quality of the food supplied to the people, and their verdict appears to be that it is deficient in quantity and poor and often unwholesome in quality."[20] A visitor to the Leipzig fair in July 1916 reported that she had paid for "inferior articles of food" and that the only bread to be had was "sour and heavy."[21] A Danish man, in October 1915, described the bread he encountered in Germany as being of a "distinctly poor quality," whereas in September 1916, an intercepted letter from a woman in Hamburg read, "My heart aches sometimes when I see the two girls going off to school as often as not on dry bread, or on bread spread with a *beastly* artificial honey [emphasis added]."[22]

The report by Vernon Kellogg and Alonzo Taylor, conducted at the behest of Herbert Hoover and the American Relief Administration, had the following to say about the state of the food supply in late 1918:

> The people are tired of the war food. It is unsatisfactory, disagreeable, tasteless and necessarily consumed largely in the form of soup. The bread is heavy, indigestible and unsatisfying. There is very little meat. The fat ration is so low

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[18] The question of how the Allies perceived nutrition in Germany at the end of the war is a difficult historiographical problem due to the political question of whether Germany should be included in Allied relief efforts. For excellent coverage of this question, see Cox, *Hunger in War and Peace*, 241-273.
[19] Max Müller, "May 1916," *BDFA*, vol. 10, 115.
[20] Ibid, "May 1916," *BDFA*, vol. 10, 117.
[21] Ibid, "The Economic Situation in Germany during July 1916, being the Twenty-fourth Month of the War," *BDFA*, vol. 10, 198.
[22] Ibid, "October 1915," *BDFA*, vol. 9, 291; and ibid, "September 1916," *BDFA*, vol. 10, 292.

> that the cooking of food must be done without fat. The beverages are all substitutes. From every point of view of a normal diet, the food is *revolting*. [emphasis added][23]

Not long after, in early 1919, a British commissioner reported after an inspection trip to Germany that "It was with difficulty that one could believe the potatoes I referred to could be eaten by any human creature; only the pangs of direct hunger could make their consumption possible."[24] Reports like these were not just limited to the quality of *ersatz* goods, like turnips, war bread, or other products, but chose to highlight the food supply in general as having an inferior, deteriorated quality which marked it out as distinct from the high-quality foods of German peacetime consumption.

The generalizing tendencies of these sources to portray wartime substitutes as inferior products, using language like 'deterioration', 'ill-flavored', 'indigestible', 'beastly', and 'revolting' (among many, many others), is something which has been easily carried over into our histories of the food crisis, and has been liberally applied to the description of *ersatz* food in particular. Holger Herwig, to start with, has described swedes as being "a stringy, coarse root crop, tasteless and bland at the best of times," perhaps overselling their disgustingness by imbuing the vegetable with the same nose-wrinkling quality as a child toying with their Brussels sprouts for laughs on a television show.[25] Chickering does better in this regard by noting that, while turnips rivalled potatoes in their versatility and nutritiousness, most Germans found their taste to be

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[23] Alonzo E. Taylor and Vernon L. Kellogg, 'German Food and Trade Conditions: A Survey of German Conditions and Germany's Future by Two Trained Observers and Analysts. Of Particular Interest at This Time When the Need for Allowing Germany to Secure Food and When the Ability of Germany to Repair the Damage Done the World, Are Subjects of Vital Interest', *American Relief Administration Bulletin* No. 1, (14 April 1919), 9.
[24] Heinzelmann, *Beyond Bratwurst*, 245.
[25] Herwig, *The First World War*, 292; See also 'Stock "Yuck!"', TV Tropes, accessed 15 February 2025, https://tvtropes.org/pmwiki/pmwiki.php/Main/StockYuck.

"execrable."[26] The emphasis here is correctly placed on how Germans perceived the taste, and not on any inherent quality of the turnip itself. However, elsewhere Chickering makes broad claims that "the nutrient quality of food […] declined, to say nothing of its palatability," before launching into a discussion of *ersatz* products like tree bark coffee, watered down beer, war bread, and meatless sausage.[27]

In Richard Wall and Jay Winter's classic edited volume, *The Upheaval of War: Family Work and Welfare in Europe, 1914-1918*, we see a similar falling back on simple characterizations of *ersatz* food.[28] In Armin Triebel's contribution, the discussion of the food crisis begins with the following:

> We will not dwell upon the fact that the supply of consumer goods became worse for the masses, both in quantity and quality as the war went on. We need only ask those who lived through these times for their memories of turnip winters (especially the fateful *Kohlrübenwinter* of 1916/17) and of all sorts of substitutes that appeared in the shops.[29]

That the quality of food became worse as a result of the war, and that this drop in quality was directly linked to the appearance of substitutes, is so taken for granted as to be not even worth expanding on. "Housewives had to manage with poor substitutes," reads another excerpt, as well as "Another problem with which housewives had to contend was the rapid deterioration in the quality of food," in a section contributed by Ute Daniel.[30] The paragraph goes on to discuss an executive meeting of the Bavarian association of municipal authorities held in July 1917, where Mayor Gessler of

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[26] Chickering, *Imperial Germany*, 141.
[27] Ibid, 45.
[28] Wall and Winter, *Upheaval*.
[29] Armin Triebel, "Variations in Patterns of Consumption in Germany in the Period of the First World War," in *The Upheaval of War: Family, Work and Welfare in Europe, 1914-1918*, ed. Richard Wall and J. M. Winter (Cambridge: Cambridge University Press, 1988), 159.
[30] Ibid, 163; and Daniel, "Women's Work," 275.

Nuremburg remarked, "sometimes you have to take a pickaxe to it," when describing bread flour, followed by Daniel asserting that "this characterisation of his was by no means an isolated example," though no other examples are provided.[31] On the subject of *ersatz* products like dried milk powder and fish-free fishcakes, Daniel offers that the "quality of these substitutes was dubious if not actually harmful," though again, no evidence is provided of any harm related to these products, or any chemical testing done to give rise to suspicion. They just sound strange, and that seemingly is enough.

Even in newer entries to the historiography, similar dynamics hold sway. In Alexander Watson's otherwise excellent book, *Ring of Steel: Germany and Austria-Hungary in World War I*, he writes that although the war bread of 1914 had generally "not been too bad" when baked with potato and rye, in the later years of the war, "war bread became *vile* [emphasis added]."[32] This sentence is then immediately followed with two, very evocative anecdotes about this vile bread. One revolves around a Cracovian woman who remembered decades later that, "you couldn't slice it […] you broke it up with your hands. It was yellow, sticky, not good."[33] The other shares the experience of a Bulgarian woman in 1918, who wrote to her relatives saying, "I have been vomiting […] I feel burning from my mouth to my chest as if there is a fire and I feel heaviness as if there is a stone inside."[34] While these are clearly affecting examples of 'bad' bread, there are some questions about how this paragraph—and the idea that it is trying to convey—are structured. The structure of the paragraph seems to be leading the reader down this logical route: a) war bread in 1914 was of decent quality when

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[31] Daniel, "Women's Work," 275. Even here there is a misrepresentation of the evidence. The flour which needed a pickaxe to work had been soaked in transit. The necessities of the food shortage required that the flour be used regardless—hence the pickaxing—but this was not a representative case. See Klaus-Dieter Schwarz, *Weltkrieg und Revolution in Nürnberg* (Stuttgart: Ernst Klett Verlag, 1971), 157.
[32] Watson, *Ring of Steel*, 334.
[33] Ibid.
[34] Ibid.

made with rye and potatoes, b) increases in the milling ratio affected the bread's digestibility,[35] c) shortages in rye and potatoes led to the inclusion of "less appetizing" admixtures, like maize, peas, or lentils, d) the end result was a late-war bread which yellow, sticky, and crumbly, and could cause severe gastrointestinal distress when consumed. The problem with this construction is that it suggests to the reader that changes to the bread were progressive and final, that once the bread dipped in quality, it remained that way. In reality, although emergency admixtures were added in response to acute shortages, the recipe for war bread changed over time based on available supplies. As supplies improved, so too, generally, did the war bread.[36] Finally, the included anecdotes do not seem to be representative of the war bread experience, and thus lead the reader to false conclusions about the bread's digestibility. For starters, both women in the anecdote are consuming war bread from places outside of Germany (occupied Poland and Bulgaria), which hardly make them representative of the experiences of consumers within Germany. Furthermore, yellow or sticky bread, and vomiting, indigestion, and fiery sensations suggest that the bread consumed in these anecdotes was infected with rope and with ergot, respectively.[37] While the chances of encountering these infections in bread increased during the war due to the increased water content of war bread and issues during baking, these were not an everyday occurrence. The end result of this section of Watson's book is to give the impression that *ersatz* food was an order of magnitude worse than it actually was.

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[35] Watson, 334. Specifically, "Legitimate grains were milled less finely than in peacetime, allowing husks to enter the bread, which made it difficult to digest." Phrasing it this way makes it seem like these husks are 'bad', when in reality they are simply bran. See Chapter 2 for more on the raising of milling rates.

[36] See Chapter 2 for more discussion on the recipes of war bread.

[37] For ropey bread, see Chapter 2 and also the "Consuming 'bad' *ersatz* products" section later in this chapter. For the symptoms of ergot poisoning, see 'Plants of Mind and Spirit - Ergot', accessed 15 February 2025, https://www.fs.usda.gov/wildflowers/ethnobotany/Mind_and_Spirit/ergot.shtml. The sticky, yellow, crumbly bread of the Cracovian woman could also just be bread more heavily adulterated with maize, as the description is fitting for corn bread. In which case, the description of sticky, and 'not good' remains a subjective perception.

Is there any existing evidence for positive or neutral interactions with *ersatz* food, with which we can provide a counter to this overly generalized portrayal? This is an interesting question which has proved surprisingly difficult to answer. On the one hand, there are countless claims in the primary sources that *ersatz* food products were 'tasty' or 'just as good' as the foods they were replacing. On the other hand, many of these sources were linked to government propaganda efforts or else served as advertisements for *ersatz* products, which immediately throws their credibility into suspicion. To use war bread as one example, in the wake of the Imperial Health Office report on the inclusion of potato products in bread, a sustained effort was made across government offices, affiliated organizations, and newspapers to help sell the idea of what they knew would likely be an unpopular change to the bread. An article in the *Deutsche Tageszeitung* on 16 September 1914 laid the groundwork for public acceptance by declaring that the new war bread was "not only tasty and long-lasting, but also highly wholesome and easily digestible."[38] In a lecture to the German University League in New York City on 3 February 1915, Dr. Hugo Schweitzer likewise praised the transition to wheat bread with rye or potato admixtures, and quoted a circular shared by the authors of the Eltzbacher Commission which read, "Eat the army bread (K bread) and demand it from your baker. It is nourishing and as palatable as plain rye or wheat bread."[39] Schweitzer even went as far as to declare that "there is no doubt that it will retain its popularity even after peace has been declared," though he remained in the United States throughout the war and there is little evidence to suggest he ever tasted the bread himself.[40]

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[38] "Brot aus Roggen und Kartoffeln," *Deutsche Tageszeitung*, Nr. 470, 16 September 1914, BArch R 86/2144.
[39] Schweitzer, *Can Germany Be Starved*, 19.
[40] Ibid, 12; See 'DR. HUGO SCHWEITZER DIES.; Chemist Was on the Mayor's Committee on Enemy Aliens.', *The New York Times*, 24 December 1917, sec. Archives, https://www.nytimes.com/1917/12/24/archives/dr-hugo-schweitzer-dies-chemist-was-on-the-mayors-committee-on.html.

Another example of government propaganda aimed at popularizing the consumption of substitutes can be located in the efforts to convince consumers to give oats a chance, despite their customary use as animal feed. As part of the education campaign aimed at teaching housewives how to implement war economy measures, Anna Lindermann delivered a lecture in 1915 entitled "The Adaptation of the Individual Household to the Current Situation," in which she recommended:

> Move women to return to the customs of their forefathers and make a soup for breakfast […] Very many of these soups can be made sweet; porridge can be enjoyed with milk and sugar. We can learn a lot here from the Scottish population. It inhabits a country whose landscape is poor and mountainous; in terms of its nature, the population is more like the Germans than the remaining inhabitants of Great Britain. In most districts, this population feeds itself with oatmeal, milk and herring. It is simultaneously a highly intelligent population, whose descendants can be found in high positions in British business and in the British administration. In lonely mountain regions, you can find men there who read the Bible in the original while shepherding […] The Scot eats oats for breakfast, lunch and dinner; and if we do not have excessively large stores of oats even by the new harvest, we still want to make use of all that is still there.[41]

We see here not only an attempt at valorizing the Scots to derive a positive association with the consumption of oats (they are hardworking, good Christians, and very similar to the German people), but also connects the consumption of oatmeal, porridge, or other soups with a return to good, German customs of the past.

Should government propaganda (or perhaps 'popularization campaigns has a less negative connotation) regarding the quality of substitute foods be discounted? The

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[41] Daniel, *War from Within*, 194.

answer to that question likely depends on what one chooses to highlight as the motivation behind the propaganda effort. If the assumed motivation is to pull the wool over the eyes of consumers in a cynical attempt to salvage morale, then these sources can be safely disregarded. That said, the German government did face a huge challenge in attempting to convince consumers to eat what was not their normal habit to eat. Oats are a perfectly acceptable and nutritious food for humans to consume, despite the sociocultural taboo against their consumption, and propaganda could be a useful tool for trying to shift popular perceptions of a food product over a relatively short period of time. Shifting perceptions of taste could take decades to bear fruit, time the German government did not have in its efforts to secure the food supply. One also assumes that the authors of the Imperial Health Office report on the inclusion of potatoes in war bread believed at some level in the acceptability of their findings (at least in theory, if not in practice)—no evidence that the report was an entirely cynical showpiece is apparent to this author.[42] Context and judgment must guide our decision making on how to interpret these positive portrayals of *ersatz* products.

Several examples of first person accounts which positively describe *ersatz* products can also be found. George Schreiner, the American journalist, for one, seems to have been quite positive in his reckoning of the earlier iterations of wartime substitutes. Regarding the early (1914-1915) versions of war bread, he described it as being "very palatable, it tasted best on its third day, and could be kept a week without going bad."[43] On an early *ersatz* coffee made of roasted barley, oats, and coal tar, he wrote, "The brew had the advantage of containing a good percentage of nutritive elements. Taken with a little milk and sugar it had all the advantages of coffee, minus the effect of caffeine and

[42] "Gutachten des Kaiserlichen Gesundheitsamts über die Vertwertbarkeit von Kartoffelerzeugnissen zur Brotbereitung," BArch R 86/2144. See Chapter 1 for a more detailed discussion on the findings of this report.
[43] Schreiner, *The Iron Ration*, 8-9.

plus the value of the food particles."[44] Regarding *ersatz* tea, he said that the bloom of the linden-tree, mixed with beech buds, made an "excellent beverage, and those who dote on 'oolong' can meet their taste somewhat by adding to this a few tips of pine."[45]

Children in particular seemed the most likely to have positive things to say about *ersatz* food, possibly because they had little experience with which to compare it, or perhaps because their cultural sense of taste was less strongly formed, therefore making them open to more experiences. Piete Kuhr's diary, for example, offers multiple reactions to substitute foods, showing that their consumption could be quite mundane. Describing a Christmas dinner of 'imitation hare' in 1915, which consisted of just minced meat in the place of the regular seasonal dishes (she lists carp and smoked hare), she recalled "with brown sauce and mashed potatoes, it tasted lovely or, shall we say, middling lovely."[46] Later, in 1916, on a working trip with other school children to help farmers harvest potatoes, she describes a bake sale which was selling plum, apple, and gooseberry tarts to excursionists, topped with artificial cream "made with semolina, sugar and egg-white, which tastes nearly as good as the real thing."[47] Regarding the much reviled swedes of the Turnip Winter, Kuhr had the following to say in March 1917: "The families in Germany live mainly on turnips. We in the East call the turnips swedes. Grandma always puts carraway seed on the swedes. I can't help it—I like eating swedes, but I hardly dare admit it. Everybody complains about the turnips."[48] While positive accounts like Schreiner's and Kuhr's are not as numerous as negative descriptions of *ersatz* food, they serve as an important reminder that 'taste' and 'quality'

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[44] Schreiner, 153.
[45] Ibid, 154.
[46] Mihaly, *There We'll Meet Again*, 165.
[47] Ibid, 192. Kuhr also describes eating eclairs in October 1916 made with artificial cream, likewise praising its closeness to the genuine article, ibid, 204.
[48] Ibid, 227.

are subjective terms, and that care must be taken not to over-generalize when writing about these products. Bad experiences were not universal.

To close out this section on the representation of *ersatz* food products within the historiography, it is important to note that there is one aspect of the *ersatz* food story on which the secondary literature has been largely silent, and that is that many of these substitute products had already been a major part of the diet for years prior to the outbreak of war. They simply became a more prevalent part of the diet due to the shortages of other food supplies. August Skalweit, the author of the official German history of the wartime food economy, *Die deutsche Kriegsernährungswirtschaft*, confirmed this, writing:

> There were also a large number of substitute foods in peacetime […] Among the large number of such products that had become part of the regular consumption of *broad sections of the population*, the following should be highlighted: margarine, artificial cooking fat, artificial honey, coffee substitutes, stock cubs, soup seasoning, dry soups, pudding powder, non-alcoholic drinks, etc. [emphasis added][49]

Gustav Junge likewise describes the pre-war popularity of *ersatz* coffee products, like caffeine-free coffee, fig coffee in Austria and Bavaria, and malt coffee derived from roasting malted barley (suggesting that the coffee which Schreiner described might have been a pre-war recipe which simply gained new attention).[50] Their attractiveness as a cheaper alternative led these products to become a staple in the diets of poorer Germans well before the food crisis began. Wartime shortages, however, and the chaotic response of the authorities in securing the food supply, allowed for more opportunities for fraud

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[49] Skalweit, *Kriegsernährungswirtschaft*, 52.
[50] Junge, *Unsere Ernährung*, 82.

to occur—particularly in the marketing of food substitutes, which negatively impacted the public's perceptions of these items as the war progressed.[51]

It is therefore clear that *ersatz* food products were not a phenomenon born out of the food crisis (as is sometimes stated), but rather they were a category of food which was fundamentally affected by shortages as more pressure was placed on them to fill gaps in the diet. The way in which historians typically approach substitutes misses much of their story. More emphasis should be placed on the discourse which took place over what was and was not acceptable to eat, and more emphasis should be placed on the opportunities which the war provided for fraud to be perpetrated against consumers. While food quality should certainly remain a central aspect of this story, a more nuanced approach should be adopted which focuses on the subjective *perceptions* of consumers, rather than any inherent quality of the food itself—the latter approach has been shown to be open to criticism. And finally, care should be taken not to over-generalize when discussing a subject as massive as the food quality of an entire nation. Through adopting these recommendations, a more detailed and measured understanding of the role of substitutes in the food crisis can be achieved.

Class, social, and natural order

Far from viewing food as simply a means to an end—fuel for the body—one rarely approaches a meal as a clean slate, devoid of its cultural or socioeconomic connotations. Take, for example, a box of Kraft macaroni and cheese today: for some it represents a cheap, inferior substitute for more 'authentic' pasta dishes, an unfortunate

[51] Skalweit, *Kriegsernährungswirtschaft*, 52.

outcome of the instant or fast-food consumer culture which permeated American cuisine in the second half of the twentieth century. To others, perhaps those who were raised on such dishes due to their ease of preparation and affordability, boxed mac and cheese evokes pleasant childhood memories of an easy, but hearty meal, put together by working parents who had little time to spend on more elaborate fare. Our personal experiences, our cognizance of our position in the world (affluent vs. poor), our emotional connections to a shared culinary heritage, and even our understanding of our place in the context of history (e.g., a sense of progress over a lived or mythologized past), all contribute to our perceptions of the food we consume. Even a preconceived understanding of the 'natural order' (i.e. the hierarchy between humans and animals) can diminish or increase a dish's palatability. The consumption of insects, for example, or other 'vermin' can vary in acceptance from culture to culture, with the delineation of foods suitable for human consumption versus animal consumption playing an important role in defining the appropriateness of certain food products. If you understood a particular food as being primarily employed as pigfeed, for example, what would that say about you, if you were forced by circumstances to consume that selfsame food?

The food crisis which plagued Germany during the First World War forced many consumers into confrontation with questions about the acceptability of certain food products they ate in order to survive, and that confrontation could often be very uncomfortable. To first form a baseline by which we can judge these negative associations formed by German consumers, it is important to describe the state of German food culture at the outbreak of the war, and how it had progressed in the forty years since German unification in 1871. Prior to Germany's industrialization period in the mid-nineteenth century, much of the population led a rural, agricultural existence with a relatively low standard of living and fraught with regular famine sparked by both

human and natural causes.[52] The consumption of fats and protein was limited, even for those who raised livestock, as the meat raised in the countryside was often bound for city markets where it could fetch higher prices.[53] Daily meals were prepared of hardier, coarser foods that were filling but not as readily digestible as the animal proteins or fine white flour breads which would come to dominate German cuisine by the early twentieth century. Porridges and thin soups of buckwheat, oats, and millet were consumed daily, supplemented by seasonal fruits and vegetables, dominant root vegetables like the potato, and occasional servings of meat for holidays or special occasions.[54] The bread that was consumed was often heavy, coarse brown bread that was filling and kept well, but not as soft or fluffy as the fine white wheat bread. This former bread was more akin to the multigrain, wholegrain breads which bear pride of place in our current-day health-conscious supermarkets.[55]

As Hans Teuteberg writes, the struggles of attaining one's daily bread meant that food was "evaluated firstly by its capacity to fill the stomach, how much could be used without waste, the ease with which it could be prepared (utility value), and its cost (exchange value); secondly, for its social prestige value, and only finally its taste and nutritional value."[56] Heinzelmann notes that reports from the 1850s on the nutritional status of rural peasants found that "many of these people hadn't eaten bread, let alone meat, for years, some surviving on green potato leaves, old beans and cabbage, with a little tallow to bind the thin soup."[57] These generational experiences of relying on coarse bread, grain porridges, and root vegetables would come to represent this period of want

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[52] Messer, "Potatoes (White)," 187-91.
[53] Hans Teuteberg, "The Birth of the Modern Consumer Age: Food Innovations from 1800," in *Food: The History of Taste*, ed. Paul Freedman, California Studies in Food and Culture (Berkeley: University of California Press, 2007), 234.
[54] Teuteberg, "Modern Consumer Age," 235-6.
[55] Heinzelmann, *Beyond Bratwurst*, 237-8.
[56] Teuteberg, "Modern Consumer Age," 235.
[57] Heinzelmann, *Beyond Bratwurst*, 165.

and to symbolize the diet of backwardness and the rural peasantry which was left behind for the more affluent diets of the modern German state. Indeed, accompanying Germany's growing economic affluence in the latter half of the nineteenth century, people flooded into expanding urban centers in search of opportunity, and as wages rose they abandoned much of the diet of preceding generations. "As soon as they could afford it, urban factory workers traded potatoes for white bread and salted herring for meat," writes Heinzelmann, whereas "Porridge, gruel and related dishes by now symbolized rural backwardness and were deemed only suitable for old people and children."[58] Once popular grains like oats were abandoned almost completely by German consumers, becoming instead an important source of animal fodder.[59]

As standards of living and wages rose, so did the consumption of animal fats and protein in the form of milk, butter, and meat products and at a rate that would have been unimaginable just half a century before. In Berlin alone, the consumption of milk quadrupled in the two decades between 1893 and 1913, while the consumption of butter and margarine both more than doubled between 1897 and 1913, with butter increasing from 200,000 tonnes to 470,000 tonnes annually.[60] To put this increase into perspective, the population of Berlin, which was also quickly growing during this period, expanded by just 57 percent between 1885 and 1910.[61] Such figures translated into a much larger share of the average Berliner's diet being given over to the consumption of fat-rich dairy products. Access to seafood also dramatically expanded, the number of processing plants rising from 450 to 650 between 1900 and 1914 alone, with salting and

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[58] Heinzelmann, 166 and 186.
[59] Teuteberg, "Modern Consumer Age," 236.
[60] Heinzelmann, *Beyond Bratwurst*, 199; and Teuteberg, "Modern Consumer Age," 244.
[61] The *Statistisches Jahrbuch* shows the population of Berlin in 1885 to be 1,315,287 people, and for 1910 a population of 2,071,257. See *Statistisches Jahrbuch für das Deutsche Reich. Herausgegeben vom Kaiserlichen Statistischen Amt. Elfter Jahrgang 1890*, vol. 11 (Berlin: Puttkammer & Mühlbrecht, 1890), 1; and *Statistisches Jahrbuch für das Deutsche Reich. Herausgegeben vom Kaiserlichen Statistischen Amte. Vierunddreiszigster Jahrgang 1913*, vol. 34 (Berlin: Puttkammer & Mühlbrecht, 1913), 1.

preservation techniques bringing this source of protein from the coasts into the country's interior. At the same time as these other changes were occurring, it became easier and easier to raise livestock in the countryside, leading to an explosion in the consumption of red meat from cows and pigs. Farms consolidated, edgelands were cleared for grazing, and the newly expanded distillation and brewing industries, among other sources, provided a cheap animal fodder through their waste products which could be dedicated to feeding livestock.[62] The consumption of meat products rose dramatically as livestock herds expanded in size. In the twenty-five years prior to the outbreak of war, the number of cattle increased by 25 percent, and the number of pigs nearly tripled.[63] Sausages in particular gained popularity for their ease of preparation and because they made it possible to buy exact servings as required without waste.[64]

Thanks to this meteoric rise in living standards in the latter half of the nineteenth century, the average German consumer in 1914 was considered very well-fed by European standards, to the extent that German men had become an international stereotype for gluttons. One American correspondent in Germany glibly remarked, "Normally, all men eat too much. The Germans were the rule rather than the exception in this respect. Most men weighed anything from twenty to sixty pounds more than they should, and the women also suffered much in appearance and health from obesity."[65] Such was the belief in the level of German overconsumption that it even factored in the calculations of the disastrous Eltzbacher Commission, a commission of scientists and government officials set up to evaluate Germany's vulnerability to the Allied economic blockade. Cautioning against the needless waste of precious food, the commission

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[62] Heinzelmann, *Beyond Bratwurst*, 195, mentions that the cheap fodder from distillers' wash helped to expand the consumption of pork; See also Ashley, *Germany's Food Supply*, 7-8, for a mention of how the removal of potatoes from alcohol production during the war removed a key source of cheap fodder.
[63] Grebler and Winkler, *The Cost of the War*, 7.
[64] Heinzelmann, *Beyond Bratwurst*, 195.
[65] Schreiner, *The Iron Ration*, 31.

remarked that "At present all classes of the population deal much too carelessly with food. One source of waste is that in very many circles too much is eaten. Superfluous food is either imperfectly digested or increases the body weight to the injury of health. We should eat less and masticate better."[66] Such was the granularity of the Eltzbacher Commission's findings on consumer waste, that they estimated that 186 calories per person in fat energy content were lost to the Berlin sewer system daily.[67]

The imposition of the Allied economic blockade of the Central Powers after Britain's entry into the war struck a fatal blow to the rosy tale of rising standards of living and overconsumption. As we have seen from previous chapters, the severing of foreign imports, which provided Germany with between a quarter and a third of its annual consumption needs, coupled with the disruptions to food networks caused by mobilization, resulted in an absolute deficit of nutrition which would not be made back for years after the end of the fighting, despite the intense efforts of the German government to meet consumption needs. From the rational perspective of the bureaucracies charged with handling the food crisis, the base problem was finding enough calories with which to feed the population, and to do so in the most equitable manner possible in order to maintain the promise of the *Burgfrieden*.[68] Price controls and rationing systems worked to ensure the equitability of the distribution of available food supplies, but in order to increase the base level of food available, the authorities had just three options: 1) the extraction of foodstuffs from occupied territories like Belgium Romania, and Russia, 2) increasing imports from neutral countries like Holland, Denmark, and Sweden (more and more difficult as the blockade evolved in response to such attempts), and 3) creating more food at home through substitution,

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[66] Eltzbacher, *Germany's Food*, 208.
[67] Ibid, 227. See page 233-4 of this dissertation for a more detailed discussion of the Eltzbacher Commission's findings on consumer waste.
[68] See Davis, *Home Fires Burning*, for a detailed account of how efforts to ensure equitability factored into the food crisis.

invention, and adulteration. As the belts of German consumers tightened, increasing exposure to these *ersatz* food products forced a confrontation with the many negative associations ascribed to the foods they were being asked to consume in order to support the war efforts of the state.

The biggest of these negative connotations was the association with class and furthermore that of the items in question being considered animal food. Although war bread, the most ubiquitous of the *ersatz* food products during the war, was considered by some observers to be a palatable, if dry, bread which retained its freshness for longer than the popular white loaves, it was an endless source of discontent for many German consumers.[69] Not only was the darker, coarser bread reminiscent of that more commonly consumed by the previous generations, which had since been replaced in popularity by white wheat bread, but also the raising of extraction rates for flour meant that more and more bran was being included in the finished product. Prior to the war, the bran and chaff created as by-products of the milling process were typically repurposed as fodder for cows or pigs. As was demonstrated in the chapter on nutrition, the belief at the time was that the human body was incapable of incorporating the bran from bread grain, and that ingesting this material would lead to injury to the digestive organs. It was therefore much safer, so medical experts argued, to give the bran to livestock who could convert the material into digestible nutrients in the form of fat and protein.[70] Such was the resistance to the idea of increasing the bran content of bread that efforts to raise the extraction rates further in Bavaria led to an outcry. The Munich Municipal Supply Committee declared that "it would be impossible to go any further in this direction, as the Munich 'bran-bread' was already the worst in Bavaria, if not in all

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[69] Perry, "Kitchen Soldiers," 23; See also Schreiner, *The Iron Ration*, 8-9; and Afflerbach, *On a Knife Edge*, 137.
[70] Max Müller, "September 1917," *BDFA*, vol. 11, 339.

Germany," despite the extraction rate remaining below what would constitute wholegrain bread by today's standards.[71]

Due to the higher moisture content of the dough through its use of wholegrain flour, and the higher moisture content of rye and potato flour, war bread was certainly more dense than white bread, as it was unable to rise to the same extent under its own weight. Reflecting this, one consumer wrote to a friend in Denmark, asking them to send table scraps, as "The driest Danish breadcrust is delicious cake compared with what we here call bread."[72] The situation worsened even further with the introduction of replacement admixtures for potato flour following the collapse of the potato crop in fall 1916. The greatest amount of ire seems to have been reserved for the inclusion of turnip meal in the war breads of 1916-1917, which appeared in large quantities in the bread for munitions workers working in Krupp factories: up to three-quarters of the flour content in some cases.[73] Additionally, as the availability of wheat, rye, and potato flour fluctuated throughout the war, they were replaced with admixtures of heather meal, grass flour, straw flour, and even experiments with reeds, all of which had previously served roles as animal fodder.[74]

Turnips as well, be they kohlrabi or swedes, or white turnips, all caused considerable discontent upon their inclusion in rations following the collapse of the potato crop in 1916. As if it were not bad enough that the average diet was reduced to solely bread and potatoes, to the almost complete absence of fat or meat by 1917, now the potato ration was being replaced by swedes, which in northern Germany were

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[71] Max Müller, "November 1916," *BDFA*, vol. 10, 384.
[72] Ibid, "April 1917," *BDFA*, vol. 11, 117; and ibid, "June 1917," *BDFA*, vol. 11, 194.
[73] Ibid, "June 1917," *BDFA*, vol. 11, 194.
[74] Ibid, "November 1917," *BDFA*, vol. 12, 19; and ibid, "April 1918," *BDFA*, vol. 12, 179.

normally almost entirely reserved for the feeding of livestock.[75] The blow to morale dealt by the inclusion of these hardy tubers must have been enormous, for they flood the historical record. Not only were they disliked for being stringy and hard to digest; they were also disliked for completely taking over the daily diet. At the height of the *Kohlrübenwinter*, potato rations were being replaced by double rations of swedes or radishes, and cookbooks like the *New Swede War Cookbook* included up to fifty different recipes for preparing this new addition to the dinner table.[76] Faced with the consumption of a perceived 'animal' food every day for months prompted one consumer to lament, "All cattle fodder must now become human food."[77] After the authorities had largely removed meat and fat from the diet, and fallen back on the consumption of coarse, dark breads and hardy root vegetables for sustenance, the diet of German consumers during the war looked increasingly like the diet of German peasants long thought of as left in the past.

Even beyond negative connotations associated with class or natural hierarchies, many of the substitute foods developed during the war could additionally be perceived as distasteful for appearing to be sourced from waste products. The production of *ersatz* teas from fruit peelings seems to have been a particularly popular product throughout the war. Maylander's report includes one call to action by a German hotel wishing to capitalize off the idea:

> It would be a great pity, says Das Hotel, to throw away the parings of apples and pears, These should be dried, and will, on delivery, be paid for at the rate of 1 mark per kilogram (10.8 cents per pound). After being cleaned by a special

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[75] Heinzelmann, *Beyond Bratwurst*, 240, gives a daily ration of 36 g of meat for the standard civilian ration at the end of 1916; Grebler and Winkler, *The Cost of the War*, 81, gives the same daily meat ration for November 1917.
[76] Max Müller, "December 1916," *BDFA*, vol. 11, 21; Perry, "Kitchen Soldiers," 32.
[77] Max Müller, "April 1917," *BDFA*, vol. 11, 117.

> process, they are being manufactured into an important ingredient of a tea substitute, which makes a cheap but very good beverage.[78]

While it is doubtful that a tea substitute made from fruit peelings would taste bad (several examples exist of teas from similar ingredients, including Turkish apple tea), the very optics of having to collect what would previously have been considered rubbish to replace a now missing item is unlikely to have bolstered the spirits of consumers.

Even more concerning than the quest for a suitable tea product was the Government's search for alternative sources of fat, being both an essential nutrient for humans and a key ingredient for explosives manufacture. Throughout the war, the government issued regulations requiring the collection of animal bones, hooves, and skin from slaughterhouses for the extraction of fat and oil, while one German scientist from Bonn even recommended the installation of fat separators in the sewer systems of cities to reclaim waste fats for use and the collection of dead horses to aid the manufacture of margarine.[79] Even more disturbing than the idea of reclaiming fats from sewage waste and dead horses were the persistent (though unfounded) rumors throughout the war that the government had even resorted to the extraction of fats from the bodies of deceased humans.[80] The overall effect of *ersatz* consumption on many German consumers was to give them the impression that they were no longer able to eat as they had become accustomed in the previous decades of advancement, but rather they were reduced to the consumption of food previously fit only for animals or the rubbish bin—or worse, the sewers.

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[78] Maylander, *Food Situation*, 46.
[79] Max Müller, "October 1915," *BDFA*, vol. 9, 306; ibid, "April 1916," *BDFA*, vol. 10, 86.
[80] Ibid, "February 1916," *BDFA*, vol. 9, 424.

Finally, for evidence that Germany's material fortunes were declining everywhere, consumers needed to look no further than the advertising sections of their local and national newspapers and periodicals. Hans Peter Hanssen, a Deputy of the Reichstag from Schleswig, wrote the following observations in his memoir:

> One cannot draw correct conclusions from the leading press articles. But a part of the press is still independent of the censorship. That is the advertising section. I have studied that part very thoroughly. And what have I found? Only Ersatz, that is, substitutes, are offered for sale in German newspapers. This word is not found in the advertising columns of the French and English papers … Our situation on the other hand, is becoming steadily worse. A study of the advertisements will teach you more than all the articles about the actual state of affairs.[81]

This quote from Hanssen suggests that newspapers could act as a window to expose the stark material imbalance between the Allied and the Central Powers, further strengthening the perception that Germany was becoming slowly impoverished. As was seen with the advertisement of *ersatz* recipes in Chapter 1, efforts by the authorities to combat the flood of substitutes in the pages of periodicals came late in the war.[82] Indeed, this lack of strict censorship is also apparent in the Max Müller reports of the British Foreign Office; many of the details which composed those reports were gathered from newspaper articles and periodicals smuggled across the border.

Similar encounters with Allied material superiority also took place in the many POW camps scattered across the country. The German reliance on Allied parcel delivery programs to subsidize the feeding of prisoners of war may have seemed like an

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[81] Hanssen, *Dying Empire*,204.
[82] See Chapter 1.

excellent way to lessen POWs' burden on the food supply, but it had the unintended consequence of placing the material imbalance of the two coalitions on full display. As Evelyn Blücher recorded in her diary in June 1916, "One would expect that all of this shortage would prove a very serious question in regard to the prisoners, but as a matter of fact they are really better off than we are, as 'The Prisoners' Aid Society' sends 58,000 packages from England weekly to the prisoners, and 10,000 loaves of bread from Switzerland."[83] If the perceptions of civilians living away from the camp were attuned to this display of food wealth, then the comparison must have been even more striking to the guards who ran the camps themselves. Max Müller, drawing on reports made by escaped POWs, wrote the following in his report for June 1917: "As evidence of the poor feeding of the soldiers in the garrisons in Germany I may mention that an escaped officer tells me that he has seen the sentries at the prisoners' camps raking out the refuse heap for scraps of food and scraping out the fat left in the tins of preserved meat, sardines, &c."[84] Being confronted with such an imbalance, while resorting to waste collection campaigns, foraging, and the search for ever more substitutes, must have been an enormous blow to consumers morale, if not their pride.

Consuming 'bad' *ersatz* food products

Finally, it is important to acknowledge that many of the *ersatz* food products that people complained about were actually worthy of the ire they attracted, be it because

[83] Blücher, *An English Wife*, 143.
[84] Max Müller, "June 1917," *BDFA*, vol. 11, 197. The fact that this story occurred in June is telling, as that would have been just before the harvests started to come in. The late spring and early summer months were often the most lean, as consumers subsisted on what was left of the previous harvest in their cellars and larders.

they were prepared with inferior or spoiled ingredients, cooked incorrectly, or were one of the many thousands of fraudulent and borderline fraudulent products which flooded the market in the later years of the war. This marks a departure from the rest of this chapter, which has broadly sought to question the prevailing narrative of 'bad' *ersatz* food products, by offering explanations for why these food products have been so negatively characterized in the historical evidence and historiography. Much of that argument has been intended simply to push back against the degree of that characterization, rather than to overturn the characterization altogether. Low-quality, disgusting, and fraudulent *ersatz* products *did* exist, and their consumption directly impacted the diets and experiences of countless consumers throughout the war. The question that remains to be asked, however, is what exactly made these products bad? This section will examine a few examples of 'bad' *ersatz* products to describe the various forms a 'bad' product could take, focusing on ingredients, mistakes in preparation, and spoilage.

To begin with, we will look at the use of poor-quality ingredients in the making of foodstuffs as a reason for inferior quality. When it comes to items like war bread, this was often a cause for disdain amongst consumers, but could sometimes be linked to the necessities of avoiding localized bread famines when shipments of spoiled ingredients were given to bakers. Describing one such scenario which impacted Freiburg, Chickering relates, "In Oct 1915, the bread that arrived was made with rye that had spoiled in northern granaries, so that the bread had a disgusting, musty odor. Flour made of spoiled potatoes in in 1917 showed up in bread smelling of ammonia."[85] This issue of bread grain becoming damp and musty in the granaries is one which occurred at multiple points during the war. In April 1915, bread prices rose in parts of northern

[85] Chickering, *Freiburg*, 267.

Germany as a result of the expenditures needed to treat damp bread grain which normally would have been relegated to animal fodder rather than human consumption.[86] Ralph Lutz also noted the difficulty in keeping grain from becoming musty, as part of the bread grain from each harvest had to be kept and stored for the entire harvest year, rather than the authorities relying on fresh shipments from markets abroad to supplement domestic production. This resulted in summertime loaves of "musty-tasting bread, much of which could be eaten only with reluctance."[87]

Bad bread flour for baking came not only from spoiled grain which moldered in granaries, but also from unscrupulous adulteration practices in the mills and bread factories (*Brotfabrik*). In June 1916, an article in the *Norddeutsche Allgemeine Zeitung* reported that "bread flour is being freely adulterated, straw flour and ground chaff being used in the mixture, which is sold as spelt flour," and later issues of the same newspaper reported "cases where grains of sand, bits of coal, potato skins, etc., have been discovered and the bread is sometimes so mouldy in odour and bitter in taste as to be quite uneatable."[88] One controversy in Leipzig occurred in 1918 when the *Deutsche Tageszeitung* reported that the Leipzig Chemical Institute had uncovered the following: "In the bread analysed at Leipzig the following foreign bodies were discovered:—Feathers, thread, wadding, lysol, paper, wood, straw, gypsum, chalk splinters, and sand. The bread of one large bakery was found to contain about 13 per cent, of copper in the form of verdigris."[89] Abuses like this and their resulting punishments made for regular reading in the country's newspapers throughout the war. For example, one Hamburg bread factory was fined 500 Marks for adulterating its bread with chopped straw and sawdust—a classic admixture harking back to the abuses common in the nineteenth

[86] Max Müller, "April 1915," *BDFA*, vol. 9, 154.
[87] Lutz, *German Collapse*, 184.
[88] Max Müller, "July 1916," *BDFA*, vol. 10, 212.
[89] Ibid, "August 1918," *BDFA*, vol. 12, 336.

century.[90] Clear abuses like this one were undoubtedly the responsibility of the company choosing to defraud their customers, but the reality of the food crisis left many bakers with little choice when it came to baking bread with spoiled or adulterated flour. If it came down to using the flour to bake substandard bread, or else risk a bread famine of several days while waiting for a new shipment of flour to arrive, the choice becomes easier to comprehend.[91]

The spoiling of bread was not just restricted to its ingredients, but also extended to the loaves themselves after they were purchased and brought home. A particularly troublesome phenomenon, particularly during the warm summer months, was that the heavy, dense doughs of war bread with their higher moisture content were especially vulnerable to infections of rope—a fungal infection which, if the loaves were not sufficiently baked to ensure heat reached all the way to the center, resulted in long, sticky yellow strands in the crumb of the bread and a sickly sweet smell like overripe fruit. The consumption of such loaves of bread, while not necessarily deadly, caused severe gastrointestinal distress, and also perplexed the authorities as to how to tackle the issue.[92] Should the authorities encourage people to consume the bread before the infection set in after baking, or risk being unable to fill ration allocations as 'failed' loaves were withheld from sale? The number of reports of ropey bread which reached consumers suggest that the prudent course of action was not always followed. Spoilage could also affect other products as well, as recorded by a letter on 1 June 1917 from the *Lebensmittel-Versorgungs-Gesellschaft Leipzig* (Food Supply Company – Leipzig) to the War Food Office branch in Leipzig. According to the letter, the food company had received a shipment of 95 barrels of apple jam to their warehouse which had begun to

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[90] Max Müller, "May 1916," *BDFA*, vol. 10, 132.
[91] Ibid, "July 1916," *BDFA*, vol. 10, 212.
[92] Maylander, *Food Situation*, 19. See pages 161-2 of this dissertation for more detail.

show signs of fermentation. While this particular batch was held back from sale, references to the short shelf life of these war jams suggests that distributions issues in the past had led to consumers being sold unstable products.[93]

The problem of admixture and illegal adulteration of foodstuffs was ever-present throughout the war, and extended to virtually every product. Milk was especially prone to being watered down, though the resulting product was unadvertised and sold at a similar price.[94] If it was not being watered down, then it was being subjected to innumerable experiments with drying and powdering in an attempt to find a way to store it for longer and allow it be to shipped further afield to towns which were not well served by dairies. However, these products produced a drink which was not only much thinner than ordinary milk, but also much more expensive by volume. One product launched in 1915, Milku, a mixture of 75 percent lactose powder and 25 percent cane sugar, came in 15 pfennig packets which produced just one cup of reconstituted skimmed milk. A liter of 'Milku' milk cost 80 pfennigs—around 50 pfennigs more than a liter of regular milk at that time.[95]

Meat, butter, and eggs were also a major target for fraudulent products, as butter and eggs in particular became nearly unobtainable for the average consumer.[96] As recorded by the Max Müller reports, newspaper coverage across the country documented the flood of fraudulent products:

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[93] Letter from L.V.G. Leipzig to the War Food Office, 1 June 1917, StadtAL, 0033 KrEA, Nr. 60, p. 126.
[94] Max Müller, "March 1916," *BDFA*, vol. 10, 37.
[95] Memo to the Medical Office of the City of Berlin from the Chemical Department regarding the testing of 'Ei-ersatz' and 'Milku', "Zu den Schreiben vom 25. Januar u.8.Februar 1916," 22 February 1916, BArch R 86/2175; Max Müller, "The Economic Situation in Germany during December 1915, being the Seventeenth Month of the War," *BDFA*, vol. 9, 384, shows the price for a liter of milk in November 1915 to be 27.5 pfennigs. Note that 'regular' milk at this time refers to skimmed milk, not whole milk.
[96] By the end of 1918, the average consumption of eggs had fallen to 13.3 percent of pre-war consumption, and meat had fallen to 11.8 percent. Heinzelmann, *Beyond Bratwurst*, 243.

> The Frankfurter Zeitung (6 March) refers to cheap sausages containing indigestible waste cattle products, to butter substitutes which on analysis are found to consist of mixtures of sour-milk curds and sugar, with yellow colouring materials. The Deutsche Tageszeitung (16 March) states that certain tinned meats, preserved fish, and milk preparations have been proved to be mere frauds on the public, while an article sold as an egg substitute consisted mostly of a coloured mixture of potato flour and maize flour, with bicarbonate of soda and dry milk powder.[97]

Such was the scale of the boom in these products, particularly after the trials of the *Kohlrübenwinter* in 1916/17, that entire regulatory systems were implemented to handle the flood of products. To demonstrate the scale of the problem, an official report of the Food Ministry in 1917 stated that "there are now over 10,000 substitutes employed in Germany, 7,000 of which are food substitutes, whereas at the beginning of the present year there were only 2,000 substitutes registered, of which 1,200 were food substitutes."[98]

Despite the efforts to create a regulatory system for these products by organizing testing sites for potential products to be evaluated for their quality, and the institution of an official definition and guidelines for what constituted an acceptable *ersatz* product in early 1918, the overall effect of the 1918 Bundesrat Order was to admit defeat against the flood of fraud and move towards mitigating damage rather than preventing it.[99] Thus, consumers were confronted with ever increasing amounts of fraudulent or simply wasteful products which were a poor replacement for the items they were imitating, which undoubtedly eroded public confidence in Government efforts to confront the

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[97] Max Müller, "March 1916," *BDFA*, vol. 10, 38.
[98] Ibid, "October 1917," *BDFA*, vol. 11, 395.
[99] See Chapter 4 for a more detailed discussion of the failure of the government's *ersatz* regulation efforts.

worsening food crisis. As the *Leipziger Zeitung* reported as early as 1916, "experience had justified the 'mistrust' with which all 'reassuring notices' as to the supply of food were received by the German housewife."[100] As shown by these examples, there were many ways in which the mistrust of consumers could be earned through run-ins with 'bad' *ersatz* food products. The inclusion of subpar ingredients, the consumption of spoiled products, and the purchasing and consumption of fraudulent goods, all contributed to the negative connotation of '*ersatz*' which still formed over the course of the war.

Conclusion

As has now been demonstrated, multiple factors guided the reactions of German consumers towards the foods they consumed during the First World War. While the final section of this chapter detailed the many ways in which *ersatz* food products—particularly those of the fraudulent, late-war variety—could be distasteful or unpalatable options for consumers, it is clear that cultural, socioeconomic, and emotional factors also played an important role in determining whether certain foods were perceived to be of good 'quality' or embraced by consumers. Wartime food substitutes, though sometimes objectively 'bad', were also considered unpalatable because of what they represented. They could be symbolic of the peasant foods consumed by past generations before Germany's rise to affluence, or reminiscent of the fare more commonly associated with the poorer classes of society, engendering feelings of distaste regardless of their inherent flavor or palatability. Particularly in cases where foods traditionally

[100] Max Müller, "April 1916," *BDFA*, vol. 10, 78.

associated with animal fodder were pressed into the diets of humans, the sense of humiliation at being reduced to the status of livestock could be quite shocking. Government propaganda efforts to win consumers over to these products, regardless of their good intentions and sound logic, often met with dismal failure, unable to overcome the ingrained societal baggage some food held.[101]

Furthermore, the slowly declining quality of the food, the ever-multiplying government regulations and efforts, and the constant reaching for more and more ingredients out of desperation to expand the food supply, made *ersatz* food products—an ubiquitous presence for German consumers—deeply symbolic of Germany's declining fortunes, both in the war and more generally as its economic impoverishment seemed to turn back the clock on decades of progress. This visible and tangible barometer of Germany's fortunes made for a striking image when compared to the apparent material superiority of the Allies, and helped to shatter morale on both the home front—and arguably the Western Front—in 1918.[102] The potato bread spirit had its limits.

This brings us back to the question posed at the start of this chapter: was *ersatz* food, as a rule, inferior to the food it was replacing? It is hard to say for sure. From our perspective looking back, many of the foods which sparked outrage amongst German consumers seem perfectly acceptable to modern consumers. Oats and multigrain, wholegrain bread, for instance, bear pride of place amongst health-conscious consumers and no longer bear the stigma of being associated with animal fodder or being reminiscent of peasant foods. In fact, the weight given to 'authenticity' in our modern

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[101] Max Müller, "October 1916," *BDFA*, vol. 10, 346.

[102] B.H. Liddell Hart argued that one of the reasons for the failure of the Spring 1918 offensives was that, upon breaking through to the rear area of the Allied lines, German soldiers would stop and loot supply depots—the material superiority of the Allies on full display shattering the morale of German troops. See B. H. Liddell Hart, *A History of the World War, 1914-1918* (London: Faber & Faber limited, 1936), 509-10.

consumer culture, a rejection of the overly processed foods of the twentieth century, gives items like war bread even greater cachet in our culture, to the point of being elevated to the status of 'super' foods. It is also worth noting that continued efforts to promote whole grain bread, or *Vollkornbrot*, in Nazi Germany helped to increase the dark bread's popularity and today it is commonplace to see dense, wholegrain breads in the bakeries and supermarkets of Germany.[103] Clearly a corner was rounded on the acceptability of wholegrain bread in the first half of the twentieth century. Furthermore, many of the *ersatz* products encountered during the war were simply extensions of pre-war products which had already achieved a respectable share of the daily diet. The war simply multiplied them and increased their dietary share, while offering ample opportunity for bad faith actors to engage in fraud. That said, this cannot explain away the many examples of truly harmful or inedible food goods with which consumers had to contend. That narrative remains convincing, despite the efforts of this chapter to shift the conversation.

What is clear is that the historical record is filled with examples of consumers expressing disdain for wartime substitutes. While there are some examples of individuals who seemed to be more welcoming to the new diet, they are far outnumbered by the number of negative accounts.[104] It would be counterfactual to assert that so many accounts were incorrect in stating dislike of the food on offer (and indeed, from subjective experience, such a reaction was entirely valid), but for the work of the historian seeking to understand the challenges of the German food crisis, it is important to remember the subjectivity and mutability of taste, and to resist reductive stereotyping of *ersatz* food products as indigestible, disgusting, and vile. To engage in that exercise is

[103] See Spiekermann, "Brown Bread for Victory," 146-9.
[104] Mihaly, *There We'll Meet Again*, 227; Max Müller, "September 1917," *BDFA*, vol. 11, 326.

to paper over the complex interplay of influences which were at work during every mealtime in every German household during the war.

Also relevant is a potential bias against positive or neutral experiences with food in the historical record. There is a growing body of scientific research which suggests that humans are more likely to remember negative or traumatic events over positive ones—an example of conditioning to protect us against similar experiences.[105] People are also much more likely to remember bad experiences with food, to write about them or submit stories to newspapers, than they are to take note of neutral experiences where the food was just acceptable or functioned as expected. This would then suggest that our received historical record favors the reproduction of negative experiences, distilled from millions of other experiences which did not warrant recording. It is important for historians of the food crisis to bear this in mind, in order to avoid reducing *ersatz* food products to mere caricature. I will end here with an extensive quote from Hans Teuteberg, from his contribution to John Burnett and Derek Oddy's edited volume, *The Origins and Development of Food Policies in Europe*, which excellently encapsulates the issue at the heart of this chapter's discussion:

> Today, food chemists have come to understand that the adulteration or imitation of certain foodstuffs is only a mental abstraction which does not exist in reality. According to consumers' opinions and the legal definitions, there are, apparently, only people who produce 'bad' foodstuffs either accidentally, carelessly, or deliberately with the intention to cheat; or those who combine or process certain ingredients 'inappropriately' in the view of their contemporaries. In other words, opinions about whether a foodstuff has been adulterated or

[105] See Samantha E. Williams, Jaclyn H. Ford, and Elizabeth A. Kensinger, 'The Power of Negative and Positive Episodic Memories', *Cognitive, Affective & Behavioral Neuroscience* 22, no. 5 (2022): 869–903, https://doi.org/10.3758/s13415-022-01013-z.

> falsified with intent to defraud may vary from time to time and from region to region.[106]

An awareness of subjectivity, of consumer's opinions, of legal definitions, and of the appropriateness of varying levels of substitution, should be the guiding principle of our treatment of *ersatz* food products in histories of the food crisis moving forward.

[106] Teuteberg, "Food Adulteration," 150.

Chapter 4: Ersatz regulation and the paradox of government intervention

Introduction

In her 1937 book, *Das unbekannte Heer*, Marie-Elisabeth Lüders, a prominent interwar politician and women's rights activist who worked in the Women's Department of the German War Office during the First World War, recounted the sheer ubiquity of *ersatz* food products during the war. In just the period spanning from the inception of the War Food Office in May 1916 to the war's end in 1918, more than 12,000 food substitutes were officially approved by the government through its various vetting processes. Hundreds of sausage, coffee, tea, beer, milk, oil, pudding, egg, and soup cube substitutes flooded the consumer market during what she termed the "second major boom," which followed the acute food insecurity of the *Kohlrübenwinter* (Turnip Winter) of 1916/17.[1] Each one of these thousands of substitutes would have been submitted to an examination office, where they were subjected to a chemical analysis to determine their ingredients and their suitability for consumption, and to check that their listed market prices were representative of their contents and not fraudulently inflated. Compared to the food regulatory regimes which existed in Europe prior to the outbreak of the First World War, this was an operation which was staggering in its scope, and undoubtedly influenced the shape of new food regulatory regimes moving into the twentieth century.

This chapter will follow the development of government regulations in response to the boom in *ersatz* food products which occurred at two points during the war: first in

[1] Lüders, *Das unbekannte Heer*, 75-6.

the creation of "luxury" food products and staple foods like war bread in the period immediately following the outbreak of war, and second in the explosion of *ersatz* products which occurred in response to the deprivation of the Turnip Winter. While the most consequential government interventions in the country's food supply came in the form of extensive rationing and price control regimes which were constructed over the course of the war, the government's intervention in the production, distribution and consumption of *ersatz* products was no less important in terms of the implications for German consumers. First and foremost, the regulation of these food products—particularly the regulatory regime adopted in early 1918—signaled a tacit acceptance of their necessity. Despite the rosy prognostications of the Eltzbacher Commission in the early months of the war that the German food supply would hold if proper economizing measures were taken, the increasing numbers of *ersatz* products throughout the war were a symptom of the inadequacy of the government's provisioning efforts to meet the needs of consumers, in regard to luxury goods or to base nutritional requirements. In the context of collapsing public morale in the closing year of the war, the implementation of the spring 1918 *ersatz* regulations can be seen in two lights: as a surrender to mounting market pressures to give consumers *something* to buy to make good the deficit in rations, and as an exercise in harm reduction to prevent the worst abuses of fraud and mitigate risks to consumer health.

Neither of these perspectives, as we will come to see, engendered confidence among consumers that the German government had the food supply under control, and instead they painted a picture of an administration on the defensive against an ever-deteriorating situation. Nonetheless, the rapidly evolving regulatory infrastructure can be argued to have had an ultimately positive effect on consumer protection in Germany which extended into the interwar period and beyond. The wartime necessity for government intervention in the consumer market and in the food supply helped to

normalize the regulation of food as an accepted function of government, and once offices were created to oversee the operation of those regulatory regimes, bureaucratic inertia ensured that their portfolios remained an essential aspect of governance. As such, the experiences of the tumultuous years of 1918-1919 can be viewed as accelerating and expanding the development of modern consumer food protections in Germany, which had been slowly accumulating since the mid-nineteenth century.

In order to chart the development of *ersatz* regulation over the course of the war, this chapter will be divided into five sections. The first section will provide the context out of which these regulatory regimes grew by sketching a brief summary of food protection in Germany, which began with the unification of the German state in the 1870s. The next section will cover the initial government response to the food crisis through the creation of the Eltzbacher Commission, which attempted to measure the country's vulnerability to the Allied blockade which came into effect at the outbreak of war, and which made policy suggestions for addressing those vulnerabilities. The third section will provide an overview of government efforts to regulate staple *ersatz* food products during the early years of the war, including an examination of the often contradictory relationship between such *ersatz* foods and government efforts to regulate them. The fourth section of the chapter will focus on efforts to rationalize the food regulatory effort through the creation of the War Food Office (*Kriegsernährungsamt*) in 1916, and the increasingly accepted and expected role of the government as an interventionist guarantor of quality in the food supply. The final section of the chapter will cover the second *ersatz* boom which occurred during and after the experiences of the Turnip Winter, when consumers desperately attempted to fill their stomachs in the face of failing supplies and plummeting rations, and the introduction of the Substitute Ordinance which was introduced in March 1918 in response to this second boom. It is the aim of this chapter not only to examine the means by which the German government

sought to regulate the consumption of *ersatz* food products, but also to evaluate the impact of these regulations on food supply and its affordability, and their effect on public morale. Finally, this chapter will conclude by examining the legacy of these new regulations and how they influenced the development of food policy moving forward into the twentieth century.

Before beginning, it is important to establish what exactly is meant by the use of the term 'regulation', as its meaning can be stretched to accommodate a wide range of actions. For example, food regulation could mean the implementation of controls that restrict what goods can and cannot be sold, thus acting as a safeguarding measure for the health of consumers. In the context of the German food crisis during the First World War, 'regulation' can also refer to the various measures implemented by the government to control or restrict what foods were produced, how they were produced, how they were distributed to the consumer, and in what amounts and at what prices they could be sold. According to this latter interpretation regulation was relatively unconcerned with consumer welfare, and more motivated by the practical questions of how to maintain the nutrition of soldiers and the labor force, while also honoring promises of equitable distribution which underpinned support for the war. This chapter will consider both interpretations of food regulation, but is particularly interested in how *ersatz* food products intersected with the role of food regulation as a guarantor of public health.

Food regulation in the pre-war period

Anxieties surrounding the healthfulness of our foods have long been common in modern societies, particularly as they transitioned from a regime of small-holding farms

and local food networks, under which consumers were intimately familiar with where their food came from and how (if indeed, at all) it was processed. As more people left the countryside to live and work in cities, and as food systems underwent centralization and industrialization, consumers became increasingly alienated from their food, where it was grown, and how it was processed before reaching their dinner plates. The newly unified German state of the mid-1800s was no exception in this regard, as tens of thousands of consumers moved to the cities for employment. Food purchased in the markets and from the grocers of major cities like Berlin could have originated dozens or even hundreds of miles from where it was purchased, and the stripping of interpersonal contact from the production and procurement of food heightened concerns over the quality of food being consumed. This alienation and anxiety were only heightened by a growing understanding of nutritional science which gained momentum in the second half of the 1800s—particularly due to the rising star of German scientists like Justus von Liebig, Carl von Voit, and Max Rubner, who all made major contributions to the field.[2]

As Ursula Heinzelmann has noted in her book on German food history, *Beyond Bratwurst*, cookbooks of the late nineteenth century were replete with warnings on the dangers of adulteration, almost to the point of hysteria. Readers were advised to check the quality of all foods they received for illegal additions, such as ash in cocoa, rice flour in chocolate, artificially colored coffee beans and tea leaves, fish inflated or stuffed to fetch higher prices in the market, and the usual suspects of adulterated bread flour and milk.[3] The adulteration of bread flour was the most serious offender, given the share of the diet of the average citizen which bread occupied. At a meeting of the Section for Public Health Care (*Section für öffentliche Gesundheitspflege*) held in

[2] See Chapter 2 for more detail on the developing field of nutritional science during this period.
[3] Heinzelmann, *Beyond Bratwurst*, 196.

Breslau in 1877, a Dr. Hulwa gave a lecture on the many dangers posed by bread to consumers. While he highlighted that many cases of bad bread were the result of poor sanitation practices, most notably in cases of ergot contamination in rye flour, he also took great pains to describe the various tactics employed in the adulteration of flour. The most common adulterants were found to be potato starch, ground pulses, or powdered minerals in the more extreme cases of adulteration, with potato starch being by far the most popular as in lower quantities it was virtually indistinguishable from unadulterated flour in terms of taste and appearance. Interestingly, however, Hulwa noted that economic considerations prohibited the inclusion of potato starch in amounts greater than 8-10 per cent, as this would render the flour less able to absorb water and thus make it "unsuitable for baking bread," and furthermore reduced the quantity of bread loaves which could be baked from the same amount of flour.[4] Contrasted with war bread recipes from the later years of the war, where starch content could reach between 20-25 per cent of the loaf, it becomes easy to understand why German consumers viewed that staple product as being of such low quality—it was more than double the amount considered unacceptable by pre-war fraudsters. As for the mineral adulterants used in bread flour, gypsum, chalk, clay, barite, magnesite, magnesia mud, and soapstone were the most common culprits. In Rhineland-Westphalia, an undisclosed amount of magnesite, magnesia mud, and soapstone sourced from Silesia was being openly advertised to flour producers for the price of 1½, 2½, and 3 thalers, respectively, for use in adulterating wheat and rye flour. Even worse than this brazen case of open fraud, Hulwa uncovered at least one case where alabaster powder was being used in high percentages as an admixture in a potato starch product marketed as "purified potato

[4] "Ueber die Sanitätspolizeiliche Controle der Lebensmittel in Breslau," *Schlesische Presse*, 29 March 1877, BArch R 86/2068.

starch for the nutrition of children," causing him to exclaim in exasperation, "this surrogate is just what was missing in the already poor nutrition of children!"[5]

Milk was also of particular concern to city dwellers, as it often arrived at the market watered down, skimmed for fat, or with flour and sugar added to increase the perception of its creaminess, and the cleanliness of the milk collection and distribution process left much to be desired.[6] The scale of the problem was such that, in 1877, an investigation by the *Agricultural Press* (*Landwirtschaftlichen Presse*) had revealed that the amount of water disguised as milk in Berlin alone totaled between three and four million liters, out of a total consumption of thirty-seven million.[7] Even this relatively high figure of 10 per cent may have been on the lower end compared to the fraud of earlier decades, as local police efforts were expanded to address the issue. In the same year, Dr. Hulwa noted that of the 20,000 police fines issued against adulteration in the Breslau area, only ten were in response to milk adulteration. This, Hulwa argued, was a substantial reduction against previous years, and the result of recent, concerted efforts to combat milk adulteration in the cities.[8] Such was the intensity of public anxiety over the quality of food, however, that the state eventually bowed to the pressure and established the Imperial Health Office (*Reichsgesundheitsamt*) in 1876, with the first German food law passing into force three years later. The aim of the law was to safeguard the health of the public by creating a number of laboratories which could test food samples for adulteration or harmful preservatives, with set punishments being established for offenders.[9]

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[5] "Ueber die Sanitätspolizeiliche Controle der Lebensmittel in Breslau," *Schlesische Presse*, 29 March 1877, BArch R 86/2068.
[6] See Teuteberg, "Food adulteration," 147, for a detailed account of the poor hygiene practices around milk.
[7] "*Zur Verfälschung der Lebensmittel.*," *Staatsbürger – 3*, 15 August 1877, BArch R 86/2068.
[8] "*Ueber die Sanitätspolizeiliche Controle*," *Schlesische Presse*, 29 March 1877, BArch R 86/2068.
[9] Heinzelmann, *Beyond Bratwurst*, 196. See also Helstosky, "The State," 1579.

While the passing of this legislation marked an important first step in developing a regulatory framework to ensure food safety and quality, its implementation was less than perfect. For starters, it delegated most of the responsibility to regional and local authorities, who were charged with carrying out inspections and tests on samples, but without establishing a universal set of standards for those authorities to adhere to. As a result, standards for the food products being examined varied wildly from region to region. As Heinzelmann notes, "[i]n Saxony egg noodles had to have a minimum egg content, but not so in Frankfurt; honey made with glucose syrup that had been made from potatoes was deemed adulterated in Dresden but not in Magdeburg."[10] As for new, processed food products, like glucose syrup derived from potatoes or sugar beet, standards had to be invented from scratch to allow their use in the production of items like jam and marmalade.[11] Between 1879 and the outbreak of war in 1914, the legislation was expanded to address the increasing presence of preservatives in food in response to a number of controversies, the regulations evolving to allow only thoroughly tested additives and colorings, with maximum content levels being displayed on packages.[12]

In addition to the patchwork nature of the regulatory regime in this period, there was also a severe lack in testing capacity and a widespread belief that punishments were too lenient to deter fraudulent practices. As pointed out by an article in the *Kieler Zeitung* from August 1877, the burden of proof required for a consumer to successfully challenge an alleged adulteration was such that only sophisticated chemical testing could prove the offence, and such facilities were difficult to access outside of the major cities, despite the rapid expansion of chemical testing which was occurring during this

[10] Heinzelmann, *Beyond Bratwurst*, 196.
[11] Ibid.
[12] Ibid, 197.

time.[13] Even when such facilities could be accessed, savvy fraudsters were constantly adjusting their adulterations to avoid triggering positive test results.[14] Being unable to prove the accusations of adulteration themselves, the typical course of action was for consumers to report suspected fraud to the local authorities—but such a decision was not without its own difficulties. As the *Kieler Zeitung* article remarked in relation to the adulteration of beer:

> It is undisputed that if genuine Nürnberger beer is mixed with local beer, the 'experienced beer drinkers' recognize it immediately; but the taste is no proof, and if the host learns that a guest has claimed the mixing, he is entitled to bring an action for defamation against the wicked guest, the end result of which will deprive the guest once and for all the desire to ever again claim mixing, no matter how boldly, no matter how obvious![15]

The ability of businesses to pursue defamation claims against accusations of adulteration, unless sufficient public pressure could be brought to bear against the offender, almost certainly stifled complaints against all but the most egregious cases of fraud.

Even when cases of adulteration could be proved to the authorities, the punishments allowed for under existing legislation were surprisingly lenient. Whereas adulterations that included poisonous or otherwise dangerous ingredients could see the offender receiving up to ten years' imprisonment, more mild cases of adulteration were treated with a much lighter-hand. Section 367, No. 7 of the penal code in 1877 simply stated: "Anyone who offers or sells adulterated or spoiled drinks or food, especially

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[13] Teuteberg, "Food adulteration," 152. As an example of the expansion of examinations in this period, Justus von Liebig's pupil, Max Joseph von Pettenkofer, conducted 40,000 food analyses in 1875, and 80,000 analyses in 1879.
[14] "*Zur Verfälschung der Lebensmittel.*," *Kieler Zeitung*, 24 August 1877, BArch R 86/2068.
[15] Ibid.

meat containing *trichinae*, shall be punished with a fine up to 150 M., or with imprisonment"[16] However, when given the choice between a fine or imprisonment for such offences, the *Kieler Zeitung* article asserted that judges were far more likely to choose the former, and for far more lenient sums in the range of 2-20 M., which the offender could easily recoup through continued swindling. The biggest issue seems to have been the lack of clarity in the language of the legislation, and the lack of clear definitions for what constituted spoiled or adulterated food—at which point did the product cross from being simply 'low quality' into criminality? After all, "Milk with water is still milk, butter with tallow or flour is always butter, only the quality is lower."[17] Due to preservation methods being limited at the time as well, it was difficult for courts to determine between cases of carelessness, or the deliberate sale of adulterated or spoiled food.[18] Without clear and descriptive legal definitions, especially in a period where 'artificial' products like margarine, bouillon cubes, and sweeteners were entering the market, it would appear that the judiciary favored a more permissive than restrictive approach to the issue.

Taken as a whole, the system of food regulation which existed in pre-war Germany was one which was making steady advances in attempting to address the rampant issue of food adulteration. These efforts were spurred in part by insecurity, as Germans were increasingly aware of the improvements which had been made in England and France in relation to the same issues and did not want to fall behind.[19] But

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[16] "*Zur Verfälschung der Lebensmittel.*," *Kieler Zeitung*, 24 August 1877, BArch R 86/2068. *Trichinella spiralis* is a type of parasitic worm which is commonly found in swine and can be transferred to humans. See Teuteberg, "Food adulteration," 148-50, for a description of official efforts to combat the spread of *Trichinella* in this period through the creation of public slaughterhouses. This remained one of the few areas of true success for food regulation, with cases of infection falling drastically by the turn of the century. The quality of sausages, however, remained a burning issue up to the beginning of the war.

[17] "*Zur Verfälschung der Lebensmittel.*," *Kieler Zeitung*, 24 August 1877, BArch R 86/2068.

[18] Teuteberg, "Food adulteration," 150.

[19] "*Ueber die Sanitätspolizeiliche Controle*," *Schlesische Presse*, 29 March 1877, BArch R 86/2068. See also Teuteberg, "Food adulteration," 149-50.

the regulatory regime which was introduced in the 1870s suffered from its patchwork nature, which relied on a combination of consumer volunteerism and local and state regulations that were often at odds with one another. In addition, the infrastructure required to conduct testing at the level required to enforce the regulations was simply unavailable at the time, and imprecise legal language likewise hampered the ability of the judiciary to form a strong deterrent to would-be swindlers. These drawbacks were gradually addressed in the years leading up to the outbreak of the war: there was a dramatic increase in quality testing between 1903 and 1908 in seventeen federal German states, and regional differences in regulation were slowly removed to make way for unified standards.[20] The exception to this improvement was the issue of vague language in the laws, which remained a lingering issue until 1918 when lawmakers were finally forced to address the matter by the rapid expansion of low-quality *ersatz* products which appeared on the market. This trajectory of government intervention in the food supply as a guarantor of quality is one which would only deepen during the course of the First World War, but which would also clash with government efforts to secure the food supply through the expansion of *ersatz* food products—two roles which the German government would struggle to reconcile.

The Eltzbacher Commission and the early war years, 1914-1916

Despite warnings in the years leading up to the outbreak of war that Germany's food supply would be insecure and insufficient in the event of conflict, surprisingly little was done to secure the nation's food supply—largely due to bureaucratic inertia and a

[20] Teuteberg, "Food adulteration," 154.

misplaced belief that any war would be brief in duration.[21] There was little desire to make preparations economically for a hypothetical war, as this would divert attention and resources away from attempts to further develop agricultural production through subsidies, which benefitted Conservatives and agrarians. Furthermore, state finances were severely strained by the naval program, and in the face of escalating armaments expenditures, the government was loath to introduce yet another arena of spending. In the end, war plans that promised a swift end to the war were the only politically palatable solution.[22] This lack of proactive measures would come to bear dire consequences for Germany as its external sources of nutrition (Russia, the Netherlands, Italy, and Switzerland, among others) dropped away as they became belligerents or were slowly forced into cutting exports to Germany in accordance with the Allied naval and diplomatic blockade of the Central Powers.[23] As a result, Germany found itself forced back onto its largely inadequate domestic agricultural production to see itself through the long years of war—with deficits ranging from 20-30 percent of its pre-war consumption levels and exacerbated through the mobilization of men, animals and transportation networks.[24]

Only with the failure of the opening offensives to produce a decisive result, thus raising the specter of a protracted war, were serious measures taken to understand the vulnerability of the food supply and to secure it in the face of the mounting Allied

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[21] See Lambert, *Planning Armageddon*; Offer, *Agrarian Interpretation*, 270-317, for an overview of British strategic thinking regarding the implementation of an economic blockade; Angell, *The Great Illusion*, for contemporary views on the susceptibility of nations to such economic weapons. While the myth of the short war theory amongst decision makers has become the site of debate, German military planning expressed at least the hope for a quick victory, with public sentiment following suit; See William Mulligan, *The Origins of the First World War*, (Cambridge: Cambridge University Press, 2017), 96-9; and Chickering, *Imperial Germany*, 17-23, for an overview of German military planning.

[22] Offer, *Agrarian Interpretation*, 335-7.

[23] See Bell, *History of the Blockade*; Guichard, *The Naval Blockade*; Farrar, *Conflict and Compromise*, for official, semi-official, and early histories of the enforcement of the blockade; See Osborne, *Britain's Economic Blockade*, for an overview of current scholarship.

[24] Davis, *Home Fires Burning*, 22, offers the higher figure of one-third; Grebler and Winkler, *The Cost of the War*, 9, provide the lower end of this range, based on an average of the years 1903-1913.

blockade. Beginning its work in the fall of 1914, the Eltzbacher Commission, led by Paul Eltzbacher, a Jewish German law professor from Cologne, compiled an extensive report which outlined the agricultural production of the German Reich, its international balance of trade in agricultural goods, and the nutritional needs of its citizens. The scope of the report was massive; it attempted to calculate the yearly caloric requirements of the population and estimate the amount of calories provided by various agricultural goods produced within the country, ranging from staples like bread grain and potatoes to goods occupying a much smaller share of the nutritional economy, like honey, fruits, and vegetable oils. Accepting a baseline daily calorie requirement of approximately 3,000 calories for the average working man, and a daily protein requirement of around 80 grams per person, the researchers working for the Eltzbacher Commission arrived at the following conclusions: with an annual calorie requirement of 53.75 billion calories and an estimated annual protein requirement of 1.6 million tons, Germany's domestic agriculture was insufficient to meet consumption requirements, with a deficit of 20 per cent and 26 per cent respectively.[25] These deficits were normally made good through foreign imports, especially in the form of concentrated animal fodder from Russia, which was key to the maintenance of German livestock.[26] Cut off from these crucial imports, German decision makers were presented with a difficult problem in the form of a ticking time bomb. They must either find a way to end the war quickly before the compounding deficits were manifested in malnutrition and famine, or must find a way to close the nutritional gap by eking out the food supply through all means necessary.

The recommendations of the Eltzbacher Commission on how to achieve this goal were wide-ranging and ultimately optimistic in their assessment. They called first for a reduction in what they viewed as an overconsumption of meat on the part of

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[25] Eltzbacher, *Germany's Food*, 26, 29, 34, and 74.
[26] Ashley, *Germany's Food Supply*, 4.

German consumers and a culling of livestock numbers to reduce the amount of food diverted as animal fodder, noting that the conversion of calories into protein resulted in a substantial amount of "lost" calories. Drawing attention to the amount of food needed to fatten pigs, for instance, the authors remarked that "[w]ith the milk, grain, and potatoes which a pig devours we could feed twice as many people as with the resulting pork."[27] This strand of pragmatic vegetarianism would become a common element in official thinking throughout the war, with livestock and human consumers consistently portrayed as being in competition for the same scarce foodstuffs. The tension in this line of thinking, however, was that German livestock remained one of the most efficient means of producing protein, therefore threatening the already insufficient protein supply if livestock numbers were reduced to free up food for human consumption. In addition, German tastes at the time were heavily in favor of a protein-rich diet, risking blows to morale if consumers were unable to access the foods they habitually ate, and which bore strong connections to their cultural identities.[28] This issue would remain unresolved at the war's end, with debates over meat consumption and meat rations being a continuous source of contention throughout the war.[29]

Indeed, calls for consumers to reduce wasteful overconsumption of all types can be found repeatedly throughout the finished report, encouraging a voluntarist approach to making good the shortfall in foodstuffs that was to be an integral pillar in the government's strategy for surviving the food crisis. Drawing attention to the dire deficit

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[27] Eltzbacher, *Germany's Food*, 86.

[28] Schweitzer, *Can Germany Be Starved*, 14, claimed that Germans were the heaviest meat eaters in Europe, boasting an annual per capita consumption of 52.3 kilos, compared to 47.6 for England and 10.4 in Italy.

[29] The most notorious example of this was the *Schweinemord* (Swine Murder), which occurred in early 1915 at the insistence of Eltzbacher's experts. An attempt to divert grain consumption from animals to humans, a slaughter of nine million pigs was conducted—a third of Germany's stock. The result was a policy disaster. A brief glut in meat gave way to scarcity and even higher prices, after which subsequent price controls incentivized producers to withdraw their pigs from the market and sell them through illegal channels. Watson, *Ring of Steel*, 234.

of fat which Germany was facing as well, the report's authors decried what they viewed as a waste of precious fats in the common habit of eating bread spread with butter and jam, cheese, or ham as a midday meal. ""The widely-spread and senseless extravagance of eating bread with some form of fat for the between-meal in the forenoon, must be given up," the report advised, "Bread alone is sufficient, or bread with fruit or jam. Buttered bread is absolutely superfluous with such fat foods as cheese and ham."[30] Continuing their criticism of the wastefulness of German consumers, the report's authors continually highlighted the reduction of waste as the most important action which could be immediately implemented on the home front, advising consumers to avoid over-eating and to chew their food more thoroughly.[31] Post-meal scraps also drew the ire of the report's authors, who claimed that "table scraps are treated very extravagantly. The valuable scraps of fat and gravy must not be allowed, as they now are, to flow in enormous quantities into the sewers; they must be collected and if necessary freed from their taste by clarifying in boiling water."[32] To illustrate their point that obscene amounts of fat were being lost to waste, they presented findings that showed that enough edible fat was found in the Berlin sewer system to provide 20 percent of the daily fat requirements for everyone in the city.[33] By reducing the amount of nutrients that were lost through overeating, waste, and spoilage, the commission hoped to further narrow the gap imposed by the Allied blockade.

The Eltzbacher Commission also found reason to be hopeful in what they believed to be an overreporting of the amount of food actually required to feed the nation. Given the assumption that German consumers were habitually given to overconsumption, the actual nutritional requirements of the country's population would

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[30] Eltzbacher, *Germany's Food*, 205.
[31] Ibid, 208.
[32] Ibid, 209.
[33] Ibid, 227.

be a good deal lower than the amount of food produced domestically and imported from foreign sources to cover pre-war consumption figures, thus shrinking the nutritional deficit.[34] The blockade, the authors reasoned, also cut both ways. Though the country could no longer import goods like coffee, tea, chocolate, or animal fodder, sizeable German exports, like the energy-dense sugar beet, were also cut off from international trade and thus could be redirected to German consumers, shrinking the deficit further.[35] Finally, it was reasoned that livestock herds were far larger than they needed to be in order to support the Germans' love of a meat-rich diet. The commission recommended the culling of nearly 9 million hogs and 1 million milk cows to lower livestock numbers to a more sustainable amount while leaving enough animals to prevent the collapse of the livestock population under the increased pressure they would face in a food crisis.[36] In so doing, supplies of grain, oats, and skimmed milk which would have been used as fodder could be redirected to human consumption.

The basic plan of the Eltzbacher Commission outlined in the report's conclusion and subsequently referred to the government to influence policy decisions, was outlined in the following manner: 1) the use of sugar for animal fodder, 2) the cultivation of moorlands and other marginal use lands for agriculture, 3) changes in stock-keeping methods, 4) prohibiting the use of bread grain as fodder, 5) a prohibition on the manufacture of wheat starch, 6) a prohibition on the use of grain to manufacture alcohol, 7) implementing preservation programs for fruits, vegetables, and potatoes, 8) reducing butter production and popularizing the drinking of skimmed milk, and 9) the

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[34] Schweitzer, *Can Germany Be Starved*, 14; Eltzbacher, *Germany's Food*, 227, estimates 10 per cent of the calorie requirement and 5 per cent of the protein requirement could be recouped through avoiding overeating.

[35] Eltzbacher, *Germany's Food*, 96-103. Eltzbacher estimated that Germany exported approximately 11 million double zentners of sugar (~1.1 billion kilograms) in 1913 which could be retained for consumption. The political question at play in 1914 was whether that sugar would be better used in conducting trade with neutral countries.

[36] Ibid, 231-2.

implementation of waste reduction through consumer volunteerism.[37] Through this wide-ranging program of action, the authors of the report hoped to achieve a surplus in the amount of required annual calories and protein of 44 percent and 26 percent, respectively, demonstrating that Germany was not as vulnerable to economic blockade as it first appeared, granted that appropriate measures were taken.[38]

However, the German government was never able to successfully close the nutritional deficit as promised by the report's authors. Despite the commission's impressive effort at economic accounting, the reality of the situation sharply undercut the optimism of the numbers on the page. The essential flaw in the commission's approach was to portray a highly complex agricultural system as a flawless machine which could be directed on a minute level without deviation, friction, or mistakes. The human element inherent in the production and distribution of food precluded such exacting measures of control, and competing interests prevented the uniformity of action required for the recommendations of the commission to succeed. On the level of implementation and enforcement, the German authorities in charge of securing the food supply were simply too fragmented to tackle the issue as a unified front. This fragmentary approach to the food crisis was an issue which had seen much discussion before, but for the sake of context we will briefly examine the factors which prohibited decisive, unified action.[39]

For starters, Germany lacked a nationwide regulatory network at the outbreak of the war upon which wartime regulations could be built. As was discussed at the beginning of this chapter, what little regulatory framework existed within the German

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[37] Eltzbacher, *Germany's Food*, 229.
[38] Ibid, 230.
[39] The disfunction of German efforts to resolve the food crisis has been the subject of many excellent studies. For recent treatment of the subject, see Watson, *Ring of Steel*, 348-359; Afflerbach, *On a Knife Edge*, 128-146; and Leonhard, *Pandora's Box*, 462-6.

empire at the outbreak of war was divided between jurisdictions on a regional and on a local level, with no clearly defined definitions or standards existing between them (though unified standards had seen some improvement in the years before the war). What passed inspection in Frankfurt would not necessarily have passed inspection in Hamburg, and the infrastructure which supported this regulatory system was not mutually supporting, but rather region-oriented—in essence, there existed dozens of competing, small regulatory systems rather than one interconnected framework upon which an effective wartime food bureaucracy could be constructed. Once war began and the food crisis presented itself, policymakers were left to either create new bureaucratic machinery out of whole cloth with the foundation of new offices to control specific articles of food (potatoes, wheat, etc.), or to co-opt the many regional and local systems to attempt to coordinate a dynamic plan for nutritional conservation.[40] Neither option was ideal, as the larger number of moving parts introduced more areas where bureaucratic inertia and jurisdictional competition hindered efforts to address the crisis.

To make matters worse for policymakers, the primacy of the military over the civilian government, which only strengthened as the war progressed, further complicated efforts to rationally and equitably address food shortages.[41] A holdover from an earlier period, the Prussian State Law of Siege was triggered once a state of war was declared in 1914, investing wide-reaching powers in twenty-five deputy commanding generals who each helmed an army corps district. They held ultimate authority within their districts and had the power to override civilian leadership if it was

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[40] Grebler and Winkler, *The Cost of the War*, 52, estimates that approximately 200 *Kriegsgesellschaften* (War Companies) were established during the war, organized under various offices of the Ministry of the Interior, and later the War Food Office, employing more than 33,000 personnel.

[41] Watson, *Ring of Steel*, 152-4, and 415. The Third OHL's armaments drive in 1917 under the leadership of Hindenburg and Ludendorff led to a weakening of *Burgfrieden* ideals. Food allocations for heavy armaments workers were prioritized over those for more vulnerable segments in society. See also Davis, *Home Fires Burning*.

deemed in the interest of the war effort. In reality, the imposition of these army corps districts introduced yet another layer of competing jurisdictions which further confused efforts to address the food crisis in a rational manner. Though many deputy commanding generals delegated such matters to the civilian government, some jealously guarded their authority, or overruled the decisions of the civilian leadership in the name of protecting military privileges or responding to popular demands.[42] The end result of these army corps districts, from the perspective of civilian leadership, was to hamstring any effort to introduce a unified food policy to address the crisis. Any new policy or regulation put into place had to contend not only with a myriad of competing bureaucratic bodies, but also an entire network of competing military governance bodies—all of whom could be cajoled into cooperation, but never forced.

In addition to these issues of competing civilian and military jurisdictions, there were other factors which placed the rosy predictions of the Eltzbacher Commission out of reach. As was pointed out by critics at the time, the agricultural years leading up to the First World War which were used in the calculations of the commission were unusually good in terms of their crop yields, inflating the authors' predictions. Including just a few more years into their sample size would have resulted in noticeably more modest average crop yields, widening the nutritional deficit which needed to be covered.[43] There was also the problem posed by mobilization. Not only were millions of young men called up for service in the military, removing them from the fields during the crucial planting and harvesting seasons, but the draft animals required for this heavy work were called up as well. Nearly one-third of the nation's draft horses were pressed

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[42] See Albrecht Mendelssohn-Bartholdy, *The War and German Society; The Testament of a Liberal* (New York, H. Fertig, 1971), http://archive.org/details/wargermansociety0000mend, 108-114 for a discussion on the fractious nature between military districts; See also Wilhelm Deist, *Militär und Innenpolitik im Weltkrieg 1914-1918.*, Quellen zur Geschichte des Parlamentarismus und der politischen Parteien. Zweite Reihe, Militär und Politik ; Band 1 (Düsseldorf: Droste, 1970), for an authoritative record of the actions of the Deputy Commanding Generals.
[43] Ashley, *Germany's Food Supply*, 10-11.

into service and the closing of the borders also removed nearly one million seasonal Polish workers who would have otherwise been available to tend the fields.[44] Throughout the war, this agricultural labor shortage would be covered to some extent by the increasing the workloads of women on the farms and eventually the employment of POWs in agricultural work, but wartime harvests would never match the yields of the pre-war years.[45]

In addition to the labor shortage, the blockade cut Germany off from international sources of fertilizer which had come to fuel its increasingly intensive agriculture. Although the newly developed Haber-Bosch process helped to counter the loss of nitrogenous fertilizer imports, there was no reliable replacement for the Chilean saltpeter which had helped grow the expansive crop yields of the preceding decades.[46] Synthetic production at the time was unable to fully replace Germany's reliance on imported sources, and direct competition between the military and agricultural producers for this scarce resource further eroded available stocks, with the military absorbing a large portion of Germany's nitrate production capacity for the manufacture of explosives.[47] As reports for the British Foreign Office would show, German efforts to meet the agricultural sector's demands for fertilizers would consistently fall short. In December 1916, the Prussian Minister of Agriculture announced that of the 1.25 million tons of nitrogenous fertilizers required by the agricultural sector annually in peacetime, wartime production was only providing around half a million tons.[48] Initial hopes that

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[44] Watson, *Ring of Steel*, 314. See also Eltzbacher, *Germany's Food*, 16-7, and Theo Balderston, 'Industrial Mobilization and War Economies', in *A Companion to World War I*, ed. John Horne, Blackwell Companions to World History (Chichester, U.K.; Malden, MA: Wiley-Blackwell, 2010), 227.
[45] Balderston, "Industrial Mobilization," 227; Grebler and Winkler, *The Cost of the War*, 84-5, suggests a decrease in the total area under crops by 8.25 per cent between 1913 and 1919. The lack of available labor caused some fields to lie fallow.
[46] Ashley, *Germany's Food Supply*, 5; Chirol, "Fourth Month," *BDFA*, vol. 9, 29.
[47] Broadberry and Harrison, *Economics of World War I*, 20-1.
[48] Max Müller, "December 1916," *BDFA*, vol. 11, 15.

the German soil had been so well-fertilized in the preceding decades that the loss of a few seasons of fertilizer could not possibly affect its viability were likewise proven false.[49]

The loss of available farm labor, reduced access to fertilizers (including manure due to livestock being culled and draft animals pressed into service), and disruptions to the regular distribution resulting from military demands on the rail network, all combined to strike a lethal blow to the normal functioning of the food production system in Germany upon which the calculations of the Eltzbacher Commission were based. The real flaw in the Eltzbacher Commission's report was not in its findings, which remain impressive, but in its assumption that everything would go according to plan. For the program of action outlined in the report to succeed in its goal of meeting the nutritional requirements of the population, there was vanishingly little room for error. It required not only that harvests continue as they had done in the pre-war period despite wartime shocks to the system, but also that the military and civilian arms of the government would march in lockstep in confronting the causes of the food crisis. Even further, it necessitated that tens of millions of consumers would heed the call to patriotic sacrifice and adhere completely to the proposed changes, and would maintain that level of sacrifice for an unforeseen number of years without faltering. In short, it was an impossible task, even for the famously bureaucratic German government of the day. Any amount of friction or confusion in the system would result in unaffordable losses to the food supply, and there is no shortage of such friction and confusion even in the best of times, let alone in a war as unprecedented as that in which the German government found itself.

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[49] Schweitzer, *Can Germany Be Starved*, 6.

This brings us back to the introduction of ersatz food products into the German diet. The pressures for ersatz food development were already present, regardless of whether the government effectively managed the food crisis or not. The desire for luxury food products made scarce by the blockade, like coffee, chocolate, or tea, alone would have driven the development of substitutes to fill these niches, and indeed, many of the measures called for in the commission's report included elements of ersatz food production, such as higher milling rates for bread, preserving fruits and vegetables in war marmalade, and using unusual or underutilized foods and types of animal fodder. However, as it became increasingly clear that the government was unable to adequately address the food crisis as the commission's authors had hoped, the role of ersatz food products in filling the gaps became ever more necessary.

The problem that this posed to the authorities was a paradoxical one: while the government was forced to rely on ersatz food to make good shortages, by their very definition many ersatz foods were products of adulteration, a practice which the government had made strides to combat in the half century leading up to the war. For example, in order to stretch the amount of foodstuffs extracted from dairy cows, at various points during the war only babies or invalids were permitted to drink whole milk, while the regular consumer had to make do with skimmed milk—a by-product of butter production which before the war had only been deemed fit to give to livestock, even amongst the poorer segments of society.[50] In better times, such an offering would have caused outrage and likely have resulted in punishment for the vendor, but the necessities of the food crisis clearly shifted what was deemed an acceptable standard by the regulating authorities. The German government thus had to walk a tightrope between ensuring that there was enough food to feed consumers by bolstering stocks

[50] Max Müller, "February 1915," *BDFA*, vol. 9, 126; Perry, "Kitchen Soldiers," 23-4.

with substitutes (some of which were indistinguishable from adulteration) and continuing to safeguard consumers by tackling egregious offenses and fraudulent products, to varying degrees of success.

Before getting to the discussion of how regulations during the food crisis affected the creation, consumption, and acceptability of ersatz food, it is important to first establish what this section does not address. Above all, it does not address the complex system of price controls and the command economy which developed over the course of the war, as well as the rationing system and its attempts to maintain the equity of nutrition amongst the population, except where such issues directly affected the development or consumption of ersatz food products. These other aspects of the food crisis are well-trodden ground and readers interested in exploring them can do no better than to consult the many works listed in the literature review at the beginning of this dissertation—there is simply not enough space to devote to them here. What this section does address is in how wartime food regulations impacted the creation of ersatz food products, and how those substitutes inspired regulation in return.

At the beginning of the war, ersatz food products did not receive an undue amount of attention from the authorities, except tangentially in the form of official mandates for staples like war bread, which simultaneously created the product and regulated what the product could contain. Like most foods during the food crisis, *ersatz* food products were regulated through a combination of prescriptive and proscriptive measures. Prescriptive measures often went hand in hand with the development of ersatz food products, as was discussed in Chapter 1. The most conspicuous example of this is the slow emergence of war bread through dozens of iterations of official mandates over the course of the war. Beginning in September 1914, for example, bakeries in Berlin were ordered to bake “mixed-bread” only, requiring wheat bread to contain at least 10 percent rye flour and 5 percent potato starch, though higher

percentages of each would be permitted—foreshadowing the direction in which war bread would later develop.[51] Aside from the ingredient list of wheat, rye, and potatoes, the extraction rates of the flour itself were also subject to continuous prescriptive regulation. Faced with the flour stocks falling increasingly under stress, the government began to mandate higher milling rates during the first year of the war. One circular published by the Imperial Grain Office in January 1916 outlined the new regulations for making bread, declaring that "Wheat must be milled up to 80 per cent. of its content, and rye up to 82 per cent. instead of the 75 per cent fixed for both kinds of grain on the 20th of August."[52] Such decrees dictating milling rates and flour ratios fluctuated wildly throughout the war in response to positive and negative changes to the food supply and illustrate the means by which the government communicated to bakers and consumers alike the expectations for what war bread should look like and consist of, as an officially sanctioned form of mass adulteration in the name of securing the consumer's daily bread.

Complementing the prescriptive regulatory efforts during the opening years of the war were the proscriptive measures designed to protect scarce foodstuffs from being used in suboptimal ways. Permitted items for animal fodder and alcohol production were two popular targets for such efforts, especially considering the constant efforts of farmers to circumvent price controls to maximize their profits.[53] As early as August 1914, the Ministry of Agriculture released guidelines warning that the use as animal fodder of cereals fit for human consumption was forbidden, whereas by September of the same year, the *Berliner Tageblatt* was reporting that the number of stills allowed to use potatoes in the production of spirits was being restricted to protect the potato

[51] Chirol, "Third Month," *BDFA*, vol. 9, 20.
[52] Max Müller, "February 1916," *BDFA*, vol. 9, 417.
[53] See Moeller, *German Peasants*, 44-7, for a representative example of this dynamic.

supply.[54] Beer was likewise a target for such regulations, as more of the country's barley supplies were directed towards the baking of war bread. Although using barley for brewing was never banned outright during the war, thanks to the cultural significance of beer in the German diet, breweries were rationed in the amount of barley they could use. By 1916, most breweries were restricted to 25 per cent of their normal peacetime consumption of malted barley, whereas Bavarian breweries were afforded a higher 35 per cent ration due to "the recognition of the fact that in Bavaria, beer is really a food."[55] The resulting beer would have been thinner and lighter, akin to the small beer which had been traditionally part of the brewing process in previous centuries, but which had fallen out of favor by the twentieth century.

While these proscriptive regulations did not play a direct role in the creation of ersatz products in the way that the prescriptive regulations did (with the exception of the ersatz beer created by introducing barley rations), by limiting what farmers and producers could use they indirectly spawned numerous substitutes to fill the gaps. Animal fodder in particular was a fruitful area of ersatz development in response to the myriads of bans and regulations on what could and could not be used as fodder during the war. By December 1916, when Germany's nutritional fortunes had begun to turn for the worse, the list of commodities banned as fodder included:

> "wheat, rye, and spelt, or flour or bread made therefrom, buckwheat, millet, peas, lentils, beans, potatoes suitable for human consumption, and potato products, sugar-beet, kohlrabi, and beechnuts. Of barley only 40 per cent, of the harvest may be used, and of oats only so much as is required to provide the legal

[54] Chirol, "Second Month," *BDFA*, vol. 9, 12; and ibid, "Third Month," *BDFA*, vol. 9, 20.
[55] Max Müller, "December 1916," *BDFA*, vol. 11, 20.

> rations for horses, bulls, and oxen, while whole milk may only be given to calves and pigs under 6 weeks at age."[56]

In the constant battle between humans and livestock over consumable food, a bewildering array of substitutes were pressed into service to fill the absence left by more traditional commodities. An article in the semi-official mouthpiece, *Norddeutsche Allgemeine Zeitung*, in December 1914 called for consumers to collect their kitchen scraps and potato peelings for delivery to farmers to use as fodder, and in June 1915 it was recorded that rushes and leaves were being gathered for the same purpose.[57]

Even stranger by contemporary standards were the highly processed fodder substitutes which arose from scientific experiments to better utilize waste or fringe resources. Compressed straw, heather meal, grape-skin meal and reed meal were all introduced with much acclaim as answers to Germany's fodder shortfall, but production levels of these fodders were never satisfactory, and due to the nature of their origin, they were very energy-intensive to collect. A December 1916 report by the War Committee for Fodder Substitutes found that only 22,000 tons of compressed straw had been delivered at that point, whereas estimates for 1917 placed production of heather-meal at only 12,000 tons, grape-skin meal at 10-15,000 tons, and reed meal at 8,000 tons—numbers far too low to have a meaningful impact on demand, as contemporary experts estimated that pre-war Germany had imported nearly 1.25 million tons of bran from Russia each year to employ as fodder.[58] Even the carcasses of animals were converted towards the effort. The same December 1916 report makes mention of several substitutes derived from animal remains, including "gelatine compressed fodder, albumen fodder, compressed bone fodder, blood-meal, and fodder made from animals'

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[56] Max Müller, "December 1916," *BDFA*, vol. 11, 19.
[57] Chirol, "Fifth Month," *BDFA*, vol. 9, 58; Max Müller, "June 1915," *BDFA*, vol. 9, 208.
[58] Max Müller, "December 1916," *BDFA*, vol. 11, 20; Ashley, *Germany's Food Supply*, 4.

stomach muscles."[59] As inventive as these ersatz fodders were, however, their feasibility as a truly viable replacement for traditional fodder was repeatedly cast in doubt. The Bavarian Fodder Distribution War Committee described the above substitute fodders as "articles some of which are useful for making natural fodder go further," but the small available stocks and high prices "out of all proportion to the feeding value," prevented their widespread adoption.

The story of beer in relation to its regulation is another interesting example of the effects of proscriptive regulations on ersatz development. As was previously mentioned, the restrictions on the amount of malted barley that breweries were permitted to brew with resulted in ever-thinner examples of small beer, much weaker in terms of its alcohol content and likely watery thin, as there would be fewer proteins and complex sugars derived from the malt which contribute to the perception of body in a full-strength beer.[60] However, such restrictions ran afoul of previous regulations which protected consumers from adulterated beer, either watered down or purposefully brewed to be thinner and lighter. In April 1917, special permission was granted to breweries in Prussia to brew an especially light beer, "with a wort containing not more than 5 per cent. of extractive matter […]," and it was noted by the *Berliner Tageblatt* that the demand for beer by the army and munitions workers was so high that they would likely absorb all the full-strength beer production, leaving to the civilian consumer market only the light beer permitted by the new regulations.[61] Regular beer production continued as a portion of brewery business to supply full-strength beer to the army and heavy munitions workers. The remainder of their business was subject to these

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[59] Max Müller, "December 1916," *BDFA*, vol. 11, 20.
[60] Keith Thomas, Horst Dornbusch, and Garrett Oliver, 'The Oxford Companion to Beer Definition of Proteins', Craft Beer & Brewing, accessed 17 February 2025, http://beerandbrewing.com/dictionary/E7FlzS6H7Q/; Ray Anderson, 'The Oxford Companion to Beer Definition of Small Beer', Craft Beer & Brewing, accessed 17 February 2025, http://beerandbrewing.com/dictionary/yiXZMDswJO/.
[61] Max Müller, "April 1917," *BDFA*, vol. 11, 131.

restrictions as a means to increase the volume of beer produced. Despite its drain on barley supplies, the government remained unwilling throughout the war to ever fully cut off beer production, given its strong German cultural ties and its attendant popularity.[62]

By the end of 1917, the pressure on barley supplies resulted in even stricter restrictions on the amount of malt permitted to brewers, resulting in some of the weakest beers of the war. In December, the Central Committee for Native Beer Supplies published guidelines urging brewers to introduce a beer with a wort content of no higher than 2 percent—whereas peacetime beer brewing involved a wort content of between 10 and 12 percent on average—which would result in a massive reduction of alcohol content and body comparatively.[63] These ever-tightening restrictions on brewing supplies likely influenced brewers to seek other means by which to meet the still present demand for fresh beer. In February 1918, new regulations were imposed in Prussia to forbid the use of turnips and beets in the manufacture of beer substitutes, which brewers had presumably been drawn to as a source of fermentable sugars, but which the authorities were anxious to preserve for consumption as food.[64] Aside from turnips and beets, the restrictions on barley, as well as the soaring cost of all brewing ingredients resulted in the addition of many substitute ingredients in an attempt to keep the industry afloat. In May 1916, for example, the German government permitted the sale of a "mixed" beer, which was created by mixing lager beer with a beer brewed using caramel as the primary fermentable sugar, whereas at other points in the war, ingredients like corn, oats, rice, Indian millet, Pisum, potato flour, potato starch, and

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[62] Max Müller, "April 1917," *BDFA*, vol.11, 131. Bavarian breweries in 1917 were obligated to use half their malt ration in the production of light beer, for example.
[63] Ibid, "December 1917," *BDFA*, vol. 12, 71.
[64] Sadler, "The Internal Situation in Germany during February 1918, being the Forty-Third Month of the War," *BDFA*, vol. 12, 110.

honey were incorporated into the malting process.[65] The introduction of any of these substitutes in beer would have been in contravention to the longstanding *Reinheitsgebot*, a sixteenth century food quality law which restricted beer ingredients to just water, barley, and hops (and sometimes wheat), but the necessity of continuing wartime beer production outweighed such concerns.[66]

Evolving government roles and the creation of the War Food Office, 1916-1917

In addition to the implementation of these prescriptive and proscriptive regulations which had a profound influence on the course of ersatz food development, the German government had to simultaneously maintain its role as a regulator of food quality—a role which had been gathering momentum in the decades preceding the First World War, but which entailed competing imperatives that a wartime government facing a food crisis needed to carefully navigate. Whereas officially sanctioned adulteration was tolerated or even mandated to achieve the ultimate goal of nutritional security for millions of people, it was imperative that dangerous or fraudulent food products be investigated and punished in order to maintain both public morale and public faith in the government's efforts to secure the food supply. The responsibility for administering these protective efforts fell to the patchwork regulatory system which existed at the beginning of the war—inspectors from various regulatory bodies, the police, and the judicial system worked in concert to detect and punish wrongdoing, usually with the

[65] Max Müller, "May 1916," *BDFA*, vol. 10, 134; Franc, "Bread from Wood," 77-8, provides examples from Bohemian breweries, but the pressure to find similar fermentable ingredients would have affected breweries Germany in much the same way.
[66] Horst Dornbusch and Karl-Ullrich Heyse, 'The Oxford Companion to Beer Definition of Reinheitsgebot', Craft Beer & Brewing, accessed 17 February 2025, http://beerandbrewing.com/dictionary/7SMpZlapQl/.

help of the public in the form of tips or complaints. Public outrage in Cologne in May 1916 led police to investigate a number of butchers who were found to be withholding meat, as well as some bakers who were fined for "mixing ground wood into their bread."[67] Indeed, the illegal adulteration of bread was a common offense (as it was before the war) with one Hamburg-based bread factory being fined 500 marks in May 1916 for allegedly selling bread composed of one-fifth flour and four-fifths sawdust and chopped straw.[68] Scarce luxury goods like coffee or cocoa were also popular targets for illegal adulteration, with Danish travelers in Germany reporting to the British Foreign Office in May 1916 that numerous people had been fined five marks and sentenced to one day in prison for "selling roasted barley prepared to resemble coffee, or else used to adulterate cocoa."[69] What is interesting about this last offense is that barley-ersatz coffee was relatively commonplace as a recipe during the war and even as a cheap alternative in the decades prior to 1914, which leads one to surmise that the crime lay not in the ingredients used, but in passing it off as the bona fide product.[70]

Unfortunately for the authorities, such attempts to crack down on abuses and fraud did little to dissuade others from attempting the same, and also did little to repair the public's perception of government efforts, which were viewed as fumbling and allowing exploitation to run uncontrolled. The essential problem at work was twofold: an artificial price control system provided ample opportunity for speculation, whereby producers would withhold products to wait for authorities to announce higher prices, as well as an absolute shortage of food products leading to higher demand and therefore opportunities for abuse. As an example of the former, in the aforementioned mentioned case of public anger against butchers in Berlin and Cologne in May 1916, sixteen

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[67] Max Müller, "May 1916," *BDFA*, vol. 10, 128.
[68] Ibid, 132.
[69] Henry Crofton Lowther, "Notes on the Economic Conditions in Germany," *BDFA*, vol. 10, 110.
[70] Schreiner, *The Iron Ration*, 153-4; Junge, *Unsere Ernährung*, 82; Ursula Heinzelmann, *Food Culture in Germany* (New York: Bloomsbury Publishing USA, 2008), 23.

butcher's shops were found to be hiding illegal supplies of meat, with one of them sparking particular controversy as a purveyor to the Court.[71] In Cologne, the police found in one shop alone "23,000 lb. of good, 5,000 lb. of inferior, and 9,000 lb. of spoilt meat goods."[72] Such cases of hoarding as well as the practice of 'hamstering', or travelling to the countryside to buy or steal from farmers directly as a means of circumventing regulations, were particularly damaging to regulatory efforts because they removed food from the official supply chain, thereby aggravating shortages and lending increased confusion to the government's efforts.[73]

The absolute shortage of goods arguably presented an even greater challenge to German regulatory efforts. Not only did the higher demand for food goods result in higher prices, especially for goods which were not covered under price control schemes, but the shortage of supply also placed a hard ceiling on the amount of goods which could be sold—therefore limiting the amount of profit to be made. These two factors combined presented a double-profit incentive which encouraged illegal food adulteration and fraud, for through such actions one could increase the stock of goods to be sold and rake in profits due to the shortage-induced high prices. In yet another case of illegal bread adulteration, the *Norddeutsche Allgemeine Zeitung* reported on 25 June 1916 that bread flour in Prussia was being "freely adulterated, straw flour and ground chaff being used in the mixture, which is sold as spelt flour. The bread made from this mixture is much less nutritive and less palatable," whereas a 4 July article from the same paper noted cases "where grains of sand, bits of coal, potato skins, &c., have been discovered, and the bread is sometimes so mouldy in odour and bitter in taste as to be quite uneatable."[74] The sale of moldy or bad bread did not always indicate a producer

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[71] Max Müller, "May 1916" *BDFA*, vol. 10, 128.
[72] Ibid.
[73] Ibid, "July 1917," *BDFA*, vol. 11, 239.
[74] Ibid, "July 1916," *BDFA*, vol. 10, 212.

acting with malicious intent, however. Illustrating another means by which an absolute shortage of food goods encouraged inferior products, bakers involved in cases of adulterated or moldy bread often blamed the quality of flour which they received, noting that a refusal to bake with the flour supplied would have precipitated a local bread famine for several days while waiting for replacement flour to arrive.[75]

Furthering damaging the public's perception of government efforts to regulate the food supply and stamp down on abuses were the government's own efforts at ersatz production to make up for shortfalls, which highlighted the tension at play between the two goals of government regulatory policy. Especially in times of extreme dearth, when desperation on the part of local authorities resulted in greater levels of adulteration, or the inclusion of more unorthodox ingredients, the distinction between government sanctioned food products and those being condemned as fraudulent began to blur. As the Max Müller reports remarked in their monthly coverage of the food crisis, the government's roles as both creator and regulator of ersatz goods seemed to contradict one another. The report from June 1917, following the harshest months of the war for German consumers, offered the following:

> Probably in most instances these substitutes are harmless, and neither benefit nor injure the consumer, but only confer enormous pecuniary advantage on the producer. In other cases, however, these substances are directly harmful to the health and contain the most noxious ingredients. The Governments have taken drastic measures to do away with fraudulent dealing in substitutes, but all to no good, as the profits to be made are too tempting; on the other hand, they directly encourage the manufacture of certain substitutes which may be nasty and nothing else.[76]

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[75] Max Müller, "July 1916," *BDFA*, vol. 10, 212.
[76] Ibid, "June 1917," *BDFA*, vol. 11, 198.

Examples of this dilemma were a common occurrence. Shortages of bread grain occasionally led to damp grain—which prior to the war would have been deemed unfit for consumption—being treated and then pressed into service despite the issues this created in terms of proper baking and taste.[77] Similar scenarios arose in response to shortages of potatoes, whereby substitutes for potato starch (which made up approximately 20 percent of the bread) had to be introduced into the recipe for war bread. In June 1916, the regulations in place authorized the use of flour made from beans, soya beans, peas, barley, oats, maize, tapioca, rice or sago, or of finely-milled bran in place of potato starch.[78] While these ingredients were feasible substitutes for potato starch, the inclusion of multiple different types of flour in bread increased the chances of something going wrong during the baking process, such as striations in the bread or failure to rise, resulting in a substandard loaf with reduced palatability.[79]

Complaints were also raised over the quality of the government's war jam, particularly in the first half of 1917. In order to preserve the nation's annual yield of perishable fruits and vegetables, consumers were limited in the amount of fresh produce they were allowed to purchase, and a government purchasing company was established to consolidate supplies for the production of war jam, known as *Kriegsmarmalade* or *Kriegsmus*. However, according to an explanation published in the *Deutscher Reichsanzeiger* on 30 June, as there were not enough apples and plums to prepare the recipe as outlined in the instructions provided by the war company to the factories in January that year, the factories were instead instructed to use apple and plum pulp in combination with turnips in a ratio of four to six. Unsurprisingly, the resulting product proved highly unpopular: "This compound proved very unsatisfactory, in spite of the

[77] Max Müller, "April 1915," *BDFA*, vol. 9, 154; Chickering, *Freiburg*, 267
[78] Max Müller, "June 1916," *BDFA*, vol. 10, 174.
[79] See the section on war bread in Chapter 2.

attempted concealment of the turnip flavour by the addition of ethereal oils and lemons; and many people complained of serious gastric complaints as a result of eating it."[80] The official defense stated that the factories were unaccustomed to the manufacture of such products and that the supplies of turnips they received were frozen, which prevented them from being properly cleaned before being added to the war jam.[81] Such blunders only served to further exacerbate public frustration with official efforts to regulate the food supply and again blurred the line between official ersatz products and the fraudulent products the authorities were attempting to eliminate.

Another issue which plagued Germany's efforts to secure the nation's food supply was the proliferation of competing regulatory bodies which were established over the course of the first half of the war, resulting in their eventual consolidation under the War Food Office in May 1916. The scale of the government's intervention in the food supply necessitated the introduction of dedicated offices within the Ministry of the Interior and the Ministry of Agriculture which could focus on directing relevant food supplies and issuing regulations, as well as implementing price controls and rationing systems. From the beginning, however, there existed no holistic strategy for tackling the burgeoning food crisis; regulatory bodies were founded on a piecemeal basis in response to individual crises and shortages and operated largely independently from one another. As an example of such a body, the *Reichsgetreidestelle* (Imperial Grain Office) became the first regulatory organization to be established when it was founded by Bundesrat order in January 1915. Composed of the leading capitalists from that sector, the corporation was empowered to purchase entire crops at fixed prices before they were rationed out as required to local governments, to ensure that the supply of the

[80] Max Müller, "July 1917," *BDFA*, vol. 11, 257. The exact war company is not disclosed, but it was operating under the aegis of the Imperial Vegetable and Fruit Office.
[81] Ibid.

commodity would last the entirety of the harvest year.[82] Likewise, by a series of Bundesrat orders in July 1915, a corporation for coffee, tea, and their ersatz products was established, requiring all stocks of coffee exceeding 10 kilograms, and all stocks of tea exceeding 5 kilograms, to be sold to the corporation at fixed prices to enable the rationing of those products to begin.[83] As shortages began to affect other commodities, relevant regulatory bodies were established in turn, resulting in an administrative network of dozens of organizations by mid-1916 covering every conceivable article of food from potatoes, to fat, to fruits and vegetables.[84]

Far from improving the availability and supply of their associated foodstuffs, however, the proliferation of these regulatory bodies merely added more complexity to an already bloated bureaucratic apparatus which lacked the centralized leadership to coordinate its efforts. Stories of food left to rot and spoil because of inefficient bureaucracies or jurisdictional wrangling became a common lament amongst the public, fueling frustrations.[85] Furthermore, the introduction of specific food corporations was frequently linked in the public imagination to an increased scarcity of the associated foodstuff, as stockpiles were withheld to await higher prices, or purchasing officers scooped up local supplies. This cynicism was exemplified in a popular joke amongst Berliners that the most efficient way to remove snow from the city streets would be to create an Imperial Snow Corporation, and they would awaken to find the snow vanished.[86] An April 1915 issue of the *Leipziger Volkszeitung* likewise contrasted "the multiplication of official regulations and announcements with the amount of food supplied to the individual," and argued that experience justified the mistrust with which

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[82] Max Müller, "January 1915," *BDFA*, vol. 9, 90; Chickering, *Imperial Germany*, 43.
[83] Max Müller, "April 1916," *BDFA*, vol. 10, 87.
[84] Chickering, *Imperial Germany*, 43-4.
[85] See Blücher, *An English Wife*, 122; Max Müller, "July 1917," *BDFA*, vol. 11, 256-7; and Cox, *Hunger in War and Peace*, 76, for examples.
[86] Chickering, *Imperial Germany*, 44.

German housewives met government reassurances as to the security of the food supply.[87]

Recognizing the inefficiencies generated by their current system of ad hoc regulation and responding to the public outcry to rectify what was perceived as government mismanagement and waste, momentum grew in early 1916 to establish a unified organ which could centrally coordinate the nation's efforts to address the food crisis. The *Kriegsernährungsamt* (War Food Office), as it came to be known, was established on 22 May 1916 under the leadership of Adolf von Batocki, affectionately nicknamed the 'Food Dictator', with the charge of rationalizing the government's economic plan prior to the year's harvest, as well as putting an end to the abuses which were so damaging to public morale. To achieve this objective, the president of the newly formed War Food Office, who reported directly to the Chancellor, would be given the right of disposal over "all stocks of necessaries of life, raw materials, and other commodities existing in the Empire and required for the people, and over all fodder," including the power to regulate their trade, consumption (through rationing), imports, exports, and prices.[88] Other powers of the office included the ability to impose penalties in the form of imprisonment, fines of up to ten thousand marks, and the confiscation of goods. More importantly, however, the president would also hold the ability to issue direct orders to state authorities and even issue regulations counter to those imposed by the Bundesrat, so long as those regulations were immediately submitted to the legislative body for review.[89]

Despite the optimism expressed by the Kaiser to the Reichstag and the Prussian Diet over the announcement, public skepticism lingered over the new organization's

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[87] Max Müller, "April 1916," *BDFA*, vol. 10, 77-8.
[88] Ibid, "May 1916," *BDFA*, vol. 10, 130.
[89] Ibid, "May 1916," *BDFA*, vol. 10, 130.

ability to fundamentally change what was an issue of shortage. As the Müller reports wryly remarked, "Imperial optimism found slight echo in the hearts of the people, who appear to realise that no rules and no organisation can make the fields yield more than a certain amount, can increase the productiveness of animals, reduce the wants of the army to any appreciable extent, or make the cows produce a greater supply of milk." Batocki himself even attempted to temper expectations by warning not to expect a sudden change in conditions.[90] In the end, while the establishment of the War Food Office did help to consolidate the government's regulatory efforts, it was too late to stop the cumulative damage which had already been done to Germany's food supply. Furthermore, the creation of the new office did nothing to change the fundamental subordination of the civilian government to the military, which fueled much of the confusion in official efforts to tackle the food crisis. Attempts were made to bring the efforts of the War Food Office into harmony with the orders of the Deputy Commanding Generals through the appointment of a high ranking military official as a colleague to the president, but the fact remained that the War Food Office retained only the power of suggestion over the military authorities, which severely curtailed the ability of the new organization to achieve its stated objectives.[91]

The 1918 Substitute Ordinance

While the development of *ersatz* food began concurrently with the first signs of shortage following the outbreak of war, the volume of *ersatz* food being produced exploded during and after the desperate months of the Turnip Winter in 1916/17. This

[90] Max Müller, "May 1916," *BDFA* vol. 10, 117.
[91] Ibid, 131; Watson, *Ring of Steel*, 349.

boom in the *ersatz* food industry can be directly tied to the severely strained state of nutrition in the early months of 1917. *Ersatz* products, with the exception of staples like war bread, were often not included on ration cards and thus offered hungry customers the prospect of fuller bellies—assuming they could afford the often usurious prices.[92] At a time when the official ration supplied only 1,100 calories per day for those without special allocations, the proliferation of *ersatz* food products would have been a strong temptation indeed.[93] This expansion of *ersatz* production is perhaps best illustrated by the flood of advertisements which filled the pages of local periodicals. Although the German government was well-known for its censorship activities during the war, Hans Peter Hanssen, a Danish member of the German Reichstag, recorded in his memoirs remarks made in a July 1917 meeting of the Finance Committee to the effect that "a part of the press is still independent of the censorship. That is the advertising section."[94] Inside the advertising section, the speaker continued, "Only *Ersatz*, that is, substitutes, are offered for sale in German newspapers," while their enemies' papers continued to offer for sale all of the regular foodstuffs and necessities of life.[95]

An official report from the War Food Office published in October 1917 provides further evidence for this boom in *ersatz* production. The findings of the report stated that "there are now over 10,000 substitutes employed in Germany, 7,000 of which are food substitutes, whereas at the beginning of the present year there were only 2,000 substitutes registered, of which 1,200 were food substitutes."[96] While this explosion in the number of *ersatz* products might at first seem like a boon to hungry citizens seeking

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[92] One example of a "nutritional yeast" meant to serve as a replacement for meat was sold at 16.66 marks per kilogram, while yeast sold to Berlin city authorities could be bought at only 1.5 marks per kilogram. "*Zu den Schreiben vom 25. Januar und 8. Februar 1916. -Zeichen 64 c / 16 Prs.-,"* BArch R 86/2175.
[93] The modern daily recommended caloric intake is roughly estimated at 2500 calories, Watson, *Ring of Steel*, 352; interview with Soeng Ha Liu, Registered Dietitian, April 2020.
[94] Hanssen, *Dying Empire*, 204.
[95] Ibid, 204.
[96] Max Müller, "October 1917," *BDFA*, vol. 11, 395.

to satiate their hunger, in practice it generated a number of problems which served to exacerbate the difficulties of the food crisis. First and foremost, desperate customers proved a tempting target for unscrupulous business practices aimed at exploiting the extreme shortages for monetary gain. Products sold by such producers were far too expensive for the nutritive value they conferred, adulterated to the point of unrecognizability, or downright dangerous to consume.[97] Not only would these *ersatz* foods fail to provide their advertised nutritional value; they would also financially drain those who purchased them, which was no small danger as salaries struggled to keep pace with rising food prices.[98]

Experiences with these fraudulent *ersatz* foods had the compounding effect of increasing civilian dissatisfaction with the state of the war, while simultaneously eroding public trust in the government's handling of the food crisis. Far more damaging from the government's perspective, however, was the deleterious effect which such *ersatz* foods had on the limited food supply. One example of this can be found in the previously mentioned *Frankfurter Zeitung* article from 6 March 1916, which declared that advantage was being taken of the food crisis to palm off worthless food items, including the use of indigestible waste cattle products and sour milk curds to fashion subpar sausages.[99] If these fraudulent products were used in the preparation of food alongside viable ingredients, or if food was stretched to the point of indigestibility, as was the case with the Hamburg bakery that was found selling loaves of bread made of one-fifth flour and four-fifths sawdust and chopped straw, then those nutrients contained in the viable ingredients were lost to the consumer.[100] For a government whose policy of

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[97] Grant Watson, "Notes on Germany," *BDFA*, vol. 10, 20; Max Müller, "April 1916," *BDFA*, vol. 10, 87; and ibid, "May 1916," *BDFA*, vol. 10, 132, furnish examples of fraud and extreme adulteration; ibid, "April 1917," *BDFA*, vol. 11, 134, mentions attempts to pass off mineral oil for kitchen use and consumption, which was likely to result in harm to the consumer.
[98] Ibid, "August 1917," *BDFA*, vol. 11, 278.
[99] Ibid, "March 1916," *BDFA*, vol. 10, 38. See page 214 of this dissertation for the full quotation.
[100] Max Müller, "May 1916," *BDFA*, vol. 10, 132.

ersatz production was to expand the pool of available nutrition to its greatest possible extent, these wastages were an unforgiveable offence.

Therefore, in the spring of 1918, the German government for the first time sought in earnest to tackle these issues posed by new *ersatz* foods. Through the implementation of a strict regulatory regime, the War Food Office sought to strengthen consumer protections while simultaneously shielding the food supply from the *ersatz* food industry's most wasteful offenders. On 7 March 1918, a Bundesrat Order was issued which dictated that 'Substitute Offices' were to be established in each of the different states and which forbade the production or sale of substitute foods which had not been previously approved by one of these new offices.[101] Any application for the approval of a new *ersatz* food was required to include:

1. Full data about the composition of the substitute, the manufacturing process, the kind and quantity of materials used in its manufacture, and the quantity of the finished products manufactured from them.
2. The cost of manufacture and the proposed wholesale and retail selling price.
3. The exact descriptive title under which the article is to be exploited.[102]

This order was further supplemented by two Bundesrat Orders issued on 8 April, which sought to clarify the former by providing an official definition of *ersatz* food and the grounds for which it might be approved or denied. A food substitute, as described by these subsequent orders, "is defined as an article intended to serve instead of a particular foodstuff in respect of the particular properties of that foodstuff."[103] Furthermore, the orders laid down "that approval of a food substitute cannot be withheld because it may wholly replace a particular food, or may resemble such food very closely," but that a

[101] Max Müller, "March 1918," *BDFA*, vol. 12, 145.
[102] Ibid, "April 1918," *BDFA*, vol. 12, 178.
[103] Ibid.

food substitute might be refused if it was "injurious to human health," contained "disgusting ingredients," or simply because it was too expensive relative to its nutritional value.[104]

To facilitate the assessment of these applications for new *ersatz* foods, the Office for National Nutrition published a series of guidelines for the assessment of substitute foods on 31 March 1918. These guidelines established a series of general principles for the rejection of new *ersatz* foods, like those mentioned above, as well as more specialized guidelines for each specific category of food. Tea, for instance, was required to consist of mostly dried leaves and flowers and "must not contain health-threatening plant parts at all and worthless plant parts only in a small amount due to the type of collection."[105] In addition, it was stipulated that the descriptions and packaging of the tea product must not engender any "false ideas about its nature and origin."[106] This emphasis on combatting the false advertising of products seems to have been a priority, as the guidelines mention similar prohibitions on passing off *ersatz* food as the genuine article for honey products, milk, meat, and eggs.[107] Images of eggs, poultry, or even the inclusion of words like "Gluck-Gluck" were prohibited for *ersatz* egg products, as the Office for National Nutrition deemed that "There is no egg replacement."[108] Similarly, the guidelines pertaining to *ersatz* meat simply declared "There is no full meat substitute," and as such, protein-rich products must have a description "corresponding to their true nature."[109]

To enact these regulations on the ground, a series of new 'Substitute Offices' (*Ersatzmittelstelle*) were opened across the country, which would analyze and approve

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[104] Max Müller, "April 1918," *BDFA*, vol. 12, 178.
[105] "*Richtlinien zur Begutachtung der Ersatzlebensmittel*," 27 July 1919, BArch R 86/2174.
[106] Ibid.
[107] Ibid.
[108] Ibid.
[109] Ibid.

of new substitute food products. These decisions would then be forwarded to the relevant department of the War Food Office for review, either upholding or overturning the decisions of the lower office as necessary.[110] To use the office in Hamburg as an example, the application process for a new substitute to receive registration worked as follows: the individual or company who sought registration for their product would have to submit three samples of their product for examination. Two of those samples would be sent by post to a Professor Dr. Lendrich for an expert opinion on their chemical composition and nutritional value. The third sample would be submitted to a specialist auditor at the closest Price Inspection Office (*Preisprüfungsstelle*) to determine if the proposed price for the product fell within existing price control regulations, as well as ensuring the price was fair given the base cost of materials and manufacturing. If the recommendations of Dr. Lendrich and the auditor were in agreement, the substitute product would receive approval or rejection and be recorded in the relevant registers. In cases were the two parties could not agree on approval or rejection, a presentation would be made to the head of the Substitute Office, who would render judgment.[111] Those products which received approval would then be cleared for sale, but only if they clearly displayed the date, case number, and name of the approving body on the packaging or upon request—functioning, in essence, as a seal of quality to anxious consumers.

For an example of how these assessments might have been conducted in practice, let us look to a report published by the Medical Office of the City of Berlin on 26 February 1916, concerning the examination of a certain meat substitute, called "Naerol".[112] At fifteen pfennigs (cents) for a nine-gram bag, Naerol advertised itself as

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[110] "*Betrifft: Die Durchführung der Ersatzmittelordnung,"* 29 April 1918, StaAH 371-8 III_Pr VII 278, p. 12.
[111] Ibid.
[112] "*Zu den Schreiben vom 25. Januar und 8. Februar 1916. -Zeichen 64 c / 16 Prs.-,"* BArch R 86/2175. Although conducted two years before the introduction of official *ersatz* regulation

the "Cheapest, most nutritious and delicate substitute for sausage and other bread toppings."[113] Consisting primarily of so-called "nutritional yeast" blended with up to 12 percent table salt and 18 percent mineral content (likely the artificial red food coloring mentioned in the report), the directions on the package called for the consumer to mix the powder with "as much butter, lard, or fat as you want," to form a "mass similar to anchovy butter."[114] This substance could then be spread over bread as a "complete replacement for sausage or meat toppings."[115] While Naerol's claims to its protein content were found to be true (49.04% "protein substances"), the report harshly criticized the product for its extremely high price which did not come close to the true value of the goods.[116] With just nine grams of Naerol costing 15 pfennigs, the price per kilogram came to a whopping 16.66 marks, as compared to the wholesale price of yeast (Naerol's central ingredient) which was estimated at only 2 marks per kilogram—an increase of over 800 percent.[117] Were Naerol to have been assessed under the guidelines set in the spring of 1918, it likely would not have been approved.

While the introduction of these new regulations marked a positive development in the policing of substitute food products, the approval process could be quite time consuming for businesses looking to bring new products to market. One Hamburg businessman by the name of Georg Raabe learned this while seeking approval for his new product, Kosmata, an "egg-saving powder" (*Ei-Sparpulver*), which presumably functioned by stretching eggs in the making of scrambled eggs or in baking. While the specifics of Kosmata's analysis remain a mystery, the outcome of the examination is

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measures, the examination followed a very similar process to that stipulated by the Bundesrat Order of 7 March 1918, and as such was likely representative of examinations conducted later in the war. Indeed, the process of chemical analyses used to conduct these tests was much the same as those developed in the pre-war period of food regulation.

[113] Ibid.

[114] Ibid.

[115] Ibid.

[116] Ibid.

[117] Ibid.

clear; following an undisclosed period after the product was submitted to the Substitute Office, Raabe's egg-saving powder was rejected on 24 May 1918. An appeal against the decision was filed on 19 June, but was dismissed and the decision finalized a few days later on 24 June, with a fee of 50 M. being exacted from Raabe for the entire process.[118] Despite this setback, it appears that Raabe once again submitted the product for approval under another name, as it appears in a later register of banned substitutes under the name Kosamta (an anagram of Kosmata), with a rejection date of 10 August. This suggests that attempts were sometimes made to cheat the new system by rebranding products and resubmitting them for registration.[119] Frustrations with the lengthy application process became a point of criticism among those who saw it as yet another manifestation of Germany's glacial bureaucracy leading to waste. An article published in the *Hamburgischer Correspondent* on 31 October 1918, entitled "Ever slowly moving forward…", highlighted such examples where business owners missed out on important deals due to the constraints set upon them by the Substitute Office, ending with a call for the newly formed government to "thoroughly tackle the outdated bureaucratic system."[120]

In addition to the slow pace of processing applications, there also seems to have been a good deal of confusion amongst officials and business owners alike regarding how the new regulations intersected with previous rulings. In one series of letters between the Substitute Office in Hamburg and a company by the name of W. N. Helmers Wwe. & Sohn, a disagreement over whether a lemonade concentrate constituted an ersatz product was sparked when a delivery of 86 bottles was made to a retailer. The recipient could not provide proof of authorization for the "artificial"

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[118] "*Beschwerde-Register der Ersatzmittelstelle*," StaAH 371-8 III_Pr VII 281.
[119] "*Liste. Der auf Grund der Bundesratsverordnung vom 7. März 1918 von der Ersatzmittelstelle Hamburg abgelehnten Ersatzmittel.*," StaAH 371-8 III_Pr VII 281.
[120] "*Immer langsam voran…*," *Hamburgischer Correspondent*, 31 October 1918, StaAH 371-8 III_Pr VII 278, p. 24.

lemonade concentrate, and thus the matter was reported to the Substitute Office. The heart of the issue lay in the timing of the delivery, which occurred on 16 May 1918. The new regulations stipulated that ersatz food products would be temporarily exempt from the approval process if 1) they were already in circulation before 1 May, and 2) they were delivered to their end customers by 1 October—thereafter all products would need to be compliant with the approvals process. Since the initial and only delivery of the concentrate occurred after 1 May, it was the position of the Substitute Office that the product was not exempt and thus had to submit samples for approval.[121] In their response, however, Helmers & Sohn responded that they did not believe their product to be subject to *ersatz* regulations at all, asserting that it was not a substitute, but a "natural lemon juice sweetened with saccharin solution."[122] The company went on to explain that they "labelled the bottles with 'lemon syrup *ersatz*' taking into account the uncertainty at the time due to the use of saccharin and we believed that adding '*ersatz*' we would definitely meet all requirements."[123] In the intervening period, the company noted that several court cases decided that lemon juice could be sweetened with saccharin without being labelled *ersatz*, but they neglected to remove the term from their labels due to the small number of bottles remaining in stock. A curt response from the Substitute Office confirmed the validity of their explanation and the matter was summarily dropped.[124]

Despite these stumbling blocks, the new Substitute Ordinance was relatively successful in standardizing the substitute food market—even if the effort proved too late to salvage plummeting consumer confidence in the food supply. Between March and

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[121] Letters from *Ersatzmittelstelle Hamburg* to W. N. Helmers Wwe. & Sohn, 28 December 1918 and 3 January 1919, StaAH 371-8 III_Pr VII 316, pp. 1-2.
[122] Letter from W. N. Helmers Wwe. & Sohn to *Ersatzmittelstelle Hamburg*, 7 January 1919, StaAH 371-8 III_Pr VII 316, p. 3.
[123] Ibid.
[124] Ibid.

October alone, the new regulatory regime processed 2,975 applications for approval, with 1,086 *ersatz* products being rejected on various grounds.[125] This represented a major step forward in consumer protection performed by the government compared to the earlier years of the war when *ersatz* was a largely unregulated industry. Most importantly, the Substitute Ordinance finally strengthened one of the key weaknesses of the pre-war regulatory regime by providing strict legal definitions for adulteration, empowering enforcement efforts. Consumer volunteerism continued to play an important role alongside these developments, with notices warning the population to be on the lookout for unapproved *ersatz* foods in an attempt to remove them from the market. An announcement addressed to the "German housewife!" published on 8 October 1918, called on women to be wary when buying *ersatz* food and to only purchase those products which could be proven to have received official approval.[126] For those vendors who could not provide evidence of official approval (as with the Helmers & Sohn case) the notice called on the consumer to contact the police immediately and to "be as considerate of substitute swindlers as they were of you before!", engendering a sense that the period of exploitation suffered by the hungry German consumer was coming to an end—even though the food crisis did not truly abate until well into 1924.[127]

Conclusion

[125] "*Zahl der zugelassenen und abgelehnten Ersatzlebensmittel*," 13 January 1919, BArch R 86/2174.
[126] "*Deutsche Hausfrau! Üb' Vorsicht beim Einkauf von Ersatzlebensmitteln!*," 8 October 1918, BArch R 86/2174.
[127] Ibid.

The relationship between *ersatz* food products and regulation in Germany during the First World War was one full of contradiction and competing impulses. On the one hand, the flood of low quality *ersatz* products which appeared after 1917 finally forced the government to clarify the legal definitions of 'adulteration' and 'substitute' through the introduction of the 1918 Substitute Ordinance, thereby patching one of the major flaws of the earlier 1879 legislation. Armed with these updated definitions, and supported by an expanded testing infrastructure in the form of the newly established *Ersatzmittelstellen*, the German authorities were better placed than ever to deny the entry of harmful products to the market, as well as prosecute offenders who skirted around the new regulations. The effects of this change on the relationship between consumers and the government should not be minimized. Through the introduction of this ordinance, the concept of the government as a guarantor of food quality became firmly entrenched, the culmination of nearly four decades of policy trajectory. This position would only be strengthened by the introduction of an entirely new food law on 1 October 1927, which replaced the 1879 law and which granted the government the ability to establish definitions of quality for individual products, as well as the principles by which those products would be considered adulterated, imitated, or spoiled—a direct expansion upon the language of the 1918 ordinance.[128] As noted by Hans Teuteberg, the 1927 law also acted as a compromise between consumer interests and the food industry, requiring the government to consult the *Reichsgesundheitsamt* (Imperial Health Office), composed of producers, traders, consumers, and experts before passing new laws or decrees. In doing so, the law "took into account the interests of the economy, technology and research without neglecting those of the consumer," resulting in a more democratic economy and serving as the basis for later food

[128] Teuteberg, "Food adulteration," 155.

protections in Germany.[129] While it is probable that such a development might have occurred independently of the war, experiences with war-time *ersatz* products served to accelerate the development of food quality measures.

On the other hand, the necessity of addressing a general food shortage compelled the government to expand the production of sanctioned *ersatz* products like war bread and war jam through a combination of prescriptive and proscriptive regulatory measures. This placed the authorities in a difficult position: decades of policy development and consumer expectations exerted pressure on the government to ensure food quality, but these pressures clashed with the reality of the food crisis. The only way the authorities could hope to meet the gap in nutrition was through stretching the food supply as far as possible, but these efforts resulted in food products which were reminiscent of—and sometimes even worse than—the adulterated foods which consumers had long striven to see the government regulate out of existence. After all, if 10 per cent potato starch content was deemed *too much* for perpetrators of fraud in 1877, what did that say about the government's war bread which could contain as much as 25 per cent potato starch? Not to mention the myriad of other ingredients which stretched the nation's bread supply. In the end, it was an impossible contradiction to resolve. While the expansion of the food supply through the promotion of sanctioned *ersatz* products was a reasonable course of action for the government, it also enflamed consumer dissatisfaction and laid bare the truth that the government was unable to secure the food supply, despite frequent assertions to the contrary.

The effect of *ersatz* food products upon food regulations can thus be viewed from two perspectives: one short-term and one long-term. The short-term effect of *ersatz* food regulation was to see a weakening of the government position in the eyes of

[129] Teuteberg, "Food adulteration," 155-6.

disgruntled consumers. Not only did the expansion of officially-sanctioned *ersatz* foods foster doubts about the government's ability to adequately and equitably address the food crisis; it also cast the government as a perpetrator of food fraud and adulteration, akin to the fraud which was common in the second half of the nineteenth-century. The introduction of the 1918 Substitute Ordinance, while a step forward for food protection, came too late to change public perceptions about the government's regulatory efforts. The long-term effect, however, was for *ersatz* food products to act as an important catalyst for the long-term development of food regulations for German consumers, even if the wartime government did not survive to see the fruits of its efforts.

Conclusion

What does the study of *ersatz* food products tell us about the German food crisis, or more broadly, about the experience of Germany during the First World War? This is the main historiographical question with which this thesis must grapple. Until now, histories of the food crisis, whether coming from the perspective of blockade, economic, or home front histories, have largely dealt with substitute foods as an illustrative curiosity. They symbolized both the government's desperation to expand the food supply and the greed of war profiteers who plied the market with fraudulent products. Above all, they symbolized the declining quality of both food and life on the German home front—a compelling visual metaphor for war weariness and the material imbalance between the Allied and Central Powers, all rolled into one. For this reason, pieces of historical evidence describing unfortunate encounters with *ersatz* products, or detailing unorthodox ingredients, were prized for their anecdotal value to the history-writing process. After all, nothing drives home the sense of deprivation which afflicted the home front better than a list of strange flours which appeared in the bread, or a description of the disgust with which consumers regarded their ration of turnips. Aside from this, *ersatz* products tended to inspire little curiosity, becoming footnotes to seemingly more important topics. Rationing regimes, price controls, mass feeding programs, the proliferation of regulating bodies, black marketeering, and government mismanagement have become the cornerstones to our understanding of the food crisis and have received significant attention. What then, do *ersatz* foods have to offer?

This thesis has attempted to provide an answer to that question by examining four aspects of the *ersatz* food story and the unique role which it played in the food crisis. The first chapter, which focused on the development and production of *ersatz*

food products by various actor groups across the German food system, envisioned the food system as an engine hungry for fuel. As resources to keep that engine running grew scarce, its constituent parts all participated in actions which sought to increase the amount of digestible organic matter passing through the system. Their creators sometimes acting in collaboration with one another, and sometimes acting out of selfish interest, this chapter argued that wartime substitutes were a symptom of a food system under stress—*ersatz* food products were not simply the result of government intervention, or the profiteering of fraudsters, but emerged from a collective action which involved the whole of German society in a grand act of self-preservation. By focusing on the development of *ersatz* products, this chapter also traced the motivations and decision-making of various actor groups across the food system, highlighting the process by which substitute foods appeared on the market.

The second chapter confronted the nutritional value of *ersatz* food products. Focusing on the consumption of war bread and turnips (the two most commonly consumed substitutes), this chapter interrogated the frequently repeated position that *ersatz* products were—as a rule—nutritionally inferior to the products they were replacing. A side-by-side nutritional analysis of war bread versus white bread, and turnips versus potatoes, demonstrated that under ideal conditions, war bread was of a similar (or even higher) nutritional value than white bread, and although turnips could not match up to potatoes in terms of energy content, the quick pivot to turnip rations during the winter of 1916/17 likely averted an even greater nutritional catastrophe. An examination of advances in the field of nutritional science since 1918 likewise serves to caution historians on the uncritical use of sources from contemporary experts (physicians, nutritionists, etc.), as they often advocated an understanding of nutrition which has since become outdated. As a result of these findings, the chapter advanced the argument that war bread in particular was an example of a successful food policy; the

expansion of the bread supply through higher milling rates and flour admixtures was not only nutritionally and scientifically sound, but likely contributed to the durability of the German home front.

In the third chapter, a critical eye was turned towards the popular reception of *ersatz* products and how German consumers perceived their quality. Why was it that *ersatz* food products seemed to be universally reviled by those who consumed them? Were all *ersatz* food products—as a rule—also inferior in terms of taste? The findings of this chapter were less conclusive, but of no less value to future historians of the food crisis. While minimal evidence was uncovered which detailed positive experiences of consuming *ersatz* food, multiple social and cultural influences were explored which help to explain why these substitute foods were so poorly received. Associations with the foods of Germany's poorer past, and with foods typically reserved for animal fodder, as well as issues of quality control and the sheer monotony of the diet, all influenced consumers perceptions of these food products and illustrate the impact which *ersatz* consumption had on morale. The chapter also proposed, however, that historians should be careful not to paint the unpalatability of *ersatz* foods with too broad a brush—for consumers were much more likely to record bad experiences with *ersatz* food than neutral or positive ones. Certain *ersatz* products may have tasted better than the historical record would suggest.

The final chapter of this thesis dealt with the intersection between *ersatz* food products and government regulation. Charting the trajectory of the German government's intervention in the food supply since 1876, the chapter argued that efforts to combat food adulteration prior to the war encouraged public perceptions of the government as a guarantor of food quality and safety. Experiences of wartime shortages and successive booms in *ersatz* products only accelerated this process, with multiple regulatory efforts being implemented during the war to curb the worst of the abuses.

Competing with this impulse for consumer protection, however, was the pressure to secure the food supply through any means necessary—including by encouraging or mandating the consumption of *ersatz* products. These conflicting objectives presented an impossible problem for the legitimacy of the government's efforts to manage the food crisis, ultimately eroding public trust and contributing to the collapse of those efforts in 1918.

There is a certain contradiction in the arguments made by these chapters. On the one hand, *ersatz* products like war bread represented sound government policy which likely bolstered the nutritional durability of the home front. On the other hand, government participation in *ersatz* development clashed with the state's growing role as a guarantor of food quality, generating confusion and distrust. Practically everyone was involved in *ersatz* foods' production, and despite the propagandistic praises of advertisements, lectures, and cookbooks, everyone seemed to hate them as well. But I argue that these contradictions are only fitting, as wartime substitutes were not the product of a system working as intended—they were the product of a system in turmoil: the messy result of competing motivations, altruistic and malign, and simultaneously the outcome of scientific innovation and a sign of desperation. The German food system searched for anything to put on the dinner table, however unfamiliar, but preferred if it was disguised as something that *was* familiar. Ultimately, the study of *ersatz* food products increases our understanding of the German food crisis by illustrating the disfunction of the German food system under the triple pressures of the economic blockade, military mobilization, and government mismanagement.

This thesis is just a first step towards addressing this gap in the historiography of the First World War. More work remains to be done. For starters, an updated treatment of *ersatz* food products could be incorporated into a general history of the food crisis, or at the very least a general history of the German home front. Anne Roerkohl's book,

Hungerblockade und Heimatfront is by far the most detailed history of the food crisis, but it is now more than thirty years old and nothing comparable has yet entered the English literature—a massive oversight by anglophone historians.[1] There is also ample opportunity for comparative studies to be conducted on the topic of nutrition and substitute food products. A longitudinal comparative study of *ersatz* consumption in Germany during the First and Second World Wars would be a natural next step, essentially an update of Arnulf Huegel's work.[2] A comparative study of the consumption and perception of wartime substitutes in Germany, France, and Britain would also be informative. Though *ersatz* products never took hold in France and Britain to the same extent, the expansion of milling rates for bread and other war economy measures were taken, and an extensive discourse on proper nutrition took place in the form of the Inter-Allied Scientific Food Commission of 1917-1918.[3] Comparative studies could also be undertaken between the Central Powers (mainly Germany and Austria-Hungary) to tease out similarities in their approach to the food crisis, as well as highlighting the sharing and transfer of knowledge to create certain food products.[4] Finally, the interpretation developed in the first chapter of this thesis, that *ersatz* food products were a symptom of food systems under stress, might be a useful model for understanding the turn to substitute foods in other periods of history. A comparative study between the German food crisis and the Confederate food crisis during the U.S. Civil War, for instance, might generate useful insights given the broad similarities between those two cases.[5]

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[1] Roerkohl, *Hungerblockade*.
[2] Huegel, *Kriegsernährungswirtschaft*.
[3] Helstosky, "The State," 1578.
[4] Letter to the Imperial Health Office from Hirsch & Frank, Budapest-Salgótarjáner Maschinenfabrik & Eisengiesserei Actien-Gesellschaft, 9 October 1914, BArch R 86/2144. The letter requests information on how to construct the machinery used to make dried potato products, so that those products could also be incorporated into Hungarian war bread.
[5] Massey, *Ersatz*, provides a study of *ersatz* products in the Confederacy, but this study is now over seventy years old. An update here would be very welcome.

To return one last time to the central argument of this thesis—that a deeper understanding of *ersatz* food products and the role they played in the German food crisis will help us to better understand the dynamics of the crisis itself—there are two quotes which aptly demonstrate the potential which *ersatz*-focused research can offer to a new generation of First World War histories. The first is a newspaper article written by Paul Eltzbacher in the *Berliner Tageblatt* on 9 April 1915, entitled, "Streckung" (Stretching). Eltzbacher, one of the leading proponents of war economy measures, criticized the various efforts to stretch foodstuffs through adulteration, asserting that such efforts were a practice in futility, as they misunderstand the fundamental problem facing the German food supply: that there simply was not enough. "What is called stretching," he wrote, "means nothing other than when someone mends a hole in his right sleeve with a piece of material that he has cut out of his left sleeve […] What we call stretching always consists only in covering a defect in one place and at the same time creating one in another."[6]

Eltzbacher, like many historians of the food crisis, discounted the impact and value of pursuing *ersatz* food products, characterizing them as a frittering away of precious resources. But thinking of them as merely a waste, or as an inferior product, is to miss the larger picture of the story of *ersatz* development and consumption. Our second quote comes from the introduction to Heather Benbow and Heather Perry's edited volume, *Food, Culture and Identity in Germany's Century of War*, a book which has had a profound influence on this thesis, and is worth reproducing at length here:

> The control of food resources and access to food becomes critical during times of war and can cement, disrupt, determine or challenge peacetime power relationships. This is true at a transnational and at a personal level. It is also true

[6] Paul Eltzbacher, "Streckung," *Berliner Tageblatt*, Nr. 179, 9 April 1915, BArch R 86/2144.

> of the power of food as a symbolic object—hence its frequent deployment in wartime propaganda. Food, in the pressurized context of conflict, *is* power—yet it is often a power that poses a significant challenge or subversion of peacetime authority.[7]

While Benbow and Perry write here in general terms about the power of food, their ideas map perfectly onto wartime experiences with *ersatz* food products. Far from being a 'disgusting' and 'indigestible' curiosity, which has long been its lot in the historiography, *ersatz* food can instead be seen as the attempted exercise of power (futile or otherwise) between the various components of the German food system seeking to adjust to the pressures of the crisis—with potentially far reaching consequences.

[7] Heather Merle Benbow and Heather R. Perry, 'Hunger Pangs: The Contours of Violence and Food Scarcity in Germany's Twentieth-Century Wars', in *Food, Culture and Identity in Germany's Century of War*, ed. Heather Merle Benbow and Heather R. Perry (Cham: Palgrave Macmillan, 2020), 5.

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