

ABSTRACT

Title of Thesis: MOVING MILK: PUBLIC HEALTH, MILK
TRANSPORTATION, AND MODAL
CHOICES IN BALTIMORE, 1840-1940

James Dixon McDonald, Master of Arts, 2018

Thesis Directed By: Professor Thomas Zeller, History Department

This thesis studies the factors leading to the modal shift from rail to road in Baltimore's farm to city milk transportation in the 1920s. It draws on histories of transportation, public health, food, and business to maintain that progressive public health regulation, driven by calls for reform of the milk supply, created an oligopoly for which trucks better suited vertical integration goals. This research highlights the relevance of public health policy to the study of transportation regulation and modal competition. Secondly, this thesis establishes railroads as a primary actor in the 19th century rise in urban milk consumption.

MOVING MILK: PUBLIC HEALTH, MILK TRANSPORTATION, AND
MODAL CHOICES IN BALTIMORE, 1840-1940

by

James Dixon McDonald

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Advisory Committee:
Professor Thomas Zeller, Chair
Professor Chantel Rodríguez
Professor David Sicilia

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List of Abbreviations

AASPIM	American Association for the Study and Prevention of Infant Mortality
B&O	Baltimore and Ohio Railroad
B&P	Baltimore and Potomac Railroad
BMFA	Babies' Milk Fund Association
CMIF	Council Milk and Ice Fund
ICC	Interstate Commerce Commission
Ma & Pa	Maryland and Pennsylvania Railroad
MCMP	Maryland Cooperative Milk Producers (before 1935 see MSDA)
MDICMPA	Milk Dealers' and Ice Cream Manufacturers' Protective Association
MPA	(Also M&PA) See Ma & Pa
MSDA	Maryland State Dairymen's Association (after 1935, see MCMP)
NCRY	Northern Central Railway (or Railroad)
NDP	National Dairy Products Corporation
PRR	Pennsylvania Railroad
PSC	Public Service Commission of Maryland
PW&B	Philadelphia, Wilmington, and Baltimore Railroad
UMPA	United Milk Producers' Association
USDA	United States Department of Agriculture
WB&A	Washington, Baltimore and Annapolis Railroad
WCL	Women's Civic League
WMR	Western Maryland Railroad (or Railway)

Chapter 1: Introduction

Railroads dominated the movement of milk into Baltimore for ninety years, yet within less than a decade trucks became the city's dominant mode of milk transportation. The following thesis examines the history of milk transportation in Baltimore from 1840 to 1940 to investigate the nature of this modal shift.¹ It endeavors to highlight the importance of transportation to the history of milk consumption. In what follows I show that milk moved away from railroads because the dairy and transportation industries were reshaped in ways that favored roads over rails by a complicated mix of actions by milk producers, milk dealers, civic reformers, transportation interests, and above all, regulatory measures by the Baltimore City Health Department.

The period from about 1917 to 1930 was the high point in Baltimore of transformation in the technologies and technological systems used to transport milk, namely trains, trucks, wagons, and the systems on which they operated: roads and rails. This was a result of a variety of overlapping and often interacting factors ranging from economics; public perceptions of safety, health, and mobility; and the ensuing regulatory and technological structures these concepts engendered. Most of these factors had national dimensions, such as the rise of sanitarianism and progressivism, but I have chosen to focus on one city, Baltimore.² The North American dairy trade

- 1 The movement of milk from farm to city, generally speaking, is the focus of this thesis. Changes in intracity transportation, such as house delivery, may be the subject of later analysis, but as they did not involve the modal shift between rail and road examined here, are largely omitted from this analysis.
- 2 Throughout this thesis I have chosen to use small 'p' progressive to distinguish from the various political parties that formed under the Progressive name.

had a distinctively local character at the beginning of the 20th century. Baltimore's geographic location in the borderlands between north and south, as well as its position as an early and important nexus of rail, road, and maritime commerce, make it a compelling case study. It was among the U.S. cities with the highest populations, but was not so large that lessons from its study would diminish its usefulness as a comparative counterpoint to future research on another metropolis. Furthermore, its circumstances were in many ways indicative of the entire state because in 1900 Maryland adopted Baltimore City's dairy standards as its own.³ Lastly, available evidence indicates that Baltimore's milk transportation remained on the rails for longer than some other cities of analogous size, making its study useful in illuminating factors that allowed rail to remain viable for milk traffic after it had been usurped elsewhere.⁴

In the Baltimore context railroads did not fail to transport milk in as much as they were unable to provide a service that fit shifting perspectives in the dairy industry of how milk transportation fit into its business. Furthermore, rail passenger traffic, to which milk transport was so closely tied, diminished precipitously as personal automobiles became more common, creating additional financial pressures on railroads. That the truck would prove dominant in milk transport was far from assured in the transitional period of the mid-1920s when most Americans, even road transportation boosters, conceived of railroads as central to transportation.⁵ There

3 Joyce E. Wessel, "Learning to Cooperate: The Origins of the Maryland State Dairymen's Association" (Master's Thesis, University of Virginia, 1980), 31-32.

4 Henry R. Trumbower, "Transportation of Milk by Motor Truck: Results of a Survey of Milk Transportation for Eight Large Cities," *Public Roads* 5, no. 5 (July 1924): 1-18.

5 Thomas H. MacDonald, "Roads and the Load," *The Milk Dealer* 11, no. 11 (August 1922): 46-54; Bruce E. Seely, *Building the American Highway System: Engineers as Policy Makers* (Philadelphia: Temple University Press, 1987), 25.

were many hurdles for early trucks to surmount, and the beginning of the 20th century was a time of great change in transportation and dairying technologies alike. In 1900 dairying in the Baltimore area was still widely practiced as craft but by 1940 had become almost entirely an industry. This craft intersected with a well-established railroad industry and a nascent trucking industry, which was still finding its feet as a viable competitor to the railroads even while it gained the majority in milk transportation.

The transportation mode chosen by shippers and receivers was ultimately nuanced by policy decisions more than rates. Milk's great propensity to kill infants generated wide and active public calls for reform that gave the Baltimore City Health Department a leading role in shaping milk transportation. Its policies redefined the city's milk business in ways that placed great emphasis on industrial processes, with concomitant demands on transportation. The availability of technologies was therefore not the sole determinant in how milk was shipped.

A number of groups with differing agendas and expectations had a stake in the way milk moved into Baltimore. Railroads, trucking companies, and to a lesser extent, equipment manufacturers made contributions to the technologies and ways in which they were utilized. An outspoken segment of the city's population distressed over the safety of the milk supply provided much of the pressure key to reshaping the dairy trade in ways that colored its configuration and transportation choices. Federal and state regulations on transportation, though less so on health, defined much of the playing field on which transportation choices were made. Milk producers and dealers exercised the most direct influence on the choice and implementation of

transportation technology. Above all, the Baltimore City Health Department's regulatory activity defined much of the structure within which milk transportation, if not the Baltimore milk industry overall, changed. The transportation of fluid milk into Baltimore changed because of dairy farmers' desire for independent mobility, because of milk dealers' reconceptualization of their business as industry, because of citizen concern over the safety of the milk supply, and because of regulatory actions and inactions that shaped the dairy and transportation fields alike.⁶

Methodology

This thesis approaches the question of what caused milk transportation to change using the Social Conception of Technology (SCOT) model proposed by Trevor Pinch and Wiebe Bijker. SCOT postulates that technology develops in multi-dimensional ways, not as a linear progression of improvement.⁷ The same technology may have multiple meanings to different groups of individuals and institutions that shape how these groups interact with the technology. Perceptions of a technology's fitness for a given purpose (or lack thereof) are formed by these meanings and determine perceived need for change. The resolution of tension between these differing meanings often comes from a reformulation of perceived problems. The example Pinch and Bijker cite is the friction between groups of early bicyclists who

6 Despite these broad categorizations, these groups were not all homogeneous. Some of them routinely engaged in internecine squabbles that further complicate their roles in the change. Nor did they all engage directly with each other in exercising their vision about how a given technology should be used or constructed.

7 Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," *Social Studies of Science* 14, no. 3 (1984): 399–441.

were split on issues of the comfort versus the appearance of pneumatic tires. When it was found that pneumatic tires ran faster in races, the two groups' problems were resolved by a redefinition of their earlier concerns into a new one of speed and thus “closure” was achieved. With multiple parties involved, each having different motivations and visions, the SCOT theory is useful to gain insights into the question of technological change in milk transportation.

Inquiry

Assessing the technological change of milk transportation immediately raises a number of questions about the technology chosen and those involved in determining its use and form. Given the variety of opinions on technology, what was at the root of these differences and how were they resolved? Were these concerns different than parties involved in the transport of other perishables such as produce or meats?

Railroads' relationship with most perishable shipments grew increasingly ambivalent over the 19th century due to the more specialized equipment and handling required. Milk was an exception—one of the first, if not the very first perishable shipped. Despite this early embrace by rail interests, milk began to move by motor truck almost as soon as roads and trucks were available. What was it about milk that caused it to remain attractive to railroads when other perishables were generally avoided? What does the rapid rate of modal change indicate about railroads, trucks, or their users?

Milk was an early factor in the competition between road and rail, a modality theme that would dominate 20th century transportation histories. The first trucks began moving milk into Baltimore in 1915 and garnered seven percent of Baltimore's milk traffic that year.⁸ By 1937 they had control over 94.5 percent of the same traffic.⁹ What technological changes were needed for trucks to become the dominant mode of milk transport, and why did they take place when they did? Were these changes driven by regulatory structures put in place to address consumer concerns? To what extent was dissatisfaction with rail service a factor in the introduction of trucks? Were there wider changes in dairying processes that fostered truck transportation? For instance, to what degree was the use of trucks an outgrowth of rural desires for good roads and better mobility?

These aforementioned questions could easily be applied to any metropolis in the same time period. Historian Joyce Wessel and sociologist Melanie DuPuis independently argue that the dairy industry in America was an intensely local enterprise based on local perceptions and socio-political circumstances.¹⁰ Factors unique to the Baltimore area doubtless played a role in the composition of its transportation infrastructure. What was unique about Baltimore and how did this affect its dairy industry? Why, for instance, did rail remain a prominent transportation mode far longer in Baltimore than in many other cities?

8 Trumbower, "Transportation of Milk by Motor Truck," 1–18.

9 "Motor Publication Cites Truck Gains Over Rail Traffic," *Railway Age* 100, no. 20 (November 13, 1937): 698.

10 Joyce E. Wessel, "Baltimore's Dairy Industry and the Fight for Pure Milk, 1900-1920," *Business and Economic History*, Papers presented at the thirtieth annual meeting of the Business History Conference, 13 (1984): 150–57; E. Melanie DuPuis, *Nature's Perfect Food: How Milk Became America's Drink* (New York: New York University Press, 2002), 9.

A unique, local dairying history notwithstanding, this examination of Baltimore's milk transportation seeks to contribute to the wider understanding of how transportation technology changes in response to local stimuli and conditions. It is hoped that the analysis below will contribute in some meaningful way to larger studies of technology, but also public health, agriculture, mobility, and public policy.

Chapter 2: Milk on the Move, 1829-1880

The roughly fifty years between 1829 and the 1880s witnessed a large transformation in American milk transportation and consumption. The expansion of the railroad network in the 1830s and 1840s combined with concerns over the urban milk supply moved the locus of milk production into the country. By opening new connections between producers and consumers, railroads increased milk consumption, but this greater access to milk also complicated the trustworthiness of the urban milk supply.

In the early years of the 19th century Baltimore's milk generally originated from within the city limits or the immediate suburban vicinity, which was largely rural at the time. The presence of roads dating back to colonial times or even earlier allowed peri-urban farmers to bring milk to market, but what dairying that occurred in the rural areas further from Baltimore was primarily for the production of butter, which traveled to the city over the rough roads better than perishable milk.¹¹ Most urban fluid milk consumption prior to the 1830s was from cows stabled in the cities.

As cities grew in the 19th century ever-decreasing space in urban environments for pasturage or growing animal fodder led to the practice of feeding city and peri-urban cows leftovers from the distilling or brewing process, called "slop" or "swill."¹² For cow owners swill was readily obtained fodder and for brewers and distillers it was an ideal use of a by-product and a chance to make extra income. This symbiosis

11 Wessel, "Learning to Cooperate," 11, 14. Commercial cheesemaking in the Baltimore milk shed was almost nonexistent.

12 Ralph Selitzer, *The Dairy Industry in America* (New York: Dairy & Ice Cream Field and Books for Industry, 1976), 34-35.

led to many city stables being erected in direct proximity to distilling and brewing facilities.¹³

Although swill feeding may have seemed an ideal method of recycling, the milk produced by cows that consumed exclusively swill was of poor quality by standards of the time.¹⁴ A diet consisting entirely of by-products was also linked by contemporaries to various bovine ailments.¹⁵ Nevertheless, swill feeding was widespread by the 1820s and went on for decades because of its economy and, in some cities, the political power of distilling interests.¹⁶

The conditions in which city cows were kept often alarmed contemporary observers. City stables became infamous for dirty conditions, objectionable odors, and holding cows in cramped quarters. The odors and dirt especially alarmed proponents of the miasmatic, or zymotic, theory of disease that came to prominence

13 Hannah Velten, *Milk: A Global History* (London: Reaktion Books, 2010), 59-60. Velten notes that by the 1830s in New York City, 18,000 cows in city stables were being fed exclusively on swill.

14 Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1901* (Baltimore, Md.: Baltimore Health Department, 1902), 63; Henry Elijah Alvord and R. A. Pearson, *The Milk Supply of Two Hundred Cities and Towns* (Washington, DC: United States Department of Agriculture, Bureau of Animal Industry, 1903), 84. Milk's quality was at the time determined by its fat content and the milk from cows fed only swill often had fat content so low it could not be made into butter. A 1900 law fixed the minimum butterfat content of milk at 3.5 percent. A study conducted the following year determined that only three stables in the city of Baltimore were producing milk as legally defined by the law.

15 William Travis Howard, *Public Health Administration and the Natural History of Disease in Baltimore, Maryland, 1797-1920* (Washington, DC: Carnegie Institution of Washington, 1924), 136.

16 On prevalence of swill feeding See Velten, *Milk*, 59-60; Health inspectors in Baltimore called for the closure of city stables for years, even passing a 1912 law prohibiting city stables only to have this held up in court until 1917. Swill feeding was banned outright along with the feeding of refuse from brewing, distilling, vinegar making, canning, or any fermented foods. See Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1913* (Baltimore, Md.: Baltimore Health Department, 1914), 610; Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1915* (Baltimore, Md.: Baltimore Health Department, 1916), 276. For specifications on the laws governing feeding see Carroll Fox, "Public Health Administration in Baltimore: A Study of the Organization and Administration of the City Health Department," *Public Health Reports (1896-1970)* 29, no. 24 (June 12, 1914): 1513. On political power of distillers see John Duffy, *The Sanitarians: A History of American Public Health* (Urbana: Univ. of Illinois Press, 1992), 184.

in the first half of the 19th century and held that dirt and odors could be transmissible agents of illness.¹⁷ Urban cows lay at the center of a philosophical struggle that began to take hold as cities grew larger between the questionable character of the milk supply and the perception of milk as naturally healthful. This ambivalence about milk from urban cows would foster the importation of milk from outside the city.

Through exposés in the press, the public grew to connect the milk from urban stables to a troubling rate of infant mortality. In 1842, a New York dry goods merchant and preacher named Robert M. Hartley published a pro-prohibition book that sought to dissuade readers from purchasing swill milk in an attempt to diminish distillery incomes.¹⁸ Hartley's writing extolled the virtues of "pure" milk, while connecting the feeding of swill milk to infants with their death or physical and mental disadvantage.¹⁹

The vectors involved in tracing infants' illness to their food supply were fewer than with older children or adults because infants seldom consumed any food besides milk and the practice of feeding them cow's milk had grown with a general decrease in breast feeding over the 19th century.²⁰ Hartley's writing prompted several

17 Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life* (Cambridge, Mass: Harvard University Press, 1998), 27.

18 Selitzer, *The Dairy Industry in America*, 34.

19 Valenze, *Milk*, 167.

20 Selitzer, *The Dairy Industry in America*, 35; Richard A. Meckel, "Save the Babies": *American Public Health Reform and the Prevention of Infant Mortality, 1850-1929*, The Henry E. Sigerist Series in the History of Medicine (Baltimore: Johns Hopkins University Press, 1990), 12-13, 104-7, 243. Data on the contemporary death rate among infants under two years of age, who were the most likely to consume swill milk, is today considered untrustworthy but may have borne out Hartley's assertions of an increase. Dairy historian Ralph Selitzer notes that the average infant mortality rate for Boston, New York, and Philadelphia rose from 30 percent to 50 percent. Although poisonous milk certainly contributed much to this rate, it certainly was not the only cause of infant mortality. The condition of the urban water supply must also have played some role, as well as the massive urbanization of cities in the same period of time, creating more disease vectors than had previously existed. The accuracy of Selitzer's statistics is called somewhat into question by Meckel's contention that it was not until 1896, or as late as 1900, that data on infant mortality was collected that even contemporary health officials considered accurate. Nevertheless, the 1900-1902 census revealed that Baltimore's infant mortality rate in 1900 was 205.3 deaths per

journalistic explorations of the conditions of city stables and the milk from swill cows in the 1850s, launching the widespread American awareness of and concern over the urban milk supply.²¹

Railroads as Milk Carriers

Hartley's writing coincided roughly with the beginning of regular milk transport by rail and no doubt helped give the public additional reasons to seek out rurally produced milk, but it was the construction of railroads that provided city dwellers ready access to milk options other than urban stables. Dairying was at first incidental to railroad construction, which in the Baltimore area tended to focus instead on the movement of grain, flour, tobacco, and coal, but the speedier connection to the city afforded by rail encouraged farmers who were already producing milk to ship it into the city and inspired farmers who had previously not engaged in dairying to add this to their other activities. Railroad sales agents would soon encourage farmers to ship by rail.²²

Dairy industry folklore maintains that the first shipment of milk by rail in North America may have been from Laurel, Maryland, to Baltimore in 1835.²³ There

1,000 births, or more than 20 percent.

21 Selitzer, *The Dairy Industry in America*, 37.

22 Selitzer, *The Dairy Industry in America*, 38-39;

23 The 1835 speculation appears to come from a 1939 article entitled "The Big Haul" in the dairy industry journal *Association Quarterly*. The railroad's own papers and local newspapers are silent on whether shipment of milk from Laurel to Baltimore took place in that year, but Laurel was easily within an hour's reach of Baltimore even at the 18 mile per hour speeds common on the Baltimore and Ohio Railroad line at the time. See Herbert H. Harwood, Jr., *Impossible Challenge: The Baltimore and Ohio Railroad in Maryland* (Baltimore: Barnard, Roberts and Co., 1979), 211; Baltimore and Ohio Rail Road *Annual Reports* for the years 1830-1837; Selitzer, *The Dairy Industry in America*, 38; "The Big Haul," *Association Quarterly* 2, no. 2 (May 1939): 5-32.

is indirect evidence that at least one milk shipper began shipping milk to Baltimore from north of the city in 1837.²⁴ Although these earliest accounts could not be verified, regular milk service to Boston began in 1838, to Baltimore by at least 1840, and to Manhattan in 1842.²⁵ In that latter year the New York and Erie Railroad, a line running from just north of Manhattan inland to Goshen, New York, was already moving four million quarts of milk per year, in large part due to the New York City market for fresh rural milk as an alternative to urban swill milk.²⁶ The greater speed afforded by rail travel permitted milk production further from the city center than had been previously feasible.

Commercial communication and trade in Baltimore in the early 19th century was primarily oriented toward its waterways by virtue of the city's placement on the Chesapeake Bay and riverine connections inland. The National Road, built in 1818, connected the city with the west, but even on its improved surfaces, travel was slow.²⁷ The orientation toward water was still predominant when Baltimore's railroads were chartered. The city's first line was the Baltimore and Ohio Railroad (B&O). When its construction began in 1828 it was not the nation's first railroad, but it was the first attempt to use the relatively new technology of railroads as a substitute for canals over longer distances.²⁸ Baltimore had the geographic advantage of being closer to

24 John W. McGrain, *An Agricultural History of Baltimore County, Maryland* (Perry Hall, MD.: Self Published, 1990), 40. An 1887 obituary of Capt. Thomas Love, a dairy producer in Sparks, Maryland, notes that he had begun shipping his milk via the Northern Central Railroad some fifty years earlier, which would have been in 1837.

25 Selitzer, *The Dairy Industry in America*, 38; John H. White, *The American Railroad Freight Car: From the Wood-Car Era to the Coming of Steel* (Baltimore: Johns Hopkins University Press, 1993), 284.

26 Patrick C. Wider, "Erie 40-Ton Express Milk Cars: Greenville-Built Insulated Cars That Served the Northeast," *Railway Prototype Cyclopedia* 19 (2009): 51; Selitzer, *The Dairy Industry in America*, 39.

27 Harwood, *Impossible Challenge*, 3.

28 Harwood, *Impossible Challenge*, 2; Joseph Snowden Bell, *The Early Motive Power of the Baltimore and Ohio Railroad* (New York: Angus Sinclair Co., 1912), 1.

desirable western destinations than other Atlantic port cities; however, its geography made canal building, the choice of New York, Philadelphia, and Washington, DC, an expensive option with little chance of success given the hilly terrain west of the city. Instead it chose rail, which had hitherto been used only in short industrial applications.²⁹ Opening in 1829, the B&O continued to build west from Baltimore toward the Ohio River. It reached Frederick in 1831.³⁰ In 1835 it connected to Washington, DC, and continued its westward expansion throughout the 19th century, eventually connecting to Chicago and St. Louis.³¹

Other railroads soon followed suit. A year after the B&O, the Northern Central Railway (NCRY) began building due north out of Baltimore towards York, Harrisburg, and the Great Lakes.³² The Baltimore and Potomac Railroad (B&P) built south toward Washington, DC on the Potomac River. The Philadelphia, Wilmington and Baltimore Railroad (PW&B) ran northeast to its namesake cities. In the 1850s the Western Maryland Railroad (WMR) was built west out of Baltimore, taking a more northerly route than the B&O to reach Williamsport on the upper Potomac River.³³ Beginning in the 1860s two small railroads, the Baltimore and Lehigh and the York Southern, were built from Baltimore and York, respectively, meeting at the state border in Delta.³⁴ Within a few short decades Baltimore was linked to the nation by an expanding network of rail lines.³⁵

29 Harwood, *Impossible Challenge*, 3-4.

30 Harwood, *Impossible Challenge*, 27.

31 Harwood, *Impossible Challenge*, 207.

32 Kathleen Waters Sander, *John W. Garrett and the Baltimore & Ohio Railroad* (Baltimore: Johns Hopkins University Press, 2017), 98.

33 Other than sharing in a portion of their name, Western Maryland Dairy and Western Maryland Railway do not appear to have had any other corporate linkages besides that of carrier and shipper.

34 George Woodman Hilton, *The Ma & Pa: A History of the Maryland & Pennsylvania Railroad*, 2nd ed (Baltimore: Johns Hopkins University Press, 1999), x.

35 Most early rail lines were private companies with capital investments from the cities and states to, from, and through which they traveled and from interested parties along the line. Because much of

The area from which a municipality obtains its milk is referred to in the dairy industry as its “milk shed.” The development of railroads from the 1830s onward expanded Baltimore's milk shed out from the city so that by century's end it extended from Baltimore in a rough radius of 100 to 200 miles.³⁶ While many farmers within approximately 10 miles of Baltimore delivered milk directly into the city, for the majority of milk producers in the milk shed the railroad was the sole feasible shipping method until the coming of the motor truck in 1915.

Rural milk production for sale to urban markets involved milking cows by hand mornings and evenings. The milk was collected in pails, which were then poured through a strainer into larger cans, typically ranging from 8 to 40 gallons in volume.³⁷ These cans were set in a spring house to cool. Cooled milk cans were then loaded onto a wagon and taken to the city directly, or in the case of the more distant farmers, to the railroad station from whence they would be moved to the city by train. At city rail stations urban milk dealers or distributors would collect the milk consigned to them and cart it off for sale.³⁸

Over the course of the 19th century the railroads developed a unique relationship to milk that was not identical to other perishables, or even other dairy products like butter or cheese, with resultant effects on the technology used for milk's

Maryland's railroad network was constructed before the expansion of the milk shed outwards from Baltimore, there was little apparent investment by dairying interests in early railroad construction. As the newest railroads, the Western Maryland or the Ma & Pa would have been most likely to have had milk interests as investors, but no evidence of this was uncovered in the research for this thesis.

36 Douglas M Washburn et al., *A History of Pylesville, Harford County, Maryland*, 1st ed. (Whiteford, Maryland: Self Published, 2014), 93; Alvord and Pearson, 200 *Cities*, 84. The lower number comes from Washburn, the higher from Alvord and Pearson. The distance is historically contingent as the size of the milk shed was modified, as too the boundaries of the city, over the analysis period.

37 Selitzer, *The Dairy Industry in America*, 112-3.

38 Selitzer, *The Dairy Industry in America*, 116-7.

transport. This relationship between railroads and milk was driven in large part by milk's early appearance as a commodity that customers wanted to transport.

Movements of milk by rail began at a time when railroads themselves were still discovering their role in the nation's transportation architecture. This allowed railroad processes to develop around milk transport and for milk to become a common rail commodity before many cities were even reached by railroads. This differs substantially from the experience faced by shippers of other perishables such as meats, the introduction of which came after the railroads had well-established practices and processes.³⁹ By 1880 when Chicago meatpacker Gustavus Swift wanted to use railroads to ship beef to East Coast markets, he found the railroads so unwilling to help that he ended up purchasing his own refrigerator cars for the service and still found it difficult to find a railroad willing to haul his cars. The railroads' objections to meat shipping were manifold, including the added expense of specialized freight cars, the lack of infrastructure to ensure the cars were resupplied en route with ice, and a strong financial stake in the transportation of live animals.⁴⁰ In short, between the 1840s and the 1880s the railroads became highly specialized in the movement of people and goods, which they accomplished at levels not previously possible through other transportation means, but this specialization made them suspicious of exogenous pressures to innovate.⁴¹

39 White, *The American Railroad Freight Car*, 272. Although experiments in shipping other kinds of perishables began in 1842, such shipments appear to have remained largely experimental or at least uncommon until the late 1860s.

40 John H. White, *The Great Yellow Fleet: A History of American Railroad Refrigerator Cars* (San Marino, Calif: Golden West Books, 1986), 15-17.

41 For an excellent summary of late 19th century railroad attitudes towards innovation and flexibility see Steven W. Usselman, *Regulating Railroad Innovation: Business, Technology, and Politics in America, 1840-1920* (Cambridge, U.K. ; New York: Cambridge University Press, 2002).

The railroads' comparatively positive relationship to milk was driven in part by milk's relatively more robust perishability than fish or beef. In the late 1830s reliable isothermal railcars were not yet available so the railroads sought to address the question of perishability primarily through speed. By placing the milk on passenger trains that generally arrived more quickly and ran on a more predictable schedule than freight trains, the railroads, their shippers, and milk consignees favored management of time over temperature.

Further contributing to the choice of passenger trains over freight trains was the distributed nature of the contemporary milk trade. Instead of picking up a car fully loaded with milk at one station and moving it to another as was prevalent with bulk goods like coal or grain, railroads had to handle a great number of small, individual loads of milk, shipped by numerous farmers from many train stations and picked up by many urban distributors. This focus on many, small, time-sensitive, less-than-carload shipments fostered the transport of milk by rail as express. Express was a courier service to move parcel shipments faster than was possible through the standard U.S. Post Office. Although express could include letters, it frequently took the form of small, often high-value, freight shipments or parcels.

Given the time sensitivity of express shipments and the fact that they seldom took up an entire car's worth of space, they most often traveled in passenger trains along with passenger baggage. This gave them celerity over freight trains and the comparative regularity of a passenger train schedule. Most railroads ran passenger trains to a fixed timetable, but with few exceptions freight trains generally moved as

unscheduled “extra trains,” only when sufficient traffic justified a movement.⁴² Using passenger trains for milk ensured the regularity and reliability of delivery needed to factor transportation into milk’s time- and temperature-dependent perishability calculus. Furthermore, the decentralized, less-than-carload nature of milk production served to keep milk traveling in passenger trains as express even after isothermal cars were available to control temperature enough for milk to move at freight train speeds.

Express was a logical choice for milk shipments not only due to the preponderance of many small shipments needing rapid delivery, but because demand for milk served to keep rates charged and received high enough to merit express surcharges. Milk was able to move as express because it was consistently a high-value commodity. Even as early as 1845, only three years after milk service into Manhattan began, milk made up 40 percent of the New York and Erie Railroad's non-passenger revenue.⁴³ *Niles National Register* reported that the “vast quantities” of goods arriving by rail resulted in a reduction in milk prices to consumers in Manhattan that saved them \$200,000 aggregate in 1842.⁴⁴ These were exceptional figures, driven by the size of the New York City milk shed and market, but the numbers indicate that milk transport was already an established, important source of revenue in railroads’ pioneering years and worthy of pursuit.⁴⁵ The figures also show

42 Even when scheduled, the movement of freight trains on timetable basis was uncommon. Special scheduled freight trains for time-sensitive merchandise would depart their originating depot within a rough time range, not generally a precise hour as a passenger train would. See Grover. G. Huebner and Emory Richard Johnson, *The Railroad Freight Service* (New York: D. Appleton & Co, 1926), 114, 117.

43 White, *The American Railroad Freight Car*, 284.

44 “States of the Union: New York,” *Niles National Register*, May 13, 1843.

45 Meyer and MacGill also note that the westward construction of the New York and Erie Railroad beyond Goshen was fraught with financial missteps but continued to receive public support (and funding) due to anticipated additional savings in milk and other perishables. See Balthasar Henry Meyer and Caroline E. MacGill, *History of Transportation in the United States before 1860* (Washington, DC: Carnegie Institution of Washington, 1917), 371.

that railroads played a direct role in making milk more affordable for urban residents, thus contributing to the practice of milk drinking. It undercut the income of urban producers, further encouraging rural milk production.

Railroads also welcomed milk shipments because the technological barriers to its transport were minimal. Under conventions of the time, responsibility for cooling milk before shipping rested with the farmer, and the railroads' responsibility was limited to protecting milk from temperature change en route. From the 1840s forward, ordinary baggage cars with no special provision for milk shipment were used. In particularly hot months ice would be placed on and around the milk cans as refrigerant.⁴⁶

The unequipped baggage car was not ideal for all circumstances, however. Purpose-built milk cars began to appear in 1877 and they took several forms, many of which appear to have been only slight modifications to existing baggage cars. The earliest purpose-built milk cars were equipped with internal racks to hold more milk cans than a regular baggage car, but were left uninsulated.⁴⁷ In keeping with then popular miasmatic theories on medicine that maintained bad air was a frequent cause of disease, purpose-built milk cars would often be equipped with ventilators to provide the cargo with what was considered a healthful flow of fresh air.

These late-1870s builders of milk cars typically sought thermal control in the form of insulation and tended not to be overly concerned with keeping the refrigerant separated from the cargo. Unlike meat, which when iced directly tended to discolor, milk in metal cans could have ice placed on and around it without any damage.

46 White, *The American Railroad Freight Car*, 285.

47 White, *The American Railroad Freight Car*, 285.

Bunker systems in milk cars to keep ice separate from the cargo were therefore not necessary. Such early measures of temperature control were not pasteurization, but merely sought to slow milk's souring process through cooling. If the journey was short enough in duration, the use of unequipped baggage cars and loose ice to ship pre-cooled milk was found to be quite satisfactory at maintaining suitable temperature for decades, even as temperature standards began to be codified by regulations.

Early Milk Regulation

Although swill milk generated the first public outcry over the safety of the overall milk supply, it was the adulteration, sometimes called “sophistication” or “toning,” of milk that would lead to the first milk-related Baltimore health laws. For much of the 19th century the city's Health Department, founded in 1797, was largely concerned with matters of disease management through quarantine and nuisance abatement.⁴⁸ Its food regulations were focused on fraud rather than health. Adulterations it sought to address ranged from merely diluting milk with water to make its quantity appear greater, to the addition of substances as diverse as boric acid, formaldehyde, chalk, or animal brains to the milk, all of which were thought to improve its appearance or slow the souring process in the era before bacteriology.⁴⁹ While these additions could be harmful to health, the main concern of the Health Department was truth in labeling.⁵⁰

48 Howard, *Public Health*, 50.

49 Velten, *Milk*, 61-62.

50 Tomes maintains that until the mid-19th century, most people did not consider food a vector for illness. See Tomes, *The Gospel of Germs*, 5.

As more parties entered the milk market and the distances milk traveled grew, the problem of adulteration appeared to be worsening rather than improving. Despite multiple Baltimore laws enacted between 1797 and 1879 to prohibit the adulteration of foods, including milk, this practice remained widespread and grievous due to the laws having no enforcement mechanism.⁵¹ Furthermore, the adulteration ordinances only had jurisdiction in the city, which meant that there was no city control over conditions on rural farms, which were increasingly becoming the primary source for urban milk.⁵²

Anxiety over adulterated foodstuffs grew as the distances and the physical and psychological barriers between the city and the country increased between the 1830s and 1860s. Consumers became increasingly detached from their foods' production places and processes. This period witnessed a staggering population boom in American urban environments—a 552 percent expansion in nationwide urban populations.⁵³ This was due not only to urban migrations of former rural residents, but a large influx of immigrants. Overcrowding in cities unprepared and unequipped to deal with such population growth resulted in dirty conditions that many felt were the root of epidemic illnesses.⁵⁴ This fit well within an evolving philosophical divide

51 It would not be until 1894 that there were any health inspectors other than the Commissioner of Health and his assistant physician. See Howard, *Public Health*, 54, 74-75.

52 Although the state of Maryland charged its State Board of Health with investigating and prosecuting food adulteration, most regulatory and enforcement activity of milk took place at the city government level. It wasn't until 1890 that the state passed its own adulteration law. See Howard, *Public Health*, 82. Enforcement and inspection by the state appear less common in Baltimore than city inspection, despite the fact that by the end of the century the state and the city shared laboratory facilities. In part this was due to rural inspection being managed by the state's Livestock Sanitary Board, which was more concerned with the animals than the milk they made. See Carroll Fox, "Public Health Administration in Maryland: A Study of the State Department of Health and Other Agencies Having Sanitary Functions," *Public Health Reports (1896-1970)* 29, no. 24 (January 30, 1914): 222-300.

53 Baltimore's boom, however, would come somewhat later. Martin V. Melosi, *The Sanitary City: Environmental Services in Urban America from Colonial Times to the Present*, Abridged ed, History of the Urban Environment (Pittsburgh, Pa: University of Pittsburgh Press, 2008), 41.

54 Melosi, *The Sanitary City*, 31.

between city and country. Whereas in the earlier 19th century the city had been considered a civilized bastion against dangerous wilderness, by the middle of the century an inversion had begun to take place.⁵⁵ Urban environments became synonymous with human creation, squalor, and overcrowding, all unnatural and therefore harmful conditions, while the once dangerous rural regions were considered natural, and thus healthful. Increasingly, urban residents were paradoxically promoting a city life that was considered less healthy than the idealized country while excising practical vestiges of nature from within cities.

This unease with urban living was magnified by a succession of epidemics from the 1830s onward. Older theories of medicine failed to properly explain the epidemics of the 19th century.⁵⁶ In response, some medical professionals turned to the miasmatic theory of medicine that maintained illness was transmitted through disease carrying particles called “fomites” created by the decomposition of organic matter.⁵⁷ Frequently wind-borne, fomites were also thought to concentrate in dirt and stagnant water and move through the atmosphere as gaseous miasma. Consequently dirty, damp, dark spaces were thought of as particularly unhealthy, whereas sunlight and fresh air were thought to have disinfecting properties. Cleanliness became a matter of health rather than aesthetics.

55 Carol Sheriff, *The Artificial River: The Erie Canal and the Paradox of Progress, 1817-1862*, 1st ed (New York: Hill and Wang, 1996), 32-35; Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2001), 11-12.

56 An imbalance of humors might explain one person’s illness, but when large numbers became ill, humoral precepts fell short. While belief in divine will persisted, 19th century scientifically-minded physicians and natural philosophers sought explanations to the body’s health and illness in mechanical and chemical terms. See Duffy, *The Sanitarians*, 68; Melosi, *The Sanitary City*, 31; Peter J. Bowler and Iwan Rhys Morus, *Making Modern Science: A Historical Survey* (Chicago: University of Chicago Press, 2005), 446.

57 Tomes, *The Gospel of Germs*, 27.

The miasmatic theory of medicine was core to a group of physicians and engineers who embraced a scientific and sanitary philosophy to city management, and of private citizens who advocated against the dirt, disease, bad air, poor water, and poverty of urban life. Although the scientific underpinnings of their philosophy have been broadly usurped by present understandings of disease, between the 1860s and the First World War these so-called sanitarians were successful in bringing medical and engineering expertise to bear on urban hygiene issues in many large metropolises such as New York or Chicago, introducing infrastructural improvements in sewerage, water quality, and air pollution.

Their legacy in Baltimore, however, is more ambiguous. As the city with the oldest health department in the country, Baltimore began enacting public hygiene measures decades before sanitarianism became a movement, but these efforts began to wane in the 1830s.⁵⁸ Subsequently, Baltimore was late to take part in the sanitary revolution of the 1870s, yet was in some ways already ahead of many cities, especially in matters of running water, refuse collection, and quarantine facilities.⁵⁹ In part this lateness was due to Baltimore's population boom taking place after 1870, rather than in the 1850s, deferring a feeling of acute need for reform until closer to the end of the century.⁶⁰ Efforts that were entertained after the 1830s, such as projects to install a sanitary sewer system, or to improve aging existing sanitary systems, were frequently stymied by political infighting and, in the period following the Civil War, a

58 Fox, "Public Health Administration in Baltimore," 1490; Howard, *Public Health*, 116-7, 119, 124-6.

59 Duffy, *The Sanitarians*, 147; Howard, *Public Health*, 116-7, 119, 124-6.

60 Diane E. Weaver, "Maryland Women and the Transformation of Politics, 1890s-1930" (University of Maryland, 1992), 4.

rise in party boss politics in Baltimore and Maryland that was characterized less by corruption than neglect of public services.⁶¹

The Baltimore City Health Department at the height of the national sanitarian movement suffered, in the estimation of historian of public health William Howard, from a lack of leadership, with a series of well-meaning, but ineffectual politically-appointed commissioners at the helm.⁶² This is not to imply that the Health Department did nothing—it began serious collection of vital statistics in 1873 and did try to get support for sewer construction—but as I have shown the laws it passed about milk had no enforcement provisions. It would not be until the mid-1890s that Health Department officials were able to take stronger reform actions.⁶³ When they did, as we will see in the following chapter, the cleanliness of the milk supply was among their chief public health concerns.

Milk Consumption

Despite the dangers prevalent in the milk supply, its consumption increased over the 19th century. DuPuis sees the growth of milk drinking as resulting from changing relationships with the natural world as the daily lives of urban dwellers became more distanced from the production of the food they consumed, an idealization of food and its origins, evolving notions of “purity” in which milk was seen as the most “perfect” and “natural” food, and social changes in which cow’s

61 James B. Crooks, *Politics and Progress: The Rise of Urban Progressivism in Baltimore, 1895-1911* (Baton Rouge: Louisiana State University Press, 1968), 8.

62 Howard, *Public Health*, 157-9.

63 Howard, *Public Health*, 158-9; Duffy, *The Sanitarians*, 94; Weaver, “Maryland Women and the Transformation of Politics,” 11; Crooks, *Politics and Progress*, 20.

milk was increasingly employed as a substitute for breast milk.⁶⁴ DuPuis maintains that although the increase in milk drinking initially accompanied an effort to save the lives of babies with insufficient access to breast milk, constant production to meet these needs transitioned into constant availability, which in turn fostered greater consumption by adults.⁶⁵ Changing notions about what represented a good diet for adults in the late 19th and early 20th centuries also contributed to greater milk drinking.⁶⁶

All of these explanations of the growth in milk consumption have merit but underemphasize or tacitly accept without comment the role of rail transportation. DuPuis and anthropologist Andrea Wiley both acknowledge the proximal nature of milk's supply as a contributing factor in its consumption, but the milk historiography broadly takes for granted that milk's consumption grew along with its ability to become mobile. By increasing connections between producers and consumers and raising the volume and availability of milk—in short, making milk more mobile—railroads drove down prices, thereby facilitating the increased consumption of milk.

Conclusion

The period from 1829 to 1880 saw the source of milk consumed in cities expand into the country, driven in the main by the construction of rail lines from 1828 onward and a worrying association of urban stables with milk of low, even dangerous,

64 DuPuis, *Nature's Perfect Food*, 6-13.

65 DuPuis, *Nature's Perfect Food*, 64.

66 Deborah M. Valenze, *Milk: A Local and Global History* (New Haven: Yale University Press, 2011), 168-9; Helen Elizabeth Veit, "Victory over Ourselves: American Food and Progressivism in the Era of the Great War" (Yale University, 2008), 6, 68-9.

quality. The poor repute of urban milk sources served to underscore a growing urban perception of the country, and its products, as natural and thus healthful, in contrast with city sources that were frequently associated with squalor and illness. This added impetus to seek alternative sources of milk.

Railroad expansion from the late 1820s onward opened the countryside to milk production for urban needs. Between 1820 and 1880 the Baltimore milk shed expanded generally along the rail lines, growing from an area immediately surrounding the city to reach west to Frederick, north to York, and south towards Washington, DC (see Appendix E for a map). To bring perishable milk to market in salable condition, the railroads integrated milk transport into their passenger service offering, choosing speed over temperature control. The addition of milk traffic was a large source of income for the railroads with minimal technological hurdles. They were able to meet the handling demands for decades with service adjustments rather than specialized equipment.

The intercommunication provided by railroads spurred greater production in the countryside, but also greater urban consumption. By providing a conduit to greater supply, prices in cities were reduced, contributing to greater consumption. With this greater consumption volume and the disconnection between rural producer and urban consumer came greater concern over mishandling and adulteration of milk. These concerns were largely seen as economic or ethical rather than related to health. Laws preventing adulteration did little to address the problems in the milk supply, and neither city nor state government was greatly motivated to take action of its own to address milk issues. By 1880 there was a robust milk trade established between city

and country, made possible by the railroads, but many concerns persisted over the quality of the milk supply. If anything, the dissatisfaction over urban swill milk had been compounded by worry over adulterated country milk and a tepid governmental response.

Railroads embraced milk as a commodity early and built it into their service offering due to its high value and relative (for perishable goods) transportability without investment in new technology. The railroads established the transportation model for milk and did so in a way that largely suited their equipment, growth patterns, and schedules. The result was a system that boosted the milk business but created dependencies both among the urban consumer and the rural producer that would, from the 1870s onward, become increasing sources of ambivalence and dissatisfaction.

Chapter 3: Discontent and Early Reform, 1870s-1904

Worsening issues with the safety of milk and the enlargement of the milk shed combined in the final decades of the 19th century to bring issues of hygiene and connectivity to the forefront of public concern. The close of the 19th century saw social reform groups form and incorporate milk as part of broader efforts to combat corruption, poverty, and infant mortality. At the same time, rural resentment over dependency on railroads for intercommunication with the wider world fostered a movement led by the Maryland dairying community to construct roads as an alternative to rails. These dissatisfactions laid the groundwork for 20th century changes in the milk trade, but also altered the relationship between the populace and its government. The Baltimore City Health Department in this period began to come into a position of authority on milk matters, while participants in the milk business would take leadership roles in state-level efforts in road improvements.

Railroads and the Milk Shed

In the three decades between 1870 and the turn of the century railroads reached the apex of their influence on American life. What had started largely as a collection of small companies striving for regional gain had by 1870 connected both coasts and morphed into an industrial transportation empire that dominated the

American transportation landscape and became the model for industrial enterprise.⁶⁷ Trains were cheaper, faster, and went more places than road or water, and they transformed Americans' perceptions and expectations of travel, distance, and intercommunication. At the same time the railroads became a source of consternation. The rates charged for carriage appeared to be arbitrary, but the railroads' transportation dominance left shippers little other option for commercial connection to the wider world.⁶⁸ The perception of railroads as “predatory monopolists” run by the very wealthy led to widespread public opprobrium and shippers' concern over equity in rate making led to calls for governmental intercession.⁶⁹ These led in 1887 to an act of Congress creating the Interstate Commerce Commission (ICC) that banned railroad pooling (cartelization) and monitored railroad activity in the hopes of bringing stability to railroad rates.⁷⁰

67 Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass: Belknap Press, 1977), 80.

68 Mark H. Rose, Bruce E. Seely, and Paul F. Barrett, *The Best Transportation System in the World: Railroads, Trucks, Airlines, and American Public Policy in the Twentieth Century* (Columbus, OH: The Ohio State University Press, 2006), 2, 9. Albro Martin, *Railroads Triumphant: The Growth, Rejection, and Rebirth of a Vital American Force* (New York: Oxford University Press, 1992), 199-200.

69 Gabriel Kolko, *Railroads and Regulations, 1877-1916*. (Princeton, N.J.: Princeton University Press, 2015), 3, 21-22. Legislative efforts to curtail the practice of providing discounted rates to preferred shippers had been ongoing since at least 1876.

70 Many of the early provisions of the Interstate Commerce Act were supported by the railroads as they promised to bring stability to the oscillations unfettered competition had been causing in the industry. Initially the ICC had minimal enforcement authority, vague provisions (such as that rates be “reasonable and just”), and railroads were also able to secure an injunction against its more restrictive policies. A series of Acts between 1906 and 1920 expanded its enforcement powers and the ICC began to exert more regulatory control over a diverse array of railroad matters including accounting, safety, modal competition, and rate floors and ceilings. As business historian Thomas McCraw characterizes, a spectrum of interpreting the ICC has arisen among historians. One side, exemplified by the work of Gabriel Kolko, maintains that the ICC was widely embraced and influenced by the major railroads before WWI, which utilized it to reduce competition. The other, exemplified by Albro Martin's works, portrays the ICC as governmental brake on railroads' competitiveness. See Chandler, *The Visible Hand*, 130, 135, 174; Gabriel Kolko, *Railroads and Regulations*, 5; Albro Martin, “The Troubled Subject of Railroad Regulation in the Gilded Age—A Reappraisal,” *The Journal of American History* 61, no. 2 (September 1974): 339-71; Martin, *Railroads Triumphant*; Thomas K. McCraw, “Regulation in America,” *Business History Review* 49, no. 02 (June 1975): 159–83; Rose, Seely, and Barrett, *The Best Transportation System in the World*, xxi, 3; United States Congress, *An Act to Regulate Commerce* Public Law Ch. 104 (1887); Steven W. Usselman, *Regulating Railroad Innovation: Business, Technology, and Politics in*

As the national railroad network expanded throughout the latter half of the 19th century, so too did Baltimore's. By 1900 the city could boast rail connections from seven railroads that joined it to what had become a national railroad network.⁷¹ Within two years through mergers the number would be reduced to four. The large Pennsylvania Railroad (PRR) based in Philadelphia began controlling some of Baltimore's railroads through stock purchases, bringing the Northern Central Railway under fiscal control in 1861 and in 1902 merging the Baltimore and Potomac and the Philadelphia, Wilmington, and Baltimore Railroads.⁷² The York Southern and Baltimore and Lehigh narrow gauge lines were standard gauged and, in 1901, merged to form the Maryland and Pennsylvania Railroad.⁷³ By 1902, Baltimore's milk hauling rail companies were the Pennsylvania, the Baltimore and Ohio, the Western Maryland, and the Maryland and Pennsylvania.

Baltimore appears to have been somewhat unique in the structure of its milk shed in that its dense and mature railroad network radiating from the city encouraged the expansion of dairy farming in areas further away from the city center. By the turn of the century the regions of greatest milk production in the Baltimore milk shed began some 20 miles outside the city, extending 200 miles, whereas in a number of other cities such as Milwaukee or Minneapolis the maximum distance that

America, 1840-1920 (Cambridge, U.K. ; New York: Cambridge University Press, 2002); Robert H. Wiebe, *The Search for Order: 1877 – 1920*, 47th printing, American History (New York: Hill and Wang, 2007), 48, 53.

71 Counted in this total is also the Washington and Annapolis Electric Railway, which became the Washington, Baltimore, and Annapolis Railroad in the early 20th century. Although it maintained a passenger and express terminal in Baltimore and did brisk express business between Baltimore and Annapolis, the WB&A's milk traffic appears to be limited to Annapolis and no evidence was found of it transporting milk to Baltimore.

72 Sander, *John W. Garrett*, 99. Of these three lines that made up the Pennsylvania Railroad's presence in Baltimore, only the Northern Central was a major milk hauler to Baltimore.

73 Hilton, *The Ma & Pa*, xi.

milk traveled was under 40 miles.⁷⁴ In this fashion Baltimore's milk shed was geographically akin to those of northeastern cities such as Boston or New York.

To account for the increasing distances milk needed to travel, Baltimore's railroads begin using refrigerator cars for milk for longer hauls, keeping unequipped baggage cars for short hauls. In 1887 the Baltimore and Ohio Railroad built what appeared to be normal six-axle baggage cars, but the center section of the car had an insulated room that was iced from a roof top hatch.⁷⁵ Closely related to the milk refrigerator car was the express refrigerator car, which also came into milk service although their primary purpose was to move any perishable at passenger train speeds. In insulation and refrigeration components express refrigerator car construction drew heavily on contemporary freight car practices, while the carbody and underframe was based largely on passenger equipment.⁷⁶ While purpose-built milk cars were used only for milk and often had facilities for an attendant, express refrigerator cars could be used for any cargo requiring fast transport and isothermal protection but did not have facilities for an attendant. The Pennsylvania Railroad appears to have been the most frequent user of express refrigerator cars for milk shipments in the Baltimore milk shed.⁷⁷

74 Alvord and Pearson, *200 Cities*, 84; Trumbower, "Transportation of Milk by Motor Truck," 1–18.

75 White, *The American Railroad Freight Car*, 288. White indicates that these cars may have been remodeled from existing baggage cars and not built from the factory as milk cars. Many of the purpose-configured milk cars used in the Baltimore milk shed were converted from baggage cars.

76 Wider, "Erie 40-Ton Express Milk Cars," 51–60; White, *The American Railroad Freight Car*, 285–8.

77 PRR Reefers 1920s, Handwritten Note, Archives of the Maryland and Pennsylvania Railroad Historical Society.

Rural Discontent and Good Roads

As mentioned above, railroads were a source of significant ambivalence to rural residents in the 19th century. Rural communities in the Baltimore milk shed were largely responsible for creating an alternative to railroads for the transportation of milk, in significant part because of this sentiment of dependency on railroads.⁷⁸ Their concerted push for linkage with each other and with major cities resulted in a network of improved roads that allowed motor trucks to become a feasible alternative to trains. The impetus to build roads was not solely for commercial gain. Rural people sought better roads for independence of schedule, greater access to schools, churches, and recreation in addition to commerce.⁷⁹ Rural residents' material involvement in developing the trucking industry in the early 20th century emphasizes the importance of that mode of transportation to their communities. Although producers and other rural residents were not wholly responsible for the modal shift that occurred in the early 20th century, the change would not have been possible without rural engagement to find an alternative to railroads.

Maryland had an established network of roads dating back into the colonial period, and a series of surfaced private roads and turnpikes connected Baltimore with Washington, Frederick, and the Pennsylvania cities of York and Philadelphia since the early 1800s; however, the expansion of railroads had pulled away much traffic and

78 Wessel, "Learning to Cooperate," 81, 83, 100. The rates producers paid to ship milk were frequent areas of concern. Wessel cites dissatisfaction over freight rates as one issue that prompted producers' early attempts to organize and notes a pattern of organization efforts that overlays with railroad lines, but she subordinates the freight rate issue to the farmers' concern about rates paid by city dealers for the milk itself.

79 H. J. Patterson, "Some Problems for Maryland Farmers," *Maryland Farmer* 3, no. 1 (September 26, 1919): 4.

the cash-strapped turnpike companies deferred maintenance.⁸⁰ Accordingly, passage by these roads was slow enough that, until the construction of railroads, milk's production was limited to within about ten miles from the city center.⁸¹

The search for better roads precedes the automobile and did not begin with the farmer. It was driven largely by bicyclists in the 1870s seeking better surfaces on which to ride. By 1880 a group of bicyclists in New England formed an organization called the League of American Wheelmen that agitated politically for states to build good roads.⁸² The Wheelmen's efforts were successful in obtaining funds inside the U.S. Department of Agriculture (USDA) to create an Office of Road Inquiry in 1895.⁸³ This federal body soon became a clearing house of information on road building and together with the Office of Public Roads (later the Bureau of Public Roads), advised state bodies on best practices, administered funding, and provided expertise in good road construction. By the late 1890s the National Good Roads Association had become the primary lobbying organization for good roads. In the progressive ethos of the time, which extended even up to the federal Office of Public Roads, the perceived inefficiency of roads was cast as immorality and injustice, particularly to rural dwellers whose roads were typically in the worst condition.⁸⁴ Not only were good roads convenient and useful, their presence or absence was considered a matter of equity.

Although they supported the better intercommunication possible on good roads, farmers were initially less enthusiastic about the advent of the automobile,

80 Neal A. Brooks, Eric G. Rockel, and William C. Hughes, *A History of Baltimore County* (Towson, Md: Friends of the Towson Library, 1979), 142-3, 150.

81 Baltimore Health Department, *1901 Annual Report*, 56.

82 Seely, *Building the American Highway System*, 12.

83 Seely, *Building the American Highway System*, 12.

84 Seely, *Building the American Highway System*, 25.

which disturbed rural life with its noise, dust, and speed. The transition of farmer from the automobile's opponent to its proponent occurred as the price of automobiles dropped and more rural residents were able to join the automotive community. This shift, which is often credited to Henry Ford's use of mass production techniques, together with a growing market in second-hand cars, expanded rural automobile use.⁸⁵ Among many other reasons, better mail delivery was a potent motivator for farmers to embrace rural roads. It was also an entry point for government involvement because the government strove to provide mail access to all citizens equally.⁸⁶ Good roads promised the farmer better communication with the city and other rural areas, lower vehicle maintenance costs, and increased business opportunity.⁸⁷

At the turn of the 20th century road building in Maryland was by several accounts quite advanced, yet farmers generally circumvented the various turnpikes and private roads in favor of county roads, which had begun to expand in distance and quality in the last decade of the 19th century, but were still often found wanting.⁸⁸ The desire for better roads among rural residents in the Baltimore milk shed soon turned

85 McCarthy, *Auto Mania*, 35.

86 Seely, *Building the American Highway System*, 35; Harold J. Counihan, *Moving Maryland Forward: A Century of Modern Road Building* (Baltimore: Maryland Department of Transportation, 2008), 9.

87 This was hardly new in the 1890s. Farmers centrality to good roads movements begins even earlier. Wooden plank roads constructed in the 1830s and 1840s were referred to even then as "farmers' railroads." See Meyer and MacGill, *History of Transportation in the United States before 1860*, 300, 305.

88 Brooks, Rockel, and Hughes, *A History of Baltimore County*, 150; Editorials in *The Maryland Farmer*, the journal of the Maryland State Dairymen's Association and the Maryland Grange, are ambivalent in their assessment of the state's roadways in the early 20th century, repeatedly citing good trunk roads, but poor connecting roads. For examples see "We Can Have Good Dirt Roads," *Maryland Farmer* 3, no. 2 (October 3, 1919): 5; "The Country Roads," *Maryland Farmer* 3, no. 11 (December 5, 1919): 7; The widespread notion among rural residents that dirt roads were insufficient was also a development of the early 20th century good roads movement. As late as the 1890s many rural residents had no qualms with road conditions later found to be unacceptable. See Christopher W. Wells, *Car Country: An Environmental History*, Weyerhaeuser Environmental Books (Seattle: University of Washington Press, 2012), 27. The last of the turnpikes was taken over by the state in 1918. See McGrain, *An Agricultural History of Baltimore County*, 77.

into an organized movement at the state level. Two of the most vocal and notable personalities in the Maryland good roads movement were prominent Baltimore milk shed dairymen Samuel M. Shoemaker, Jr. and Asa B. Gardiner, Jr. A Maryland native of affluent upbringing, Gardiner attended Columbia University in New York and worked in New York in the food importing trade until 1894 when he took over management of a deceased uncle's Baltimore area dairy farm.⁸⁹ Gardiner then founded his own eponymous dairy in 1903.⁹⁰ He played a leading role in the dairy industry of Baltimore, encouraging pasteurization and advocating sanitary processing methods well before these were prevalent in the industry. He was also an early automobile advocate and his outspokenness for better roads garnered him a position on the state Good Roads Commission.⁹¹

Shoemaker, also of affluent roots, was a Baltimore County cattle breeder and milk producer who held many positions of renown: chairman of the Maryland State Board of Agriculture, chairman of the Board of Regents at the Maryland State College, and chairman of the Baltimore County Board of Education.⁹² Shoemaker and Baltimore County Road Engineer Walter Crosby collaborated on a plan to have the state fund road building, instead of the counties or private groups. When passed in 1904, the so-called Shoemaker Act established that the state would provide 50 percent of the costs of road construction, subject to approval by the Maryland Geological and Economic Survey, while the county would provide 40 percent and the property

89 Macaulay, "From Open Cans to Grade A Milk"; "A. B. Gardiner Dies in Cockeysville," *The Sun*, June 26, 1936.

90 "Was Asked to Resign: Mr. Gardiner Out as Manager of Filston Farm," *The Sun*, January 6, 1903.

91 Brooks, Rockel, and Hughes, *A History of Baltimore County*, 151.

92 "For Improved Dairying: State Milk Producers and Distributors Organize," *The Sun*, December 16, 1908, 12; Wessel, *Learning to Cooperate*, 108, 137.

owners abutting the road the remainder.⁹³ The roads constructed under this funding had to be macadam, a design using compacted stone that was resistant to water damage.⁹⁴ The roads to Washington, Frederick, and Bel Air received the majority of the first funding allotted by the Shoemaker Act. The latter two roads led directly into some of Baltimore's most prolific milk producing regions.⁹⁵ Advocacy for good roads in Maryland was deeply interconnected with Baltimore's dairying activity and was of substantial interest to the region's agricultural elite who took leadership roles in crafting the state's roadway system.

Antitrust and Early Dairy Organization

Although the traditional practice of farmers selling directly to customers continued in small amounts throughout the analysis period, by 1900 a substantial bifurcation in the dairy trade had resulted between the producers (dairy farmers who kept milch cows) and urban milk dealers who were city customers' primary source for milk.⁹⁶ The tensions largely broke over prices, with producers seeking to sell their milk at the highest price and dealers striving to keep the cost of milk as low as they could. This price-driven dynamic would color all of the interactions between the two

93 Brooks, Rockel, and Hughes, *A History of Baltimore County*, 151. The Shoemaker Act also set standards for road building, which were administrated by the State Geological and Economic Survey. The Maryland State Roads Commission functioned similarly to the federal Office of Public Roads, directing funding, administrating projects, and providing direct engineering assistance, while the Maryland Geological and Economic Survey was the analog of the federal Office of Road Inquiry, performing testing and setting best practice standards. See Counihan, *Moving Maryland Forward*, 3, 9.

94 Counihan, *Moving Maryland Forward*, 9.

95 Brooks, Rockel, and Hughes, *A History of Baltimore County*, 152.

96 It is not clear how the number of producers that sold directly to customers over time changed, but there were only 29 in 1913, out of 2,084 producing farms in the country. See Fox, "Public Health Administration in Baltimore," 1526.

groups, even when they were cooperating. Accordingly, regulatory activity by the Health Department was often interpreted by producers and dealers alike in financial terms, even as it touched on fundamental philosophies within the two groups (neither of which was entirely homogeneous) on matters such as individual liberty and the place of government in society.

Late 19th century public concern over monopolies and trusts applied not just to railroads but began to factor into attitudes toward businesses generally, including those involved in milk. In late 1899 a group of the largest milk dealers in Baltimore began quietly acquiring the city milk delivery routes of small, independent operators.⁹⁷ Attuned to a possible trust in the making, seventy smaller city dealers countered by forming the Retail Milk Dealers' Protective Association.⁹⁸ Milk producing farmers, concerned that the dealers' internecine conflicts could result in a single, victorious milk trust responded by organizing as the United Milk Producers Association (UMPA). The dairy farmers of UMPA sought to control all of the milk coming into Baltimore to protect milk producers from dealer trusts and be used as leverage in price and payment negotiations.⁹⁹

UMPA was initially quite successful in their aims. In January of 1900, they controlled 15,000 gallons of the 20,000 supplied to Baltimore daily.¹⁰⁰ This challenge dissolved the dealers' intramural acrimony and they cooperated to stymie UMPA's efforts. A number of the medium and larger dealers began importing milk by rail from

97 This could be seen as an example of attempted vertical integration to control channels of distribution, but it is unclear the extent to which these purchases were curtailed or stopped by the ensuing public agitation.

98 Wessel, "Learning to Cooperate," 82-83.

99 William Crowther, "Statement to the Public," *The Sun*, January 16, 1900; Isaac Wallace Heaps, *Twenty Years of Cooperative Milk Marketing in Baltimore* (Baltimore: Self Published, 1938), 2.

100 "War of the Milkmen: Producers' Association Officials Say They Have the Best of It.," *The Sun*, January 17, 1900.

other milk sheds.¹⁰¹ Dealers that refused to sign with UMPA successfully used a public relations campaign to portray the producers to the public as having formed a monopoly.¹⁰² UMPA spread itself too thin attempting to counter the dealers' efforts and went bankrupt in December of 1900.¹⁰³ Although it did not last two years, UMPA's rise and somewhat abrupt failure proved to dealers that rail transportation could be used to circumvent any producers' monopoly or production shortage. Furthermore, it extended even further the geographic area from which Baltimore obtained its milk. Even after the failure of UMPA dealers continued to ship milk in from great distances, to the benefit of railroad carriers and consternation of producers.

Infant Mortality and Early Social Reform Efforts

As the discontent of rural residents with railroads and city dealers grew over the last decades of the 19th century, city residents' dissatisfaction with the urban milk supply was also on the increase. At center was milk's association with infant mortality. Long alleged, this suspicion was increasingly quantified after the gathering of vital statistics by health officials began in the 1870s. Alongside public discontent with the corruption and inaction of city and state government, the issue of infant

101 "War of the Milkmen: Producers' Association Officials Say They Have the Best of It.," *The Sun*, January 17, 1900.

102 UMPA was not entirely a monopoly as there were some producers that did not join, but the market share of non-UMPA producers was small. See Wessel, "Learning to Cooperate," 86; "War of the Milkmen."

103 Wessel, "Learning to Cooperate," 96.

mortality became a locus of social reform and was key in motivating the broader public to demand legislative action to render the milk supply safe.¹⁰⁴

Exactly why milk was killing infants was not clear, but it was apparent that the problem was increasing, not abating.¹⁰⁵ Alongside the notion that infant mortality was linked to the milk supply grew the additional idea that American mothers, especially immigrant mothers, may not be educated enough about the potential dangers of milk to care for their children properly.¹⁰⁶ This represented a shift away from the Victorian understanding of women as natural caregivers by virtue of their gender and their standing in the home, where child rearing took place.¹⁰⁷ A persistently high infant mortality rate challenged the expectation that women knew instinctively how to care for infants. The belief in the need to educate mothers on how to care for infants became central to many social reform movements in Baltimore that focused on milk.

Although historian of public health Richard Meckel contends that the reconceptualization of infant mortality as a problem of motherhood generally arrived around the turn of the century, well after the sanitarian focus on food reform, events

104 Meckel, *Save the Babies*, 5; Crooks, *Politics and Progress*, 13, 86-87.

105 Data on deaths was collected by the Health Department since 1797 but records before 1812 were lost. While death rates for those over two years of age began to decline, those of infants under two years remained stubbornly high. Some portion of the high infant mortality rate was certainly connected to the lull in Baltimore's sanitary efforts in the mid-19th century. The early advances Baltimore made in refuse collection and running water had no corresponding provision for sewerage, and much of the early water supply system of wooden pipes had by the 1860s become subject to contamination. Despite failed efforts to construct sewer systems dating back to before the Civil War, this would remain largely unaddressed until 1915. See Howard, *Public Health*, 121, 127, 194, 235; Robert J. Brugger, *Maryland: A Middle Temperament, 1634-1980*, Robert G. Merrick ed (Baltimore, Md: Johns Hopkins University Press in association with the Maryland Historical Society, 1988), 391.

106 Meckel, *Save the Babies*., 99.

107 Suellen M. Hoy, *Chasing Dirt: The American Pursuit of Cleanliness* (New York: Oxford University Press, 1995), 16. Paradoxically, this transition also facilitated an attenuation of the social circles that had assisted many families in child rearing and the transmission of child rearing knowledge. See DuPuis, *Nature's Perfect Food*, 62.

in the Baltimore context appear to have had a slightly different chronology.¹⁰⁸ First, as mentioned, many of the sanitary reforms attempted by the Health Department from the 1860s onward had not been very effective. Adulteration laws had had minimal success and efforts to resolve other issues of city hygiene were stymied by a neglectful city government. Secondly, educating mothers had been ongoing throughout the last twenty years of the century as part of Baltimore's private efforts to provide assistance to the poor.

Baltimore was home to the Thomas Wilson Sanitarium for the Children of the Poor, a hospital where both infants and their mothers could stay during the course of a child's illness.¹⁰⁹ This intended not only to care for the infant, but to provide what was perceived by the Sanitarium's operators as necessary training of new mothers on the care of infants. By 1898 the chief pediatrician of the Sanitarium was Dr. J. H. Mason Knox, who also was a lecturer at Johns Hopkins University Medical School. Connecting poor quality milk to infants' maladies, in 1904 the Wilson Sanitarium began to operate milk stations in Baltimore to provide clean milk for babies. The milk stations proved so popular that they eclipsed the initial purpose of the Sanitarium. The milk station activities and maternal education component were eventually bundled and renamed the Babies' Milk Fund Association.¹¹⁰

The Babies' Milk Fund Association (BMFA) became one of the leading privately-run public health efforts in early 20th century Baltimore.¹¹¹ In addition to

108 Meckel, *Save the Babies*, 5, 93.

109 "Leaving Money for the Poor," *New York Times*, September 6, 1879.

110 American Association for Study and Prevention of Infant Mortality, *Transactions of the Sixth Annual Meeting, Philadelphia, November 10-12, 1915* (Baltimore, Md: American Association for Study and Prevention of Infant Mortality, 1916), 383-5

111 There were others, such as Council Milk and Ice Fund (CMIF), established in 1895 "to instruct the mothers in the welfare of the home," and "educate them to use only pure milk." It distributed to its patrons milk and ice free of charge and provided training on child care to expectant and new

providing discounted milk for babies and maternal educational seminars, it provided obstetrical care to impoverished women. Sustained by donations and fundraisers, the BMFA soon came to operate multiple clinics throughout Baltimore where expectant or new mothers could receive medical care and counseling, as well as receive milk for their babies. The BMFA was also a progressive advocacy organization. Its primaries, particularly Knox, editorialized in newspapers and held lectures on the necessity of a clean city milk supply, education for mothers, and public action for milk reform.¹¹² Although its focus was primarily on the impoverished residents of the city, the BMFA served as an example to later reform groups on how to simultaneously support and pressure the Health Department.

Whether by printing exposés of the conditions of city stables and the detrimental health effects of swill milk, or merely as a public forum for the circulation of opinion through letters to the editor, the press was an important factor in molding and communicating public opinion about milk. It was also an important forum for the dairy business to communicate with the public. During disputes between milk producers and dealers in Baltimore both sides often took out regular newspaper ads to state their positions to the public.

In 1891 the Baltimore newspaper *Evening News* came under new, progressive, ownership and began publishing a series of invectives against the governance of, and social conditions in, Baltimore that its editors found objectionable.¹¹³ Baltimore of the

mothers. CMIF appears to have been the first organized effort to combat infant mortality in Baltimore specifically through the improvement of the milk supply. See American Association for Study and Prevention of Infant Mortality, *Transactions*, 385.

112 Classified Advertisement, *Sun*, June 5, 1912; Meckel, *Save the Babies*, 112.

113 While historian of Maryland Robert Brugger does not explicitly link the *Evening News* to the rise of social reform movements in the city, historians James Crooks and Diane Weaver both credit the *Evening News* as having acted as the preeminent progressive mouthpiece to expose government corruption and reform issues. Crooks names the *Evening News*' owner Charles Grasty among the

mid-1890s was soon gripped by “a rising tide of indignation” that brought with it a bloom in social reform activity.¹¹⁴ Ministers used the pulpit to speak out against children's living conditions, volunteerism to help the sick and poor became more widespread, and organizations were founded to promote and organize reform activity. All manner of social ills were targets, from the conditions of streets, water, and milk supplies to the larger issue of political corruption and inaction.

Health Department Transitions

As I have shown in the previous chapter, for much of the 19th century other than the aforementioned steps to address fraudulent labeling, the Baltimore City Health Department had not taken much action on matters of the food supply.¹¹⁵ In response to growing public calls for greater engagement, in 1894 it appointed a chemist and two inspectors to address the milk problem.¹¹⁶

Diluting milk with water had been commonplace in the antebellum period, but after the Civil War adulterations of milk worsened drastically.¹¹⁷ One of the more

most prominent Baltimore progressives. See Brugger, *Maryland*, 400; Weaver, “Maryland Women and the Transformation of Politics,” 5-6; Crooks, *Politics and Progress*, 18, 227.

114 Brugger, *Maryland*, 401.

115 Although the city thought enough to engage Prof. Tonry as a consultant to study chemically the milk supply in 1873, it took no action to address the practice of watering down milk or its frequent impurities Tonry identified at that time. See Howard, *Public Health*, 165.

116 “Vital to Health: A Conference with a View of Improving the City’s Milk Supply,” *The Sun*, June 17, 1896, ProQuest Historical Newspapers: The Baltimore Sun.

117 Meckel associates this rise with greater industrialization of the food supply in the period after the Civil War combined with diminishing connection between producers and consumer. See Meckel, *Save the Babies*, 66. Dilution of milk with water was not always considered bad but rather the sale of diluted milk sold as undiluted. The addition of water appears to have been commonplace as a matter of personal preference, as this 1840 Baltimore *Sun* article explains: “It is suggested in a Philadelphia paper that persons who sell milk should drive their cows around and supply each customer from the teat; then every one could add the water for himself, and suit his own taste exactly.” See “Milk,” *The Sun*, April 21, 1840, ProQuest Historical Newspapers: The Baltimore Sun.

useful steps toward the practical regulation of milk was to establish legal definitions for what constituted “milk” and then to assess the milk supply based on that definition. This became possible after 1890 when an easy test for butterfat content was developed.¹¹⁸ Butterfat became the measure of milk's quality and the degree to which a fluid was considered milk. Baltimore law of 1894 set forth that only milk containing 3.0% butterfat, a specific gravity of 1.029 at 60°F, and no less than 12 percent of total solids could be sold as “milk.”¹¹⁹ In 1895 the city's chemist, William Tonry, reported that analysis of milk arriving at train stations found all manner of foreign matter in the milk, including blood, dead birds, and live frogs.¹²⁰ Not even half of the milk sold in the city was considered “microscopically clean” by contemporary standards but jurisdictional limitations gave inspectors little recourse.¹²¹

The city could, however, act on problems originating inside city limits, and thus their first legislative target was the perennial nuisance of urban stables. Widespread medical belief held that if the milk supply could be produced under clean conditions and without exposure to animal or human sickness, it would result in milk that was not poisonous.¹²² The Health Department managed to secure from the legislature two ordinances governing the maintenance of city stables, one in 1896 and

118 This measurement, made possible after the 1890 introduction of the Babcock test for butterfat content, helped detect issues where milk was adulterated by the addition of foreign substances less obvious than birds and frogs. The Babcock test, developed by chemist Stephen Babcock, measured milk's butterfat content using acid and centrifugal force. It was a test easily conducted by inspectors without necessitating elaborate equipment or testing delays. See Selitzer, *The Dairy Industry in America*, 83.

119 Howard, *Public Health*, 75.

120 Howard, *Public Health*, 137.

121 “Vital to Health.” The concept of “microscopically clean” was in 1896 not predicated on studies of bacteria, but instead looked for dirt, pus, and other non-bacterial foreign matter indicative of mishandling or contamination not apparent to the naked eye.

122 In the early 19th century and persisting in some cases into the early 20th, the notion was widespread that febrile diseases were either contagious (transmitted by proximity to the sick) or infectious (resulting from exposure to dirt and putrefaction). The semantic distinction between the two terms has largely been lost as germ theory became the dominant paradigm, but was important to contemporary medical practice. See Howard, *Public Health*, 37-38.

the second in 1902.¹²³ Together these shuttered 107 city stables, predominantly ones nearest the city center that could not meet new size requirements for pasturage.¹²⁴ The forced closure of many urban stables, even as milk consumption continued to grow, placed further importance on rural sources for the city's milk supply. In this way, beginning in 1896, regulatory efforts to deal with issues of cleanliness can be seen as elevating the railroads' role in the Baltimore dairy trade.

The late 1890s also saw the Health Department begin to embrace germ theory to help understand the milk problem. The idea that microscopic organisms could cause illness was not new in the 19th century, but began to gain wider acceptance after French chemist Louis Pasteur determined in the early 1860s that bacteria caused spoilage.¹²⁵ The further identification in the 1880s of germs responsible for prevalent diseases served to underscore the importance of bacteriology to public health.¹²⁶ The geographical nearness to and professional overlap with Johns Hopkins University Medical School, with its progressive leadership and strong interests in the areas of bacteriology, preventative health, and health education, also played a role in the changes taking place within the Health Department in the 1890s.¹²⁷

123 Baltimore Health Department, *1901 Annual Report*, 57.

124 Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1902* (Baltimore, Md.: Baltimore Health Department, 1903), 18.

125 Historian of public health Howard notes that bacteriological causes for disease were theorized about in the 15th century, and were entertained as a potential or contributing factor by some physicians thereafter, without gaining prominence until Pasteur, Robert Koch and others were able to replicate disease transmission from germs in the laboratory. See Howard, *Public Health*, 41-3. On the importance of the laboratory in the proliferation of germ theory see Bruno Latour, *The Pasteurization of France* (Cambridge, Mass: Harvard University Press, 1988).

126 Health officials generally began to pay more attention to the potential relevance of this relationship when Dr. Martin Rosenau of the U.S. Marine Hospital and Public Health Service released a finding that infants were more susceptible to bacteria in milk than older people. See Meckel, *Save the Babies*, 77.

127 Howard, *Public Health*, 165; Weaver, "Maryland Women and the Transformation of Politics," 5.

Although Health Commissioner from 1873-1892 James Steuart was a staunch adherent to miasmatic theories of disease and had little interest in bacteriology, his successor James McShane established chemical and bacteriological laboratories for the City Health Department in 1896 and brought in respected scientists to head them.¹²⁸ McShane, himself apparently agnostic on germ theory, was however willing to employ all of the tools science offered toward public health issues.¹²⁹ Baltimore's tardive sanitarianism and early exposure to bacteriology resulted in miasmatic and germ theories about disease coexisting simultaneously within the Health Department of the late 19th century, though it took years for health law to be based on bacteriology.¹³⁰ McShane was succeeded in 1897 by Charles Hampson Jones, a progressive and ardent proponent of germ theory, who together with chief bacteriologist William Royal Stokes would play a large role in shaping the Health Department's approach to public health into the late 1920s.¹³¹ As the 20th century dawned, the Health Department was largely staffed by reform-minded progressives who saw much of the answer to the milk problem in bacteriology.

128 Howard, *Public Health*, 54, 158-9, 165, 167. The initial impetus for adding a bacteriological laboratory was the rapid detection methods for diphtheria possible through bacterial culture, not the milk problem, but bacterial analysis of milk and water soon came to be its primary tasks.

129 Howard, *Public Health*, 159.

130 In many ways this was not uncommon. The widespread notion of infection being transmitted through fomites translated naturally to germs. This resulted in a transitional period in which dirt or dust and germs were broadly considered among those outside the medical field as synonymous. It would not be for several decades before bacteriologists were able to advance the notion that not all dirt contained pathogens. Howard states that it was not until 1910 that bacteriology exerted "a controlling influence" on municipal policy. This may be due to the fact that until 1912 and 1917 the Health Department merely made legislative recommendations rather than itself set legally enforceable policy. See Tomes, *The Gospel of Germs*, 56, 82, 238-9; Howard, *Public Health*, 111.

131 Howard, *Public Health*, 159.

Conclusion

The final three decades of the 19th century were marked by a rise in discontent. As disparate as aggravation over dependence on railroads and poisonous milk may appear as concerns, they represent motivating factors that helped set the stage for the regulatory transformation of the dairy field. These dissatisfactions manifested themselves in the context of the Baltimore milk shed as public outcry, reform action, and a change in expectations of government. In the rural areas of the milk shed, residents' disenchantment with the railroads and feelings of dependency drove them to agitate for good roads, even taking leadership roles in transforming this desire into reality. The 1904 Shoemaker Act designating state funding for roadway construction marked a transition from viewing roads as generally a local matter to one best addressed and administered by state governmental bodies. This followed a trend of physical interconnection and expansion of communication networks, pioneered by railroads, but also an expansion in conceptions of interconnection. Rural communities gained new expectations of and demands for connection to the wider world and looked at the government in a new light as an arbiter, if not provider, of solutions.

In the city the milk problem was one of many issues that prompted social reform movements that sought redress first through private and then public means. On the private side this resulted in organizations such as the BMFA while on the public side, the Health Department was prompted for solutions. Sanitarian efforts in Baltimore had largely been unfulfilled by a disinterested government so that when at last reforms began in the 1890s, miasmatic theories of illness often associated with

sanitarian efforts were informed by, in some ways melded with, the new discipline of bacteriology. Nevertheless, early public policy aimed at milk supply reform was largely rooted in sanitarian philosophies that viewed environmental conditions as having deleterious effects on health and largely incorporated bacteriology only as a supporting factor. Laws that focused foremost on cleanliness, such as those that closed so many city stables, were an example of this late century sanitarianism. Private efforts, meanwhile, tended to focus on educating mothers and providing safe milk for newborns while advocating publicly for greater civic action.

Baltimore's early and dense railroad network and its ensuing large milk shed geography contributed to the sense of isolation and dependency of rural milk producers and to the sustained dominance of railroads. Even with efforts to build good roads beginning in the 19th century, construction took time, and once connected by road, the distances for many producers were still great enough that no alternative technology was available to top railroads in speed to market. While rural dissatisfaction with transportation options was growing, urban distrust of the milk supply prompted calls for reform. Both urban and rural situations saw citizens look to their municipal, state, and federal governments for solutions. Public policy became the preferred instrument of problem resolution, and it would prove to be decisive in reshaping the modal landscape.

These developments align very closely with those described on a national scale in Robert Wiebe's *The Search for Order*. In his analysis populist discontent and anxiety over finance, the decline of localism, and loss of frontier culminated in an overall angst that gave rise to progressivism. This urban disquiet over the safety of

the milk supply and the rural sense of dependence on railroad would lay the groundwork for 20th century reform efforts and introduce new options for transportation. It also changed the relationship between citizens and government. Twentieth century milk regulation and the embrace of motor trucking were not spontaneous developments, but can trace continuities to these 19th century phenomena.

Chapter 4: The Era of Reform and Regulation, 1894-1917

The span of years beginning around 1894, when the first laws attempting to clean up urban stables were enacted, and 1917, when Baltimore's most comprehensive milk legislation was passed, were a time of remarkable change in the prominence of public health in civic and even rural life. Agitation by reform-minded segments of the populace, especially middle class women, motivated the Health Department to address the milk problem and supported its progressive pro-regulatory actions, which increasingly extended city thoughts and values into the country. Rural producers and urban dealers attempted to find ways to cooperate to improve the milk supply. A series of progressive regulations, culminating in the 1917 milk ordinance, redefined the milk trade in ways that paved the way for the growth of large dairying entities and shifts in transportation modes.

Laboratory Science

Within a few years of legally defining milk's makeup in 1894, the officials of the Health Department were encountering the limitations of butterfat content as a marker of quality and beginning to incorporate germ theory into their policy recommendations. The reason was a growing surety that bacteria in milk was directly connected to its propensity to cause illness.¹³² Previous theories reasoned that milk

¹³² As early as 1902 the Health Department had pondered setting standards based on bacterial criteria. See Baltimore Health Department, *1902 Annual Report*, 135, 166.

soured naturally due to age and temperature, or was adulterated by human act or proximity to dirt and putrefaction.¹³³ In 1905 the Health Department reported to the mayor that bacterial quotient and temperature were better indicators of milk's safety than butterfat content or its chemical composition and for the next three years public health officials pled with the mayor and lawmakers to institute milk laws based on these measurements.¹³⁴

The appeals for bacterial standards did not, however, appear to shape the 1908 Food and Milk Ordinance, but it did grant the Health Department new powers to regulate directly the milk supply, increasing its independence as a regulatory agency. The 1908 law required for the first time that all parties engaged in the commercial sale or handling of milk obtain a permit. It set new standards for sanitation and initiated the inspection of rural dairy farms by city milk inspectors. It also revised the legal definition of milk, raising the minimum butterfat content to 3.5 percent.¹³⁵ The 1908 ordinance also attempted to ban outright the sale of milk in Baltimore from swill-fed cows.¹³⁶

133 Howard, *Public Health*, 37-38.

134 Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1905* (Baltimore, Md.: Baltimore Health Department, 1906), 90-1; Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1906* (Baltimore, Md.: Baltimore Health Department, 1907), 119; Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1907* (Baltimore, Md.: Baltimore Health Department, 1908), 13.

135 Howard, *Public Health*, 76.

136 Howard, *Public Health*, 76. This ban was met by a legal challenge by urban stable owners who succeeded in securing an injunction against enforcement of the ban on swill feeding. The matter would be held up in court for several years, during which the Health Department could do little to stop the practice. See Baltimore City Health Department annual reports 1909 through 1915 make explicit mention of the case still being unresolved. See, for instance, Baltimore Health Department, *1915 Annual Report*, 276.

Although the legal definition of milk in Baltimore after 1908 may have still been described in terms of chemical composition, the city's public health officials began setting recommended practices around bacteriological factors. For instance, although the 1908 ordinance did not change the law regarding temperature, that same year the Health Department sent notices to all milk producers recommending that milk be kept at a temperature of 50°F or lower, a number connected scientifically to bacterial growth rates.¹³⁷

Progressive Reforms

Although the Health Department took on the milk problem in an official capacity, producers and dealers also worked on ways to address the milk problem. In 1908, Dr. R. J. Patterson of the Maryland State Experiment Station called a meeting on “proper” dairy production techniques to which dealers and producers were invited.¹³⁸ The result was the foundation in 1909 of the Maryland State Dairymen's

¹³⁷ The 1894 Baltimore city ordinance against the adulteration of milk had required it to be kept at no more than 60°F. See Howard, *Public Health*, 76. The lower 50°F recommendation was based on the bacteriological studies of American bacteriologist Herbert Conn whose tests between 1890 and 1903 determined that milk soured because of bacterial growth and that milk above 50°F served as an ideal breeding ground for bacteria. See Herbert William Conn, *Bacteria in Milk and Its Products, Designed for the Use of Students in Dairying and for All Others Concerned in the Handling of Milk, Butter or Cheese*, (Philadelphia: P. Blakiston's Son & Co., 1903), 171-2. A subsequent report established that even at the standard 50°F the number of bacteria in milk would rise to between double and six-fold in as little as six hours. See Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1912* (Baltimore, Md.: Baltimore Health Department, 1913), 610. The 50°F number recommended by the Health Department proved somewhat more idealistic than practical. Many farmers at the time cooled their milk in spring houses but the average temperature of spring water in Maryland was slightly higher than 50°F year round. See Charles P. Doane, *Economical Methods for Improving the Keeping Qualities of Milk*, Bulletin No. 88 (College Park, MD: Maryland Agricultural Experiment Station, 1903), 47. Meckel, *Save the Babies*, 79;

¹³⁸ Wessel, “Learning to Cooperate,” 103.

Association (MSDA) as an organization of producers and dealers dedicated to promoting the production of milk of highest quality through education.¹³⁹ Although the ability to collectively bargain for members' rates was part of its charter, it did not at first engage in price negotiation.¹⁴⁰ Instead it set out to be a state-level organization of all parties in the dairy industry to foster sanitary production methods in response to the public outcry that had arisen over milk safety.¹⁴¹ While the failure of UMPA in 1900 had left milk producers in the Baltimore milk shed leery of forming new organizations for almost a decade, the MSDA's cooperative focus was quite attractive and the new organization's goals doubtless appeared quite laudable.

The MSDA was unique in that it had members of both producers and dealers on its executive committee, including Asa B. Gardiner, Jr., an earlier staunch opponent of UMPA, representing the Baltimore milk dealers.¹⁴² Elected president was Samuel M. Shoemaker, Jr., of the 1904 road funding law, himself Chairman of the Maryland State Board of Agriculture.¹⁴³ MSDA served initially as a forum for dealers, producers, and allied agricultural experts to exchange views without public scrutiny, and to promote fairs and competitions for sanitary agricultural achievements.¹⁴⁴

Private citizens played a pivotal role in determining the contours of regulation in Baltimore and, through this, were crucial in setting in motion changes in dairy transportation. Reflecting on Health Department activities of the time William Howard, Jr., Assistant Commissioner of Health in Baltimore from 1915-19, wrote that

139 Wessel, "Learning to Cooperate," 102.

140 Wessel, "Learning to Cooperate," 103.

141 Wessel, "Learning to Cooperate," 103.

142 Wessel, "Learning to Cooperate," 103.

143 "For Improved Dairying"; Wessel, "Learning to Cooperate," 108, 137. Shoemaker was also a member of Knox's organization, the American Association for the Prevention of Infant Mortality.

144 Wessel, "Learning to Cooperate," 105.

much of the ability of the Health Department to enact meaningful policy required public engagement and support.¹⁴⁵ The quality of the milk supply rose to such a great concern in the early 20th century that it became the focus of a broad progressive social reform effort.¹⁴⁶ Private citizens and public officials cooperated closely on social reform efforts, often with different methods or capacities, but generally sharing overlapping goals. While health professionals might propose the most effective choices of action based on expertise, much of the mandate and agitation for milk reform in Baltimore came from private citizens. Historian of medicine John Duffy maintains that the larger milk producers and dealers were responsible for much of the milk legislation in New York, but these parties appear to have played a small role in Baltimore.¹⁴⁷ Instead, citizen activist groups spurred much of the milk legislation. The changes in the milk trade resulting from these social reform efforts would eventually give rise to circumstances that favored the use of trucks over trains.

145 Howard, *Public Health*, 161.

146 Milk reform was a national phenomenon, and tied closely to overall concerns about the safety of food and drugs, yet federal regulatory efforts, such as the 1906 Pure Food and Drugs Act, receive curiously little mention in the primary sources consulted relating to Baltimore. This may have been because Baltimore had already passed several of its own truth-in-labeling laws between 1797 and 1904. Cohen asserts that the federal law was “weak” and thus it may have seen little enforcement in Maryland. Baltimore was receiving milk from outside Maryland so federal guidelines would have been applicable, yet there was no mention found of the Health Department invoking the federal government to deal with interstate violators. More particularly, because the Pure Food and Drug Act dealt with labeling, and even properly labeled milk could become pathogenic, its overall relevance to the specifics of this one product were limited. Nevertheless, federal intercession on behalf of consumers combined with the popularity of such writings as Upton Sinclair’s *The Jungle*, show that the milk problem was part of a larger moment of actualization in which consumers began to see themselves as having rights in safe foodstuffs. See Lizabeth Cohen, *A Consumers’ Republic: The Politics of Mass Consumption in Postwar America*, 1. Vintage Books ed (New York: Vintage Books, 2004), 21-22; Susanne Freidberg, *Fresh: A Perishable History* (Cambridge, Mass: Belknap Press of Harvard University Press, 2009), 210.

147 The main organization representing the larger milk dealers in Baltimore after 1900, the Milk Bottlers' Exchange, did come out publicly in favor of many regulations, but it even favored some regulations by which its own members would be disadvantaged, such as the 1917 ordinance requiring pasteurization. See Duffy, *Sanitarians*, 184; Wessel, “Learning to Cooperate,” 43.

By 1909 the question of infant mortality as a public health problem had risen to enough prominence that it prompted a national conference in Connecticut where like-minded medical professionals met, including the BMFA's Dr. Knox. The output of this meeting was the formation of a national organization, the American Association for Study and Prevention of Infant Mortality (AASPIM), with Knox as its initial director.¹⁴⁸ Despite beginning reform efforts somewhat late, Baltimore's reformers became respected players on the national reform stage.

Social reform groups founded before or around the turn of the century such as the BMFA and CMIF were generally focused on the welfare of the poor, or, in the case of the Arundell Good Government Club, on the elimination of corruption in government.¹⁴⁹ These groups were supported broadly by the upper middle class with sufficient leisure time to participate in such reform activities. Those with lower incomes were more often the objects of reform activity than themselves activists. The focus on poverty was not merely charitable, but seen as a way to combat epidemics. Early sanitarian positions had often equated illness and poverty, maintaining that the poor were more often sick because they were poor, or both sick and poor because of a lack of moral fiber, a concept also bound up in ideas of morality and divine will.¹⁵⁰ This soon would be supplemented by the idea espoused by infant welfare activists that poverty, and illness, were environmental in nature and that high levels of infant mortality among the poor were less a marker of immorality than ignorance or even incompetence.¹⁵¹ Apart or in tandem these attitudes focused reform on both the

148 Meckel, *Save the Babies*, 109.

149 Weaver, "Maryland Women and the Transformation of Politics," 12.

150 Duffy, *Sanitarians*, 99.

151 Meckel, *Save the Babies*, 157-8.

character of the person, as well as their living environment and, depending on the reform organization, both tactics were applied.

While 19th century social reform organizations had often been oriented toward the poor, by the early 20th century the focus had broadened to include all citizens. This was partly due to the 1904 fire that devastated a large portion of the city giving new weight and importance to civic reform efforts generally.¹⁵² One of the most active organizations in Baltimore pushing for the reform of milk in such a comprehensive manner was the Women's Civic League. Formed in 1911 as an outgrowth of the Arundell Good Government Club, the Women's Civic League (WCL) was devoted to a "clean" Baltimore, with the slogan "clean air to breathe, clean water to drink, clean milk for the children and clean streets and alleys."¹⁵³ At first the WCL encouraged the beautification of public and private spaces alike, often through the planting of trees and flowers, and organized diverse efforts to improve the quality of life of all Baltimore residents.

The WCL's members were generally white, middle or professional class women, most having a college education, and whose husbands were frequently doctors, lawyers, or businessmen.¹⁵⁴ Although most women's social reform groups in Baltimore shunned cooperation with African American social reform groups due to a pervasive strain of white supremacy among Maryland's progressive reformers, the WCL engaged the African American community in reform efforts, in 1913 forming

152 Weaver, "Maryland Women and the Transformation of Politics," 6.

153 "Women For Clean City: Civic League Will Hold Big Meeting April 7 to Outline Plans for Work," *The Sun*, April 1, 1911; Weaver, "Maryland Women and the Transformation of Politics," 30-1.

154 Weaver, "Maryland Women and the Transformation of Politics," 9-10. A number of the husbands were themselves progressive activists. See Crooks, *Politics and Progress*, 224-36.

the affiliated Women's Cooperative Civic League (WCCL).¹⁵⁵ The WCCL advanced the campaign for better milk in and for Baltimore's African American community and the two groups regularly shared expertise and cooperated in reform efforts.¹⁵⁶

The presence of women in Baltimore's reform movement was not uncommon. Nor was the leadership of women in public cleanliness efforts limited to Baltimore. It was part of a national conception of women as "municipal housekeepers."¹⁵⁷ Despite the regimented and segmented Victorian ideals of gender roles, social causes became an accepted, even expected, way for 19th century women of the upper middle and affluent classes to engage in civic life throughout the country. Nor was agitation for milk reform at odds with the Victorian notion that women's activities should be limited to the home. Caring for the less fortunate, nurturing children, and overseeing the food supply of families was viewed as an appropriate activity areas for women, whether conducted in the private or public spheres.¹⁵⁸

In 1914 women's groups in Baltimore began to become strategically focused on issues rather than general civic reform.¹⁵⁹ The WCL's target was the milk supply of Baltimore. The group's publication *The Town* began in 1915 and served as an additional organizing tool, facilitating communication with members, and agitating against city forces it found deficient in protecting the milk supply. Of all social

155 Weaver, "Maryland Women and the Transformation of Politics," 10, 55; Raymond Stanley Sweeney, *Progressivism in Maryland, 1900-1917* (Chapel Hill: University of North Carolina Press, 1972), 17.

156 Weaver, "Maryland Women and the Transformation of Politics," 55-56.

157 Hoy, *Chasing Dirt*, 32, 62, 72; Elizabeth King Ellicott, who founded the Arundell Good Government Club herself referred to the civic work that the group did as "municipal housekeeping." See Weaver, "Maryland Women and the Transformation of Politics," 13.

158 DuPuis, *Nature's Perfect Food*, 61; Hoy, *Chasing Dirt*, 73.

159 Weaver, "Maryland Women and the Transformation of Politics," 37.

reform groups in Baltimore, the Women's Civic League was at the forefront of addressing the milk problem.

While many reform groups held lectures where expert speakers would convey the latest information and make calls for action, the WCL also engaged in practical research and financial underwriting of efforts to improve the milk supply. In 1914 the organization appears to have provided the Health Department with sufficient funding to hire three new inspectors.¹⁶⁰ In 1915, after appealing to federal authorities to help solve the milk problem and being told that there was insufficient information on which base legal action, the WCL conducted its own research, which it published as *The Modern Milk Problem*.¹⁶¹

Despite ongoing questions about the safety of the milk supply, its consumption continued to grow. The national production rate rose from 235.5 million gallons in 1870 to 5.2 billion gallons in 1899.¹⁶² Baltimore's milk consumption, however, lagged behind that national average. In 1903 the national average for cities over 100,000 inhabitants was 0.61 pint per person per day, but in Baltimore this rate was 0.39 pint.¹⁶³ Nevertheless, the amount of milk shipped into the city rose steadily

160 Contemporary Baltimore Health Department annual reports only specifically mention the WCL's funding in connection with one chemist, but remark that three new inspectors were added in 1914. Fox writes in 1914, however, that six men were inspecting farms and three of them had been funded, or at least lobbied for (the text is unclear) by the Women's Civic League. See Baltimore Health Department, *1914 Annual Report*, 330, 356; Fox, "Health Administration in Baltimore," 1516.

161 Anne Galbraith Carey, "Observe-Read-Understand-Talk-About Milk," *The Town* 3, no. 5 (November 17, 1917): 4.

162 Specific numbers are difficult to determine because the Census of Agriculture conducted by the United States government did not list milk among its products of agriculture until 1870 See U. S. Bureau of the Census, "Historical Statistics of the United States: Colonial Times to 1957" (Washington, DC, 1960), 292-3; U. S. Bureau of the Census, "Seventh Census of the United States" (Washington, DC, 1850); U. S. Bureau of the Census, "Agriculture of the United States in 1860 Compiled from the Original Returns of the Eighth Census" (Washington, DC, 1860); U. S. Bureau of the Census, "Ninth Census of the United States" (Washington, DC, 1870), 84; U. S. Bureau of the Census, "Report on the Productions of Agriculture as Returned in the Tenth Census of the United States" (Washington, DC, 1880), 141.

163 Alvord and Pearson, *200 Cities*, 84.

over time (Appendix D), indicating that Baltimore's population grew more than its individuals' appetite for milk.

The 1912 Milk Ordinance

The 1903 finding that bacterial counts benign to adults could be dangerous to infants added fuel to a pro-pasteurization movement that was already well underway. Louis Pasteur's experiments in the mid-1860s showed that heating beer and wine to over 140°F for a few minutes stopped them from spoiling as quickly.¹⁶⁴ The heat killed off bacteria in the fluid. The use of heat itself was not novel. Mothers had been encouraged to boil milk for their babies since at least the 1820s, but this practice changed its flavor in ways many adults found objectionable.¹⁶⁵ In 1886 Austrian chemist Franz Ritter von Soxhlet employed Pasteur's technique, which would be commonly called pasteurization, on milk and developed a device to pasteurize milk for babies in bottles.¹⁶⁶ Soxhlet's process was found not to be entirely effective at eliminating bacteria or preserving flavor and, in response, two types of pasteurizer were developed, one using a higher temperature of about 178°F and shorter time (the flash method) and the other using a lower temperature of around 140°F but a longer heating duration (the hold method).¹⁶⁷ The former would become the most prevalent

164 Selitzer, *The Dairy Industry in America*, 130; Valenze, *Milk*, 212. Valenze avers that Pasteur himself only worked on the bacterial diminishment of wine and beer. Selitzer, however, states that Pasteur reported to the Scientific Society in Lille, France in 1857 that when heated through his process milk would take longer to sour.

165 Selitzer, *The Dairy Industry in America*, 130.

166 Selitzer, *The Dairy Industry in America*, 130.

167 Selitzer, *The Dairy Industry in America*, 130-1, 163. Valenze avers that Pasteur himself only worked on the bacterial diminishment of wine and beer. Selitzer, however, states that Pasteur reported to the Scientific Society in Lille, France, that when heated through his process milk would take longer to sour. In any case Soxhlet is largely seen as popularizing the process. See Valenze,

in early use, supplanted by the latter around 1907.¹⁶⁸ Commercial use of pasteurization for milk began in Europe around 1890 and came to the US in 1892 when a New Jersey milk dealer installed its first pasteurizer.¹⁶⁹ Baltimore is reported to have installed its first commercial pasteurizer in 1893.¹⁷⁰

Two camps arose around the issue of pasteurization, one maintaining that raw milk, when properly handled, could be kept safe and was the most healthful. The other side of the debate favored pasteurization to remove as much bacteria as possible thus ensuring the safety of all who drank such milk. This debate was not eased by the fact that around 1906 flash pasteurization was found to be inconsistent in its ability to kill germs but the alternative holding pasteurizers were less available and more expensive.¹⁷¹ Equipment and agreement on the proper temperatures at which to operate it appears to have delayed many health departments from taking earlier action on the question, including Baltimore's.

In 1912 the Baltimore City Health Department placed its weight behind pasteurization, setting maximum bacterial standards of 500,000 bacteria per cubic centimeter of milk and recommending mandatory pasteurization of all milk sold in

Milk, 212; Selitzer, *The Dairy Industry in America*, 130. Related to flash and hold pasteurization techniques was the technology that would later become prevalent outside the United States of ultra-high temperature pasteurization, which was essentially sterilization and allowed milk to be stored for longer periods of time. This was studied in the United States in the 1940s, but was not widely embraced commercially for reasons left unexplored in the milk historiography. See Selitzer, *The Dairy Industry in America*, 346-7.

168 Selitzer, *The Dairy Industry in America*, 131. In the 1910s and 20s an improved method of flash pasteurization would supplant the hold method.

169 Selitzer, *The Dairy Industry in America*, 131.

170 Selitzer, *The Dairy Industry in America*, 131. Selitzer's source for this date is uncredited. No mention of the 1893 installation of a pasteurizer in any Baltimore dairy plant could be found in Health Department annual reports or Sun newspapers but in a 1911 advertisement the Gardiner Dairy claims to have been the first dairy in Baltimore "to pasteurize continuously." See Asa B. Gardiner, Jr., "The Baltimore Milk Supply: The Benefits of Pasteurization," *The Sun*, June 8, 1911, ProQuest Historical Newspapers: The Baltimore Sun.

171 Selitzer, *The Dairy Industry in America*, 163. An improved flash pasteurizer would return in 1917 and become the standard process used into the 21st century by American dairies.

the city, and noting that the “public is realizing more and more the danger from milk-borne infections and more slowly, the practical impossibility of producing in large quantity the ideally ‘pure’ raw milk.”¹⁷²

Pasteurization gave an aura of cleaner milk that was not always genuine. The pasteurization process, in killing off all bacteria, also served to kill off beneficial bacteria that in raw milk inhibited the growth of pathogenic bacteria. Accordingly, any new spores of pathogenic bacteria grew faster in pasteurized milk than in unpasteurized milk. Pasteurization thus necessitated a corresponding importance in temperature control and cleanliness to retard all bacterial growth.¹⁷³ Pasteurized milk needed to be kept colder than unpasteurized milk. While earlier standards required 60°F, recommended 50°F, but were generally loosely enforced, the 1912 ordinance required milk to be refrigerated by the farmer to 50°F or less immediately after milking and held at that temperature until delivered to the railroad station.¹⁷⁴

“College Boys” and Dairy Farmers

Although milk legislation in 1908 provided the mandate for Health Department personnel to inspect rural dairy farms, for reasons unclear in the Health Department's reports such inspections did not begin until 1911.¹⁷⁵ Before inspections

172 *Baltimore Health Department, 1912 Annual Report*, 477, 516-7. By this point “pure” milk had been legally defined as milk from healthy cows, unskimmed, unadulterated, and with no less than 12.5 percent solids, 3.5 percent butterfat, and a specific gravity of 1.029 at 60°F. See Fox, “Public Health Administration in Baltimore,” 1512.

173 Fox, “Public Health Administration in Baltimore,” 1517.

174 *Baltimore Health Department, 1912 Annual Report*, 516-7. Milk was allowed to rise to 60°F during delivery, however.

175 The state of Maryland did have authority to inspect farms, but because it had assigned sanitary inspections to its Livestock Sanitary Board, few inspections of rural farms were made, leading the U.S. Public Health Service to refer to the work of the state in farm inspections as “inert.” See Fox,

began the city's chief recourse for any milk violations remained limited to spilling out milk it found unacceptable.¹⁷⁶ Even after the summer of 1911, when rural farm inspections began, they were random and with only two farm inspectors to cover over 2,000 producers, many farms escaped a visit.¹⁷⁷ After 1912 the new threat of a permanent ban on any farmers selling adulterated milk into Baltimore diminished the incidences of adulteration violations by farmers. Together with an educational campaign, and regular inspection of rural farms, by 1913 some 71 percent of the milk arriving by rail was below the official standard bacterial count of 500,000 bacteria per cubic centimeter, compared to only 28.1 percent in 1912.¹⁷⁸ Although there were violations cited, the Health Department noted the general cooperation, even support, received from milk producers.¹⁷⁹ Even as the Department saw much to improve on the farms of the milk shed, the relationship with producers appeared frequently much more cooperative than that with dealers.

Rural producers seldom took pen in hand to comment on directives from the city, but the occasional voice dissented. Rural pundits were most often concerned with questions of finance and equity, especially the perennial worries over rates and

“Public Health Administration in Maryland,” 254-5.

176 In 1900 the Health Department reported that so few arrests resulted in actual prosecutions that they had ceased arresting violators. See Baltimore Health Department, *Annual Report of the Department of Public Safety, Sub-Department of Health, to the Mayor and City Council of Baltimore, for the Fiscal Year Ended December 31, 1900* (Baltimore, Md.: Baltimore Health Department, 1901), 67; On the success rates of prosecution on food related health laws see Marc T. Law, “The Origins of State Pure Food Regulation,” *Journal of Economic History* 63, no. 4 (December 2003): 1103–30; Marc T. Law, “How Do Regulators Regulate? Enforcement of the Pure Food and Drugs Act, 1907-38,” *Journal of Law, Economics, & Organization* 22, no. 2 (October 2006): 459–89.

177 Baltimore Health Department, *1912 Annual Report*, 514.

178 Baltimore Health Department, *1912 Annual Report*, 444; Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1916* (Baltimore, Md.: Baltimore Health Department, 1917), 146; Baltimore Health Department, *1913 Annual Report*, 669; Baltimore Health Department, *1913 Annual Report*, 606.

179 Baltimore Health Department, *1913 Annual Report*, 562-3.

unscrupulous city dealer practices; however, sometimes other matters were expressed.¹⁸⁰ A 1913 letter to the *Sun* editor from a dairy farmer objected to inspections from city officials, exhorting the Health Department not to “send your college boys out to our dairymen to instruct them how to produce clean milk” but instead focus on “your unreliable, dirty and filthy milk dealers.”¹⁸¹

The objections of the farmer provide a counterpoint to the Health Department’s mention of frequent cooperation. The farmers might have been cooperative, but they weren’t all happy about it. Some resented the idea that those with academic credentials had something to show experienced farmers, viewing the concerns of the Health Department over cleanliness as officious and misplaced. The dig at education shows that despite the widespread push among progressive agricultural organizations like the MSDA toward education and the adoption of scientific farming, classroom learning was seen at least by some farmers to be subordinate to experience. The words plainly reveal the long-held friction between producers and dealers persisted despite MSDA cooperations. The writer also aligns with most of his fellow producers who felt that the milk they sent to the city was good. What happened to it after it was put on the train was a city problem. In writing to the *Sun* newspaper, as opposed to an agricultural periodical the writer clearly hoped to reach an urban audience already animated by the milk question.

The writer’s protest was not without merit. The problem of illness connected to milk was by far an urban issue. Testing bore out the assertion that milk’s condition

180 “The Quiet Observer,” *Maryland Farmer*, December 19, 1919, 8-9.

181 W. Evans Anderson, “A Plain Countryman Grows Sarcastic at the Expense of Baltimore Dairy Inspectors and Says the Trouble with the Milk Is in the City and Not in the Country,” *The Sun*, January 28, 1913.

was most deteriorated at the point of sale.¹⁸² It also shows that not every farmer was interested in the MSDA's message of cooperation. Nor did the writer's complaints go entirely unheeded. The Health Department began to turn its focus toward city dealers shortly thereafter, especially those who sold "loose" milk door-to-door, a practice that fostered very high bacterial counts through unsanitary handling.¹⁸³ By 1914 the sales outlets for milk, be they independent delivery services or stores, were considered the areas of greatest contamination of the milk supply by the Health Department.¹⁸⁴

The Industrialization of Milk Dealing

Although the majority of dairy farms in the Baltimore milk shed were of similar in size and structure, the gradations in scale between Baltimore's milk dealers at the turn of the 20th century were broad, and contentious. Common among all dealers was the role of intermediary between the farmer and drinker, but by 1900 dealers ranged from the single merchant with a horse cart to firms with significant technological and capital investments in processing and delivery machinery.¹⁸⁵

182 Baltimore Health Department, *1914 Annual Report*, 290.

183 In 1912, for example, 55.7 percent of milk inspected at railroad stations was over the standard of 500,000 per cubic centimeter, but 71.9 percent of milk in stores and 83.1 percent of wagons exceeded the limit. See Baltimore Health Department, *1912 Annual Report*, 444.

184 Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1914* (Baltimore, Md.: Baltimore Health Department, 1915), 333.

185 Contemporary accounts show that "dealer" or even "dairy" appeared to encapsulate different functions at different times, sometimes used interchangeably, other times referring to specific functions. It is not even entirely possible to separate the milk producer from the dealer because many milk producers engaged in processing activities. The milk dealers, however, were very specific about the differences, with the larger enterprises preferring "dealer" to describe a firm that bottled, and delivered milk (often pasteurizing it first), versus a "distributor" or "peddler" who sold unprocessed "loose" milk. See Wessel, "Learning to Cooperate," 22; Of the farms in the Baltimore milk shed with their own dairies the most famous is likely Brooklandwood of Capt. Isaac Emerson, inventor of Bromo Seltzer, whose on-farm store regularly sold as much as \$350 of milk daily in 10¢-15¢ servings. See McGrain, *Agricultural History of Baltimore County*, 82;

Between these two poles lie a range of activities that were often conducted in fierce competition, with substantial animus between the larger industrializing dealers and the small operators. The former thought of the latter as “peddlers” who were apt to provide sub-standard milk, while the latter found the former to be monopolists seeking every opportunity to drive smaller players out of business.¹⁸⁶

The smaller distributing merchants played a substantial role in the urban dairy scene before the First World War. Two of the firms that would later become dominant players in the market, the Western Maryland Dairy, and Fairfield Farms Dairy, had both started out as small operations.¹⁸⁷ With few barriers to entering the milk sales trade beyond a wagon and horse, many of the smallest dealers would move in and out of business as it suited them, or their profits dictated.¹⁸⁸ The advent of Health Department permitting in 1908 may have stopped some prospective milk distributors from engaging in the business, but many simply continued to operate without a permit.¹⁸⁹ Their casual attitudes toward health regulations and general scorn of industrializing dairying put them increasingly at odds with the local government and the larger dealers.

“Brooklandwood Farms,” *Maryland Farmer* 3, no. 23 (February 27, 1920): 2.

186 Doubtless in an effort to distinguish on the basis of quality the City Dairy opined in a press release published in newspapers, “There is a marked distinction between a ‘DISTRIBUTOR’ of Milk and a properly and ADEQUATELY EQUIPPED MILK DEALER. A ‘distributor’ of Milk is a ‘peddler’ of Milk. As dealers, we buy Milk, which must be pasteurized-bottled-capped-refrigerated-and delivered to consumers at early morning hours...” (*capitalization in original*). See City Dairy, “Milk: This Statement by the City Dairy Concerns Every Milk Consumer in Baltimore,” *The Democratic Advocate*, August 24, 1917, 8; The key differentiating factor between dealers and peddlers appears to have been the former’s use of bottles. The slogan of the International Milk Dealers’ Association was “An Organization Built on Service to the Man who Sells Fresh Milk in Bottles.” See R. E. Little, “General Bulletin No. 18,” *The Milk Dealer* 11, no. 10 (July 1922): 6–10.

187 Washburn et al., *A History of Pylesville*, 97; Wessel, “Learning to Cooperate,” 158; “C. R. Bowman, Dairy Concern Head, Is Dead,” *The Sun*, August 29, 1933, 18.

188 Wessel, “Learning to Cooperate,” 19.

189 Baltimore Health Department, *1913 Annual Report*, 680.

On the other end of the spectrum, the city's largest dealers were a small group of ambitious, industrially-oriented firms.¹⁹⁰ One of the longest running dairies in Baltimore was Irvin Baxter's Western Maryland Dairy. From humble beginnings with two wagons, Baxter patiently grew his business until, by the time of his death in 1931, he headed the largest dairy concern in Baltimore.¹⁹¹

Asa B. Gardiner, Jr. was perhaps the most colorful and outspoken dairyman in Baltimore's milk shed. As we've seen, he was a founding member of the MSDA and keenly involved in the Good Roads cause. Despite occasional frictions, he tended to keep constructive relationships with the milk producing community. He was, however, frequently vocal on milk issues and was unafraid to take critics to task in open letters to the editor in Baltimore newspapers to support his belief in scientific methods and the benefits of pasteurization.¹⁹²

Gardiner's approach clearly preferred the customer to be, in historian Lizabeth Cohen's terms, a purchaser and not a citizen consumer.¹⁹³ For Gardiner, it was up to experts and industry leaders to educate the consumer and even publicly chastise them when they advanced contrary notions. Gardiner's attitude that intercession by experts was sometimes necessary to save consumers from themselves was, to a certain degree, shared by the writings of Health Department officials in their annual reports.¹⁹⁴

190 "Milk By Pints Advances," *The Sun*, November 26, 1913, 5.

191 "Pioneer in Milk Business Dies: Irvin D. Baxter, Dairy Head, Dies," *The Sun*, January 25, 1931.

192 Gardiner's missives in newspapers are widespread, and deal with a range of issues, from disputes over pricing, concerns about trust building, and hygiene. He could occasionally become quite undiplomatic in tone, accusing critics of being "mentally deranged" or having over-consumed alcohol before writing. See Asa B. Gardiner, Jr., "Mr. Gardiner Says 'Consumer' Talks Like an Ass," *The Sun*, September 18, 1920, sec. Letters to the Editor, 6.

193 Cohen, *A Consumers' Republic*, 56-7.

194 Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1918* (Baltimore, Md.: Baltimore Health Department, 1919), 123-4.

Intercessions by industrializing dealers also began to happen in the country. One of the first manifestations of this was the appearance of the city milk agent in rural areas. The agent would arrange for wagons to pick up milk from farmers directly and deliver it to the local train station.¹⁹⁵ Such collection services were not utilized by all farmers, but became increasingly popular toward the end of the 19th century because they freed up more time for the farmer to conduct other tasks.¹⁹⁶ Notable was that a representative from the city concern was making logistical arrangements for rural people in rural settings.

Another manifestation of city dealers in the countryside was their involvement in creameries. Essentially butter-making factories, creameries began to be constructed first by farmers in the 1870s.¹⁹⁷ Whereas farmers tended to establish creameries on the property of a local farm, urban-oriented dairy companies often situated their facilities by rail lines or, later, highways to take advantage of surplus milk.¹⁹⁸

In the city proper, divisions between small and large milk dealers in Baltimore only increased after the turn of the century. Many of the larger firms made investments into technologies that would give them advantages over their competitors. Chief among these was the automatic bottle filler, which rapidly increased the amount of milk that could be prepared.¹⁹⁹ Also prevalent was the growth of pasteurization equipment, as we have seen. Twenty eight Baltimore dealers were pasteurizing milk in 1914.²⁰⁰ For certain segments of the dealer population, often

195 Selitzer, *The Dairy Industry in America*, 115.

196 Selitzer, *The Dairy Industry in America*, 112.

197 Selitzer, *The Dairy Industry in America*, 116.

198 Wessel, "Learning to Cooperate," 14-15.

199 Selitzer, *The Dairy Industry in America*, 200.

200 The type of pasteurization employed, the quicker "flash" method or the slower "holding" method, came increasingly under scrutiny from 1912 on. Holding was preferred. See Baltimore Health Department, *1914 Annual Report*, 342-3; Baltimore Health Department, *1912 Annual Report*, 478.

those with the largest market segments, dairying was rapidly becoming an industrial pursuit to which other parties would simply need to adapt.

The Pasteurization Ordinance of 1917

Despite the ordinances of 1908 and 1912, the milk problem persisted in large part due to wide disregard of Health Department recommendations to pasteurize or varying understandings about what effective pasteurization entailed.²⁰¹ Agitation for greater action, such as generated by the WCL, was only increasing due not only to the persistence of milk illnesses, but very likely an overall rise in consumers' belief in their right to demand a safe food supply.²⁰² To address the continued issues, Baltimore Mayor James Preston empaneled a special committee in October of 1916 chaired by renowned physician and microbiologist William H. Welch of Johns Hopkins University Hospital. Educated in Germany, Welch had long been an advocate of

201 Even into the 1930s the Health Department was still endeavoring to set standards for pasteurization equipment. Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1930* (Baltimore, Md.: Baltimore Health Department, 1931), 98.

202 Milk reform was a national phenomenon, and tied closely to overall concerns about the safety of food and drugs, yet federal regulatory efforts, such as the 1906 Pure Food and Drugs Act, receive curiously little mention in the primary sources consulted relating to Baltimore. This may have been because Baltimore had already passed several of its own truth-in-labeling laws between 1797 and 1904. Cohen asserts that the federal law was "weak" and thus it may have seen little enforcement in Maryland. Baltimore was receiving milk from outside Maryland so federal guidelines would have been applicable, yet there was no mention found of the Health Department invoking the federal government to deal with interstate violators. More particularly, because the Pure Food and Drug Act dealt with labeling, and even properly labeled milk could become pathogenic, its overall relevance to the specifics of this one product were limited. Nevertheless, federal intercession on behalf of consumers combined with the popularity of such writings as Upton Sinclair's *The Jungle*, show that the milk problem was part of a larger moment of actualization in which consumers began to see themselves as having rights in safe foodstuffs. See Lizabeth Cohen, *A Consumers' Republic: The Politics of Mass Consumption in Postwar America*, 1. Vintage Books ed (New York: Vintage Books, 2004), 21-22; Susanne Freidberg, *Fresh: A Perishable History* (Cambridge, Mass: Belknap Press of Harvard University Press, 2009), 210; Marc T. Law and Gary D. Libecap, "The Determinants of Progressive Era Reform: The Pure Food and Drugs Act of 1906," *National Bureau of Economic Research Working Paper Series* 10984, no. 10984 (2004).

bacteriological testing of milk and had come to espouse a public health, “sociologic,” focus on preventative care rather than individual patient cure.²⁰³ Although also President of the Maryland State Board of Health, Welch was the primary instructor at Johns Hopkins University Medical School where he had been teaching bacteriology and pathological anatomy since 1884.²⁰⁴ Historian of public health William Howard credits Welch with having influenced the “entire medical profession of Baltimore” through his lectures and laboratory work.²⁰⁵ Indeed, a number of Health Department personnel appear to have studied under Welch, including Howard himself.²⁰⁶ Although he referred to himself as a physician rather than a humanitarian, Welch was one of Baltimore's leading progressives who espoused efficiency, stronger governmental involvement in public health, reduction of political influence on public health appointments, and above all the use of scientific principles in shaping public policy.²⁰⁷

The Welch Committee, itself composed of members from the City Council, the Health Department, the Maryland State Board of Agriculture, and the Women's Civic League, submitted its report in the form of draft legislation for a new ordinance governing milk production.²⁰⁸ The WCL had garnered enough social and political

203 Meckel, *Save the Babies*, 112.

204 Carroll Fox, “Public Health Administration in Maryland,” 295; Howard, *Public Health*, 15.

205 Howard, *Public Health*, 15.

206 “Medical Archives of the Johns Hopkins Medical Institute: The William T. Howard, Jr. Collection,” n.d., http://www.medicalarchives.jhmi.edu/papers/howard_wt.html.

207 William H. Welch, “Duties of a Hospital to the Public Health,” in *Papers and Addresses*, vol. 1, 3 vols. (Baltimore: Johns Hopkins University Press, 1920), 621–28; Elizabeth Fee, *Disease and Discovery: A History of the Johns Hopkins School of Hygiene and Public Health, 1916-1939* (Baltimore: Johns Hopkins University Press, 2016), 14.

208 The members were William H. Welch, Chairman; Samuel M. Shoemaker, Jr.; Anne Galbraith Carey; Duke Bond; Thomas J. Faherty; Albert C. Tolson; J. Tyler Gray; Vincent L. Palmisano; William T. Howard, Jr., secretary; and Marion Hopkins. It is unclear whether Shoemaker's role was as representative of the MSDA or the Maryland State Board of Agriculture. The presence of Carey, the Milk Director of the WCL, is evidence of her organization's influence in milk matters of the city. See William H. Welch, “Dr. Welch's Letter on Milk Ordinance,” *The Town* 3, no. 7 (December 1, 1917): 5–6; James H. Preston, “Mayor's General Message to the City Council, October 1, 1918,” in *Report of the City Officers and Departments* (Baltimore, MD: City of Baltimore, 1919), 36.

capital that Mayor Preston appointed Anne Galbraith Carey, the Milk Director of the Women's Civic League, to the Welch Committee. Carey was the only woman on the committee, and the only member of a reform group among a group otherwise staffed with medical and political elites.

As the contents of the draft bill became known, it garnered objections from smaller dealers that feared provisions of the bill would force them out of business due to the cost of equipment, or disadvantage them in favor of larger operations, creating a milk trust.²⁰⁹ These voices were drowned out by the chorus of public health officials, advocates for the poor, women's groups, and even the stolid *Sun* newspaper, all supporting stronger laws to protect the city's milk supply.²¹⁰

The law came into force June 1, 1917 as Ordinance 262 and brought sweeping change to Baltimore's milk trade. First and foremost it placed control over the city's entire milk trade in the hands of the Baltimore City health commissioner, resolving questions over jurisdiction that had previously prevented adequate enforcement.²¹¹ Regular sterilization of bottles, cans, and processing equipment became mandatory.²¹² It also created a grading system for the quality of milk based on bacterial count.²¹³ The law confirmed microbial standards for milk and mandated the previously recommended practice of pasteurization for all milk sold in Baltimore.²¹⁴

The two immediate effects of the law were a reduction in milk-related illness and tumult among milk dealers. The Health Department noted with some satisfaction

209 Wessel, "Baltimore's Dairy Industry," 154.

210 Wessel, "Baltimore's Dairy Industry," 150-3.

211 Howard, *Public Health*, 76.

212 Howard, *Public Health*, 76.

213 Raw milk was limited to 50,000 bacteria per cubic centimeter (cc). "Selected" grade milk could not have more than 30,000/cc after pasteurization and "standard" grade milk, 100,000/cc. Bacterial counts were stipulated for condition at time of delivery. See Howard, *Public Health*, 76.

214 Howard, *Public Health*, 76.

in 1918 that the rate of typhoid infection attributable to the milk supply had dropped to zero cases from 43, although this self congratulation would later be amended.²¹⁵

The law also contributed to the diminishment of disease vectors, if only by reducing the number of milk handlers. By prohibiting outdoor transfer of milk from one container to another, the 1917 law made illegal a widespread practice and forced smaller peddlers to begin bottling or exit the trade. Furthermore, the pasteurization equipment needed to be compliant with the law was not within the financial reach of many smaller dairies.

The response of those who felt disadvantaged by the law was to band together, with some 200 dealers forming the Milk Dealers' and Ice Cream Manufacturers' Protective Association (MDICMPA) for the purpose of fighting the 1917 ordinance and advancing the positions of the smaller dealers.²¹⁶ Despite their large membership, the MDICMPA faced opposition from almost every corner. The MDICMPA's newspaper advertisements warned of future price increases and cast specters of government overreach, including misleadingly stating that customers could be arrested and fined for returning unsterilized milk bottles to dealers.²¹⁷ These were met by a flurry of responses in favor of the law from the major milk dealers, the Women's

215 The total number of typhoid cases in 1917 had been 544 with 43 clearly attributable to milk. In 1918 the overall number dropped to 302, and in 1920 there is no mention of any cases connected to milk. The Health Department's 1920 annual report also credits improvements in the water supply for decreasing typhoid, and explicitly distances the drop in typhoid rates from the 1917 milk ordinance. It does, however, credit the law with renewing public confidence in milk. See Baltimore Health Department, *1918 Annual Report*, 32; Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1920* (Baltimore, Md.: Baltimore Health Department, 1921). 120-1.

216 Wessel, "Learning to Cooperate," 48. It is not clear if this was separate from or derived from the earlier Milk Dealers' Protective Association that opposed UMPA in 1900.

217 The veracity of the MDICMPA assertion is highly questionable. Customer responsibility for the care of milk bottles appears not to have been a provision of the 1917 law. Compare "A Milk Trust: An Inevitable Result of the Passage of the Proposed Milk Ordinance," *The Sun*, March 10, 1917 and "'Dipped Milk' Barred: Ordinance Provides City's Supply Shall Be Pasteurized," *The Sun*, January 30, 1917, 4

Civic League, and the *Sun* newspaper editors.²¹⁸ When the 1917 law passed, dealers were given six months to comply, in recognition that some adjustments to their processes and facilities may be needed. Many of the dealers in the MDICMPA stubbornly took no action, with only 900 of 2,000 milk permit-holders having complied with the applicable provisions by the deadline.²¹⁹ Enforcement began in earnest in November of 1917 to the dismay of unprepared milk dealers.²²⁰ Many smaller dealers and dairies went out of business.²²¹ From a 1917 market in which 300 dealers operated and the largest controlled only 15 percent of the market, two years after the passage of Ordinance 262 this had dropped to 100 dealers and the three largest dairies controlled half the milk business in the city.²²²

After passage of the 1917 ordinance Welch continued to be chief consultant to the Baltimore City Health Department. The formation of the Johns Hopkins School of Hygiene and Public Health in 1916 under Welch's leadership institutionalized public health as a separate discipline from general medicine and doubtless contributed to the increased professionalization and efficacy of the Health Department. Welch, together with Jones, Stokes, and doubtless other like-minded progressive staff at the Health Department would shape public health laws into the 1930s.

218 Wessel, "Learning to Cooperate," 48-50; "'Dipped Milk' Barred"

219 Wessel, "Learning to Cooperate," 50.

220 Samuel G. Imwold, "Letters to the Editor: The President of the Milk Dealers' Association Protests Against the Senseless Destruction of Milk by the Inspectors and Says He will be Compelled to Slaughter His Herd of One Hundred Cows if the Drastic Terms of the Ordinance are not Modified," *The Sun*, November 17, 1917.

221 It is not clear from the contemporary accounts the degree to which the economic depression in 1920-21 factored into falling dealer numbers, but it must also be seen as a contributing factor.

222 Wessel, "Baltimore's Dairy Industry," 155.

Conclusion

The progressive push for greater use of science in the interest of efficiency, and its belief, to paraphrase historian Steven Hayward, of economic and social progress through the expansion of the administrative state, reached its apex in the Baltimore milk industry with the 1917 milk ordinance.²²³ This was the culmination of attempts by reform groups, scientists, and health officials to combat milk-related ailments and as I will show in the following chapter, reshaped the dairy industry in ways that changed its expectation and vision of transportation. Public reform pressure saw the Health Department rise in prominence and be empowered by the populace and the legislature to address the milk problem, a mandate that increasingly inserted government and regulation into areas of milk production and distribution that it had not previously occupied, including extending urban law into the countryside in the form of farm inspections and challenging the livelihood of hundreds of milk dealers.

Bacteria in milk had been connected to illness and provided empirical justifications for a legal requirement to pasteurize milk, an action that favored industrializing milk dealers. Health-related social reform efforts, which had previously concentrated on the poor, began to focus on overall community. It is a mark of their influence and prominence that a representative from the Women's Civic League was appointed to the committee that drafted the 1917 milk ordinance.

The 1917 milk law indicates that progressivism in Maryland, at least in matters of public health, crested later than the 1912 high point Robert Wiebe cites for

223 Steven F. Hayward, "The Decline and Revival of *Laissez Faire* in the American Mind: An Outline of the Odyssey of Progressivism in Law, Economics, and Political Philosophy" (Doctoral Dissertation, The Claremont Graduate University, 1996), 3.

the movement's national acme, and more akin to the 1917 date cited by Raymond Sweeney.²²⁴ Embracing the tenets of rationality and efficiency, the Welch Commission suggested, and the mayor and city council agreed, that the safety and cleanliness of the milk supply outweighed the livelihood of many citizens. Furthermore, even as national progressivism diminished, the progressives in the Health Department did not disappear but continued to provide guidance on policy and procedure into the 1930s.

Regulatory structures came to have great influence on the modal shift between rail and road, but a great deal of their influence was mediated. Other than temperature requirements that largely affected trucks more than trains due to the latter's better abilities to maintain stable temperatures, the Health Department ordinances passed between 1908 and 1917 may appear on the surface to have little overt application to transportation. Nevertheless, as we will see in the following chapter, the ways in which they changed the milk trade in Baltimore would have lasting ramifications for transportation.

²²⁴ Wiebe, *The Search for Order*, 208; Raymond Stanley Sweeney, *Progressivism in Maryland, 1900-1917* (Chapel Hill: University of North Carolina Press, 1972), 276.

Chapter 5: Mergers and Modal Options, 1900-1925

As progressive regulatory activity was reshaping relationships within the Baltimore dairy trade, giving fewer dealers greater market share and fostering producers to organize, milk traffic coming into the city began to rise at an unprecedented rate, bringing Baltimore's railroads their milk boom years. Beginning in 1915, however, a quiet challenge to their modal dominance was being raised in the form of motor trucks operated by rural entrepreneurs. Good roads had begun to reach fruitful areas of the milk shed and allowed the producers to tap their long-sought alternative means of communication. At the same time, as I have shown, the dairy trade was rapidly coalescing into an industry, especially among urban dealers that sought new transportation methods commensurate with mass production.

Dairy Mergers

The result of so many dealers exiting the market after 1917 was in many ways a boon for the larger dealers, even though several of their number had not previously installed pasteurizing equipment and faced their own fiscal challenges due to the new law and wartime shortages.²²⁵ Although for the consumer the law promised a milk supply with fewer pathogens, it also set in motion a reorganization of the dairy trade in the city. Much of this came in the form of mergers. Mergers were not uncommon in the Baltimore dairy field. In the more fluid years leading up to and around the turn of the century when little capital was required to participate in the milk trade, mergers or

225 Wessel, "Learning to Cooperate," 43.

takeovers often happened as a business left the trade. These had been small affairs of little public concern. The first merger of consequence that took place in the Baltimore milk shed was that which created the City Dairy in 1914.²²⁶ It was consequential mostly because of its scope and the anti-monopoly protest it engendered. The idea to form the City Dairy had been in discussion between the parties since 1910 and had drawn consistent anti-monopolistic ire from the public.²²⁷ In 1912 the Gardiner, Pikesville, Holme & Waddington, and Western Maryland Dairies reentered merger talks because of duplication of delivery routes, but due to public grumblings they soon couched their merger talks as finding a way to provide farmers with a steady income and customers with an assured supply.²²⁸ Gardiner, spearheading the merger efforts, eventually got his way, but the 30 percent stake in the milk dealer market that City Dairy controlled as of 1914 was hard won from a suspicious public.

The Western Maryland Dairy opted out of the 1914 merger that formed City Dairy and remained the number two dairy after City's founding, but it quietly began absorbing several other dairies until, in 1921, it took over the City Dairy. Asa Gardiner was appointed president and Irvin Baxter chairman of the board of directors.²²⁹ By 1922 the combined Western Maryland-City Dairy processed 60 percent of Baltimore's milk supply.²³⁰ It continued to grow through further expansions

226 Included in the merger was his own Gardiner dairy, along with the Pikesville Dairy, Hygeia/Schier, and Holme & Waddington. See "Big Dairies Merge: \$1,500,000 Combination Becomes Effective Today," *The Sun*, April 1, 1914, 14.

227 "Milk Combine Feared: Consumers Are Watchful to Protect Their Own Interests," *The Sun*, September 23, 1910, 7.

228 "Talk of Dairy Merger: Consolidation of Companies Said to Aim at Simplified Deliveries," *The Sun*, December 6, 1912, 12; "More and Better Milk: Said to be the Aim of the Proposed Dairy Combination," *The Sun*, December 7, 1912, 3.

229 Wessel, "Learning to Cooperate," 23; "The Western Maryland City Dairies Have Department of Public Relations," *The Milk Dealer* 11, no. 7 (April 1922): 88.

230 "Dairy Industry Keeping Abreast of Present Day Policies," *The Milk Dealer*, September 1922, 90.

and mergers so that by the end of the 1920s Western Maryland-City Dairy was the dominant dairy in the Baltimore market.

If Irvin Baxter represented the traditional, start-from-scratch dairyman and Asa Gardiner the well-to-do anomaly, Charles Bowman represented a third model. At age 13 Bowman convinced his father to purchase a dairy farm, but after graduating from the Maryland Agricultural College, Bowman left the farm to begin a career as a chemist with the Baltimore City Health Department.²³¹ He worked in milk regulation enforcement until 1912 when he used his father's dairy farm to go into business as a milk dealer with a single wagon. Bowman essentially went from being one of the "college boys" of the Health Department to an independent milk dealer.²³² His company, Fairfield Farms, grew quickly and by 1920 it controlled more than a third of the city's milk supply.²³³ By 1922, the firms City Dairy and Fairfield Farms Dairy together controlled the majority of the milk sold in Baltimore.

Producers Organize

Dissatisfaction over milk rates paid by dealers had continued to simmer among dairy producers since the collapse of UMPA. As a progressive organization, one of the MSDA's early efforts was to encourage its members to compile statistics on the costs of operating a dairy farm. While this assisted in scientific farming efforts, it also allowed quantitative proof to accompany any negotiations for price

231 "C. R. Bowman, Dairy Concern Head, Is Dead."

232 It is unclear the extent to which Bowman's work as a health inspector was advantageous to him in his career as a dealer, but it would be hard to surmise that it was inconsequential.

233 "C. R. Bowman, Dairy Concern Head, Is Dead."

increases.²³⁴ The milk producers' contention that prices needed to be increased was vindicated in 1917 when the Tri-State Commission, empaneled by the governors of Maryland, Pennsylvania, and Delaware to study those states' milk industry, determined that the costs of dairy farming had risen substantially since 1910 without commensurate increases in milk prices.²³⁵ This led to the MSDA reorganizing to prioritize the pricing issue as part of its mission and activating for the first time the part of its charter that allowed it to engage in collective bargaining. The association discontinued memberships of milk dealers, although with the blessing of Asa Gardiner.²³⁶ Henceforth MSDA members would agree to sell their milk solely to the MSDA instead of directly to dealers, the MSDA would negotiate rates for sale and carriage of milk on behalf of participating producers, an independent arbitrator was empowered to settle disputes between MSDA producers and dealers, a mutual fund was established from which producers were paid for their milk including any surplus produced, and MSDA guaranteed dealers an adequate year-round supply of milk.²³⁷

The MSDA's cooperative model would prove remarkably successful largely due to its dual foci on managing surplus milk production and independent dispute resolution.²³⁸ Within a few years the MSDA handled most of the milk being produced in the Baltimore milk shed. Thus, by 1923, almost all milk sold in Baltimore moved through the tripartite network of Western Maryland-City Dairy, Fairfield Farms Dairy, and the MSDA.

234 Wessel, "Learning to Cooperate," 110.

235 Wessel, "Learning to Cooperate," 118-9; Harlean James, "Report of 'Tri-State' Commission," *The Town*, November 17, 1917. From 1910 to 1916 the cost of farm labor had gone up 70 percent, the cost of grain 36 percent and the cost of cows 71 percent. No mention is made of the cost of transportation or other handling.

236 Macaulay, "From Open Cans to Grade A Milk"

237 Wessel, "Learning to Cooperate," 136.

238 Wessel, "Learning to Cooperate," 145.

Despite this dominance in the field, the MSDA was a cooperative, not a trust. Membership, although strongly encouraged, was not mandatory. Its focus on consensus and independent dispute resolution appears to have been unique to Baltimore and served as a model for cooperation nationwide.²³⁹

MSDA and the Baltimore City Health Department

Despite the misgivings of some producers to the Health Department's regulations and inspections, the MSDA cooperated closely with the Health Department to facilitate rural compliance. It used editorial space in its organizational publication *The Maryland Farmer* to depict producers that did not participate in the MSDA as outsiders and to cast farmers who did not endeavor to produce the best milk under the recommended conditions as deficient and detrimental to the reputation of producers generally.²⁴⁰ The MSDA praised Health Department efforts and freely provided the Health Department space in *The Maryland Farmer* to publish news, advice, and other messages to farmers.²⁴¹

The level of cooperation between the Health Department and the MSDA appears to have been substantial due, most likely, to a shared progressive focus on producing the best possible milk through scientific methods and education. While the Health Department saw the sanitary production of milk as foundational to the safety

239 The MSDA's arbitrator, Clyde L. King, was subsequently chosen by the federal government to resolve conflicts in other milk sheds.

240 "Divides Milk Production into Four Classes," *Maryland Farmer* 8, no. 13 (July 1, 1924): 8.

241 "Health Department Position on Milk," *Maryland Farmer* 8, no. 6 (March 15, 1924): 1-2.; Baltimore Health Department, *City of Baltimore, One Hundred and Eighteenth Annual Report of the Department of Health 1932 to the Mayor and City Council of Baltimore for the Year Ended December 31, 1932* (Baltimore, Md.: Baltimore Health Department, 1933), 203.

of the milk supply, a view doubtless shared to some degree by MSDA leaders, the reputation of providing milk of the highest possible quality was an excellent economic lever for the MSDA in their interactions with dealers and even other cooperative marketing organizations nationwide. The Health Department and the MSDA depicted the question of milk quality to producers in financial terms. High quality production would inspire confidence in milk that would increase consumption, leading to greater profits for producers. Achieving these aims through education rather than penalty suited both organizations well, and would form the backbone of their cooperation.

Railroads on the Rise

Prior to the turn of the century the top milk hauling railroad had been the Pennsylvania Railroad's Northern Central line.²⁴² That route passed through the rich dairy country of the Maryland piedmont and included a branch line through the towns of Burnside, home of Samuel Shoemaker, and Eccleston, home of Asa Gardiner. By 1909 the Pennsylvania Railroad had begun to slip from its position as the top milk hauler. This does not appear to have been from a reduction in its milk transport, rather, other carriers' traffic increased. Appendix B shows the change in gallonage of milk carried by the steam railroads into Baltimore over time. Notable are the "bumps" in traffic the Western Maryland Railroad and the Ma & Pa received after 1902-03, when so many urban stables were shuttered, and again in 1908-09, when additional Health Department regulations encouraged rural milk production over urban. As

²⁴² Baltimore Health Department, *1901 Annual Report*, 56.

wagon transport during those times remained stable (compare to Appendix D), these two railroads in particular appear to have been the modal beneficiaries of early regulations.

It is probable that the 1902 Health Department regulations pushed the Western Maryland Railroad into the number one spot, which it would retain for as long as statistics were reported by the Baltimore City Health Department. It is also noteworthy that the two railroads that would come to dominate milk transport after 1912 were also the newest (formed after 1850) and those with passenger services of more regional character than the long-distance lines of the older B&O and PRR. Further research is needed to determine if dairy production along the lines of the B&O or PRR had achieved a maturity that served to brake new producers entering the business along their lines while urban milk supplies diminished.²⁴³ However, these smaller lines' efforts to cultivate milk traffic may well have been the deciding factor.

Milk may seem an odd area of prominence for a line remembered today largely for its freight service, however, the Western Maryland Railroad ran through much of the western portion of Baltimore's milk shed and was in many ways a natural transportation choice for producers in that region.²⁴⁴ It shared many characteristics with the much smaller Maryland and Pennsylvania Railroad, which ran only 78 miles

243 The data on the number of producers in Appendix A is insufficiently granular to plot concurrence, although the general upward turn suggests some alignment with Appendix C. It is also not clear from the sources whether the numbers of producers cited refers always to those outside of the city limits, or includes urban stables, the latter of which would have a smoothing effect on the curve.

244 Milk earned the railroad \$50,017 in 1907, but other freight brought in \$4,387,206. The railroad also rostered almost 4,000 cars for coal and coke in that year, but only 910 boxcars and 5 refrigerator cars. See Western Maryland Rail Road Company, *Forty-Fifth Annual Report for the Year Ended June 30, 1907* (Baltimore: Western Maryland Rail Road Company, 1908), 24, 37. Until it entered receivership in 1908, the rail company was called the Western Maryland Railroad. Upon emerging from receivership the name of the company had been changed to the Western Maryland Railway. See Roger Cook and Karl R. Zimmermann, *The Western Maryland Railway: Fireballs and Black Diamonds*, 2nd ed (Laurys Station, PA: Garrigues House, 1992), 48.

between Baltimore and York, Pennsylvania. Both serviced predominantly rural areas largely disconnected from major roadways. The two railroads also appear to have in common that they considered themselves part and supporters of the local agricultural communities they served. Both sponsored agricultural education and marketing efforts, including an educational milk exposition train in 1906, which went from village to village providing demonstrations in dairying, lectures, and displays of modern dairying equipment.²⁴⁵ The two railroads took advantage of the reasonably minor financial threshold to enter the milk business by using ordinary passenger baggage rolling stock to transport milk, although late in the 19th century the Western Maryland did begin to use refrigerator cars on longer hauls and baggage cars for shorter distances.²⁴⁶

Also remarkable is the similarity in the income both railroads earned from milk transport (Appendix C). Other than an unexplained dip between 1908 and 1912, a period that also saw a reduction in the amount of milk the railroad hauled, the Western Maryland Railway's income from milk shipping rose steadily up to its highest grossing year, 1923.²⁴⁷ The railroad even managed to increase its milk shipment during the period leading up to the First World War, when all other milk

245 Asa B. Gardiner, Jr., "The Milk Special: Schedule of the Instruction Train Over the Western Maryland Railroad Next Week," *Democratic Advocate*, March 23, 1906, 41 edition; "Milk to Be Their Text: Lecturers on Dairy Special Will Tell Farmers All About It," *The Sun*, February 1, 1906; "The Milk Special: Successful Tour Through Harford," *Belair Times*, March 30, 1906; Jared Van Wagenen, Jr., "The Making of Market Milk," *Delta Herald and Times*, May 25, 1906.

246 With its shorter distances the Ma & Pa would follow suit with refrigerator cars only in the 1920s, when shipment volume rather than distance predicated their need. See Edward G. Ward, Jr., *Milk Transportation: Freight Rates to the Largest Fifteen Cities in the United States*, U. S. Department of Agriculture Division of Statistics Bulletin 25 (Washington, DC: U.S. Government Printing Office, 1903), 39; Hilton, *The Ma & Pa*, 176.

247 Western Maryland Railway Company, *Fourteenth Annual Report for the Year Ended December 31, 1922* (Baltimore, MD: Western Maryland Railway Company, 1923), 16.

hauling lines saw a retreat in traffic, and also during the economic depression immediately following the First World War.

Further research is required to determine if the experiences of the Ma & Pa in the period immediately preceding the First World War are illustrative of the PRR and the B&O, which also experienced reductions, but the dip in earnings the Ma & Pa experienced in these years was certainly due to competition from a roadways and the same was likely true for the larger railroads. According to railroad historian and economist George Hilton, the opening of the road to Bel Air from Baltimore in 1914 was the first real challenge to the Ma & Pa's milk traffic.²⁴⁸ Bel Air was one of the largest towns in Maryland serviced by the Ma & Pa and it sat in one of the milk shed's most productive areas. By 1915, both regular passenger bus service to Bel Air and trucking of milk into Baltimore from the town had begun.²⁴⁹ As can be seen in Appendix C, these changes cut into the Ma & Pa's revenue and reversed the upward trend in milk hauling that had been underway since the beginning of the century.

The Advent of the Motor Truck

Roadway construction had been proceeding quite steadily since 1904. By 1908 Samuel Shoemaker had been appointed to the State Roads Commission, which set as one of its goals the elimination of private turnpikes and the creation of state-funded roadways to connect all of the county seats in the state with highways.²⁵⁰

²⁴⁸ Hilton, *The Ma & Pa*, 91.

²⁴⁹ Hilton, *The Ma & Pa*, 91.

²⁵⁰ Brooks, Rockel, and Hughes, *A History of Baltimore County*, 151; Counihan, *Moving Maryland Forward*, 12; Interestingly, the bonds to fund the work of the State Roads Commission construction work were funded not from automobile registrations or fuel taxes, but from a tax on

Expansion of trunk roads in Baltimore's milk shed proceeded apace after 1908, as we have seen, reaching Bel Air in 1914. Work by the State Roads Commission continued and after 1916 was partially funded with federal money from the Office of Public Roads.²⁵¹

Motor trucks made their agricultural debut in the Baltimore milk shed in 1913 when they were used to transport hay.²⁵² By 1915 they were employed to move milk, and with significant consequence even in their first year. The Baltimore City Health Department logged 751,900 gallons of milk arriving into Baltimore by truck that year, compared to 6,000 by wagon and 9,525,707 by train.²⁵³ While railroads clearly carried the majority of the milk, the 1915 amount carried by rail was down 208,011 gallons even as the total amount of milk transported by all modes rose over the previous year.²⁵⁴

Dealers, whose primary use of vehicular transport was for urban deliveries, or moving milk the short distance from train stations to their bottling plants, found little immediate reason to replace their horses and wagons.²⁵⁵ Rural producers were far less circumspect. Motor trucking's entrance into the Baltimore milk market did not simply supplement existing modes of transport. From its inception it ate into both wagon and railroad traffic and would continue to chip away at these even as the overall amounts

alcohol in Baltimore City and Baltimore County, and a general 2½ percent tax on inheritance, showing that good roads and automobility were not yet synonymous. See Austin L. Crothers, "State Roads in Maryland," *Maryland Agricultural College Bulletin* 8, no. 2 (1911): 5–12.

251 Seely, *Building the American Highway System*, 46. Maryland received federal funding for roadway construction through the 1916 Federal-Aid Road Act and the 1930 Federal-Aid Highway Act.

252 McGrain, *An Agricultural History of Baltimore County*, 77.

253 Baltimore Health Department, *1915 Annual Report*, 203.

254 Baltimore Health Department, *1915 Annual Report*, 203.

255 As late as 1922, when trucks were on the cusp of wresting the majority of milk traffic from trains, a national dairy survey found common among dealers the practice of using horse-drawn wagons for shorter runs and electric or gasoline trucks primarily for longer distances, citing financial economy as the deciding factor. See "Sales and Delivery Section," *The Milk Dealer* 11, no. 10 (July 1922): 41–44, 91–97, 101.

of milk moved into the city grew. By 1918 milk brought into the city by truck eclipsed that brought by wagon and within four years wagon transport had tapered off to minimal levels.²⁵⁶ Producers at last had their long-awaited alternative to rail.

Given its cost advantages in speed, how many continuous hours it could be operated, and its inherent independence from the schedules of trains, the motor truck first came into use in the Baltimore milk shed by producers as a substitute for trains over medium distances. Many of the road routes that the milk trucks followed overlapped with railroad routes, although trucks also established routes on roads not close to railroad lines and thus facilitated the growth of dairy farming in these regions.²⁵⁷ For instance, most of Howard County's farmers chose to ship to the city by truck due to the county's limited railroad service.²⁵⁸

Baltimore's milk shed could boast a national first when, in response to dissatisfaction with railroad shipping costs, several farmers from around Churchville, MD, founded the Farmer's Cooperative Company in 1917, which bought two motor trucks and began milk hauling. This was the first successful milk trucking cooperative in the nation.²⁵⁹ Most of the early milk trucking businesses were, however, small operators, often just one man and a truck, and almost entirely based in rural areas, not the city.²⁶⁰

256 Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1919* (Baltimore, Md.: Baltimore Health Department, 1920), 139; *Baltimore Health Department, 1920 Annual Report*, 129; Trumbower, "Transportation of Milk by Motor Truck," 4.

257 Trumbower, "Transportation of Milk by Motor Truck," 4.

258 Wessel, "Learning to Cooperate," 149.

259 The dissatisfaction over rates may have been by rail, as Churchville is located within a ten miles of the Maryland and Pennsylvania Railroad's station in Bel Air, but neither source is forthcoming on the matter. See Wessel, "Learning to Cooperate," 75-76; Trumbower, "Transportation of Milk by Motor Truck," 4.

260 Trumbower, "Transportation of Milk by Motor Truck," 4.

Railroads successfully transported milk for decades with little technological change, but as a relatively new technology coming to an established industry trucks' entrance into milk hauling saw a period of search for the best way to utilize their potential. Despite their initial good showing in the percentage of milk transported to Baltimore, for many years trucks' competition to, let alone dominance over railroads was neither expected nor assured.²⁶¹

Temperature appears to have been the most common hurdle for early trucks, especially because the refrigeration or icing of milk in trucks was not commonplace before the mid-1920s.²⁶² Even over short distances, truck transport generally showed greater temperature increases than rail. A Spring 1915 survey of 22 members of the International Milk Dealers Association in ten states (including Maryland) and three Canadian provinces revealed that 69 percent of milk arriving into the city by rail was above the ideal number of 50°F, but 92 percent of truck carried milk was over 50°F.²⁶³

261 While the history of automobiles, national roadway building, and even Maryland's own highways has been examined by historians, there is no detailed history of Baltimore's milk trucking industry. The data provided in this chapter on milk trucking is primarily assembled from contemporary accounts, often written by trucking or roadway proponents. A great deal of the history of Baltimore's milk trucking comes from writers such as Henry Trumbower, J. A. Brousseau, or Thomas MacDonald, all of whom were employed by the Bureau of Public Roads and advocated for roadway use over rail. Additional accounts from contemporary dairy industry periodicals such as *The Milk Dealer*, *Hoard's Dairyman*, or *The Dairy World* depict trucking, especially the use of milk tank trucks, as revolutionizing dairying. Agricultural sources, such as *The Maryland Farmer* tend to focus on roadways and transport rates rather than rolling stock. Dairy textbooks leading up to the 1930s such as those from Parker, Pirtle, and others tend to view trucking as a useful addition in milk transportation, but give little info on its application in specific regions. Given the inherently local flavors in applications of technology to dairying, and even the multiple variations inside a single milk shed, general histories of dairying such as Selitzer's, even when they examine transportation technologies, tend to approach technological change on a national level, or focus on unusual cases, leaving the reader with an interest in a certain region or era with more questions than answers. See J. A. Brousseau, "Highway Transport and the Railroads," *The Milk Dealer* 11, no. 12 (September 1922): 30–36; MacDonald, "Roads and the Load"; Horatio Newton Parker, *City Milk Supply* (New York: McGraw-Hill Book Company, 1917); Thomas Ross Pirtle, *History of the Dairy Industry* (Milwaukee: Olsen Publishing Co., 1926); Selitzer, *The Dairy Industry in America*; Trumbower, "Transportation of Milk by Motor Truck"; periodicals *The Dairy World*; *Hoard's Dairyman*; *The Milk Dealer*; *The Milk Producer*.

262 Trumbower, "Transportation of Milk by Motor Truck," 4.

263 Parker, *City Milk Supply*, 216. It is not clear from Parker's data, however, whether the milk delivered to the plants was strictly that coming from railroad stations, or also included milk

Five years later, a 1920 Health Department study concluded that rail transport was still superior in maintaining milk temperatures than trucks.²⁶⁴

The motor truck's apparent successes were marked by a series of less successful attempts that tend to disappear in the narrative of trucking's eventual dominance over rail. There were design and materials issues, and motor trucking introduced a worrying ability to facilitate the transport of poor quality milk. The physical and even moral integrity of shipment by truck represented an additional concern of shippers and dealers. While having oversight by a driver was listed by producers as a primary reason to ship by truck over rail, in 1919 the MSDA had to take action to stop truckers from stealing milk from trucks.²⁶⁵ The decentralized nature of trucking directly from farms to dairy plants also made Health Department inspection and enforcement of standards difficult. Smaller shippers initially used trucks to send partial cans of milk.²⁶⁶ Such partial loads were often of poor quality, which may have been related to temperature.²⁶⁷ For much of the time that trucks were pulling traffic away from the rails they were also contending with significant quality of service issues.

Bulk Milk Shipping

trucked directly from the country to the city plants.

264 Baltimore Health Department, *1920 Annual Report*, 122.

265 "Co-operation and the Price of Milk," *Maryland Farmer* 3, no. 12 (December 12, 1919) 6; Trumbower, "Transportation of Milk by Motor Truck," 6.

266 Wessel, "Learning to Cooperate," 160.

267 The reduced thermal inertia of a partial can also made it susceptible to greater temperature fluctuation. Partial cans were also more vulnerable to loss through vibration—a container that permitted the liquid milk to move about could set up sufficient sloshing to churn the milk into butter. The practice of shipping partial cans and the quality of milk received in this fashion may have been one impetus for a March 1921 regulation that farmers must deliver a minimum eight gallons a day or be cut off by the dairies. See Wessel, "Learning to Cooperate," 160.

In the 1920s the creamery was increasingly complemented by a further extension of urban dairying, the rural cooling or “receiving” station. This facility ensured that milk received from farmers in rural settings was kept at appropriate temperatures and not left sitting on a railroad platform to warm while awaiting pickup.²⁶⁸ In the first four decades of the 20th century the Baltimore milk shed had at least eleven cooling stations in Maryland and two in Pennsylvania (see Appendix E).²⁶⁹ Milk brought by farmers to cooling stations was collected in tanks and then shipped from the country in railroad tank cars or via trucks equipped with tank bodies. This approach was, however, only practical for dealers that needed great amounts of milk daily. Cooling stations thus represented urban outposts in the country, moving the industrial processing environment closer to the farm.

Bulk transport grew out of multiple factors, but chiefly answered the concentrations in the urban dairy industry. As I have shown, after 1917 dealers grew fewer in number but greater in size and, accordingly, the volume of milk they each required increased. Receiving, unloading, and sorting milk from many rural producers in ten gallon cans, which each needed to be emptied, sterilized, re-sorted, and returned to the correct farmer, was a time-consuming process requiring much physical labor. In 1903, a Boston dairy, Graustein’s, began experimenting with receiving milk

268 Depending on region, cooling stations were often also called, confusingly, “creameries” even though some cooling stations did not separate cream. The nomenclatural ambiguity is likely because many creameries provided cooling services, while not all cooling stations were creameries. The more generic “receiving station” refers to any rural location where milk was handed off from farmer to carrier or dealer.

269 This number is from Washburn et al., *A History of Pylesville*, 93; The 1929 Baltimore City Health Department Annual Report states that there were as of that year 18 creameries and cooling stations, of which 17 have chlorination equipment in use. Heaps, writing in 1938, however, lists 13 receiving stations. The variance may, however, be semantic, as the previous footnote explains. See Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1929* (Baltimore, Md.: Baltimore Health Department, 1930), 55; Heaps, *20 Years*, 60.

at a remote cooling station and then loading the milk into specialty tank cars for transport into the city plant. The cars each comprised two metal tanks mounted inside a standard railroad refrigerator car. This was successful for Graustein's, which reportedly saved \$10,000 per year with their tank cars in can replacement and can sterilization costs.²⁷⁰ The firm used the cars for ten years, but the type of service was not duplicated widely until two decades later.²⁷¹

By the early 1920s, however, changes in the urban dairy picture meant that more firms could see financial advantages in handling milk in bulk.²⁷² A Pittsburgh dairy, Harmony Creamery, asked the Baltimore & Ohio Railroad and the Pfaudler Company to construct a small series of milk tank cars. Pfaudler was a company that had developed a method to coat metal with glass and specialized in manufacturing sanitary and vacuum-insulated containment vessels.²⁷³ The cars used Pfaudler's enamel-lined tanks inside standard Baltimore and Ohio refrigerator cars. To the great pleasure of all involved, the cars were able to move milk 105 miles from Ohio to Pittsburgh with only a slight change in temperature.²⁷⁴ Noteworthy here is not only the new technology, but the cooperation of the railroad instead of recalcitrance. The experience of being circumvented by the meat packers and shut out of lucrative perishable transport in the 1890s may have been one motivating factor, but the willingness of the railroads to work in the development of new equipment is also a testament to the importance of milk to their bottom line.

270 "The Big Haul," 11.

271 White, *The American Railroad Freight Car*, 289; "The Big Haul," 11.

272 "The Big Haul," 11.

273 George F. Kroha, "The Invention and Development of Pfaudler Glass Lined Steel Equipment," *The Dairy World*, April 1923.

274 "The Big Haul," 14.

Pfudler subsequently partnered with railcar builder General American Transportation to manufacture milk tank cars for bulk milk transport and sell or lease them to individual dairies. Competitor Merchants Despatch Transportation also joined in the manufacture of bulk milk tank cars. Some of the larger dairies in the New York, Boston, and Chicago areas purchased milk tank cars outright, but many smaller dairies chose instead to lease from the manufacturers.²⁷⁵

From the simple baggage car to the milk tank car the equipment used to transport milk had long been selected based on the speed it could travel rather than its capabilities for long term temperature preservation; however, the rise of the insulated bulk milk tank car was concurrent with general improvements in refrigerator car insulation.²⁷⁶ Whereas earlier insulated milk cars had used wool, paper, or pockets of air as insulating materials, the General American Pfudler milk tank cars employed granulated cork, which was used inside the car walls and also around the individual milk tanks.²⁷⁷ Early versions of the cars received a brine-based cooling apparatus, but this was later found to be unnecessary for transporting pre-cooled milk.²⁷⁸ Later generation refrigerator cars for carrying milk, in bulk or in cans, were beneficiaries of these material and process changes in railcar construction. Milk tank cars became both fast and capable of holding temperatures for long periods of time.

275 “The Big Haul,” 27.

276 The USRA standards for refrigerator car construction adopted during the First World War mandated an overall improvement in insulation of refrigerator cars. At the time the standards were implemented, only 11 percent of the refrigerator cars in the United States had insulation that provided sufficient protection from temperature change. The General American Pfudler cars were likely direct beneficiaries of these new insulation standards. See White, *Great Yellow Fleet*, 56-8; R.G. Phillips and Samuel Fraser, *Wholesale Distribution of Fresh Fruits and Vegetables* (Rochester, NY: The Joint Council of the National League of Commission Merchants of the United States, The Western Fruit Jobbers’ Association of America and The International Apple Shippers’ Association, 1922), 183.

277 White, *The American Railroad Freight Car*, 281; “The Big Haul,” 13.

278 “The Big Haul,” 5–32, 12.

The early 1920s were also a time when, as mentioned above, two of the major Baltimore dealers began to utilize bulk milk tank trucks. By 1923 there were three such trucks in service.²⁷⁹ Although it is unclear what firms the first tank trucks in the Baltimore milk shed served, Fairfield Farms and Western Maryland-City seem most plausible. Both had large enough operations to require entire truckloads of milk, had the available capital to invest in specialized technologies, and were by the standards of the time at the forefront of milk processing technology in the city.²⁸⁰

With the utilization of bulk shipping, milk could move from rural receiving stations directly into the city processing plant machines without ever being exposed to the atmosphere, reducing opportunities for contamination. Offsetting the expense of the equipment, labor costs were saved by avoiding can sorting at the dairy. The farmer saved too in the cost of replacing lost or damaged milk cans.

Bulk milk transport in tank trucks was welcomed in the industry press as a significant advance that promised to change dairying, but its arrival was not without its own difficulties, both technical and financial. Milk tank trucks were an adaptation of the railroad technology employed by Graustein in 1903.²⁸¹ By 1911 horse-drawn wagons were being equipped with enameled tanks, and by 1912 tanks were being applied to motor trucks.²⁸² Operators of early milk tank trucks found them more dangerous to drive than can trucks due to a high center of gravity.²⁸³ The necessity of

279 Trumbower, "Transportation of Milk by Motor Truck," 4.

280 For instance, in 1923 Western Maryland-City Dairy installed a machine to wash milk bottles that took full cases, separated the bottles from the case, cleaned each, sterilized the bottles, and re-created them, all without human hands touching the bottles. See "Washing, Filling and Handling Bottles," *The Dairy World* 1, no. 11 (April 1923): 11-14.

281 Selitzer, *The Dairy Industry in America*, 195.

282 Selitzer, *The Dairy Industry in America*, 195.

283 Not mentioned in the source, but commonly known among all who have an American commercial truck driving license is the danger of operating milk trucks. For sanitation reasons milk tanks cannot have baffles inside the tank to stop liquids from surging, so a rapid application of brakes or sharp turn can set up a wave action sufficient to overturn the truck or propel it into neighboring

insulating the tanks also became clear by 1919 when milk warmed sufficiently in transit to be churned into butter by the jostling of the roads.²⁸⁴

Beyond material and technological concerns, there were also fiscal and logistical concerns over the use of tank trucks that left some Baltimore-area producers unconvinced of their utility. An author writing in *The Maryland Farmer* in 1924 under the pseudonym “Gunpowder” explained that there were too few bulk receiving stations in the Baltimore area for producers to send milk to, but noted the chief constraint on using tank trucks was that it cost the producer 8¢ per gallon to ship to a receiving station and then on to the city by bulk tank truck, whereas it cost between 4¢ and 5¢ per gallon to ship via can truck that picked up from nearby roadside collection points.²⁸⁵ Foreshadowing later refrigeration mandates, “Gunpowder” also contended that the temperature problem that continued to bedevil all truck transportation could be solved by icing the milk trucks, as was commonly done with railroad refrigerator cars.

Producers and Trucks

Although the dealers may have pushed the use of tank trucks to suit their industrial processing aspirations, the major proponent of the use of roads to move milk were the producers. As I have shown, several factors encouraged farmers to orient themselves to road transportation. Long standing feelings of dependence on the

vehicles. See Motor Vehicle Administration, *Maryland Commercial Driver's License Manual* (Glen Burnie, Maryland: Maryland Motor Vehicle Administration, 1996), 8-2.

284 Selitzer, *The Dairy Industry in America*, 196.

285 “Gunpowder,” “An Expert Studies Milk Tank-Trucks and Shows Their Practical Limitations,” *Maryland Farmer* 8, no. 21 (November 1, 1924): 1, 3.

railroads had laid the ground work, but the railroads' failures to rise to the transportation needs of World War One, resulting in the takeover of the railroads by the government, combined with a government ban on using railroads for anything other than non-essential goods during the war changed public perception of roads and their place in advancing national defense and greatness alongside personal gain or local commerce.²⁸⁶ Even as progressive influence had begun to wane at the federal level, MSDA editorials expressed these feelings in terms of fairness and equality in mobility, noting there was "nothing equal to good roads for rural progress" and encouraging farmers to "get up out of the rut and in the progressive class" by having good roads.²⁸⁷ Frequently the good roads matter was raised as a quality of life issue, which was often tied directly to commercial success. As one 1919 contributor stated, "Good roads mean good business. Good business means good living, and that is what we are all working for."²⁸⁸

As can be seen in Appendix D, the movement toward trucks for milk transport increased quickly in the period immediately following the First World War. The continued improvement of county roads in the period prompted a rise not only in traffic by 1920, but an uptick in the number of entities engaged in trucking operations.²⁸⁹ Twenty-seven percent of city's growing milk supply arrived by truck in 1920.²⁹⁰ By 1923 there were seven shipping cooperatives in the Baltimore milk shed;

286 Highway advocates at the time took some pleasure in the railroads' shortcoming during the War, See Brosseau, "Highway Transport and the Railroads," 30; Wells, *Car Country*, 83; Later historians generally attribute the railroads' inability to keep pace with the transportation needs of the First World War to regulatory measures that left them unable to respond to wartime needs. See Rose, Seely, and Barrett, *The Best Transportation System in the World*, 3-5.

287 Patterson, "Some Problems for Maryland Farmers," 4; J. Noel Bennett, "Good Dirt Roads for Winter," *Maryland Farmer* 3, no. 4 (October 17, 1919): 4.

288 Bennett, "Good Dirt Roads for Winter," 4.

289 Wessel, "Learning to Cooperate," 155.

290 Baltimore Health Department, *1920 Annual Report*, 122.

one individual who bought milk from producers outright, transported it by truck, and resold it to dealers; and four dealers operating their own trucks between city and country.²⁹¹ The majority of road carriers, however, were independent trucking companies, eleven in total, that offered common carrier milk transport to the public and ran along routes prescribed and permitted by the Public Service Commission of Maryland, the state body that regulated any carriers that sold transportation services to the general public.²⁹² In total there were 23 separate operators of trucks in 1923, with 41 trucks in service. The following year the number had risen to 28 companies carrying milk, but by 1930 the number had fallen to 20, perhaps in part due to mergers among dairies in the intervening period.²⁹³

Many of the trucking companies shipping milk also transported freight from Baltimore back to rural locations, a service that made up more than a third of their operating income.²⁹⁴ This appears to have been a prevalent practice in Baltimore, where the box body design of trucks most utilized for milk transport facilitated it, but was unusual in other areas of the country.²⁹⁵ The back-haul freight practice led to the establishment of a city freight depot where the milk trucks, after having delivered their milk directly to the city dairy plant, would come to collect freight for rural consignees. This adoption of medium distance (less than 50 miles) less-than-

291 Trumbower, "Transportation of Milk by Motor Truck," 4.

292 Although initially seen as private enterprises not subject to regulation, cooperatives were also regulated by the Public Service Commission of Maryland after 1927. See Trumbower, "Transportation of Milk by Motor Truck," 4; T. Scott Offutt, *Parlett Etc. v. Tidewater Lines*, 165 A. 313 (Md. 1933), No. 26, January Term, 1933 (Court of Appeals of Maryland March 21, 1933), <https://www.courtlistener.com/opinion/3492190/parlett-etc-v-tidewater-lines/>.

293 "Health Department Position on Milk," *Maryland Farmer* 8, no. 6 (March 15, 1924): 1–2; "Milk Hauling Now in Spotlight," *Maryland Farmer* 14, no. 4 (February 15, 1930), 8.

294 Trumbower, "Transportation of Milk by Motor Truck," 8.

295 Trumbower, "Transportation of Milk by Motor Truck," 8.

truckload shipping further chipped away at the railroads' business because much of this traffic had previously moved, at least part way, into rural areas by train.²⁹⁶

The fact that the practice of back-hauling freight in milk trucks was countenanced by the Public Service Commission, the chief state body regulating trucking in Maryland, supports the assertion made by transportation historians Rose, Seely, and Barrett that long memories of railroads' monopolistic misdeeds in the late 19th century permeated much transportation policymaking into the mid-20th century.²⁹⁷ As the Public Service Commission stood to gain from permit fees from either carrier, the circumstances point more towards the inability of railroads to utilize political clout to protect their less-than-carload freight at the state level than an outright subsidy of the trucking industry.

The Public Service Commission of Maryland (PSC) was formed in 1910 under the progressive administration of Governor Austin Crothers to regulate transportation and utilities in the public interest.²⁹⁸ It set licensing fees for common carrier operations. As far as can be ascertained by available documents, the PSC began regulating common carrier milk truckers around 1916, but certainly by early 1917.²⁹⁹ Truckers were required to file a schedule of public rates with the PSC, subject to regulatory oversight, and carry milk on determined routes.

296 The practice of numerous small truck operators chipping away at the railroads' high value, perishable, and less than carload shipments appears to have been prevalent at the time throughout the country. See Shane Hamilton, "The Populist Appeal of Deregulation: Independent Truckers and the Politics of Free Enterprise, 1935-1980," *Enterprise and Society* 10, no. 1 (March 2009): 137–71.

297 Rose, Seely, and Barrett, *The Best Transportation System in the World*, xxi-xxii.

298 John Philip Hill and Arthur R. Padgett, *Annotated Public Service Commission Law of Maryland: With Rules of Commission and Forms* (Baltimore: M. Curlander, 1913), 6, 21-22.

299 Public Service Commission of Maryland, *Report of the Public Service Commission of Maryland for the Year 1917* (Baltimore, Md: Public Service Commission of Maryland, 1918), 179.

Milk collection platforms to which farmers brought their cans were built along these routes. Milk would be loaded onto the truck at these stops and transported to the city plant directly. If the farmer needed any added incentive to wish for good roads, trucking companies would often charge higher rates to pick up milk from collection platforms on unimproved roads.³⁰⁰

Conclusion

The 1917 milk ordinance was widely supported by reform groups, producers, regulators, pundits, and larger milk dealers despite objections from, and organization by, a large number of smaller dealers. Although it brought welcome consumer confidence in milk, the net effect on transportation was to shift the majority of urban market share to two dealers whose decisions and levels of industrialization shaped approaches to transportation. The increase in industrial processing saw larger dealers begin bulk milk shipping in tank trucks. This necessitated the construction of cooling stations in the country, which acted as rural outposts of urban milk plants. As I will show in the following chapter, the industrialization of the dairy farm would soon follow.

The reduction in the number of dealers corresponded with the shift in the MSDA from being a general dairy organization to a producers' cooperative with a rate negotiating mandate. Progressive in its leadership, the MSDA cooperated strongly

300 Trumbower, "Transportation of Milk by Motor Truck," 5.

with the Health Department in bringing rural producers into compliance with standards under the rubric of better quality for greater profits.

The changes in milk laws after the turn of the century had moved the Western Maryland Railroad and the small Maryland and Pennsylvania Railroad into positions of prominence as milk haulers, but in 1915 the dissatisfaction of rural producers over their dependence on rail would manifest itself in the advent of motor trucking, which quickly began to siphon milk traffic away from railroads. This dissatisfaction was so great that trucks were favored despite many technological and logistical hurdles. Although dogged by temperature problems that worried the Health Department, trucks were obliquely supported by state regulatory measures of the PSC that permitted them to engage in non-agricultural back hauls. This backhaul freight traffic allowed them to be profitable when milk haulage alone would not have sufficed.

The rapid embrace of motor trucks by producers shows the level of frustration rural residents must have felt at their dependency on railroads, but it was likely also hastened by greater farm mechanization and an agricultural downturn after the First World War that made trying one's hand at trucking more attractive than farming.³⁰¹ With two-thirds of the dealers removed from the milk business after 1917, the remaining dealers were prompted into concentration and industrialization. As a new, seemingly more malleable technology, trucks offered dealers greater potential for vertical integration, such as their ability to deliver directly to the plant on demand, as part of dealers' move toward mass production. While both dealers and producers had their frustrations with railroads, there was no concerted effort between the two to replace rail, nor was either social group entirely homogeneous in its interest in trucks.

301 Hamilton, *Trucking Country*, 48.

The beginnings of the modal shift were the result of sequential actions borne of a common interest in trucks to solve differing perceived needs.

Chapter 6: The Transition Completes, 1920-1940

The conclusion of the First World War introduced a period of rapid change in the Baltimore milk trade, especially the character of its transportation. Railroads were earning record profits from milk but simultaneously losing market share to the roads. The modal competition between road and rail was compounded by regulatory and business changes that hindered the competitiveness of rail transport, and a series of shifts in passenger service that had little to do with the milk business itself. The decade of the 1920s saw both the greatest gain and the steepest decline in milk transport for the railroads.

The industrialization of urban milk dealers that began in the first decades of the 20th century had, by the beginning of the 1920s, largely completed. The reduction in competition resulting from the 1917 pasteurization ordinance limited the number of milk dealers, creating an oligopoly. This dominance by a small number of actors gave them substantial control over the ways in which others in the field operated, including transportation providers. The 1930s were characterized by the industrialization of rural milk production, a decline of localism in both the Baltimore dairy industry and the railroads serving the milk shed, as well as a post-progressive focus on efficiency through highly regulated, large organizations.

Baltimore's 1920s Milk Paradox

At the end of the First World War railroads were still dominant in Baltimore's milk carriage, but trucks rapidly increased their portion of traffic, especially in the shorter and medium distance hauls. As we have seen, leading up to the mid-1920s milk trucks in Baltimore supported a rigorous back haul trade in general goods that earned milk truckers significant ancillary income. Backhaul service favored the retention of can trucks, which is likely why tank trucks were slow to find widespread favor in the milk shed.³⁰² This reliance on can trucks may have permitted the railroads to retain their majority over longer distance services and remain competitive over medium distances because the longest milk hauls by road were generally the domain of tank trucks.

The seemingly convenient division of traffic belied the fact that the trucks' market share was rising even as the railroads' profits were also increasing. Herein lies the paradox of modality in the Baltimore milk shed. Railroad incomes from milk were experiencing unprecedented growth at the same time that trucks were removing milk traffic from the rails at a considerable rate. Railroad milk profits (and doubtless those of trucking companies as well) rose after 1917 (see Appendix C).³⁰³ This had several causes including greater consumer confidence after passage of the 1917 milk ordinance, no wartime rationing of milk, a 1920 ICC ruling that allowed railroads to raise their rates, and progressive nutritional theories that envisioned milk as a protein substitute for meat.³⁰⁴ As Appendix D shows, during this same time period however,

302 Trumbower, "Transportation of Milk by Motor Truck," 4.

303 Amounts of milk transported rose after 1917 for all railroads save the Baltimore and Ohio. No obvious reason for this could be found. The most likely conclusion is that milk production along the B&O, already the lowest of the four railroad systems, was the most affected by proximity to roadways and thus any milk production increase in the areas of the milk shed served by the B&O went instead by truck.

304 The Esch-Cummins Transportation Act of 1920 gave the Interstate Commerce Commission the ability to set maximum railroad rates. One of the first things that the ICC permitted was for

railroads' share of the overall milk transport was declining in favor of trucks. At least some railroads appeared to recognize this as an issue. In 1923, almost at the apex of their milk traffic, the Maryland and Pennsylvania Railroad changed its tariff for milk transport from a flat fee of 3¢ per gallon to a variable rate depending on distance that resulted in a general reduction in prices for most shippers, especially those nearest the city who would most likely be swayed to ship by truck.³⁰⁵

Railroad Restrictions

The declines in profits experienced by the Western Maryland Railway in 1924 and, in the following year by the Ma & Pa, may have seemed temporary setbacks had a series of changes not acted to accelerate the downward trend of railroad profits and market share alike. In 1924 the Health Department passed an ordinance prohibiting the sale of milk in Baltimore that originated from outside the city's milk shed except in emergencies.³⁰⁶ Prior to this milk had been moving into the city from as far away as New York.³⁰⁷ This change was supported by the MSDA and major dealers whose convivial relationship since 1918 had resolved earlier dealer concerns about access to milk.³⁰⁸ The MSDA's Isaac Heaps attributed the law to greater density of milk

railroads to raise their rates as much as 31 percent, which at least the B&O did. This may have contributed to the rapid growth in revenue but, if so, it was not the sole cause because the overall amount of milk transported also rose. See Rose, Seely, and Barrett, *The Best Transportation System in the World*, 5; Public Service Commission of Maryland, *Report of the Public Service Commission of Maryland for the Years 1920-21* (Baltimore, Md: Public Service Commission of Maryland, 1922), 160-1. On milk rationing and nutrition see Veit, "Victory over Ourselves," 1, 6.

305 Accounting Department, Maryland and Pennsylvania Railroad Company to All Milk Shippers, Memorandum, April 26, 1923, Maryland & Pennsylvania Railroad Historical Society.

306 Wessel, "Learning to Cooperate," 57.

307 Baltimore Health Department, *1924 Annual Report*, 12.

308 Wessel, "Learning to Cooperate," 57.

production close to the city made possible by road construction while the Health Department opined that milk from closer sources was preferred as it was safer than milk from far away.³⁰⁹ The ordinance served to limit the distances milk traveled, moderating any push to require trucks be capable of long distance transport but, more significantly, truncating rail milk hauls from some 200 miles to less than half that distance.³¹⁰ With the short and medium distance hauls already the bailiwick of trucks and long distance service shut out, railroads began to feel a squeeze on their profits.

By themselves the geographic restrictions on the milk shed were a burden, but still permitted the railroads income. This changed the following year when the Western Maryland-City Dairy moved to using only motor trucks to move their milk.³¹¹ Although not the only dealer in the market, at the time the Western Maryland-City Dairy controlled around 60 percent of the milk sold in the city, so a decision to ship milk by truck removed meant that at most only 40 percent of the city's milk traffic would be available to railroads.³¹²

This highlights the large reach the decisions of majority actors were beginning to exercise in the Baltimore milk shed and the ramifications these choices had for transportation. In Minneapolis and St. Paul the local producers' cooperative, the Twin

309 Heaps, *20 Years*, 109. Baltimore Health Department, *Department of Public Safety, Annual Report, Sub-Department of Health, to the Mayor and City Council of Baltimore for the Fiscal Year Ended December 31, 1924* (Baltimore, Md.: Baltimore Health Department, 1925), 12.

310 Baltimore milk shed producers were, however, shipping to dealers in other cities. Both New York and Philadelphia were known to receive milk from producers in the Baltimore milk shed by rail. The MSDA's promise to handle surplus milk may have also resulted in sales outside the milk shed. See J. E. Burrell to O.H. Nance, Letter, June 17, 1925, Maryland and Pennsylvania Railroad Historical Society Archives; J. E. Burrell to O.H. Nance, Letter, June 30, 1925, Maryland and Pennsylvania Railroad Historical Society Archives.

311 Hilton, *The Ma & Pa*, 110. Hilton does not name the dairy, claiming that "the largest milk bottler" made the change. As the Western Maryland-City Dairy was the market leader in 1922 and 1928, the extrapolation is the author's. See "Dairy Industry Keeping Abreast of Present Day Policies," *The Milk Dealer*, September 1922, 90.

312 The decline in revenues for railroads would have likely been steeper had Western Maryland-City Dairy not already been operating its own fleet of milk trucks in addition to receiving milk by rail.

City Milk Producers' Association, controlled 80 percent of that region's milk supply in 1923. Their choice to ship all but one percent of that 80 percent by truck certainly influenced a modal split that strongly favored roadways.³¹³ By contrast, the MSDA and major dealers in Baltimore had continued to ship by rail even as they used roads, but when in one stroke the majority dealer switched to roads as in 1925, the railroads' stake in Baltimore's dairy transportation, already reduced by the truncation of the milk shed, was further diminished.

Rail Innovation

It was just as railroad profits began to crest that a new type of shipping of milk came to the railroads of the Baltimore milk shed. In 1925 the Fairfield Farms Dairy began bulk tank car service over the Western Maryland Railway between Porters, Pennsylvania, and Baltimore.³¹⁴ The Fairfield Farms Dairy appears to have been the only dealer in Baltimore to have had its own direct connection to the railroad network, with both the WMR and PRR having tracks into the facility.³¹⁵ All other dairy plants in the city receiving milk by rail had to have it hauled by wagon or truck from the railroad station to the milk plant. With two railroads reaching their plant, receiving milk in tank cars was a logical move for Fairfield Farms, but their use of

313 Notable is that Trumbower does not provide modal data for the 20 percent handled outside of the Twin City Milk Producers' Association. See Trumbower, "Transportation of Milk by Motor Truck," 16.

314 Western Maryland Railway Company, Authority for Expenditure 185-26, October 18, 1926, The W. Raymond Hicks Papers, file 349.1, Michael Yetter Collection.

315 G. I. C. to M. C. Byers, December 4, 1928, Letter, The W. Raymond Hicks Papers, file 110.7, Michael Yetter Collection. It was not possible to determine given available materials whether the Fairfield Farms Dairy operated bulk tank cars on the Pennsylvania Railroad, but given their plant operations and use of these cars on the Western Maryland Railway this seems likely.

tank cars was not limited to the main Baltimore facility. From at least 1929 through 1930 the Fairfield-Western Maryland Dairy (since 1928 merged with the Western Maryland Dairy) used one of its private milk tank cars to shuttle bulk milk between its Pylesville and Woodbine cooling stations located on the Ma & Pa line. The service is notable as it indicates that the two cooling stations were performing different functions or utilizing each other as overflow, and that the Fairfield-Western Maryland Dairy was conducting industrial level movement and coordination of processes in very rural settings. It also shows that despite the merger, the very truck-friendly Western Maryland Dairy, which operated its own fleet of milk trucks to haul milk from the country, did not curtail its merger partner's use of trains, but instead diversified their use.

The use of milk tank cars appears to have been short lived, which likely had more to do with corporate changes in the dairy industry than the service provided by the railroad. On September 25, 1930, as described below, the Fairfield-Western Maryland Dairy was taken over by a firm from outside Baltimore, National Dairy Products Co.³¹⁶ The authorization to begin dismantling the bulk milk shipping facilities on the Western Maryland Railway was inked the following day.³¹⁷ Fairfield Farms Dairy's pioneering practice of transporting bulk milk by rail in the Baltimore milk shed likely did not fit into the National Dairy Products vision.

316 United States Congress, *United States Congressional Serial Set*, vol. 10126 (Washington, DC: U.S. Government Printing Office, 1937), 135.

317 Western Maryland Railway Company, Authority for Expenditure 127-30, September 26, 1930, Western Maryland Railway Historical Society Archives.

Exogenous Modal Challenges

In addition to the pressures the railroads faced from regulations and business decisions, the place of railroads in society was shifting due to developments having little to do with milk. Not only was railroad milk service being impinged upon by trucks, but the availability of good roads combined with decreasing prices for automobiles afforded unprecedented numbers of citizens opportunities for individual mobility. In short, between 1910 and 1940 passenger train service all over the country was undergoing a substantial reduction. The rate of reduction only increased as more cars became available and roadways connected more locales. Intercity passenger traffic decreased precipitously in the 1920s so that between 1920 and 1929 railroads in the United States had lost 85 percent of the passenger traffic they had previously dominated.³¹⁸

The United States Post Office's choices in mail contracts also played a contributing role. Transporting mail had long been a lucrative business for railroads. The interwar period was a time in which the federal government began to subsidize commercial aviation and airmail services became commonplace.³¹⁹ Combined with Post Office expansion in use of roadways, the result was a substantial attenuation in railroad income for hauling mail. For example, the renegotiation of the Ma & Pa's contract with the U.S. Post Office in 1937 saw their mail income change from \$809 to just \$17 per year.³²⁰ All of these factors added to the challenges to profitably operating

318 Rose, Seely, and Barrett, *The Best Transportation System in the World*, 30.

319 Rose, Seely, and Barrett, *The Best Transportation System in the World*, 38.

320 O. H. Nance to All Milk Shippers South of Delta, Memorandum, December 1, 1937, Maryland and Pennsylvania Railroad Historical Society Archives.

the passenger trains on which the milk traffic depended. In short, by the end of the 1930s it was not merely milk traffic that was becoming hard for railroads to sustain, but the entire class of service with which milk transport had become integrated.

The railroads providing milk service to Baltimore had differing attitudes and responses to changes within the dairy field. The Pennsylvania Railroad and the Baltimore and Ohio Railroad had been for decades interregional lines, connecting the Atlantic to the west through the transcontinental gateway cities of Chicago and St. Louis. By the turn of the 20th century their focus was already primarily on moving large amounts of people and goods over great distances. As such, their approach to milk transport, always a locally-oriented activity, was generally supportive but because milk played an overall smaller role in their income portfolio than other commodities, they appear to have been less involved in Baltimore's milk market as time went on. The B&O's primary focus for dairy transportation appears to have been cities between Pittsburgh and Chicago, and the Pennsylvania was oriented strongly toward the milk markets of New York, and Philadelphia.

The reduction in milk income after 1924 came as the Western Maryland Railway was undergoing a wider transformation. It built new grain facilities in Baltimore's port in the early 1920s and by the 1930s it had come under the control of the Van Sweringen brothers, who owned multiple railroads and envisioned the WMR as part of an alternative to the connections between the Atlantic and western gateways offered by the B&O and PRR.³²¹ The highly local milk business, tied so tightly to the

321 Brugger, *Maryland*, 457. On the Van Sweringen plans to create an alternative to the B&O, PRR, or New York Central see Rose, Seely, and Barrett, *The Best Transportation System in the World*, 25-27; Cook and Zimmermann, *The Western Maryland Railway*, 50.

diminishing passenger service, may simply not have been seen as having as bright a future as freight for a railroad with national aspirations, especially a line so well linked to lucrative Appalachian coal fields.³²² At the turn of the century the Western Maryland had been a line with regional focus, but the change in milk fortunes roughly corresponded to a reconceptualization by its leadership of the line as part of a national network.

While the Western Maryland, the B&O, and the Pennsylvania all appear to have moderated their activity in milk shipping as it went to trucks and focused on areas of income that were more profitable, for the Ma & Pa the matter was far more existential. Unlike its larger brethren, the Ma & Pa took overt actions to retain or regain traffic from trucks. As passenger train profits began to decrease the Ma & Pa adjusted its service offerings and the equipment used. For instance, between 1926 and 1928 the railroad replaced its primary passenger trains with more efficient motorized railcars.³²³ These railcars were equipped with trailers that hauled mail and express, including milk cans, and could pull additional cars for milk as needed. Although the Ma & Pa's milk income continued its downward trend, after the motorized railcars were put into use it leveled off for a short time and did not experience the same rapidity in decline as that of the Western Maryland in the same period (Appendix C).

These attempts may have cut general costs associated with passenger service and slowed the loss in income after 1924, but one factor that the Ma & Pa could not improve upon was its speed. Hilton speculates this was the main motivating factor for

322 As Appendix C shows, by 1938 the Western Maryland Railway brought in only \$1,848.71 annually in milk income, just over five dollars per day.

323 Hilton, *The Ma & Pa*, 110.

shippers on the Ma & Pa to switch to trucks.³²⁴ The Ma & Pa was once the vital lifeline to the city for rural communities along its route, but with the coming of better road connections it became possible to drive to the city faster than the train could travel. Speedier travel to market by road addressed any concerns over transit temperatures with trucks and also allowed urban milk recipients to bypass the terminal exchange in Baltimore. With local markets drying up the Ma & Pa found new ways to continue making income with milk by sending it to faraway locations, but even such inventive attempts were not sufficient to replace the traffic lost to trucks.³²⁵ The nature of each railroad's network and the relative importance of milk to overall profitability shaped the actions and reactions of the railroads to the change in milk fortunes after the First World War.

Rural Industrialization

Although having pasteurizing equipment did not de facto mean that a dairy had industrialized, the two were linked closely enough that the 1917 milk ordinance had broadly divided the urban milk dealers into those who had or were willing to embrace industrial processing and those who were not willing or able to industrialize and were shunted out of the market. Despite this industrialization of the dealers, and as we have seen, some encroachment on the rural milk scene by city dealers in the

³²⁴ Hilton, *The Ma & Pa*, 91.

³²⁵ Dealers in New York City and Philadelphia were frequently customers of producers on the Ma & Pa, and milk and cream for industrial uses such as candy manufacture was shipped to locations in upstate New York, Ohio, and Michigan. Numerous memos, letters, and telegrams in the archives of the Maryland and Pennsylvania Railroad Historical Society document these shipments. See, for example, J. E. Burrell to O.H. Nance, Letter, June 17, 1925, Maryland and Pennsylvania Railroad Historical Society Archives; Mayfair Creamery to Maryland Public Service Commission, July 17, 1954, Letter, Maryland and Pennsylvania Railroad Historical Society Archives.

form of agents or outposts like creameries and cooling stations, many milk producers kept to their earlier methods of production through the 1920s.

A number of efforts had been made to industrialize producers, however. The Health Department, the MSDA, and dealers all sought the industrialization and regularization of dairy farm activity. General advocacy for this change began to grow by the early 1920s. Clyde King, MSDA's arbitrator, noted that it was critical to consider dairying an industrial enterprise in order to effectively negotiate with dealers. "Essentially, dairying is an industry comparable with other great industries of this vast industrial land. More and more milk production has been evolved to a position not unlike other commodity productions."³²⁶ In short this was a message to farmers to adopt industrial methods or face increasing obsolescence.

Despite these exhortations, a large incentive to industrialize dairy farms came in the form of the weather, in tandem with production commitments. Keeping milk cool remained a challenge for farms throughout the milk shed during the analysis period but in the late 1920s and early 1930s a series of summertime droughts caused springs to dry up, leaving farmers who depended on the traditional cooling method of using springs or wells in a difficult position.³²⁷ The industrial alternative to natural water cooling was a succession of increasingly complex, purpose-built cooling apparatus to rapidly cool milk from body temperature to below 50°F. Although the Health Department relaxed cooling requirements in response to the water crisis, the episode doubtless made clear to many farmers that the demands of modern milk

326 Clyde L. King, "Price Conciliation in Milk Industry: Arbitration Essential to Success of Co-Operation," *Maryland Farmer* 8, no. 24 (December 15, 1924): 5.

327 Baltimore Health Department, *City of Baltimore, Annual Report of the Department of Health 1931 to the Mayor and City Council of Baltimore for the Year Ended December 31, 1931* (Baltimore, Md.: Baltimore Health Department, 1932), 139.

production could not always be met by traditional methods. A 1928 Health Department regulation requiring producers to install cooling equipment at farms was followed by the completion in 1930 of electrification from Baltimore to the Pennsylvania border. Farmers were offered refrigerators as incentives for connecting to the electric grid, further pushing producers toward industrial production methods.³²⁸ Although some producers may have preferred traditional methods, by the early 1930s the vagaries of the climate, legal structures, and admonitions from industrialization's proponents made clear the advantages of increased rural dairy mechanization.

Industrial Concentration

The level of influence on the market that allowed one dealer to reduce an entire transportation mode's share to less than 40 percent overnight came about because of a trend toward concentration among urban dealers that had been accelerating since the end of the First World War. This trend would in many ways shape the shift in transportation modes within the Baltimore milk shed. As described earlier, the City Dairy and the Western Maryland Dairy merged in 1921. The Western Maryland Dairy had itself been taking over smaller dairies preceding this. As I have also shown, together the Western Maryland-City Dairy and the Fairfield Farms Dairy controlled as much as 90 percent of the milk market in Baltimore as early as 1922.

328 Wessel, "Learning to Cooperate," 160; McGrain, *An Agricultural History of Baltimore County*, 87-88. Historian Ronald Kline points out that farm women also played a substantial role in convincing skeptical men to connect to the electrical network. See Ronald R. Kline, *Consumers in the Country: Technology and Social Change in Rural America*, Revisiting Rural America (Baltimore, MD: Johns Hopkins University Press, 2000), 184-5.

In 1928 Fairfield Farms and the Western Maryland-City Dairy merged, forming the Fairfield-Western Maryland Dairy Company.³²⁹ This placed 90 percent of Baltimore's milk sales under the control of a single firm.³³⁰ The merger was reportedly primarily an attempt to stave off takeover attempts from the large Southern Dairies company, which operated dairies from Miami to Washington DC.³³¹ The 1928 merger was widely praised by milk producers and consumers alike for retaining local control over the milk supply.³³² Gone was the concern over trust building that had dogged the City Dairy merger a fourteen years earlier, itself coming years behind the late-1890s public sentiment against monopolies that surrounded UMPA.³³³ In the intervening time the public had gone from fearing the uncontrolled power of large organizations to favoring regulated large enterprises specifically for their efficiency and qualitative consistency and broadly saw regulation as inserting stability into markets. The federal government under presidents Harding and Coolidge supported the growth of large organizations also, preferring not to intercede in business affairs while individual agencies adopted postures favoring the growth of large businesses.³³⁴

The localist grounds for support of the 1928 merger that Wessel documents are called into question by the subsequent takeover in 1930 of the Fairfield-Western

329 Gardiner had retired in 1926. See "C. R. Bowman, Dairy Concern Head, Is Dead," "W. MD. Dairy and Fairfield Firms to Merge: Combination Due to Handle 90 PerCent. of Milk Supply Here," *The Sun*, January 13, 1928.

330 "W. MD. Dairy and Fairfield Firms to Merge: Combination Due to Handle 90 PerCent. of Milk Supply Here"; "C. R. Bowman, Dairy Concern Head, Is Dead"; Dexter M. Keezer, "Large Milk Deal Still Unverified: Interests Concerned Silent on Reported Western Md.-National Merger Plan," *The Sun*, November 1, 1930.

331 "W. MD. Dairy and Fairfield Firms to Merge"

332 Wessel, "Learning to Cooperate," 157.

333 Wiebe, *The Search for Order*, 105.

334 Duffy, *The Sanitarians.*, 247; Wiebe, *The Search for Order*, 298. One USDA report noting that fewer and larger milk facilities in a given market were "clearly desirable" for the "purpose of efficient use of plant, equipment and personnel." See Rudolph Kungard Froker and A. W. Colebank, *Large-Scale Organization in the Dairy Industry* (Washington, DC: US Department of Agriculture, 1939), 35.

Maryland Dairy by National Dairy Products Corporation (NDP), at the time the largest dairy firm in the country. NDP saw Baltimore as a holdout territory and aggressively pursued it.³³⁵ The merger saw Fairfield-Western Maryland become an NDP subsidiary. Fairfield-Western Maryland brand products would remain on the market for some years before NDP's Sealtest brand came to be used for all of the firm's products.³³⁶ Despite the change in name, the milk itself remained unchanged and was merely sold under a new name. There appears to have been little outcry at this takeover by a foreign firm.

Although the dairy trade nationally at the beginning of the 1920s was greater than steel or automobiles, at some 4 billion dollars, its local character and distributed nature had acted as a perennial restraint on ideas of capitalizing it into an industry.³³⁷ The head of a Chicago ice cream company, Thomas McInnerney, believed that it was both possible and potentially profitable to merge the nation's disparate dairy companies under one firm and found investment bankers in New York to help him form National Dairy Products in 1923.³³⁸ The firm's aim from the beginning was to add as many dairy operations to the company as possible. It set about a brisk sequence of acquisitions and by 1928 it had surpassed Borden to be the largest dairy products company in the country.³³⁹ NDP's ambitions kicked off similar efforts from other companies and by the end of the 1920s and into the 1930s acquisitions and

335 Keezer, "Large Milk Deal Still Unverified."; NDP would eventually become the Kraft company. See Selitzer, *The Dairy Industry in America*, 323.

336 Historian Susan Strasser posits that branding created a sense of responsibility for the contents, which is borne out by the advertising of Sealtest brand milk in the Baltimore market. For years after the takeover, the Sealtest name and logo were used almost as a certification of the Fairfield-Western Maryland milk. See Susan Strasser, *Satisfaction Guaranteed: The Making of the American Mass Market*, 1st ed (New York: Pantheon Books, 1989), 30; "Fairfield Western Maryland Sealtest Milk Is Famous for Children!," *The Sun*, May 27, 1936;

337 Selitzer, *The Dairy Industry in America*, 323.

338 Selitzer, *The Dairy Industry in America*, 323.

339 Selitzer, *The Dairy Industry in America*, 324-5.

mergers came into vogue until being temporarily slowed by increasing labor unionization and the effects of the Great Depression.³⁴⁰

Baltimore's dealer mergers after 1917 had some parallels to those occurring in the 1920s on the national scale in the sense that they represented part of an overall trend toward concentration, but they differed in that the capital NDP and other national enterprises brought to bear on merger ambitions was missing. Instead, with the market largely cleared of the smallest players after the 1917 pasteurization ordinance and the remaining small and medium players facing capital expenditures for which they had not prepared, the climate was ripe for the largest players to acquire smaller companies in order to move into vacated space in the market. The Western Maryland-City Dairy merger occurred before NDP was founded, so preceded national dairy merger trends. The Fairfield Farms and Western Maryland-City merger ostensibly took place in response to, rather than because of, the 1920s merger boom. Baltimore dealer mergers of the 1920s thus were part of a national trend toward concentration, but appear to have been motivated by different factors than drove most mergers in the period.

The 1930s

As Appendix D shows, by 1930 the modal inversion of rails and roads was largely complete, but several factors served to limit the ability of railroads to raise a comprehensive challenge to this new development. Not just were the railroads down,

³⁴⁰ Froker and Colebank, *Large-Scale Organization in the Dairy Industry*, 48; Selitzer, *The Dairy Industry in America*, 324-5.

but circumstances aligned to keep them from rising. While the merged Fairfield-Western Maryland Dairy had sought to expand rail services in novel ways, NDP immediately began to reshape Baltimore's milk transportation system to suit its particular vision. As the majority player its decisions resonated throughout the milk shed. Meanwhile, technological changes to the design of milk trucks in the 1930s made them more competitive with trains in their ability to maintain temperatures over longer distances. Lastly, regulatory changes and infrastructural initiatives at the city and national level served to reinforce a view envisioning trucks as the dominant haulers of milk.

Writing an analysis of the national dairy merger situation in 1939, USDA analysts Rudolf Froker and A. W. Colebank found that one of the chief aims of large dairy corporations in the 1930s was to eliminate as much dependence as possible on external firms for support services.³⁴¹ Other than performing the milking, their ideal was to manage as much as possible of the milk's journey from udder to glass themselves. This philosophy of vertical integration did not align particularly well with the railroads' widespread practice of making milk transport conform to passenger train services. The schedule flexibility trucks enabled had long been an incentive for producers and dealers to use that mode.³⁴² More than one dealer had already begun operating their own trucks to bring milk to the city by the early 1920s and the practice would only become more prevalent as Western Maryland-City moved to truck only hauling and NDP ended bulk rail transport.³⁴³

341 Froker and Colebank, *Large-Scale Organization in the Dairy Industry*, 31.

342 Trumbower, "Transportation of Milk by Motor Truck," 4.

343 Trumbower, "Transportation of Milk by Motor Truck," 4.

Although evidence from the Baltimore milk shed does not provide area-specific details, on the national stage it would not be until the 1930s that the milk tank truck acquired sufficient design stability to begin to challenge can trucks for primacy in milk trucking.³⁴⁴ In 1929 oval profile tanks were introduced to lower the center of gravity and it became common to insulate tanks with granulated cork glued to the outside, again following a lead established first in railcar building. In the 1930s bright aluminum sheeting was applied to the tanks to reflect the sun's rays and further protect against heat.³⁴⁵

A switch from can trucks to tank trucks in the 1930s was also accelerated by regulatory factors. Studies by the Baltimore City Health Department in 1929 showed that milk arriving from cooling stations was lower in bacterial count than that shipped directly from producers to city plants.³⁴⁶ This resulted in their recommendation that the milk industry move to using bulk tank trucks and cooling stations.³⁴⁷ In 1930 the Health Department ruled that all milk transport had to occur under refrigeration, removing many older unrefrigerated trucks from legal use. Tank trucks had been first only used from a central receiving station, not from the individual farms, but by 1930 the collection of milk in bulk directly from individual producers' farms had come into practice.³⁴⁸ In 1939 the Health Department decided that the responsibility for temperature of milk in transit rested with the carrier, not the shipper.³⁴⁹ Lastly, in 1939

344 Selitzer, *The Dairy Industry in America*, 198.

345 Selitzer, *The Dairy Industry in America*, 198.

346 Baltimore Health Department, *1929 Annual Report*, 54.

347 Baltimore Health Department, *1929 Annual Report*, 55.

348 "The Big Haul," 5–32; Trumbower cites the prevalence of back hauling non-milk freight in the Baltimore milk shed as a factor that served to limit bulk milk shipment. See Trumbower, "Transportation of Milk by Motor Truck," 4.

349 Baltimore Health Department, *City of Baltimore, One Hundred and Twenty-Fifth Annual Report of the Department of Health 1939 to the Mayor and City Council of Baltimore for the Year Ended December 31, 1939* (Baltimore, Md.: Baltimore Health Department, 1940), 337.

the legal boundaries of the Baltimore milk shed were reset to include areas that were not connected to Baltimore by rail, and were of greater distance from the city, including counties on Maryland's Eastern Shore and areas in Virginia to the southwest of Washington, DC.³⁵⁰

In addition to the Health Department, other governmental bodies began to implement changes that favored trucks. In 1930, the Bureau of Public Roads conducted a survey of state roads and found that Maryland's roads were a patchwork of quality and design. In response, Maryland embarked on a project to build "dual lane" roads, including Route 40, which bisected a substantial part of the milk shed.³⁵¹ By the late 1930s, therefore, Baltimore's milk shed was served by some of the most up-to-date roads in the state.

Not all regulation was unilaterally pro-truck, however. The railroads had been subject to federal regulation by the Interstate Commerce Commission (ICC) since the 1880s, but up until 1935 there was no such federal regulation on trucking.³⁵² Anything went in the competition between trucking companies, frustrating customers and competitors alike. In 1935 the Motor Carrier Act was passed under the notion that an "oversupply" of transportation options was harmful for all transport carriers.³⁵³ The law required trucking companies to obtain permits and publish public rates. Larger trucking firms were pleased that the Motor Carrier Act removed smaller players from the market, but the USDA managed to secure an exemption for agricultural trucking. The USDA's leadership was opposed to the ICC's preference for controlled

350 Baltimore Health Department, *1939 Annual Report*, 44.

351 Counihan, *Moving Maryland Forward*, 41.

352 Hamilton, "The Populist Appeal of Deregulation," 142.

353 Hamilton, "The Populist Appeal of Deregulation," 143.

monopolies, favoring unfettered competition.³⁵⁴ At the Maryland state level, however, milk trucking had been regulated through the Public Service Commission since 1916.³⁵⁵ Furthermore, the PSC not only regulated common carrier trucks, in 1924 it began regulating trucks operated by agricultural cooperatives, showing an increase in regulation at the state level before the federal government had even begun to regulate trucking.³⁵⁶ Unlike the more *laissez-faire* oriented USDA, the PSC was more aligned with the ICC in that it held a well-regulated monopoly was more beneficial for the State of Maryland than wasteful competition.³⁵⁷ Despite the USDA's efforts to keep the ICC away from agricultural trucking and support "wildcat" unregulated truckers, the states could and did regulate agricultural trucking on their own, underscoring the local character of the milk industry.

Drawing contrast between the movement of milk and other agricultural products, historian Shane Hamilton sees small agricultural truckers first becoming "viable competitors" to the railroads through the auspices of the USDA's agricultural exemption in the mid-1940s.³⁵⁸ This is some twenty years after trucking had already overtaken railroads as the dominant milk hauler in the Baltimore milk shed and Baltimore was slower than other cities in moving away from railroads to trucks.³⁵⁹ In many ways the relationship between trucks, railroads, and regulation in Baltimore preceded that of the nation, but it was also not identical. The State of Maryland appears to have favored a greater balance of transportation than federal agencies that

354 Hamilton, "The Populist Appeal of Deregulation," 145.

355 Public Service Commission of Maryland, *1917 Annual Report*, 362, 376-7.

356 Trumbower, "Transportation of Milk by Motor Truck," 4.

357 Hill and Padgett, *Annotated Public Service Commission Law*, 21; Hamilton, "The Populist Appeal of Deregulation," 143.

358 Hamilton, "The Populist Appeal of Deregulation," 146.

359 Trumbower, "Transportation of Milk by Motor Truck," 1-18.

tended to support all modes but rail, as Rose, Seely, and Barrett argue.³⁶⁰ This variance may help illuminate future studies of the USDA's support of trucking over railroads and the role this played in modal transitions of the first half of the 20th century.

Conclusion

The upswing in milk production and consumption following the First World War brought with it a surge in the income railroads earned from milk transport, but even as they were earning more than ever before, railroads were losing transportation market share. The motor truck, at first largely operated by rural individuals, somewhat quietly began to chip away at the bloom in milk traffic so that by the time railroad profits started to waver, the truck had already gained a majority stake in milk transport. The railroads' circumstances would be exacerbated by restrictions on the size of the milk shed and the growing dominance of large dairy corporations in the milk shed. Railroads' fall from prominence was accelerated by an overall movement of the general public and mail and express customers away from passenger trains in favor of individual road transportation. Milk was caught up in this wider contest due to choices to support milk movement through passenger service made almost a century earlier. Although attempts were made to use rail for bulk shipping, this practice was discontinued after the takeover of Baltimore's majority dairy by National Dairy Products.

³⁶⁰ Rose, Seely, and Barrett, *The Best Transportation System in the World*.

Trucks were thrust into the forefront of dairy transportation before they had entirely worked out all of their teething troubles. Temperature was still a large concern, but even in its unrefined state the truck fit into the vision of most large dairy corporations as more controllable, operating on a more flexible schedule, and being able to bypass transfers at train depots. The truck could more easily be vertically integrated into plant operations. The dominance of the milk truck in Baltimore actually came later than in other cities, but still preceded the major modal shifts seen after World War Two, when railroads began to lose freight as well as passenger traffic.

The response of railroads to these changes varied greatly based on the relative importance of local traffic to their size and aspirations, underscoring that not all railroads responded equally to the same challenges, nor were the outcomes of equal magnitude. The result of the changes in the transportation and dairy industries was a reduction in the unique local qualities that had long defined the milk trade and even many railroads, replacing it with a national, but more generic and systematic character. The rural producer must be seen as an early champion of alternatives to rail transport. The dealers took this technology and integrated it into their operations, shaping its use and, in the process, further moving rural producers to industrial techniques. Regulatory structures from multiple layers of government pushed and pulled on both the dairy and transportation industries, sometimes together, sometimes in opposition, but rarely with any degree of vertical coordination.

In my introduction I asked what technological changes were necessary for trucks to become dominant over trains in milk hauling. The question as I initially

framed it was overly deterministic. It presumes that once a certain constellation of features appeared that would naturally result in a modal switch. Evidence from Baltimore suggests instead that the change was not a question of superiority but of perception. The shift from rail to road occurred despite the fact that trucks fared worse in studies of temperature control than trains. The truck was perceived as better able to align with the vision of a milk *industry* held by dealers in Baltimore in the 1920s, and embraced by producers in the 1930s. This perception of trucks fitting better into the milk industry was aided by policy structures and actions that preferred oligopoly or monopoly and made it possible for a single decision-maker to radically alter the face of modal division on multiple occasions.

Chapter 7: Conclusion

For almost a century railroads defined the milk trade by providing a vital link between rural producers and urban consumers. By making milk readily available and more affordable, railroads contributed to greater urban milk consumption. They were able to accomplish this by emphasizing speed over temperature control. The class of service to which they bound milk movement, passenger trains, would ultimately become a liability for railroads in attempts to counter competition from trucks. This illustrates that decisions made very early in the development of a technological system have long term implications for its transition or transformation.

Over the course of the 19th century railroads expanded the Baltimore milk shed some 200 miles, providing alternatives to swill milk but increasingly separating consumer and producer and enabling incidences of adulteration. The quality of the milk supply created great ambivalence among urban consumers. Farmers' dependence on railroads and disenchantment with inconsistent railroad rate-setting created strong impetus to find transportation alternatives, contributing to rural support for good roads and a re-estimation of the government's role in their administration.

Early to embrace railroads, Baltimore was however slow to enact meaningful public health reform; its apathetic city government providing little leadership despite rising public dissatisfaction with the milk supply and other matters of public health between the 1850s and 1890s. This resulted in Baltimore's reform efforts being largely a phenomenon of the period from 1894 to 1917. This late bloom in reform

caused sanitarian reforms in Baltimore to occur largely as part of the progressive movement. A new generation of progressive professionals, many educated at John Hopkins University and adherents of germ theory, came into positions of influence in the period, making Baltimore in many ways a leader in using bacteriology to inform and eventually shape public health decisions, even as it was late to embrace public hygiene.

While late 19th century milk reform efforts focused largely on lower income residents and on mothers and children, this broadened with the rise of progressivism and the re-estimation of public facilities in the wake of the Baltimore fire to focus on the well-being of the city as a whole. Spearheaded by the Women's Civic League, this new breed of milk reform championed the use of science, engaged politically as well as socially, and fostered alliances across racial lines. It expected much of government but was not afraid to intercede in research when the government could not provide.

The Women's Civic League made a direct material and intellectual contribution to the 1917 milk ordinance and thus to the subsequent changes in the dairy trade. By setting technological and financial hurdles to participation in milk dealing, this ordinance purged the urban dairy field, creating an oligopoly. In response, the MSDA became the primary milk production body. By 1922, ninety percent of Baltimore's milk moved between three large parties in the dairy field.

The creation of a controlled oligopoly changed the way in which milk transportation was envisioned by dealers and producers. Rural residents' ardent support of roads, and then trucks, provided urban dealers with a new transportation modality and new ways of considering the movement of milk from farm to plant.

Flexibility of schedule, direct delivery, bypassing terminals and local drayage, labor savings, and ease of management were compelling reasons for dealers to embrace trucks. With so much of the milk traffic concentrated among so few players, a decision by any one of them to make changes had wide-reaching modal repercussions. The decision of the Health Department to limit the size of the milk shed, and then the Western Maryland-City Dairy's switch to trucks were a one-two punch to the railroads that precipitated their downward trajectory after what had been their greatest income streak.

Bulk shipping was seen as a necessary part of industrial mass production but only one dealer had a direct rail connection. It was an attempt by railroads to remain competitive and flexible to the needs of a changing industry but came to an abrupt end with the 1930 takeover by National Dairy Products. Developments in the 1930s, largely regulatory in nature, only served to keep the railroads from being able to re-tool and attempt to compete again with trucks.

The concentration in the Baltimore milk shed largely preceded attempts by National Dairy Products to turn dairying into a big business industry. Its roots lie rather in a progressive belief that a tightly regulated oligopoly, or even an outright monopoly, was not only more efficient but safer for the public than unfettered competition.³⁶¹ This attitude, which Hamilton attributes more to interwar thought, dominated much of Maryland's progressive approach to business from at least 1910 forward.³⁶² Government and citizens alike were inclined to consider the milk industry

³⁶¹ Wiebe, *The Search for Order*, xiv; Wells, *Car Country*, 7

³⁶² Hamilton, "The Populist Appeal of Deregulation," 143; Hill and Padgett, *Annotated Public Service Commission Law*, 21, 94. The 1910 law that created the Public Service Commission of Maryland stipulated that it found no issue about a gas utility lowering its prices and "driving small concerns

as a utility, requiring regulation for the public good.³⁶³ The Health Department's regulation of 1917 was one expression of this.

One of the consistent themes in the history of Baltimore's milk transportation is the role of progressivism. Most of the events from 1895 through 1917 are rooted in progressive efforts at reforming government and bringing business under regulation in the interest of efficiency. At the height of actions to reform the milk supply progressives were in positions of influence in the Health Department, Public Service Commission, MSDA, BMFA, Johns Hopkins University, State Highway Administration, and Maryland's city and state government. This unanimity was, however, not homogeneous. As historian James Crooks observes, progressives tended to support a given tenet of progressivism up until it went against their interests.³⁶⁴ Raymond Sweeney characterizes progressivism in Maryland as being more diverse than unitary.³⁶⁵ Thus, while a great many of the changes or impetuses I have described in the foregoing are characterized as progressive, they had different motivations and applications. Shared among them, however, was a desire for efficiency, an embrace of science, and the use of governmental intercession to solve social problems.

Another of the consistent themes in the foregoing thesis has been the role of regulation in Baltimore's milk transportation. Regulatory bodies at city, state, and federal levels all took regulatory action concerning either the milk supply or transportation systems that resulted in gradations in scale, scope, and overlap. There

out of the business and creating a monopoly. The public has the benefit of low prices and the Commission will protect the public against any improper burdens.”

363 James, “Report of ‘Tri-State’ Commission.”

364 Crooks, *Politics and Progress*, 207.

365 Sweeney, *Progressivism in Maryland*, 3.

was no grand plan shaping regulation at the federal, state, and local levels; yet, together, these regulations spurred change and also defined how change could occur.

It is this combination of player and referee that warrants a closer inspection of the role of regulation in the Baltimore milk transportation context. It is necessary to recognize that regulation of “milk transportation” incorporates public policy choices about agriculture, public health, and transportation. Historians Rose, Seely, and Barrett maintain that American national transportation policy in the 20th century was largely crafted with the supposition that railroads were “predatory monopolies” and thus it put in place structures to control railroads “down to the last detail” while foregoing similar structures for other transportation modes.³⁶⁶ The three authors place large stake in the importance of federal public policy in shaping the transportation field, such as federal reticence to regulate road transport even as railroads were being regulated through the ICC.³⁶⁷ They claim that state level regulation, although initially swayed by railroads to regulate trucks, had largely begun to support road transport by the mid-1920s.³⁶⁸ Hamilton shows how larger trucking firms and railroads called on the ICC for regulation of the trucking industry while the USDA acted as protector of agricultural truckers' independence on the national stage.³⁶⁹

The Baltimore experience offers an interesting nuance to these accounts. In large measure the events in the Baltimore milk shed support Rose, Seely, and Barrett's findings of federal support of modes other than rail. Maryland's roadway construction received federal support between 1916 and 1930 through a series of highway acts.³⁷⁰

366 Rose, Seely, and Barrett, *The Best Transportation System in the World*, xxi, 28-29.

367 Rose, Seely, and Barrett, *The Best Transportation System in the World*, 46.

368 Rose, Seely, and Barrett, *The Best Transportation System in the World*, 46.

369 Hamilton, “The Populist Appeal of Deregulation,” 142.

370 Seely, *Building the American Highway System*, 46.

The federal government took no action to regulate trucking until 1935, and then only regulated manufactured goods, while simultaneously regulating railroads tightly, even taking them over during the First World War. Alone these were not the causes of modal shift, but they cannot be dismissed as insignificant.

The state of Maryland also subsidized roadway construction itself, as we have seen, in large part due to the engagement of rural residents. Maryland, however, differed with federal practice on regulating trucks. As I have shown, instead of relaxing truck regulation in the mid-1920s, as Rose, Seely, and Barrett find was commonplace, the Public Service Commission of Maryland was instead moving towards even greater regulation of trucks by including cooperatives under the same regulatory status as common carriers.³⁷¹ Maryland had strong agricultural roots, but by 1900 had a weak agricultural lobby and with a progressive body in the form of the Public Service Commission administering regulation, it is unsurprising that all modes of transport would be regulated with an interest in parity.³⁷²

At the city level there was little direct regulation of railroads and trucks other than temperature provisions, however, many Health Department laws regarding milk had considerable consequences for transportation. Of course, the 1917 law reshaped the entire trade in the milk shed, but as I have shown, other decisions affected transportation as well. For instance, the 1902 closing of city stables boosted the importance of trains, the 1924 curtailing of the size of the milk shed limited railroads'

371 Trumbower, "Transportation of Milk by Motor Truck," 8.

372 Wessel, "Learning to Cooperate," 58, 63, 67. The state Grange, by 1900, was practically inert, having been reduced from almost 200 chapters in the 1870s to only 13. Even as it picked up steam in the 20th century it tended to stay clear of politics. The Public Service Commission's commissioners were appointed by progressive governor Crothers without oversight from the legislature. The Commission's general counsel was a noted progressive. See Crooks, *Politics and Progress*, 215; Sweeney, *Progressivism in Maryland*, 95. Based on available materials it is not clear whether Maryland's practice of regulating agricultural trucking changed in the 1930s.

service offerings, and the 1929 recommendation for using tank trucks and cooling stations provided empirical and scientific justification for increasing their use.

These examples show that federal level regulation was, as Rose, Seely, and Barrett aver, not conceived of as a unified transportation system, but a series of separate systems. They also confirm that roads were promoted federally while rail was held in check. On the state level, however, Maryland was far more ambiguous. It enacted laws that favored and disadvantaged both transportation modes, but tended toward much greater regulation of trucks than at the federal level. In parsing the roles of various levels of government regulation applicable to the milk shed it is remarkable how the Baltimore City government, and in particular its Health Department, exerted a regulatory force not commensurate with its stature. In public health matters the state assumed a subordinate role to the City of Baltimore, including adopting Baltimore's milk standards for the entire state and sharing laboratory facilities and staff with the City's Health Department. The state of Maryland's ability to govern the milk supply was further hindered in the analysis period by its assignment of milk issues to the Livestock Sanitary Board, which was mostly interested only in bovine health.³⁷³ This weak state-level leadership in public health gave the city of Baltimore great autonomy but also left it to its own resources in the pursuit of policy.

The influence that public health and food regulation had on transportation architectures is remarkable. Most of the Baltimore City Health Department regulations were not intended to be transportation regulations, but their influence on transportation was far-reaching. This suggests that transportation historians would be

³⁷³ Fox, "Public Health Administration in Maryland," 254.

well-served by considering exogenous regulatory factors, instead of looking only at direct transportation policy.

Despite the rapid fall in milk traffic by rail after the mid 1920s Baltimore was still receiving a great deal more milk by rail than many other cities. Cities such as Cincinnati, Milwaukee, or Minneapolis had switched almost entirely to roads years ahead of Baltimore.³⁷⁴ There are many reasons for this, including local rates of consumption, presence or absence of producer cooperatives, fitness of transportation networks, and other unique local factors, but a great deal of the reason railroads lasted in Baltimore's milk transport was due to the geography of its milk shed. Before 1924 Baltimore's milk shed provided a Goldilocks zone that was large enough that railroads could be competitive to trucks over long distances, but after the 1924 law limiting the milk shed it became small enough that Baltimore's railroads began to lose market share to trucks faster than in cities such as Boston, Philadelphia, and New York whose milk sheds remained geographically large.³⁷⁵

DuPuis finds that the movement towards creating larger dairy companies, in her words "large-scale technical systems," was a purposeful outcome and not accidental or even driven by concerns of efficiency.³⁷⁶ Instead she asserts that officials in American health departments made a calculus to force industrialization in order to reduce the cost and logistical overhead of inspection.³⁷⁷ In short, industrialization was a political calculation to move expenses to the consumer and away from the taxpayer.

In the Baltimore context DuPuis' apparent reference to Thomas Hughes' concept of large technical systems is an inexact analogy because until after the

374 Trumbower, "Transportation of Milk by Motor Truck," 3.

375 Trumbower, "Transportation of Milk by Motor Truck," 1-13.

376 DuPuis, *Nature's Perfect Food*, 80.

377 DuPuis, *Nature's Perfect Food*, 80.

National Dairy Products takeover Baltimore dealers generally did not consist of a series of distributed networks bound together and working towards a common outcome, in the Hughesian sense.³⁷⁸ Nevertheless, on a different scale many of the larger dealers in Baltimore were the result of earlier mergers and thus did potentially have some similar structures to Hughes' large-scale technological system model on a rudimentary level.

As we have seen, the creation of a regulated oligopolistic milk industry appears to have been intentional in Baltimore, but DuPuis' notion that the motivations for the pasteurization law were largely political and intended as a budgetary device on the part of the Health Department, rather than in the interests of efficiency, appears not to have been likely in Baltimore. The members of the Welch Committee, the source of the pasteurization mandate, were too disparate in background to have acted unilaterally in the interests of the Health Department's budget. Nevertheless, as we have also seen, the Health Department's 1912 recommendation that all milk should be pasteurized did note the “practical impossibility” of ensuring (i.e. monitoring and regulating) a safe milk supply with raw milk.³⁷⁹ The extension of that impossibility to expense is not hard to make. In that sense there is a possibility that DuPuis' theory was a consideration for the Welch Commission, although it is more probable that the purposeful creation of large businesses was a result of a belief that this would provide greater safety and stability to the milk market.

378 Thomas Parke Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983), 5-8; Thomas Parke Hughes, “Designing, Developing, and Reforming Systems,” *Daedalus* 127, no. 4 (Fall 1998): 215–32; Thomas Parke Hughes, “From Firm to Networked Systems,” *Business History Review* 79, no. 3 (Autumn 2005): 587–93. Hughes, however, allows that the definition of system permits many permutations, so DuPuis assertion hinges largely on semantics.

379 Baltimore Health Department, *1912 Annual Report*, 477.

The transformation of the milk business from craft to industry was part of a widespread shift toward industrialization among American enterprise between the 1840s and 1930. But how did these transitions in milk compare to other fields? In *The Visible Hand*, Raymond Chandler charts the importance of middle management to the development of big business in the United States. Highly simplified, he maintains that the combination of mass production and mass distribution techniques in one enterprise was a hallmark of this new type of business.³⁸⁰ In many ways the developments in Baltimore's milk business align well with the changes described by Chandler. In others they differ somewhat compellingly. Until National Dairy Products took over in 1930, milk dealing in Baltimore was broadly what Chandler describes as "entrepreneurial" capitalism, or large firms presided over by owners, such as Gardiner, Baxter, Bowman and the like, rather than by middle managers. At the same time, entrepreneurial dealers did bring to bear several elements common in the machine industry's transition to big business, namely continuous-process technology, particularly in the form of pasteurizing and bottling milk, but also in the form of bulk tank railcars and trucks. With the shift of the MSDA into an organization always able to provide a steady supply of milk to the processing plants, the supply side had achieved mass production status.

As I stated in the introduction, this thesis has necessarily not described the transport from plant to consumer in detail. Nevertheless, it is on the distribution side that Baltimore's milk trade differs from Chandler's model most distinctly. In Baltimore's milk business, mass distribution was not a result of greater

³⁸⁰ Chandler, *The Visible Hand*, 285.

industrialization, but preceded it. The milk sales model originated as a route-based door-to-door marketing enterprise and grew from that to incorporate processing and bottling. Due to milk's perishability, it was for most of the analysis period a poor fit as a sales article in retail establishments. Home delivery of milk direct from the dealer thus dominated through the Second World War. Given that milk was broadly uniform, distribution was key to brand awareness and sales. Large distribution networks thus behove even pre-industrial dealers. Instead of dealers needing to create their own distribution networks because existing pre-industrial marketing infrastructure was insufficient, the majority of change appears to have been at most a concentration of existing distribution networks, often through mergers. Taken together, these characteristics show that the fluid milk trade in Baltimore did in 1930 become big business, but previous to this had been advanced entrepreneurial capitalism, with the organization of mass distribution preceding that of mass production.

Hamilton argues that trucks began to challenge the railroads in the transportation of goods in the period following the Second World War, and that milk moved away from trucks in the 1930s.³⁸¹ As I have shown, the transition for milk in Baltimore came earlier. The reason for this variance is that milk on the rails was not freight in the traditional sense, but more akin to mail. Railroads moved their highest value commodities like milk via passenger service but, as we've seen, this class of service was far more susceptible to early challenges from trucking interests and to the desire for individual mobility on the part of citizens than general freight. As to Hamilton's assertion about the 1930s as the period of transition for milk, this timing differs from the Baltimore experience but in the highly localized milk field may have

381 Hamilton, "The Populist Appeal of Deregulation," 146; Hamilton, *Trucking Country*, 59.

been applicable elsewhere. As Hamilton avers, suitable road networks had to be in place, which did not happen simultaneously throughout the country.

Hamilton also explores conflicts between milk producers near to the urban areas that sold fluid milk and those further away whose milk could generally only be used for less profitable cheese.³⁸² Reduction in milk incomes during the Great Depression inflamed old tensions between these outer and inner ring dairy producers resulting in milk strikes around the country and government intercessions and price controls (in fact, Clyde King, the MSDA arbitrator, was appointed by the federal government to resolve the tensions).³⁸³

Such class conflicts between producers were, however, seldom reported in the Baltimore milk shed. Baltimore's milk shed was almost entirely devoid of cheese manufacture and most milk was sold for fluid consumption or the manufacture of butter.³⁸⁴ The MSDA's moderating influence and control over the milk supply combined with a geography that saw most of Baltimore's milk production begin some 20 miles outside the city (further than many other metropolises) likely ameliorated any tensions.³⁸⁵ While there were dissenting voices, as the "city boys" letter showed, the majority of the milk producers in the milk shed sold through the MSDA, doubtless due to its ability to manage surplus milk and because of its focus on dispute resolution. A MSDA member could always be guaranteed a sale and there was always a third party to arbitrate issues.

Milk did not move to trucks because trucks were technologically better at hauling milk or because railroads somehow failed at moving milk. Indeed, trucks still

382 Hamilton, *Trucking Country*, 29-30.

383 Hamilton, *Trucking Country*, 29.

384 Wessel, "Learning to Cooperate," 14.

385 Wessel, "Learning to Cooperate," 206.

lagged behind trains in isothermal control capability even after the former had attained market dominance over the latter. Milk moved to trucks because milk producers had long sought alternatives to rail, as evidenced by the keen engagement of Baltimore milk elites in the shaping of Maryland's roadbuilding efforts. Milk moved to trucks because trucks allowed expansion of the milk shed in density rather than distance, opening areas to dairy production that had previously been inaccessible by rail. Milk moved to trucks because of federal government policies and actions that assisted roadway construction, established airmail routes, and exempted agricultural trucking from regulation, while tightly regulating railroad actions. Milk moved to trucks because the truck better fit into large dairy corporations' vision of transportation that came to dominate the Baltimore market in the 1920s and 30s, a vision in which flexibility and elimination of interstitial handling were key. Milk moved to trucks because the passenger service to which milk had been tied rapidly decreased in profitability as travelers chose personal cars. Milk moved to trucks because local regulatory structures largely favored trucks either through restrictions on railroads, such as limiting the size of the milk shed, or a lack of regulation of railroads' competition, such as the Public Service Commission's allowance of trucks to move non-agricultural goods from the city to the country, without which their initial profitability would have been questionable.³⁸⁶

Each of the preceding factors played a role in the overall modal shift. It is difficult to assert empirically which had the most influence over the transition, but much of the change was due to the producers, who first advanced the use of trucks over trains, and the large dealers, whose dominance in the Baltimore milk market

³⁸⁶ Trumbower, "Transportation of Milk by Motor Truck," 8.

made a decision to use trucks over trains a change of significant magnitude. Yet, neither of these groups would have been as decisive in applying change had progressive government officials, predominately at the local and state level, together with their expert consultants, not crafted a regulatory landscape that allowed dealers' and producers' choices to have such wide-reaching influence on milk transportation modes.

The move from rail to road in Baltimore's milk traffic was not inevitable. Despite contentions from transportation specialists of modal obsolescence and technological life cycles, or from automotive historians who posit the democratizing nature of individual automobile travel's inherent alignment with American culture oriented the country to prefer a road-based system, there was a degree of randomness to the transition in Baltimore—a collection of contingencies that defy attribution to an orderly cycle.³⁸⁷ It would have been a stretch for policymakers in 1916 to have foreseen that the 1917 milk ordinance would concentrate milk businesses to the extent that they would turn away from railroads. The lawmakers certainly could not have foreseen that a technology only a year into service at the time the law was drafted would overtake railroads within a decade. Even as trucks were well on the way to usurping railroads milk traffic trucks' boosters, such as Bureau of Public Roads chief MacDonald, foresaw modal compliment, not replacement.³⁸⁸ The changes contributing to the modal shift were incremental and subject to new input at every step. Many historians have written on the centrality of transportation regulation in

387 William L Garrison and David M Levinson, *The Transportation Experience: Policy, Planning, and Deployment*. (Oxford: Oxford University Press, USA, 2014, 514; Sarah Gordon, *Passage to Union: How the Railroads Transformed American Life, 1829-1929* (Chicago: Ivan R. Dee, 1996), 280; John Bell Rae, *The Road and the Car in American Life* (Cambridge, Mass: MIT Press, 1971), 359.

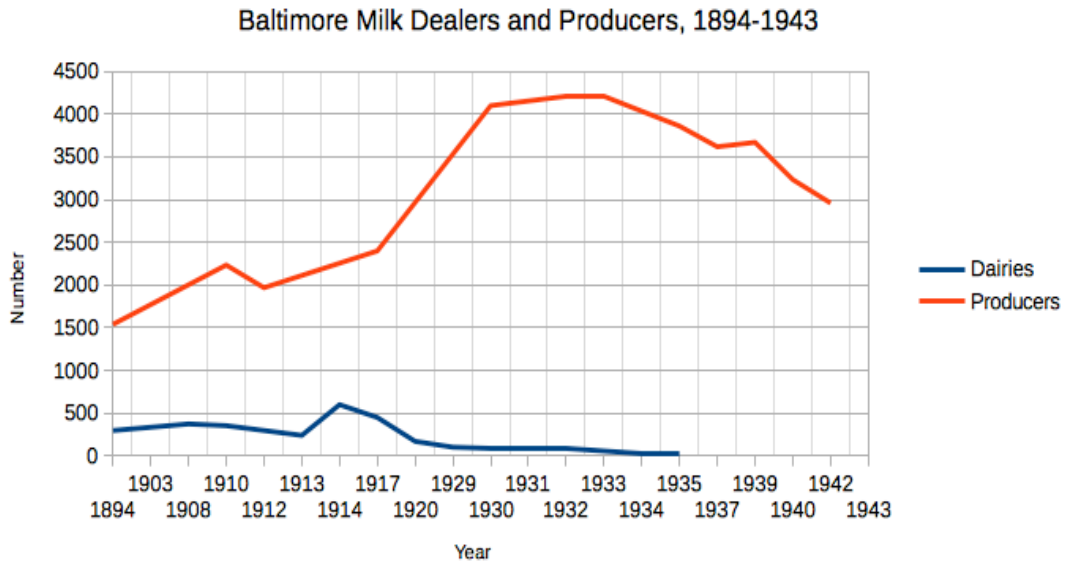
388 Thomas H. MacDonald, "Roads and the Load," *The Milk Dealer* 11, no. 11 (August 1922): 46–54.

shaping the relationship between road and rail.³⁸⁹ My findings do not counter the notion that on the national level railroad regulation and subsidy for all other transportation modes were key to the overall modal shift. Without diminishing the simultaneous national-level dynamics of federal transportation regulation, in the mid-1920s, in the Baltimore region, the effects of public health regulation had greater consequence for the modal shift from rails to roads.

389 Hamilton, “The Populist Appeal of Deregulation”; Kolko, *Railroads and Regulations, 1877-1916*.; Martin, “The Troubled Subject of Railroad Regulation in the Gilded Age – A Reappraisal”; Martin, *Railroads Triumphant*; McCraw, “Regulation in America”; Rose, Seely, and Barrett, *The Best Transportation System in the World*; Wiebe, *The Search for Order*.

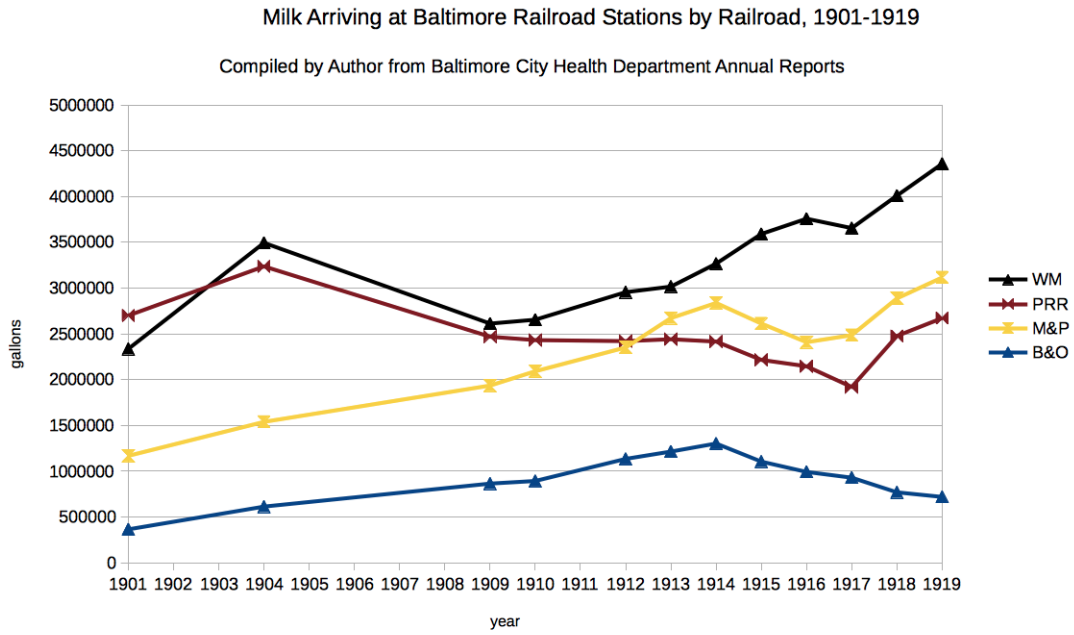
Appendices

Appendix A – Baltimore Milk Dealers and Producers, 1894-1943



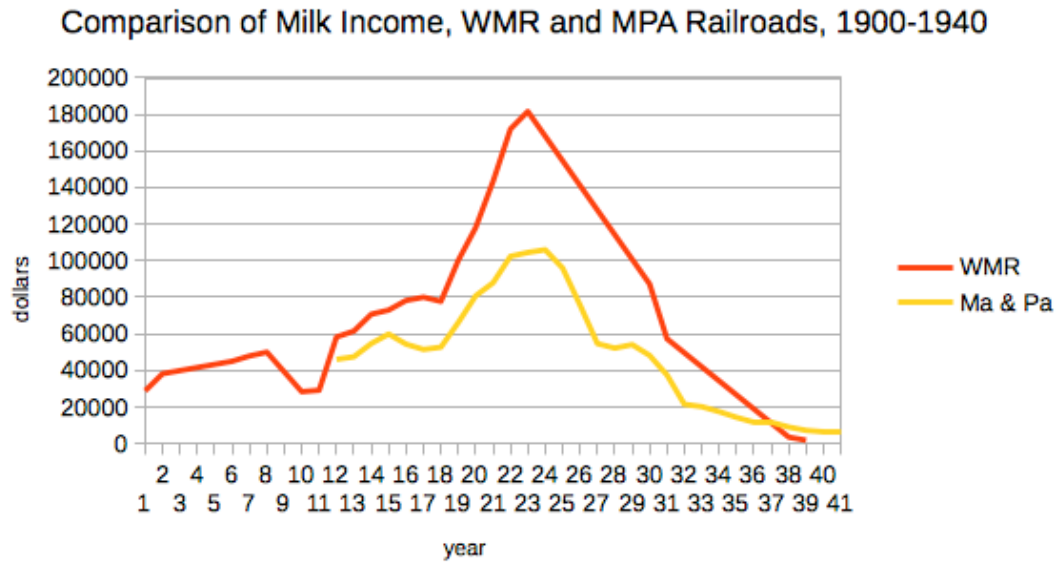
Source: Data assembled from Baltimore City Health Department Annual Reports; Joyce Wessel “Learning to Cooperate;” Dexter M. Keezer, “Large Milk Deal Still Unverified.”

Appendix B – Gallons of Milk Arriving by Rail 1901-1919



Source: Based on statistics reported in the Annual Reports of the Baltimore City Health Department for the years 1901-1919, compiled by the author.

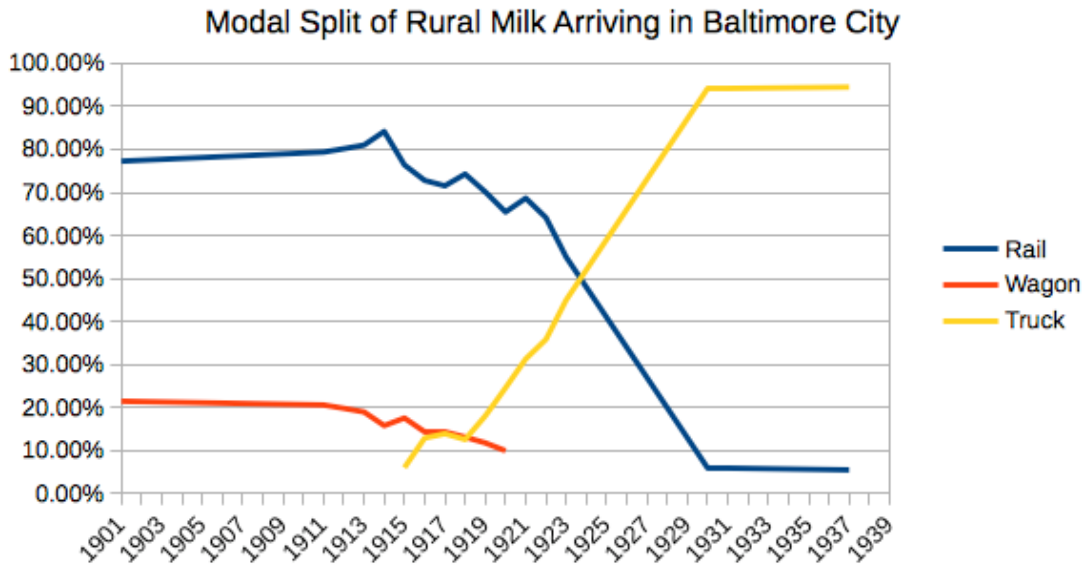
Appendix C – Income Comparison of Top Milk Hauling Railroads 1900-1940



Note: Prior to 1911 the Ma & Pa did not report milk income separate from passenger ticket sales so exact earnings are unknown.

Sources: Annual Reports of the Western Maryland Railway 1900-1940 and Maryland and Pennsylvania Railroad corporate records as compiled by Charles Mahan, Jr. in the collection of the Maryland and Pennsylvania Railroad Historical Society.

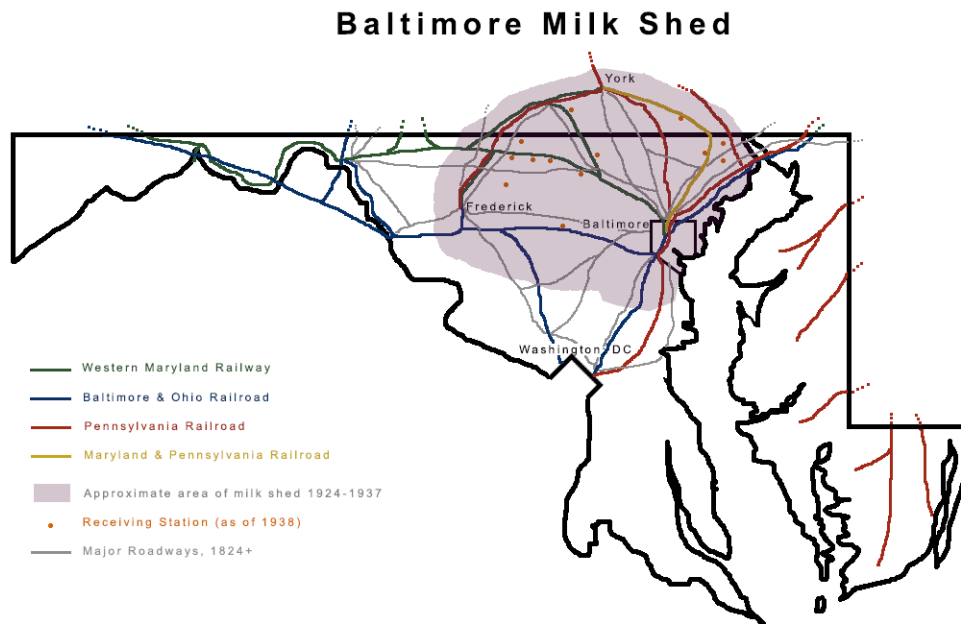
Appendix D – Modal Split of Milk Arriving in Baltimore 1901-1939



Source: Compiled by author from data in Baltimore City Health Department Annual Reports 1900-1940; Alvord and Pearson, *200 Cities*; Trumbower, “Transportation of Milk by Motor Truck”; United States Federal Trade Commission, “FTC Milk Report Baltimore”; Railway Age, “Motor Publication Cites Truck Gains Over Rail Traffic.”

Note: Reflects milk arriving from outside the borders of the city, which changed slightly in 1919 through annexation of some surrounding areas of the milk shed.

Appendix E – Map of the Baltimore Milk Shed



Source: Adapted by author from maps and data in Brooks, Rockel, and Hughes, *A History of Baltimore County*, 143; Brugger, *Maryland*, 782; Heaps, *20 Years*, 59; Wessel, “Learning to Cooperate,” 17.

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