

FOOT-AND-MOUTH DISEASE (FMD) AS A HAZARD FOR NEW ENGLAND DAIRIES

by

Richard P. Horwitz, Ph.D.
Consultant

Prepared for the
United States Department of Agriculture,
Animal and Plant Health Inspection Service (USDA-APHIS)
and the Maine Department of Agriculture,
Division of Animal and Plant Health
Under Cooperative Agreement Number 10-9623-1062 (BCOP, FFY 2010)

June 30, 2011

Contents

ABSTRACT.....	5
PURPOSE OF THIS DOCUMENT	6
BACKGROUND OF THIS DOCUMENT	6
CONTAGIOUS DISEASE AS A GLOBAL CONCERN.....	8
FOOT-AND-MOUTH DISEASE (FMD) AND VIRUS (FMDV)	9
U.S. FMD EXPERIENCE	12
THE CURRENT FMD CHALLENGE	13
THE COST NEXT TIME	21
THE NATIONAL CONTEXT	25
THE NEW ENGLAND CONTEXT	32
OVERVIEW OF THE NEW ENGLAND DAIRY INDUSTRY.....	35
VULNERABILITY TO FMD IN NEW ENGLAND.....	45
RECOMMENDATIONS FOR FMD READINESS IN NEW ENGLAND.....	58
Appendix 1: STATISTICAL OVERVIEW OF NEW ENGLAND DAIRIES COMPARED TO THE U.S. AS A WHOLE.....	60
REGIONAL MILK PRODUCTION, PROCESSING AND MARKETING	62
Milk Producers, Sales, and Processors by State and Region, 2009-2010	62
Milk Quantities Used and Marketed by Producers by State and Region, 2007	62
Marketing, Income, and Value of Milk Production, by State and Region, 2007	63
FARMS, FARM LAND, AND PROPERTY VALUE	63
Dairy Farms and Operations with Milk Cows in New England, 2010	63
Farms Primarily Engaged in Dairy Cattle and Milk Production in New England and the U.S., 2007.....	64
Milk Cows, Production and Sales in New England, 2010	64
Total Milk Production in New England and the U.S., 2007	64
Owned and Rented Land on Dairy Farms in New England and the U.S., 2007	65
Land Use on Dairy Farms in New England and the U.S., 2007	66
Estimated Market Value of Real Estate, Machinery and Equipment of Dairy Farms in New England and the U.S., 2007	67
Milk Cows per Operation in Vermont and the US, 2007	67
FARM OPERATORS.....	68
Number, Gender, Specialization, and Tenure of Dairy Farm Operators in New England and the U.S., 2007	68
PAYMENTS, EXPENSES, AND INCOME	69
Market Value of Milk and Other Dairy Products from Cows in New England and the U.S., 2007.....	70

Market Value of Agricultural Products Sold and Government Payments to Dairy Farms in New England and the U.S., 2007	70
Costs and Returns of Dairy Production in Vermont, the U.S. and Its Largest Milk-Production States, 2009-2010.....	72
Production Expenses for Dairy Farms in New England and the U.S., 2007	74
Net Income of Dairy Farms in New England and the U.S., 2007	75
FARM SIZE AND CONCENTRATION	75
Number of Farms (All Types) with Milk Cows by Herd Size in the U.S. and New England, 2007.....	75
Number of Dairy Farms and Milk Cows by Herd Size in the New England States, 2007	76
Number of Dairy Farms and Milk Cows by Herd Size in the New England and the United States, 2007.....	78
Number of Milk Cows by Farm Size in New England and the U.S., 2007	79
Income Distribution and Sources for Dairy Farms and Operators in New England and the U.S., 2007.....	80
Concentration of Market Value of Milk and Other Dairy Products Sold by Farms in New England and the U.S., 2007	82
Concentration of Market Share Among Dairy Farms in New England States the U.S., 2007	83
Share of Milk Production by Farm Size in Vermont and the US, 2007	84
FMD-SUSCEPTIBLE LIVESTOCK.....	84
FMD-Susceptible Livestock Population in New England, 2010-11	84
Deer Population in New England, 2010.....	85
Types of Cattle in New England , 2011	85
Cattle Inventory in New England and the U.S., January 1, 2011	86
FMD-Susceptible Livestock and Their Market Value in New England and the U.S., 2007 ..	86
Appendix 2: PATTERNS OF MILK MOVEMENT AND VULNERABILITY OF NEW ENGLAND DAIRIES DURING FOREIGN ANIMAL DISEASE (FAD) RESPONSE	88
Sources and Caveats	89
Statistics Derived From USDA AMS Data (January 2010).....	91
Origins and Destinations of Milk Movement in New England States.....	91
Market for Milk Movement in New England States	97
New England Exports and Imports of Raw Milk.....	98
State vs. Region Bounds of Milk Movement in New England	99
State vs. Region Borders for Control of Milk Movement	99
Summary Presentation to NESAAASA, December 2010.....	101
Appendix 3: STATUTES, REGULATIONS, AND GUIDANCE DOCUMENTS FOR FMD RESPONSE IN NEW ENGLAND	110
Summary.....	111

International Guidance Documents.....	112
National Regulations and Guidance Documents.....	113
State Laws and Regulations	117
<i>Connecticut</i>	117
<i>Maine</i>	130
<i>Massachusetts</i>	141
<i>New Hampshire</i>	151
<i>Rhode Island</i>	159
<i>Vermont</i>	169
Appendix 4: DISINFECTANTS.....	180
Appendix 5: DEFINITION OF CASES, PREMISES, AND ZONES IN FMD RESPONSE	181
BIBLIOGRAPHY	183
FMD in International History and Culture	184
Medical and Biological Perspectives on FMD	186
FMD in Emergency Management	190
FMD as a Terrorist Threat	195
FMD in Economic Risk Assessment	196
Structure and Norms of the Dairy Industry in New England and the U.S.....	199

ABSTRACT

This document is intended to add a New England perspective to plans and preparations for emergencies, particularly Foot-and-Mouth Disease (FMD). It provides background for understanding the vulnerability of regional dairies and suggests ways to sustain them if an FMD outbreak occurs. Research and outreach for this analysis were funded through a cooperative agreement between the U.S. Department of Agriculture and the state of Maine on behalf of the region as a whole.

Although the U.S. has been free of FMD for more than eighty years and the disease does not represent a significant threat to human health, there is good reason for concern about infections of this sort and FMD in particular. The disease can cause tremendous damage. Many animals, including the most common farm livestock are susceptible. The rest of the world remains a giant reservoir of many strains of the FMD virus. These strains are hardy and spread quickly, but they are also difficult to monitor. Mutation and contagion can outpace existing surveillance and testing capacity. The risk of disease transmission seems to be rising with the range, pace, and volume of global trade and transportation as well as threats of bioterrorism. Unfortunately, too, vaccination is not yet an attractive option for preventing it. An outbreak seems likely for the U.S. sooner or later. It would have fearsome consequences and staggering costs for the dairy industry, consumers, and tax-payers as well as the animals themselves.

New England is an important participant in the dairy industry as well as home to a uniquely valued and vulnerable part of it. Contrary to popular belief, New England dairy farms and processors resemble the rest of the nation in many respects. If the six states were considered one, its dairy industry would be typical for an “ordinary” state. Still, with respect to vulnerability to FMD, New England differs in a few key respects:

- Economic distress: Lower profitability, higher property values and intense development pressure increase the challenge of protecting farms and restoring any that become emergency casualties.
- Divided authority: The small size of New England states and weakness of county government increases the challenge of coordinating emergency response across relevant jurisdictions.
- Separation of production and processing: Dependence on frequent interstate milk transport increases the challenge to business continuity in an emergency.

Three strategies are recommended to improve the sustainability of New England dairies:

1. Tighten the coordination of state preparations for responding to Foot-and-Mouth Disease (e.g., endorse the USDA-APHIS “Red Book” as the center of all response plans in the region).
2. Develop, adopt and exercise a uniform region-wide plan for issuing permits to move milk – both intra- and inter-state – from farms to processors with precautions that minimize the risk of contagion (e.g., in coordination with the national Secure Milk Supply Plan).
3. Plan to preserve the diversity of existing dairy farms and processors, especially a mix of large and small, national and locally oriented operations (e.g., in priorities for issuing permits and support of biosecurity improvements).

Appended to this document are more fine-grained and comprehensive analyses of New England livestock, dairy farms, their performance and personnel, as well as international, national, and state statutes, regulations and guidance documents for FMD response.

PURPOSE OF THIS DOCUMENT

This document is intended to introduce and to add a New England perspective to preparations for agricultural emergencies, such as outbreaks of highly contagious or zoonotic disease. In particular, it explores the challenge of sustaining milk production of the region, if the U.S. experiences an outbreak of Foot-and-Mouth Disease (FMD). (Note: FMD is not a significant health risk for humans, but it is severe for livestock that have cloven hoofs, including sheep, goats, and especially swine and cattle.)

Each section of the document covers a distinct dimension of the disease, the dairy industry, and the vulnerability of New England dairy operations. Recommendations center on improving regional plans and procedures to keep milk moving even when restrictions on movement are required.

This document is intended to complement existing local, state, and national statutes, regulations, and plans for emergencies, including the National Incident Management System (NIMS), the National Response Framework (NRF), the National Animal Health Emergency Management System (NAHEMS), the new Secure Milk Supply (SMS), and Federal and State Transport (FAST) Plans, as well as local mutual aid and interstate Emergency Management Assistance Compacts (EMAC).¹

BACKGROUND OF THIS DOCUMENT

This document was produced through a Cooperative Agreement (Number 10-9623-1062 CA under BCOP, FFY 2010) between the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA-APHIS-VS) and the Maine Department of Agriculture, Food, and Rural Resources, Animal Health and Industry (AHI). Fredric Cantor (New England Area Emergency Coordinator for USDA-APHIS-VS) was the Authorized Departmental Officer's Designated Representative (ADODR). Donald E. Hoenig (Maine State Veterinarian) represented the Maine Cooperator. Richard P. Horwitz (a contract consultant and emergency planner in Rhode Island) provided the research, outreach, coordination, and documentation.

The project builds on long experience and new initiatives in New England. Public health officials, including authorities in departments of health and agriculture of all six states, regularly work with dairy farmers, cooperatives, haulers, and processors to help assure the health and safety of their products and livestock. They also regularly consult with national leaders in dairy sciences and industry. They are, for example, well represented on the new National Steering Committee for a Secure Milk Supply Plan. Among the members that committee are Cantor, Hoenig, and Horwitz as well as William Smith, the New England Area Veterinarian in Charge (AVIC) and Director of New England Area USDA-APHIS-VS.

Among the key catalysts for this project was a series of activities – Homeland Security Exercise and Evaluation Program (HSEEP) workshops, seminars, and exercises – that

¹ U.S. Department of Homeland Security (DHS), [National Incident Management System \(NIMS\)](#) (2010) and [National Response Framework](#) (2010); USDA-APHIS, [National Animal Health Emergency Management System \(NAHEMS\) Guidelines](#) (2010); [Emergency Management Assistance Compact \(EMAC\)](#) (2010). See also appended regulations and guidelines.

began in 2008. In particular, the New England Regional Foot-and-Mouth Disease (FMD) Exercise in New Hampshire, November 18-19, 2008, engaged a wide array of national and state agencies:

- USDA-APHIS-VS New England Area Office
- USDA-APHIS-VS National Veterinary Stockpile (NVS)
- USDA-APHIS Wildlife Services
- USDA-APHIS-VS Centers for Epidemiology and Animal Health (CEAH)
- US Department of Energy (DOE) Lawrence Livermore National Laboratory
- NH, VT, RI, CT, ME, and MA State Departments of Agriculture
- NH and RI State Emergency Management Departments
- NH Department of Health and Human Services (HHS)
- FEMA Region 1, ESF #11 Coordinator

The exercise *After Action Report/Improvement Plan* (AAR/IP) as well substantive, multi-state exercise experience accelerated efforts to coordinate FMD readiness. For example, New England Area USDA-APHIS began hosting monthly conference calls with the six state veterinarians to improve identification of common problems and collaboration on solutions.

Among their greatest achievements to date was forming the New England States Animal Agriculture Security Alliance (NESAASA). Precedents in other parts of the country include the Multi-State Partnership for Security in Agriculture (MSPSA) and the Southern Agriculture and Animal Disaster Response Alliance (SAADRA). All six New England governors signed the NESAASA charter in July 2010.

Chartered Goal of NESAASA

To support and develop regional NIMS-compliant standards, processes, and capacity through collaborative planning, preparedness, mitigation, response, and recovery efforts that help to ensure the safety, health and security of the regional food and animal and animal agriculture sector infrastructure and economy. NESAASA seeks to enhance New England regional animal and animal agriculture emergency preparedness and response to all hazards including chemical, biological, radiological and nuclear (CBRNE) incidents and natural disasters.

With the support of the Area Office of USDA-APHIS-VS, the six state veterinarians who comprise NESAASA developed the Cooperative Agreement and Work Plan for this project.

Horwitz was selected as contractor mainly because of his prior experience researching and developing a regional prototype (Draft "Continuity of Business Plan for New England Dairies," September 10, 2009) with significant stakeholder input. That work was completed under a Department of Homeland Security (DHS) Emergency Management Program Grant (2007-9) to the State of Rhode Island, with the cooperation of New England Area USDA-APHIS-VS. It was also a focus of the full-day Disaster Animal Response Team Summit (January 23, 2009) that included key stakeholders from both the public and private sectors of the dairy industry in southern New England (CT, MA, and RI). The summit was funded by the Rhode Island Department of Environmental Management (RI DEM) and an Emergency Preparedness Initiative Grant from State Animal Response Team (SART) and PetSmart Charities, Inc. Participants included representatives of the

major milk processors, cooperatives, haulers, and regulatory agencies of southern New England as well as nearly every dairy farm in Rhode Island. There was strong consensus that the plan should be further developed in light of a more complete review and analysis of the New England dairy industry.

These New England participants joined efforts in the hope of improving preparation for two potentially conflicting goals in an animal-disease emergency: To control the spread of disease and – insofar as possible at the same time – to sustain food supply chains.

Reconciling these emergency response goals – biosecurity and business continuity – has been an aim for many other regions and commodity groups. In particular, this document pursues lessons of recent international experience with Foreign Animal Disease (FAD) outbreaks. National strategies for implementing those lessons are now most advanced for eggs and poultry. In 2007, the U.S. Animal Health Association (USAHA) petitioned USDA-APHIS-VS to include business continuity in its plans for responding to outbreaks of Highly Pathogenic Avian Influenza (HPAI, a.k.a. “Bird Flu”), and USDA-APHIS-VS agreed. The resulting Secure Egg Supply Plan – including a Federal and State Transport (FAST) Eggs Plan and an Egg Movement Control Model (EMCM) Plan – is a powerful precedent for the national Secure Milk Supply (SMS) Plan and for this regional document.²

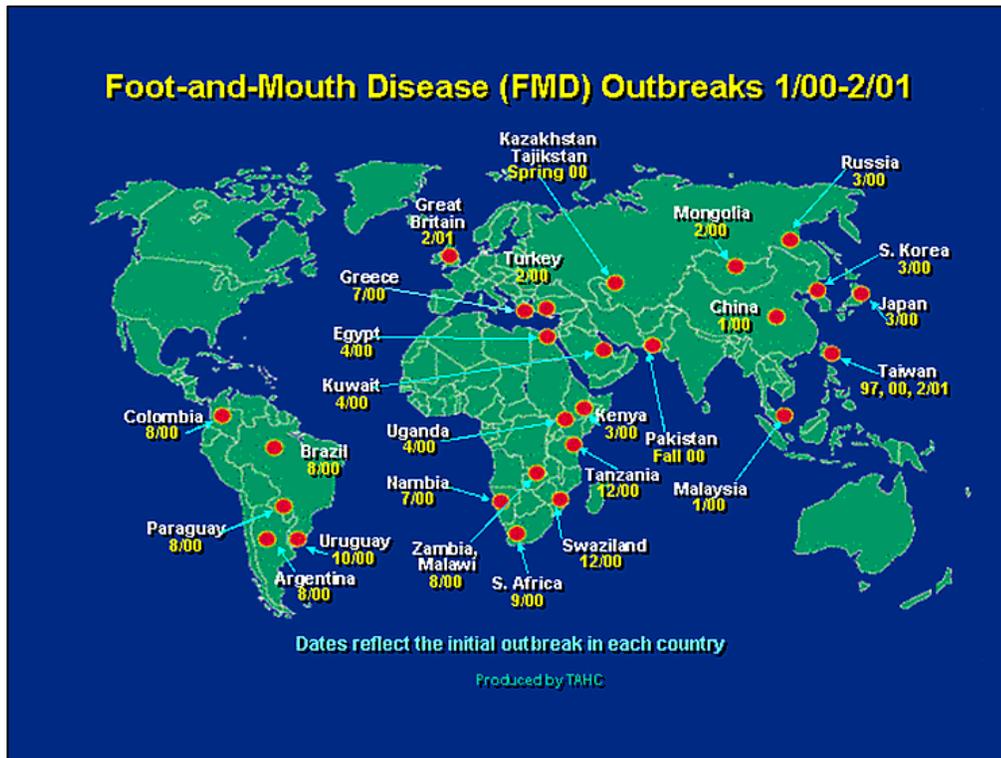
CONTAGIOUS DISEASE AS A GLOBAL CONCERN

Highly contagious disease has long been among the world’s most widely recognized threats to public health and safety. Outbreaks have changed the course of human history, as when they decimated whole populations of people, wildlife, or livestock, or when they jumped from one species to another. Generations of Americans have been schooled to recognize “The Black Death” (the Bubonic Plague that struck Europe and Asia in the mid-fourteenth century) as a standard, worst-case scenario. They are often surprised to discover that plagues are not limited to peculiar, primitive circumstance, filth and poverty, long ago or far away.

Distinctly modern concerns have recently struck close to home. The new millennium itself marked a turning point. In 2000-2001, Foot-and-Mouth Disease (FMD) and the response to it proved extremely damaging in many countries that were thought to have eradicated the disease (e.g., the United Kingdom), and international terrorists struck hard in the United States itself. Thereafter, otherwise obscure pathogens (e.g., Anthrax/“White Powder”) and ordinary commercial aircraft gained prominence as national security concerns. Fears of HIV AIDS, Ebola, SARS and then sundry strains of flu mounted around the world.

² Darrell W. Trampel *et al.*, “A Federal and State Transport Plan for Movement of Eggs and Egg Products from Commercial Egg Production Premises in a High-Pathogenicity Avian Influenza Control Area,” *Journal of the American Veterinary Medical Association* 235:12 (December 15, 2009), pp. 1412-1419; James Roth *et al.*, “Resolution 54 Update: Move to a Secure Egg Supply During HPAI Outbreak,” in [Report of the Committee on Transmissible Diseases of Poultry and Other Avian Species](#), Chair Julie D. Helm (San Diego, CA, October 2009), pp. 30-31. See the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), [Highly Pathogenic Avian Influenza Secure Egg Supply \(SES\) Plan](#) (Draft August, 2010) with associated documents at [The Secure Egg Supply Webpage](#) (2011).

Map of FMD Outbreaks, 2000-2001³



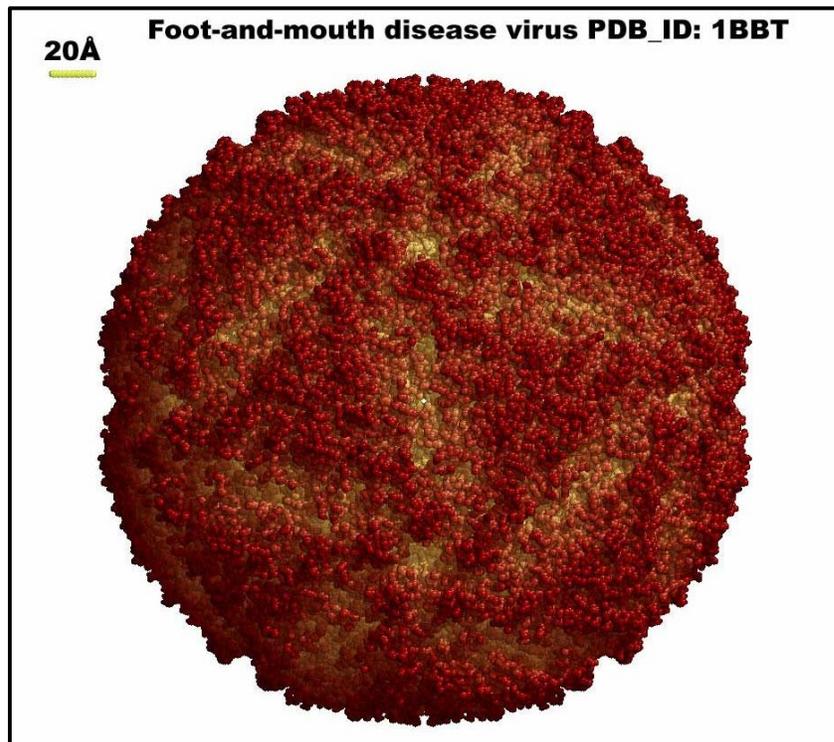
With expanded public funding, scientists and public health officials increased their attention to outbreaks of highly contagious and zoonotic disease (especially “Emerging Infectious Disease,” EID) both as a more likely, albeit unintended consequence of global commerce and as a temptation for terrorists (a “biological-agent weapon of mass destruction,” WMD). The general public has responded erratically, with extremes of skepticism or complacency and panic. Emergency managers now recognize that a planned or accidental release of a virulent pathogen could cause not only great sickness but also cracks in the social, economic, and psychological foundations of everyday life in the modern world.

FOOT-AND-MOUTH DISEASE (FMD) AND VIRUS (FMDV)

Dread of Foot-and-Mouth Disease (FMD), in particular, can be traced back long before the Protestant Reformation. FMD has been recurring in diverse circumstances for at least five centuries. Mediterranean monks wrote about it in the early 1500s, and the disease remains endemic in about two-thirds of the world’s nations. Arguably the worst outbreak in history began just ten years ago in the United Kingdom, where the disease had been eradicated. Total losses exceeded six million animals and £3 billion (\$4.4 billion) to eradicate the disease, which nevertheless recurred in 2007, after a laboratory accidentally released another strain of the virus. When USDA-APHIS reviewed routes of infection in serious new outbreaks, they found nearly a thousand cases to consider, an average of eight or nine per year for more than a century.

³ Brandling-Bennett, David. “Figure: Foot-and-Mouth Disease (FMD) Outbreaks 1/00-2/01” from the Texas Animal Health Commission (TAHC), in [Emerging Infectious Diseases Worldwide and in the Americas](#), Presentation on Emerging Infections of International Public Health Importance University of Washington (2004).

Image of a Single Foot-and-Mouth Disease Virus⁴



How It Spreads

FMD viruses can be spread by animals, people, or materials that bring the virus into physical contact with susceptible animals. An outbreak can occur when:

- Animals carrying the virus are introduced into susceptible herds.
- Contaminated facilities are used to hold susceptible animals.
- Contaminated vehicles are used to move susceptible animals.
- Raw or improperly cooked garbage containing infected meat or animal products is fed to susceptible animals.
- People wearing contaminated clothes or footwear, or using contaminated equipment pass the virus to susceptible animals.
- Susceptible animals are exposed to materials such as hay, feedstuffs, hides, or biologics contaminated with the virus.
- Susceptible animals drink common source contaminated water.
- A susceptible animal is inseminated by semen from an infected animal.

Signs

Vesicles (blisters) followed by erosions in the mouth or on the feet and the resulting excessive salivation or lameness are the best known signs of the disease. Often blisters may not be observed because they easily rupture, leading to erosions. The following signs may appear in affected animals during an FMD outbreak:

⁴ Jean-Yves Sgro, [Image of Foot-and-Mouth Disease Virus](#) (2004), in *Virus Taxonomy: Eighth Report of the International Committee on Taxonomy of Viruses*, 2nd edition, eds. Claude .M. Fauquet, M.A. Mayo, J. Maniloff, U. Desselberger, and L.A. Ball (Academic Press, 2005).

- Marked rise in body temperature [103-105° F / 39.4-40.6° C] for 2 to 3 days.
- Vesicles that rupture and discharge clear or cloudy fluid, leaving raw, eroded areas surrounded by ragged fragments of loose tissue.
- Production of sticky, foamy, stringy saliva [a sign of dehydration or failure to clean nostrils, when swallowing and moving the tongue may be painful].
- Reduced consumption of feed due to painful tongue and mouth lesions.
- Lameness with reluctance to move.
- Abortions.
- Low milk production (dairy cows)[10-20% reduction].
- Myocarditis (inflammation of the muscular walls of the heart) and death, especially in newborn animals.

Animals do not normally regain lost weight for many months. Recovered cows seldom produce milk at their former rates, and conception rates may be low.⁵

FMD and Human Health

FMDV infections in humans are rare and of little consequence. For that reason, FMD is not considered to be a zoonotic disease. A review of human infections from 1921-97 revealed slightly over 40 human cases, in all continents. . . . However, FMD is considered by the Pan American Health Organizations as a public health issue due to its impact on availability of quality protein of animal origin for human nutrition and its effects on mental health (depression, high rates of suicides, and post-traumatic mental disturbances) as a result of activities during the control of serious outbreaks requiring massive depopulations.⁶

Understandably, then, FMD has long occupied center-stage in global research agendas. In the nineteenth century, when viruses were first targeted for identification, FMD was among the first and highest priorities. Germany appointed a special research commission and arranged a state-of-the-art facility on a remote island for the Continent's best and brightest to isolate the culprit. In 1898, Friedrich Loeffler and Paul Frosch succeeded. What they found – FMDV – was the very first of vertebrate (rather than plant) viruses ever identified. But definitive understanding and practical applications remain a challenge. Efforts to refine morphology, vaccine development, and genetic sequencing occupied the following century and continue to this day.

FMD Outbreak in South Korea, 2010-2011

The [Republic of Korea] government said 150 outbreaks were confirmed in 11 cities and provinces and nearly 3.48 million animals were culled since the first outbreak in November. More than 158,000 were cattle and nearly 3.32 million were pigs. Nearly 1.975 million people participated in the battle against FMD, including 489,140 public servants and 338,862 soldiers. Eight public servants died, some from exhaustion.⁷

⁵ USDA-APHIS-VS, [Foot-and-Mouth Disease Fact Sheet](#) (February 2007).

⁶ Committee on Foreign and Emerging Diseases, United State Animal Health Association (USAHA), "[Foot and Mouth Disease](#)," *Foreign Animal Diseases* [a.k.a. "The Gray Book"] 7th Edition (St. Joseph, MO: USAHA, 2008), p. 264.

⁷ Ser Myo-ja, [With FMD Over, New Precautions Unveiled by Government](#), Korea JoongAng Daily (March 25, 2011).

Jef Hammond, Head of the World Reference Laboratory for FMD:

FMD is the most infectious disease known and it presents a continuous severe global threat. . . .

We still use control measures for FMD that are medieval. . . .⁸

U.S. FMD EXPERIENCE

Fortunately, the United States has relatively little experience with actual outbreaks of Foot-and-Mouth Disease, just nine new domestic outbreaks since 1870. The most recent was in 1929, and it was relatively mild. Within memory at the time, however, was the most severe FMD outbreak in American history. It broke first in Michigan in 1914, and within a year spread to thousands of herds in twenty-two states. More than 170,000 cattle, sheep, and goats were destroyed, with a market value of about \$5.6 million. Federal expenditures to eliminate the disease reached \$4.5 million. Just these two costs of FMD (mortalities and federal response) totaled about \$200 million in 2010 dollars. Of course, too, there were other costs as well as losses that go beyond financial measure.

Eradicating FMD in Cattle



⁸ "FMD Virus in the World Today [2009-2010]," in Carl S. Ribble *et al.*, *Report on the British Columbia Foot-and-Mouth Disease Invitational Forum and Workshop*, Abbotsford, B.C., Canada, October 27-28, 2009 (February 12, 2010), p. 7. See also Canadian Food Inspection Agency, [Foot-and-Mouth Disease Hazard Specific Plan](#) (October 2007).

⁹ Mimako Kobayashi, Richard E. Howitt, and Tim E. Carpenter, "[Model Could Aid Emergency Response Planning for Foot-and-Mouth Disease Outbreaks](#)," *California Agriculture* 63:3, p. 140.

¹⁰ David McKenzie, "[Agriculture's Decade in Review](#)," *Weekly Times Now* (December 31, 2009).

Nevertheless, even before the security breakdowns of 2001, a team of the world's leading molecular biologists met to consolidate lessons of the newly mapped FMDV genome. They concluded: "The rapid spread of a pandemic strain such as this [stereotype O FMD virus] clearly demonstrates the ability of newly emerging FMD viruses to infiltrate a wide geographic area and to cause epidemics in countries which have been free from the disease for many years."¹¹

THE CURRENT FMD CHALLENGE

Current conditions as well as characteristics of FMD itself make the prospect of an outbreak in the U.S. distinctly daunting.

- **The disease can cause tremendous damage.**

FMD is among the most dreaded of livestock diseases. The U.S. National Veterinary Stockpile (NVS) ranks it at the top of its list of dangerous diseases, second only to Highly Pathogenic Avian Influenza (HPAI, an unusually deadly strain of "bird flu" that can also infect humans). When even minute concentrations of FMDV are ingested or inhaled, painful illness follows in virtually all susceptible livestock. Associated economic, social, and psychological costs are large and long-lasting. Because the consequences of FMD are so severe, the World Trade Organization (WTO) – through the World Organization for Animal Health / Office International des Epizooties (OIE) – requires singularly strict surveillance and response to FMD. Following an outbreak, even when there are no remaining signs of infection, several months or even whole years may be required before OIE will certify that a country is disease-free and hence permitted to conduct commerce in animal products. Individual countries may set yet more severe demands on trading partners, once FMD breaks.

- **Many species are at-risk.**

Although humans are not significantly at-risk of FMDV infection, nearly all cloven-hoofed animals are susceptible, including key agricultural stock: approximately 94 million cattle, 67 million swine, and 8 million sheep and goats in the U.S. Among these farm stock, cattle and swine suffer the most with FMD; sheep and goats much less so. In fact, sheep and goats may show only very mild or even no clinical symptoms, even as they shed virus. Common American species of wildlife, too – cloven-hoofed animals such as deer, bison, elk, and antelope – have proven susceptible, albeit mainly in controlled experiments. For wildlife as well as sheep and goats, the disease appears to be "self-limiting;" that is, they will become free of the disease if they are spared reinfection from other farm stock. So, the health of many animals depends on getting and keeping cattle and swine free of FMD. Once infection is present in those farm stock, inter- and intra-species transmission is the rule.

¹¹ Nick J. Knowles *et al.*, "[Emergence of a Pandemic Strain of Foot-and-Mouth Disease Virus Serotype O](#)," *Report of the Session of the Research Group of the Standing Technical Committee of the European Commission for the Control of Foot-and-Mouth Disease*, Borovets, Bulgaria, (September, 5-8, 2000), Appendix 1, p. 20.

- **The disease is usually short of deadly, a mixed blessing.**

FMD virus makes susceptible animals painfully ill (hence, much less productive, from an agricultural point of view), and it cannot be cured, but it rarely kills adults (normal mortality increases 1-5 percent in mature cattle). In this way, the virus harnesses its hosts as long-suffering vectors of contagion. Cattle that have recovered or have been vaccinated can still serve as carriers of FMDV for more than three years. So, caretakers face an unattractive choice: nurse the disease host to reduce its suffering (and tolerate the cost, loss of productivity, and risk to other animals) or euthanize it (a total loss).

- **The virus is hardy.**

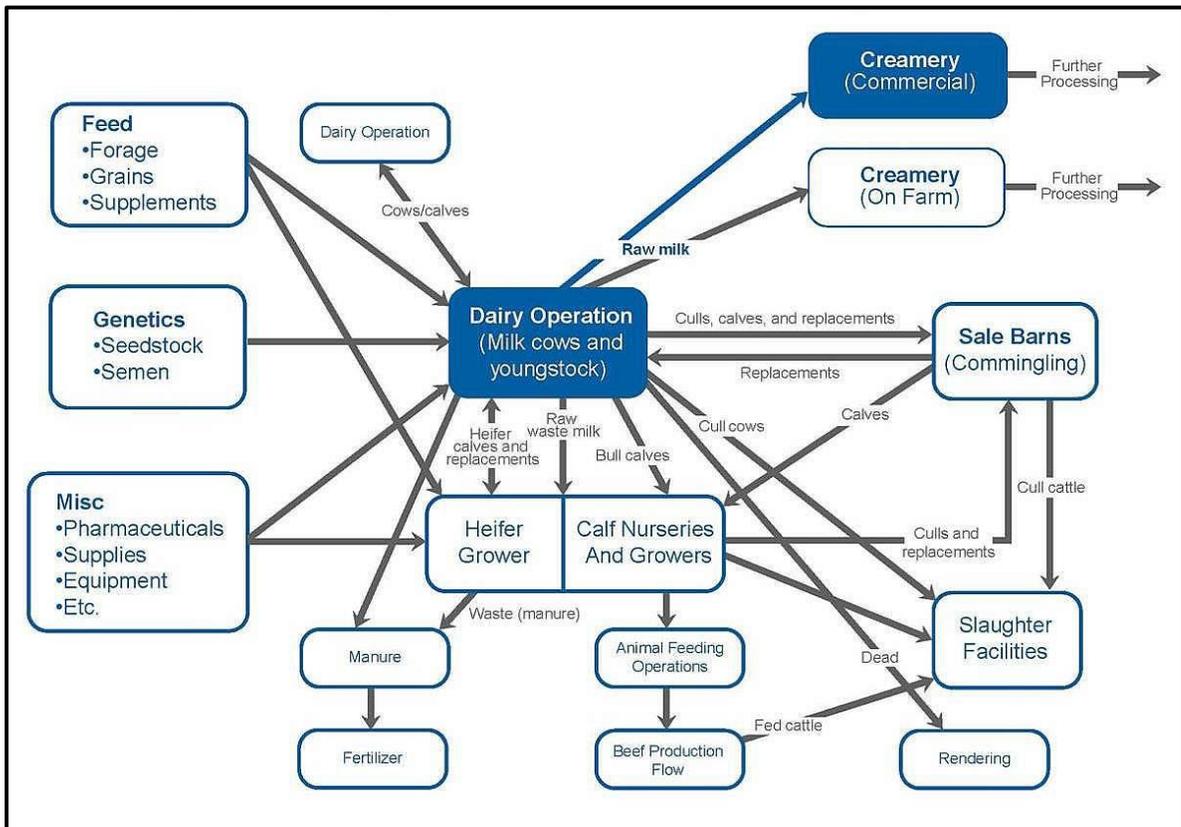
Unlike many other pathogens, FMDV can strike just about anywhere, any time of year. Fortunately, common disinfectants (listed in an appendix to this document) are effective in deactivating FMDV. That vulnerability greatly helps in response to outbreaks. Otherwise, however, when not under assault, the virus remains active in an unusually broad range of conditions. Normal extremes of dark-to-sunlit, hot-to-cold or wet-to-dry weather or acid-to-base media ($6 < \text{pH} < 9$) will not significantly deter it. Although less active in the cold, it can return to action after being frozen indefinitely. It can be aerosolized and windborne as much as 60 km. (37 mi.) overland and 300 km. (186 miles) over water. Heat does not begin to affect it until temperatures rise above 50° C (122° F). It can remain viable in manure or hay for 100 days or more; in snow-covered soil, for more than six months. It can even survive 24 hours in the human respiratory tract, making it possible, albeit unlikely, for farmers or haulers to spread virus that they may have encountered by merely exhaling later that day.

- **FMDV spreads efficiently, easy and fast.**

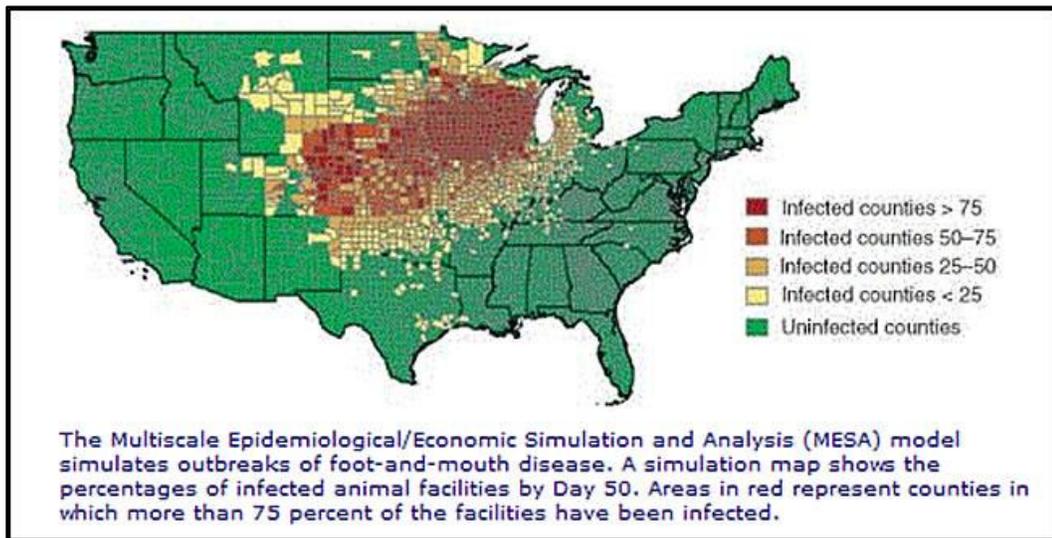
Even a tiny concentration of FMDV in the body of a host animal can multiply and be shed in manure, urine, semen, milk, mucus, and other secretions as well as exhaled air. Any susceptible animal that is exposed will almost certainly become infected, whether contact is direct (e.g., by nursing) or indirect (e.g., by ingesting or inhaling virus on contaminated grounds, boots or vehicles). As few as ten particles of virus may be sufficient to cause disease. Infected pigs excrete multiple millions or even billions of infective doses per day, and a single milliliter of raw cow's milk (less than a quarter teaspoon, before pasteurization or acidification) can contain as much as five million infective doses.

Given the frequency and diversity of traffic to and from farms, FMD can be carried from a single site of infection to many other far-flung sites with fearsome speed.

Commercial Traffic to and from Dairy Farms¹²



Anticipated Infection, 50 Days into a Simulated FMD Outbreak in the Midwest¹³



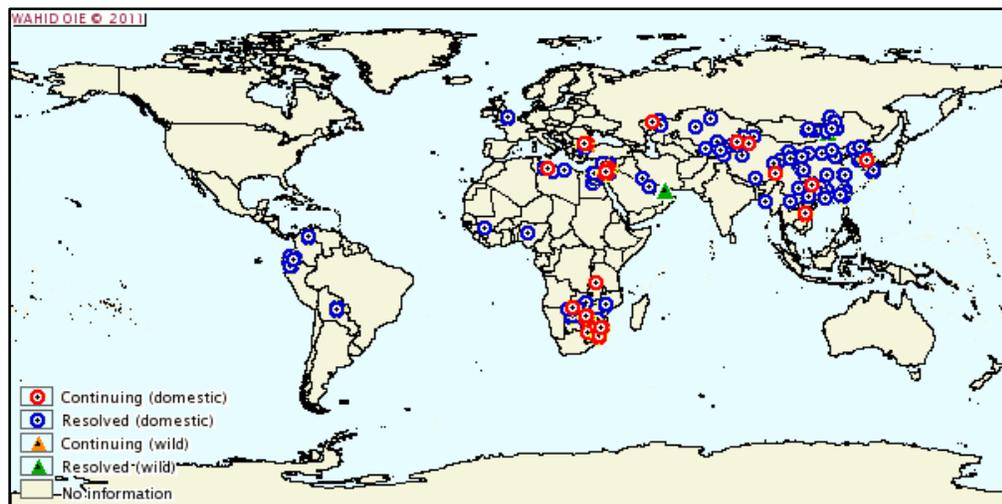
¹² Pam Hullinger, "A Secure Milk Supply (SMS) Plan to Support a FMD Outbreak Response," Meeting of the U.S. Animal Health Association, Committee on Animal Emergency Management (USAHA, CAEM), November 13, 2010.

¹³ Lawrence Livermore National Laboratories, "[Assessing the Threat of Biological Terrorism](#)," *Science and Technology Review* (September 2007).

- **The surrounding world is a giant reservoir of FMDV.**

Among the world's 200 nations, a minority (no more than 50-60) are free of FMD at any given time. Only a small share of all the land and livestock on Earth are consistently spared (in North and Central America, Australia and New Zealand, the European Union, Chile, and island nations of the Pacific and Caribbean). Given treaty-bound restrictions on exports from FMD suspects, each nation's disease status is an economic as well as public-health concern to everyone else. Disease eradication is the consensus remedy, both for animal welfare and for commerce, but the cost for most countries remains prohibitive. In the meantime, even state-of-the-art eradications can prove short-lived. Recent outbreaks of FMD in countries that were supposed to be FMD-free include: Argentina (2001, 2006), Japan (2000, 2010), North Korea (2007), South Africa (2000, 2006, 2007), South Korea (2000, 2002, 2010), Russia (2006, 2007, 2010), Taiwan (2000), Uruguay (2001), as well as the United Kingdom, France, Ireland, and the Netherlands (2001 2007). Given such frustrations, it is tempting to think of the U.S. as an outlier. A rude awakening may be overdue.

Recent FMD Outbreaks, 2006-2011¹⁴



- **The risk of FMDV transmission may be rising along with the range, pace, and volume of global trade and transportation.**

Every year, the U.S. hosts over 30 million commercial shipments and receives 60-80 million international travelers at 300 ports of entry. In most respects, this traffic is entirely welcome. For example, agricultural commerce is among the most positive elements of the U.S. balance of trade. Moreover, the vast majority (by conventional estimates, over 95 percent) of U.S. trade and tourism is both highly regulated and free from direct or even secondary contact with potential sources of FMD infection. For decades, the U.S. has been both intensifying surveillance and helping its trade

¹⁴ World Organization for Animal Health (OIE), [World Animal Health Information Database](http://www.oie.int/) (WAHID), June 30, 2011.

partners improve their own biosecurity. Despite the rise of FMD among those partners, the U.S. border has proven an effective barrier against FMDV transmission.

Still, smuggled agricultural goods are a constant challenge, and a large share of them (30-40 percent of confiscations in the U.S.) are animal products. That is the sort of contraband that may well have first reintroduced FMD into the U.K. in 2001. So far, USDA-APHIS inspectors and their partners have successfully intervened. Each year they seize hundreds of thousands of pounds of smuggled animal products at U.S. ports of entry. Nevertheless, even if only a tiny share gets through, the absolute number could be substantial, and with increased globalization the opportunity for disease transmission mounts. It is particularly alarming that since 2000, FMD has been breaking with greater frequency in countries that are among the most active partners in trade with the U.S.

- **FMD can be hard to detect.**

FMDV can easily spread among exposed, susceptible animals well before they attract attention. The incubation period (the time that normally elapses between the introduction of FMDV and the occurrence of the first overt signs of disease) varies with the host species and virus serotype, but it is generally short (ranging from a few hours to two weeks). Nevertheless, long before they themselves seem sick, infected animals begin shedding huge volumes of the virus. Moreover, judging from overt signs alone, FMD can be confused with other, less harmful domestic diseases (e.g., vesicular stomatitis, bovine virus diarrhea, and foot rot) as well as a couple of Foreign Animal Diseases (FAD) – in particular, swine vesicular disease and vesicular exanthema of swine. Whenever signs like blisters are observed in susceptible animals, tests are required to determine whether the cause is FMD or some other disease.

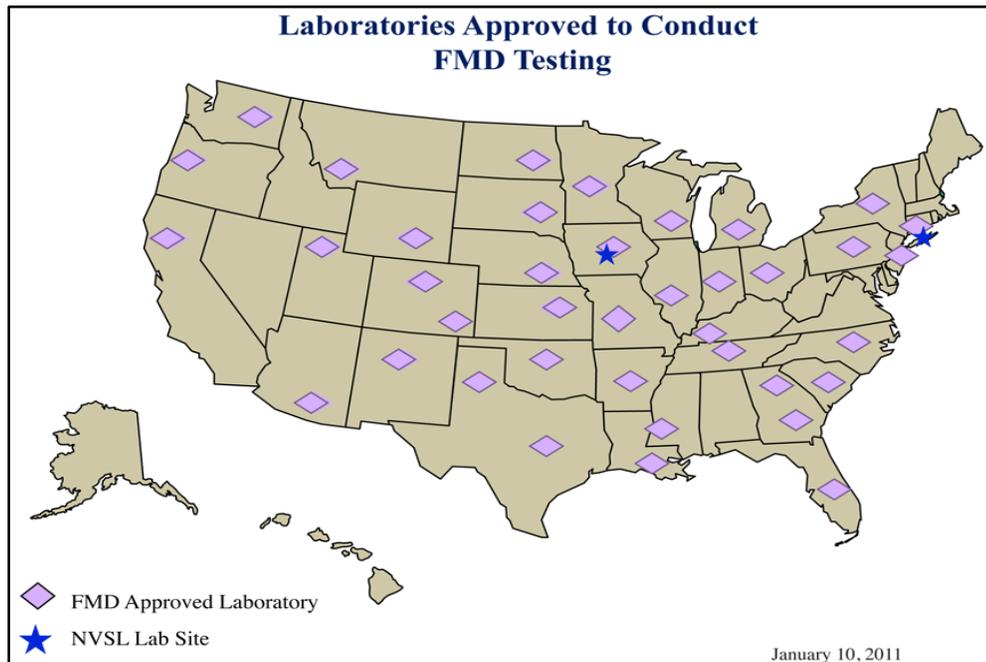
- **Contagion can rapidly outpace surveillance and testing.**

FMDV can multiply and spread from one host to another with awesome efficiency, beginning as early as the very same day as its introduction. But farmers, scientists, and public health officials are unlikely to know much about it, at least with scientific certainty, for days or even weeks later.

A few days or more can be expected to pass before even subtle clinical signs appear. A week or two may pass before exposed animals host sufficient antigens for standard laboratory procedures (rRT-PCR) to detect, that is, assuming that someone was available and duly prompted to collect and process proper samples in the first place. In the 2001 U.K. outbreak, for example, about three weeks apparently passed between initial infection and detection of FMD. (A 2010 study at the National Center for Foreign Animal and Zoonotic Disease Defense Center projected that each hour of delay between initial infection and detection could increase the cost of an outbreak in the U.S. by about \$370 million.)

Since personnel are normally required to wait 72 hours between visits to potentially infected sites, investigation of an outbreak and surveillance around it could quickly overwhelm regular field staff. Samples drawn for FMDV detection must be sent only to select sites in the National Animal Health Laboratory Network.

Laboratories Approved to Conduct FMD Testing¹⁵



The tests themselves take time, generally in proportion to the precision and confidence level of the results they yield. For example, a test that distinguishes active infection from merely prior exposure (VI) takes about a week.

Expected Time and Resources Requirements for FMD Detection¹⁶

Estimated time to complete diagnostic tests:

- Real-time reverse transcriptase polymerase chain reaction (rRT-PCR) – 4 hours
- Antigen ELISA (AgELISA) – 6 hours
- Virus infection association antigen (VIAA) group specific 3D agarose immunodiffusion (AGID) – Overnight
- 3ABC enzyme-linked immunosorbent assay (3 ABC ELISA) – Overnight
- Virus Neutralization (VNT) – 3 days
- Virus Isolation (VI) – 3 days x 2 cycles ~ 1 week

¹⁵ U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), NAHLN Laboratories. Laboratories Approved to Conduct FMD Testing [Map](#) and [List](#) (January 10, 2011).

¹⁶ U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Animal Health Emergency Management System (NAHEMS), [Foot-and-Mouth Disease Response Plan \(The Red Book\)](#), FAD PReP, Foreign Animal Disease Preparedness and Response Plan (November 2010), p. 6-13 and Appendix E: Updated FMD Outbreak Surveillance Guidance and Rationale.

Disease Detection						
Post Outbreak Response Authorization						
	Commercial			Noncommercial		
Sampling	Infected Zone	Buffer Zone	Surveillance Zone	Infected Zone	Buffer Zone	Surveillance Zone
Number of Premises	Census	Census	1% Prevalence Threshold ^o	Census	Census	1% Prevalence Threshold ^o
Unit	Individual Animal Sample	Individual Animal Sample	Individual Animal Sample	Observation or Individual Animal Sample [^]	Observation or Individual Animal Sample [^]	Observation or Individual Animal Sample [^]
Frequency						
At-Risk Premises	5 Days	7 Days	21 Days	5 Days	7 Days	21 Days
Contact, Suspect and Monitored Premises	Every 5th day for 2 incubation periods or 28 days (whichever is longest)			Every 5th day for 2 incubation periods or 28 days (whichever is longest)		
Product Movement	Daily evaluation for daily product movement; evaluation each day, 3 days prior for non-daily movement.			Daily evaluation for daily product movement; evaluation each day, 3 days prior for non-daily movement.		
^o Prevalence threshold is a predetermined proportion of Infected Premises (for example, 5 percent) used to calculate the number of premises to be sampled at a specific confidence level (for example, 95 percent) in a population of a given size (for example, 1,000 premises) based on detecting at least one Infected Premises.						
[^] Types of sample depend on available tests. Visual sampling followed 3ABC ELISA.						

Given the millions of animals and tens of thousands of premises that could merit surveillance in a U.S. outbreak, the NAHLN is apt to find its capacity quickly stressed, too. And such vast amounts of time and resources are required just to obtain a sense of the incident's proportion that is also likely to be instantly outdated. These are among the reasons that, by the time officials assess an FMD outbreak, it is apt to have spread far beyond its origin.

- **Though useful in controlling FMD during an outbreak, vaccination is not yet promising for prevention.**

There are many types and subtypes of FMDV – more than 65 recognized strains – and they mutate readily. Immunity to one type does not necessarily protect an animal against other types.

There are seven completely immunologically distinct FMDV types: A, O, C (or the so-called European types); SAT-1, SAT-2, SAT-3 (South African Territories types) and Asia 1. In addition, within a given type there are many immunologically related sub-types, particularly among the A, O and C (i.e. A₅, A₂₄, C₁, O₁, etc), totaling more than sixty type-subtype known combinations. The high number of FMDV sub-types is the result of error-prone replication of RNA viruses. The implication is that in a given infection there are a

great number of mutants being produced (quasispecies), many of which are selected out due to host immunological pressures. New variants of FMDV can also be the result of homologous recombination between two different strains of FMDV. The combined result of the genetic variation of FMDV through mutations, recombinations and selection is that new FMDV variants are constantly being generated with important implication for the selection of FMDV vaccine strains.¹⁷

To be effective, then, the strain of virus that is actually present in an outbreak must be precisely identified and then a vaccine produced to match.

Development will take time, at least a couple of weeks, and requisite monitoring diagnostics (tests to differentiate infected and vaccinated animals – DIVA) must also be proven. A sufficient supply of the vaccine must also be available, which is apt to be tough in the short run.

In any case, even with the right vaccine and DIVA plus sufficient resources to administer them, onset of immunity through vaccination may take several weeks for the animals themselves. Furthermore, to remain effective, a booster is normally required 4-6 weeks following initial vaccination and then again six months later. Even if such a regimen is practicable and successful, vaccinated as well as recovered animals can carry new types of FMDV, potentially with no visible symptoms.

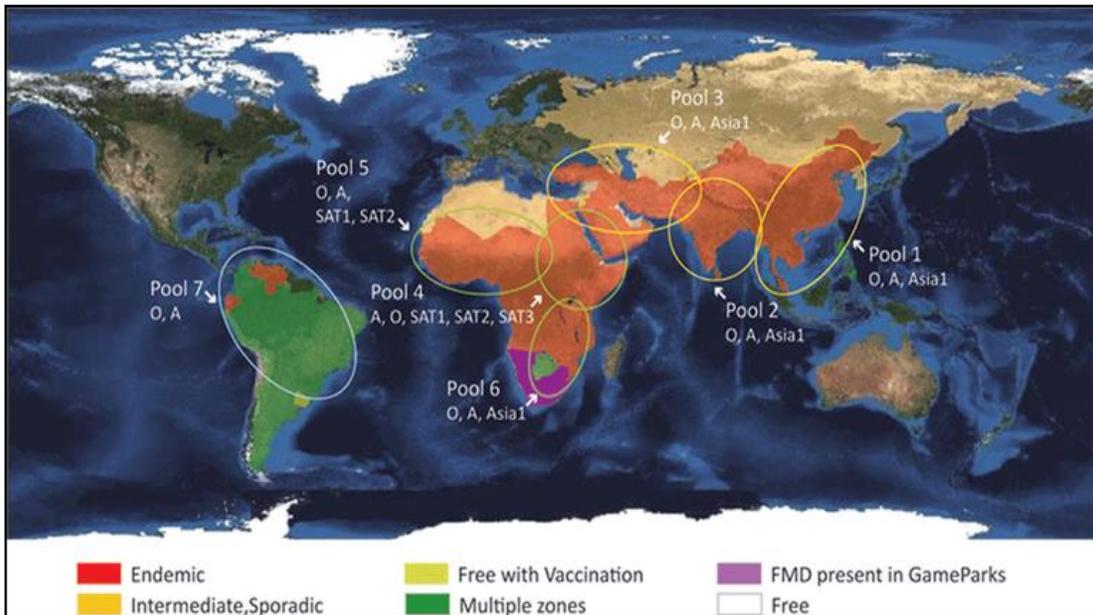
For these reasons, countries that resort to vaccination to control an outbreak are normally required to slaughter vaccinated animals and wait several extra months to regain OIE's official disease-free status and permission to export livestock and livestock products.

So, vaccination is not an ideal approach to FMD control, at least for a disease-free country like the U.S. However, emergency managers and planners are currently building capacity to use vaccination if it becomes appropriate, and it will almost certainly be appropriate in the U.S. if an outbreak becomes widespread.¹⁸

¹⁷ Committee on Foreign and Emerging Diseases, United State Animal Health Association (USAHA), "[Foot and Mouth Disease](#)," *Foreign Animal Diseases* [a.k.a. "The Gray Book"] 7th Edition (St. Joseph, MO: USAHA, 2008), p. 261. See also: Christof K. Biebricher and Manfred Eigen, "What is Quasispecies?" *Current Topics in Microbiology and Immunology* 299 (2006), pp. 1-31; Francisco Sobrino and Esteban Domingo, eds., *Foot and Mouth Disease: Current Perspectives* (Norfolk, UK: Horizon Bioscience, 2004); Esteban Domingo, ed., *Quasispecies: Concepts and Implications for Virology* (New York: Springer, 2006); and Esteban Domingo and Simon Wain-Hobson, "[Quasispecies: Past, Present and Future](#)," 30th Anniversary Meeting Report, *EMBO Reports* 10 (2009), pp. 444 – 448.

¹⁸ Policy for use of vaccines in an FMD outbreak is currently very much in flux. Internationally, in general, it is evolving to allow earlier consideration of vaccines in emergency response and to allow quicker return of countries that use vaccination to disease-free status. See: U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), "Appendix 3 – North American Guidelines for FMD Vaccine Use," [APHIS Framework for Foreign Animal Disease Preparedness and Response](#) (Draft July 2010), B-2.

Estimated Pools of FMD Virus, 2009¹⁹



In this context, FMD remains an ominous prospect. As in the Middle Ages, the disease unpredictably flares here and there. The social and economic cost of each outbreak has, in fact, increased. So, America has been extraordinarily lucky to be FMD-free for nearly a century. Still, all around the U.S., FMD continues to break out from endemic pools into surrounding regions or jumps great distances into nations that worked hard and invested heavily to maintain their FMD-free status.

THE COST NEXT TIME

Clearly, the best way for the U.S. to deal with FMD is to keep the nation free of it in the first place. Cost-benefit studies have consistently shown that the cost of many decades of prevention is a great bargain when compared to the cost of coping with even a single, isolated outbreak of disease.

Major developments in the European Union since the 2001 FMD outbreak include:²⁰

- Reduction in risks of infection and delays in detection at the onset of an outbreak. Animal movements are being regulated to reduce the number and frequency of farm-to-farm movements and thereby reduce the number of contacts.
- Development of variations in stamping out policies: Culling and vaccination options have been re-examined, leading to better definition of circumstances

¹⁹ OIE/FAO Foot-and-Mouth Disease Reference Laboratories Network, Reference Laboratories Information System (ReLaIS), [The Conjectured Status of FMD in 2009 Showing Approximate Distribution of Regional Virus Pools](#) (2010).

²⁰ Food and Agriculture Organization of the United Nations (FAO), European Commission for the Control of Foot-and-Mouth Disease (EuFMD), [Technical Developments in FMD Control: 10 Years After the 2001 Epidemic in North-West Europe](#) (February 23, 2011).

where each may provide most benefit, to contingency planning and drills of capacity to manage and deliver and resource that advance policy goals, and greater involvement of stakeholders in setting disease control goals and contingency plans.

- Greater appreciation that uncontrollable spread of FMD may be a rare event and its occurrence predictable (although virus strains differ in risk of high aerosol production and this property is not well understood or predicted) and that FMD contagion at the local level is largely through biosecurity breaches that are preventable.
- Pre-emptive culling. Better recognition of farmer reporting and veterinary surveillance performance problems, and the role/feasibility of preclinical screening has helped to define the risk of spread to contiguous premises or high risk tracings, and circumstances for pre-emptive culling.
- Vaccination. Changes in OIE and EU standards have created a more favorable enabling environment for the use of vaccination as an additional control measure.
- Surveillance. The performance and validation of NSP tests for use in post-vaccination surveillance is now widely accepted to be "fit for purpose." Commercial assays are now available, and their performance comparable to the OIE reference test.
- Recovery. The ability to regain FMD-free status after vaccination, and fate of vaccinated animals, has been assisted by development, validation and testing in simulation exercises to define and largely resolve post-vaccination surveillance issues.
- Decision making in disease management. Contingency planning and regular exercises of sufficient rigor to test capacity to respond and scaling up human and other resources to achieve greater use of local, risk-based control measures; aided by improved identification and registration systems; against this is the trend to reduced veterinary field services and farm based veterinarians able to manage complex, risk based priority setting in disease management.

Still, if prevention ever fails, livestock, producers, and the larger society will surely suffer. Judging from ample precedent, restoring "disease-free" status may require as much sacrifice as the disease itself. In the recent U.K. instance, costs included \$11-12 billion in losses to agriculture, food, and tourism business. The U.K. dairy industry may still be short of fully recovered, and citizens will long remember the burning pyres of carcasses and stories of sadness, shock, and suicide in the countryside.

Given the intensity of many livestock operations and the sensitivity of modern Americans, it is hard to imagine the depth of challenge that eradication (vs. prevention or just "living with" FMD) would present in the U.S. today. But by nearly all estimates, eradication is exactly what a national FMD response would require. Existing plans are clear on that priority.

From the NAHEMS “Red Book” (2010):

At the start of any FMD outbreak, the desired outcome is to reestablish FMD-free status. (5.4)

Goals (5.1.1):

The goals of an FMD response are to

- 1. Detect, control, and contain FMD in animals as quickly as possible.*
- 2. Eradicate FMD using strategies that seek to stabilize animal agriculture, the food supply, and the economy.*
- 3. Provide science- and risk-based approaches and systems to facilitate continuity of business for non-infected animals and non-contaminated animal products.*

Principles (5.1.2.1):

Three supporting epidemiological principles underlie the four response strategies:

- 1. Prevent contact between FMD virus and susceptible animals.*
- 2. Stop the production of FMD virus in infected or exposed animals.*
- 3. Increase the disease resistance of susceptible animals to the FMD virus or reduce the shedding of FMD virus in infected or exposed animals.*

Possible Strategies (5.1.2):

- A. Stamping-out policy.*
Slaughter of all clinically affected and in-contact susceptible animals.
- B. Stamping-out policy modified with emergency vaccination to slaughter.*
Slaughter of all clinically affected and in-contact susceptible animals and vaccination of at-risk animals, with subsequent slaughter of vaccinated animals.
- C. Stamping-out policy modified with emergency vaccination to live.*
Slaughter of all clinically affected and in-contact susceptible animals and vaccination of at-risk animals, without subsequent slaughter of vaccinated animals.
- D. Vaccination to live policy without stamping-out.*
Vaccination used without slaughter of infected animals or subsequent slaughter of vaccinated animals. . . an emergency vaccination to live policy without stamping-out.

Such an effort would be difficult and expensive. Associated costs could be expected to include:

- Lost livestock productivity and casualties due to infection or depopulation for disease control;
- Costs of emergency response operations (quarantine and movement controls, surveillance, sampling and laboratory testing, euthanasia, carcass disposal, indemnification, site sanitation and security, administration, documentation, etc.);
- Suppressed demand and decreased consumption of directly affected animal products (likely the largest portion of losses for farmers);
- Losses due to international trade restriction;
- Declines in tourism and supporting industries (likely the largest portion of overall losses);

- Effects on stock prices of related companies;
- Environmental impacts, including the value of lost wildlife plus environmental damages from disposal of contaminated carcasses.

Risks in International Trade²¹

Export losses due to restrictions imposed by trade partners on FMD-susceptible animals and products can run into billions of U.S. dollars. The value of U.S. exports of beef products alone, which would be immediately lost, was over US\$3 billion in 2001. . . . Japan, Korea and Mexico constitute the three major U.S. export markets for ruminant products. The value of lost exports to these three ruminant markets would total \$3 billion annually if trade restrictions were enforced against the U.S. . . . Indirect economic losses to U.S. firms that support ruminant [animal and animal product] exports to these three markets would equal an additional \$2.5 billion annually. . . . More than 33,000 full-time U.S. jobs, accounting for almost \$1 billion in wages annually, could be jeopardized by loss of these three markets. In the longer term, if trade restrictions persisted and alternative export markets did not develop, the U.S. ruminant production sector could contract, allowing other supplying countries to establish trade relationships in the absence of U.S. supply.

More precise costs are tough to estimate with precision and confidence. Calculations require making some large assumptions (e.g., about when and where an outbreak occurs, the strain of virus, effectiveness of response, retaliation or forbearance among trade partners, etc.), any and all of which could prove false in actual circumstances.

The difference between best-case and worst-case scenarios can be huge. For example, in 1979, in one of the most frequently cited studies, E. Hunt McCauley *et al.* figured that U.S. short-term losses would total somewhere between \$0.2 and \$27.6 billion, a range of about \$60 billion in 2010 dollars. A 2002 study agreed that costs would probably equal about \$20 billion in all, but a 2007 study found that direct losses in just a few counties in California alone would total over \$13 billion. According to a 1983 study by the National Research Council, a “modest” outbreak of FMD would cost \$54 million to control (i.e., short-term, direct costs), but the NRC also cites studies with total costs reaching as high as \$690 million. In 2010 dollars, that is a range of \$116 million to \$1.5 billion. Even amidst such uncertainty, clearly, the amount of money at-risk is staggeringly large.

At issue in this document is the hazard that FMD represents for just one region of the United States (New England) and one agricultural sector (dairy), but global, national, and local conditions are sure to shape the context of any outbreak and its effect.

²¹ U.S. Department of Agriculture, Animal and Plant Health Inspection Service Veterinary Services (USDA-APHIS-VS), National Center for Import and Export, Regionalization Evaluation Services, [Risk Analysis: Risk of Exporting Foot-and-Mouth Disease \(FMD\) in FMD-Susceptible Species from Argentina, South of the 42° Parallel \(Patagonia South\), to the United States](#) (June 2005), p. 76.

THE NATIONAL CONTEXT

By standard, national measures, New England is hardly an agricultural powerhouse. About a third of U.S. dairy production now comes from just two faraway states: California and Wisconsin. With the exception of Vermont (#15 nationally), individual New England states place near the bottom of the usual dairy rankings.

On the other hand, if the region were as a whole considered one “normal-sized” state (which it is, in many respects), New England would rank near the top (just behind #11 Ohio and well above #12 Iowa), and dairy is the region’s largest agricultural sector. Milk is nearly three times as likely to be the primary focus of a farm in New England as in the rest of the nation.

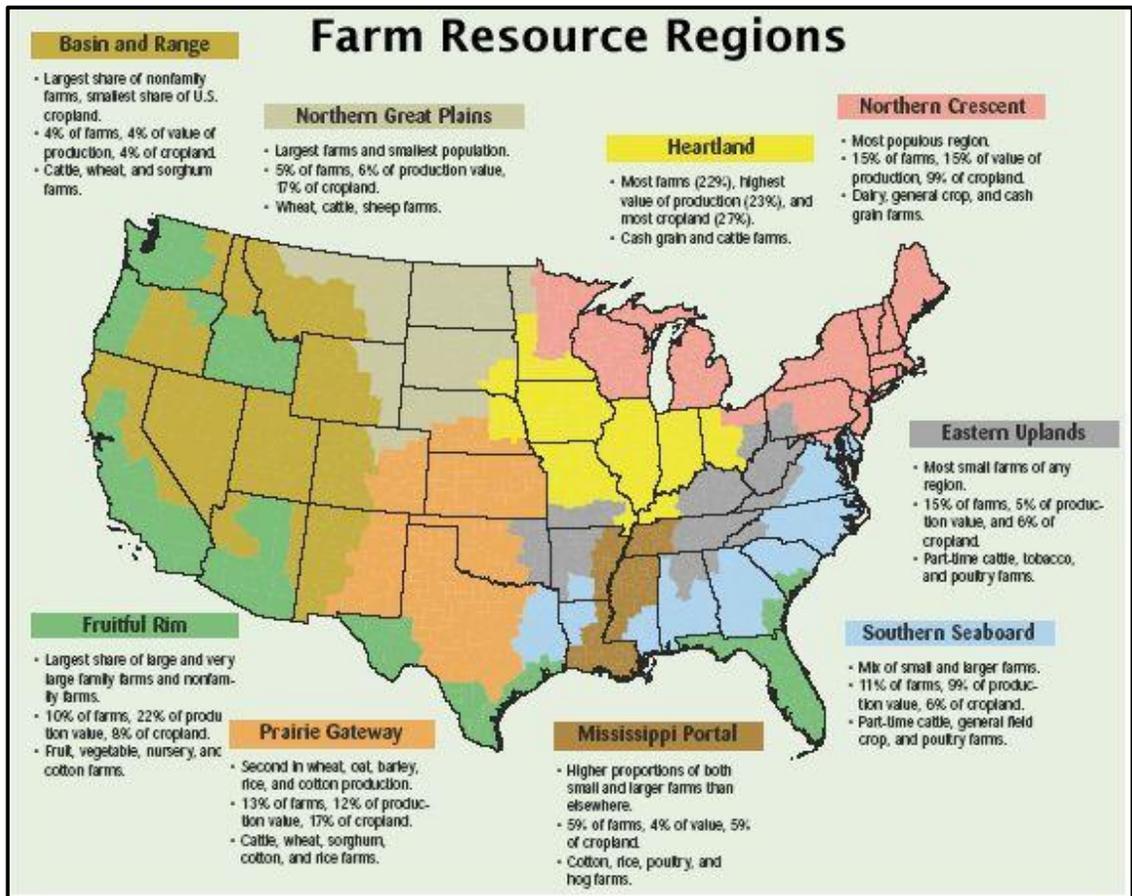
New England Milk Cows, Production and Sales, 2010²²

	CT	ME	MA	NH	RI	VT	New England
Approximate inventory of milk cows	19,000	33,000	13,000	15,000	1,100	134,000	215,100
Production per cow (pounds)	18,684	18,061	17,571	19,533	17,818	18,289	18,328
Total production (million pounds)	355	596	246	293	20	2,469	3,979
Dairy product Sales (million \$)	72.3	126.4	50.5	59.1	4.6	493.9	806.8
Sales rank in U.S.	35	32	41	38	49	15	[12]

By a host of common, more nuanced criteria, the region occupies an important place in a much larger and more complex set of natural and technological, social and economic relations.

²² The Region’s national rank [12] represents a simulation, comparing total dairy product sales of New England farms with the remaining 44 states in 2009-2010. U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Milk Cow Inventory – All States](#) (2011); USDA/NASS, New England Field Office, State Agriculture Overviews, [New England Statistics](#) (2011); U.S. Department of Agriculture, Economic Research Service (USDA/ERS), [Milk Cows and Production by State and Region](#) (September 28, 2010); U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS), [Milk Production, Disposition, and Income, 2009 Summary](#) (April 29, 2010).

Farm Regions of the U.S.²³



Raising cattle is a singularly important enterprise for the nation as a whole. According to the most recent USDA census, it accounts for more than thirty percent of all the cash receipts for American farmers. There are nearly a million U.S. cattle operations in all, but beef and dairy sectors differ greatly in scale, location, and structure.

Key Features of the U.S. Cattle Industry, 2008²⁴

	Beef	Dairy
Major farm products	Grade-quality beef, culled cattle meat	Raw milk, culled cattle meat, veal
Value of farm production	\$49.4 billion	\$35.4 billion
States with highest production	TX, NE, KS, CO	CA, WI, NY, PA
Where product is #1 in agriculture	AZ, CO, KS, MO, MT, NE, NV, OK, SD, TN, TX, UT, WY	CA, ID, MI, NM, NY, PA, VT, WI

²³ U.S. Department of Agriculture, Economic Research Service (USDA/ERS), Agricultural Resource Management Survey (ARMS): Resource Regions (2011)

²⁴ Marcy Lowe and Gary Gereffi, [A Value Chain Analysis of the U.S. Beef and Dairy Industries](#), Report Prepared for the Environmental Defense Fund by the Center on Globalization, Competitiveness, and Governance, Duke University (February 16, 2009), p. 9.

Number of farmers	~900,000	~72,000
Proportion of cattle inventory	~75-85%	~15-25%
Typical cattle lifespan	22-24 months	4 years
Types of farming operations	3: cow-calf, stocker, feedlot	2: dairy farms, custom heifer ranches
Types of manufacturing	2: meatpackers/processors, processors	3: marketing cooperatives, fluid milk processors, dairy product manufacturers

The U.S. Department of Agriculture emphasizes traits and long-term trends that are distinctive of the nation's dairy sector in particular:

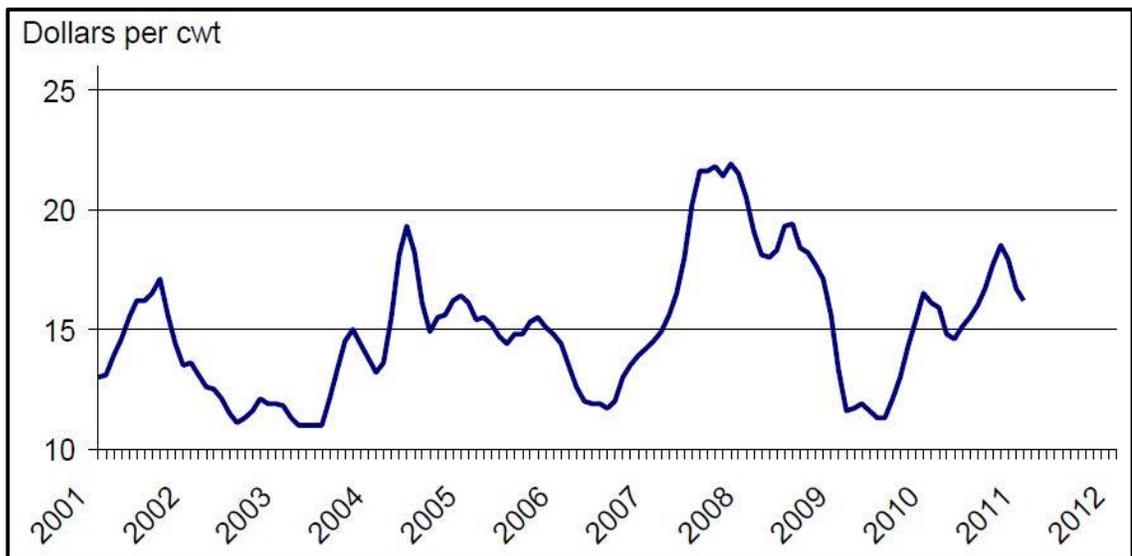
<p>Overview of the U.S. Dairy Industry²⁵</p> <ul style="list-style-type: none"> • Dairy products range from cheese, fluid milks, yogurt, butter, and ice cream to dry or condensed milk and whey products, used mostly as ingredients in processed foods. • Cheese and fluid milk products now use most of the milk supply. • Milk has a farm value of production second only to beef among livestock industries and equal to corn. • Dairy farms, overwhelmingly family-owned and managed regardless of size, are generally members of producer cooperatives. • Government traditionally has regulated both sanitary and market aspects of the dairy industry. • Historically, international trade in dairy products has only occasionally been important for the U.S. dairy industry. In coming years, however, international trade may have a greater impact on the domestic industry.
--

These generalizations apply in New England no less than in the U.S. as a whole.

For example, despite its importance to consumers and the national economy, dairy farming just about everywhere has been and remains a tough way to make a living. Quite apart from the intense labor demands and high cost of initial investment is the combination of small margins, inelastic costs, and wildly fluctuating prices paid for milk and milk products. Among the deepest and steepest drops in U.S. prices in the past century occurred in 2007 and 2009, exacerbated by a simultaneous decline in international prices and steep increases in costs of energy, transportation, and feed. Recent years have been among the most challenging in the history of the dairy industry.

²⁵ U.S. Department of Agriculture, Economic Research Service (USDA/ERS), [Dairy Briefing Room Overview](#) (2011).

Price Paid to Milk Producers in the US, 2001-2011²⁶:



These challenges and price fluctuations appear to be independent of farm efficiency. The amount of milk produced per cow has been steadily increasing since the 1930s. It doubled in the last quarter of the twentieth century. The most commonly credited causes for that gain are changes in the technology of feeding and breeding cattle (e.g., sexed semen) as well as the culling of less productive stock during economic downturns.

Most U.S. farms with dairy cattle remain small, barely profitable operations, with income supplements from other farm produce and off-farm wages. For centuries, most dairy farms have milked fewer than 100 cows at a time, raised their own heifers and feed, and pastured their own cattle.

Nevertheless, for the past decade, a very large share of farms with fewer than 100 cows have been operating in the red, at least on paper. For that reason, although the total number of U.S. dairy cattle has been rising for about a century, the size of herds on the most common (vs. unusually large) farms has remained stable or declined. The relationship of this trend – concentration – to commodity markets is complex and contestable.

The pricing of U.S. dairy products is a complex and changing consequence of supply and demand (which are both remarkably stable), major markets (especially the Chicago Mercantile Exchange – CME), federal regulations and programs (especially the Dairy Products Price Support Program – DPPSP – though the Commodity Credit Corporation, the Federal Milk Order, and the Milk Income Loss Program – CCC, FMO, MILC), and international players (particularly, global agricultural commodity traders, the World Trade Organization, and the European Union – WTO, EU).

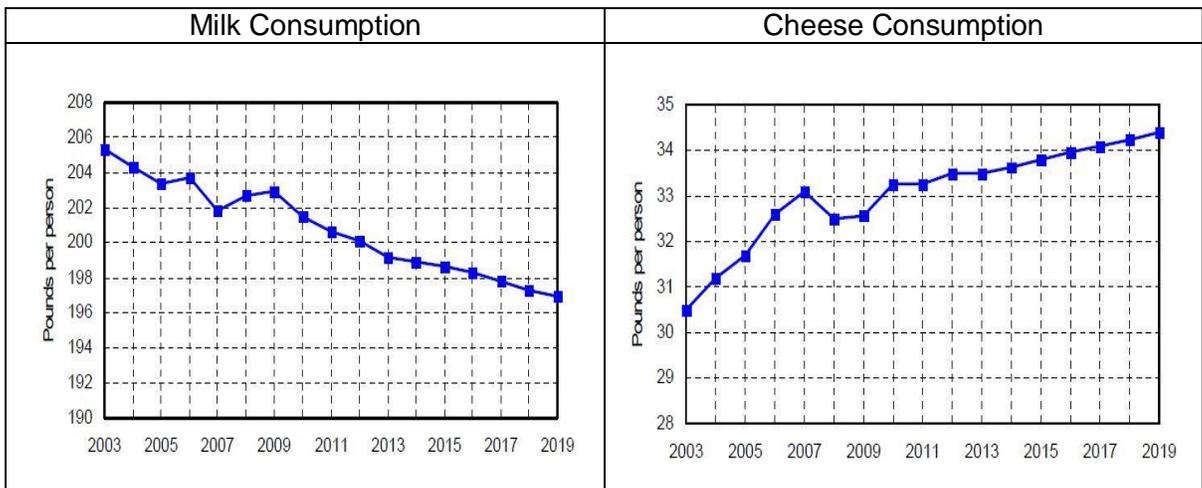
Because the DPPSP so powerfully affects U.S. farm receipts and because those prices have been so volatile and often unfavorable for producers, it is controversial. In recent years, it seems to have failed to broker a steady balance between inherently contrary

²⁶ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Agricultural Prices](#) (January 31, 2011), p. 15.

aims: Keeping the price high enough to cover producers' costs and keeping the price low enough to clear inventory and discourage over-production. The six New England states developed their own alternative – the Northeast Interstate Dairy Compact – which inspired a following, but it also faced a number of legal and political challenges. The “Northeast Compact” only functioned from 1997 to late 2001, but some of its features survive through MILC (particularly an emphasis on maintaining farm revenue relative to the Boston Class I price).

Most of U.S. dairy farm production is consumed as fluid milk and cheese. Total demand for dairy products, however, has been shifting from fresh milk bottled (pasteurized and then placed in waxed paper boxes or plastic jugs) for local consumption, to components of manufactured goods for national and global markets (not only cheese but also non-fat dry powder, butter, yogurt, ice cream, whey, and other ingredients of processed or ready-to-eat foods). Per capita consumption of fluid milk (currently about 200 pounds per person per year) has been declining nearly every year for decades. Per capita consumption of cheese (currently about 33 pounds per person per year) has been steadily increasing over the same period but at a slower rate than the decline in fluid milk consumption.

Per Capita Consumption of Fluid Milk vs. Cheese in the U.S., 2003-2019²⁷



To date, the market for U.S. dairy products remains chiefly domestic, while the European Union, has become a more important competitor. The role of particular public-sector programs and private-sector players in these trends is both complex and highly contestable.

For example, the Commodity Credit Corporation (the CCC, the U.S.-government-funded ready market-of-last-resort) is a dependable buyer for select dairy products (butter, non-fat dry milk, and cheese). The CCC has helped maintain a price floor for U.S. dairy producers. But among the unintended consequences: Manufacturers in as well as outside the U.S. have come to rely on non-U.S. sources of other dairy products (e.g., milk protein concentrate and casein from subsidy-granting members of the EU) for which

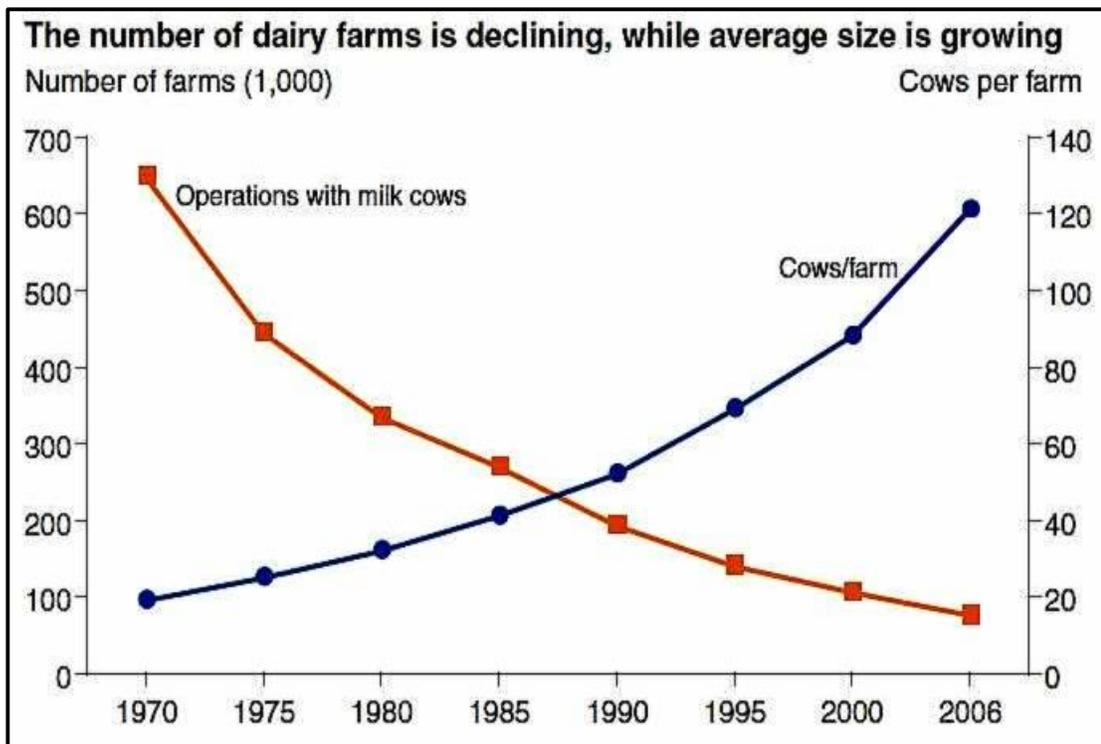
²⁷ Food and Agricultural Policy Research Institute (FAPRI), University of Missouri, [U.S. Baseline Briefing Book: Projections for Agricultural and Biofuel Markets](#), FAPRI-MU Report #01-10 (March 2010), p. 52.

demand has been increasing and for which there are, in effect, fewer price supports. Nevertheless, about forty percent of the non-fat dry milk produced in the U.S. is consumed outside the U.S. With the global recession of 2009, however, U.S. dairy exports have fallen dramatically.

Despite tradition and protective measures, a major and increasing share of U.S. dairy production comes from large (over 1,000-cow) farms with specialized, hourly-wage employees and site managers. By many of the most common measures, they define the industry's cutting edge. For example, U.S. production capacity has been growing most rapidly among farms with more than 2,000 cows. Some operations now milk many thousands of head. Even as dairy farms remain family-owned, they also increasingly purchase grain and replacement stock and confine cattle indoors or on feedlots.

As with most U.S. commodities, a dwindling share of operations produce a giant and growing share of the nation's milk. New England experience is very much conditioned by these trajectories.

Number and Size of U.S. Dairy Farms, 1970-2006²⁸



²⁸ [Changes in the Size and Location of U.S. Dairy Farms](#) in James M. MacDonald, Erik J. O'Donoghue, William D. McBride, Richard F. Nehring, Carmen L. Sandretto, and Roberto Mosheim, [Profits, Costs, and the Changing Structure of Dairy Farming](#), U.S. Department of Agriculture, Economic Research Service (USDA / ERS), Economic Research Report (ERR) 47 (September 1, 2007), p. 2.

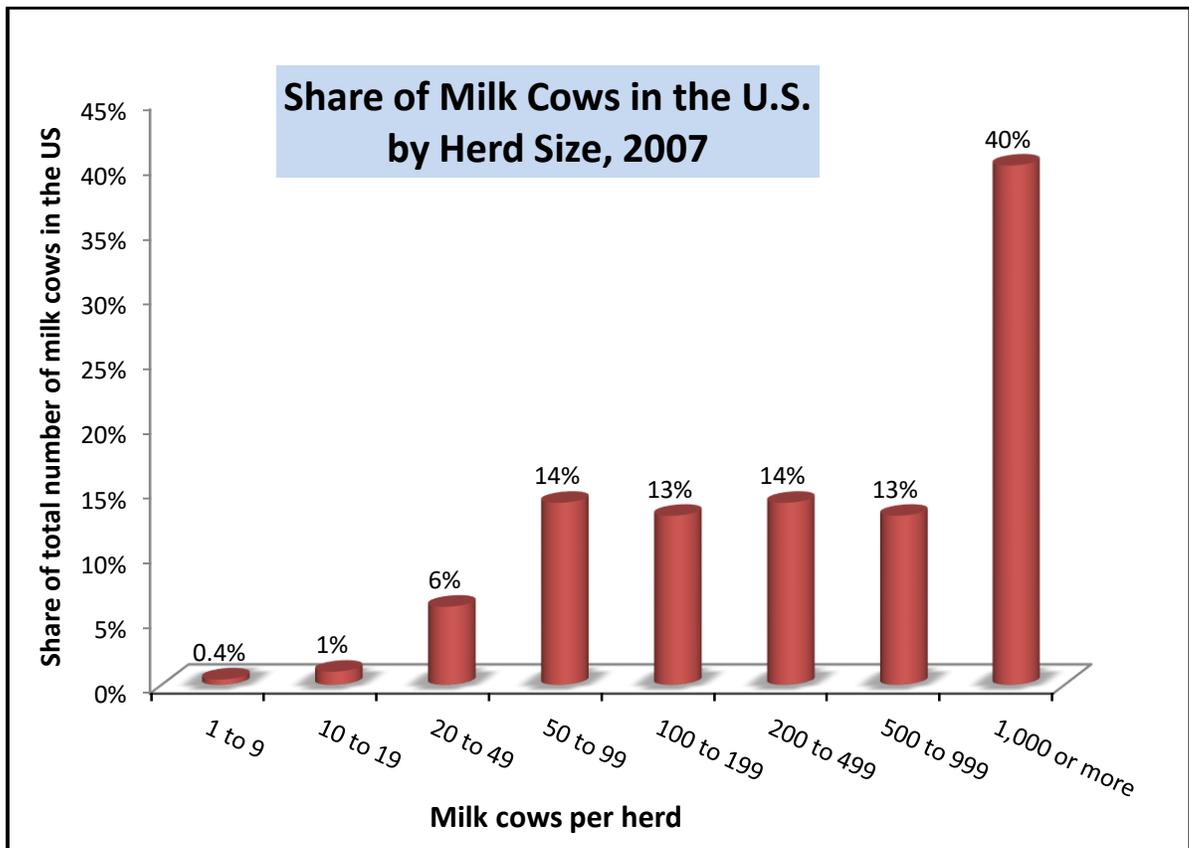
In general (but also with important exceptions), the larger a dairy operation, the higher its profit margin. Explanations are contested, but they usually feature:

- Economies of scale in the costs of production, for facilities, equipment, labor, marketing, and finance. Per-unit costs (\$/cwt.) have been about twice as high for a 50-cow as for a 500-cow operation.
- Market access. Larger farms and processor-allied cooperatives have been better able to make and meet agreements with buyers who have access to much larger markets, manufacturers and distributors, including franchise restaurants and chain retail stores in the U.S.
- Legal and political muscle. Mutually advantageous arrangements between the largest producers, cooperatives, processors, and distributors have been promoted and defended by very powerful institutions.
- Countervailing factors – those that favor smaller dairy farms – have been significant but less decisive. For example, larger operations tend to face higher costs as well as cash-flow demands for capital, wages, replacement heifers, grain, and manure/excess-nutrient management. Many are also concentrated in states with lower Federal Milk Order price differentials. And there are a host of unpriced “externalities,” such as carbon footprints and community impacts that reduce the relative value of large-scale production and distribution. But such disadvantages to date seem to be less powerful than production-cost, market-access, and institutional advantages. For example, prices paid for raw liquid milk in the Northeast are higher where small farms (or at least fewer gargantuan ones) are concentrated, but prices generally have not been high enough to preserve small farmer’s share of either regional or national markets.

For at least a decade, the geographic center of U.S. dairy production has been moving to larger operations in the west and southwest. Sixteen states (led by California, Wisconsin, and New York) now produce more than eighty percent of the nation’s milk. The share that is produced by the older, small-farm dairy regions, such as New England, has shrunk, not because of their loss of production (it has remained quite steady), but because of rapid growth elsewhere.

These trends have important implications for assessing vulnerability to FMD and priorities for preparations and response to a potential outbreak. Considerations that are driven strictly by the number of cattle (e.g., animal health and production hazards) favor very large farms, while considerations that are driven by the number of farms or farmers (e.g., sustaining local businesses and rural ways of life) favor smaller ones.

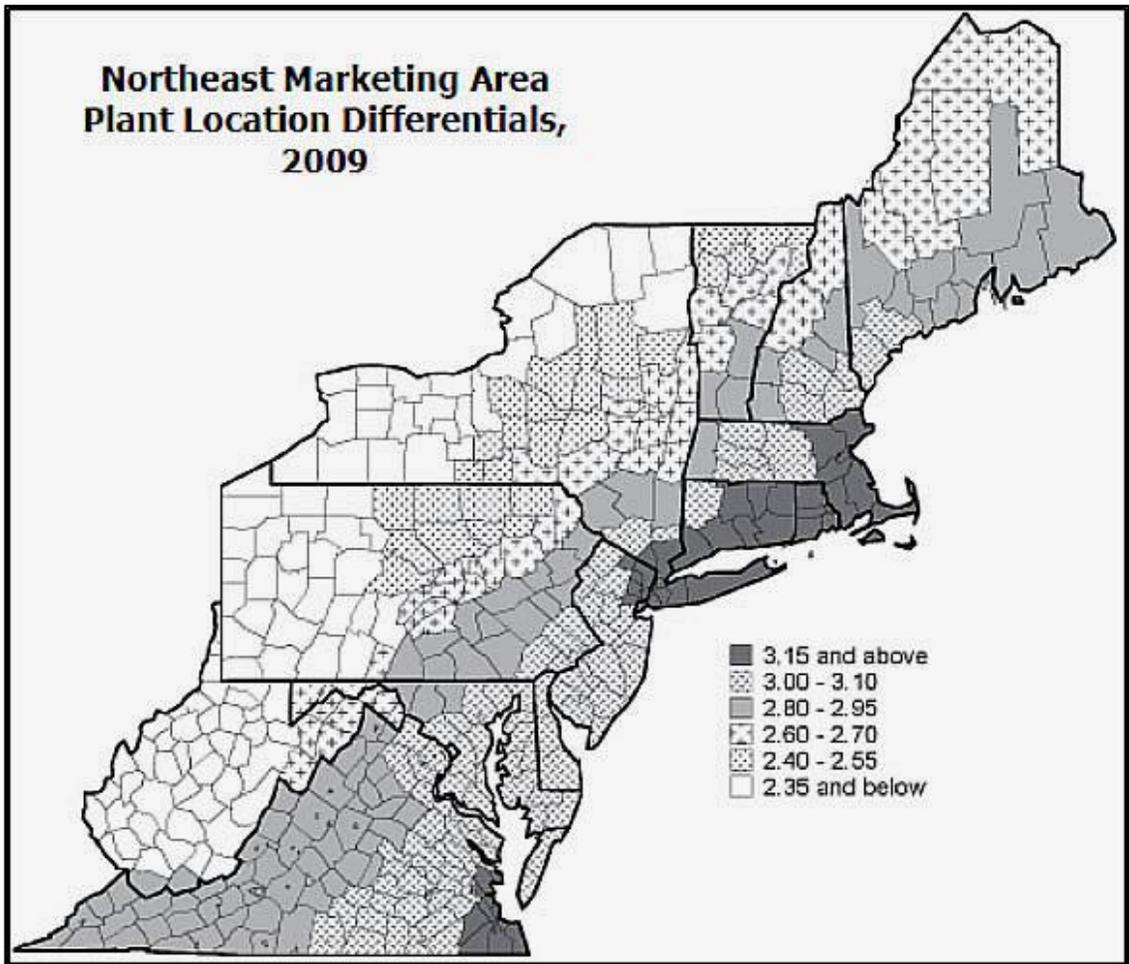
Concentration of Milk Cows by Farm Size in the U.S, 2007²⁹



THE NEW ENGLAND CONTEXT

The northeast of the United States is better known for its cities than its farms. A wide corridor from New York to Boston is infamously packed with people. Three of the six New England states (RI, MA, and CT) are among the most densely populated in the nation (#2, #3, and #4, respectively, just behind New Jersey). The federal government considers such conditions in maintaining price differentials (through the Provisions of the Milk Marketing Order, administered by the Agricultural Marketing Service of the U.S. Department of Agriculture, USDA/AMS) that nudge milk production toward that urban corridor, from land more amendable to corn and cows and toward metropolitan consumers.

²⁹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture: State Level](#), Volume 1, Chapter 1, Table 17, and [2007 Census of Agriculture: United States](#), Volume 1, Chapter 1, Table 17 (2011).

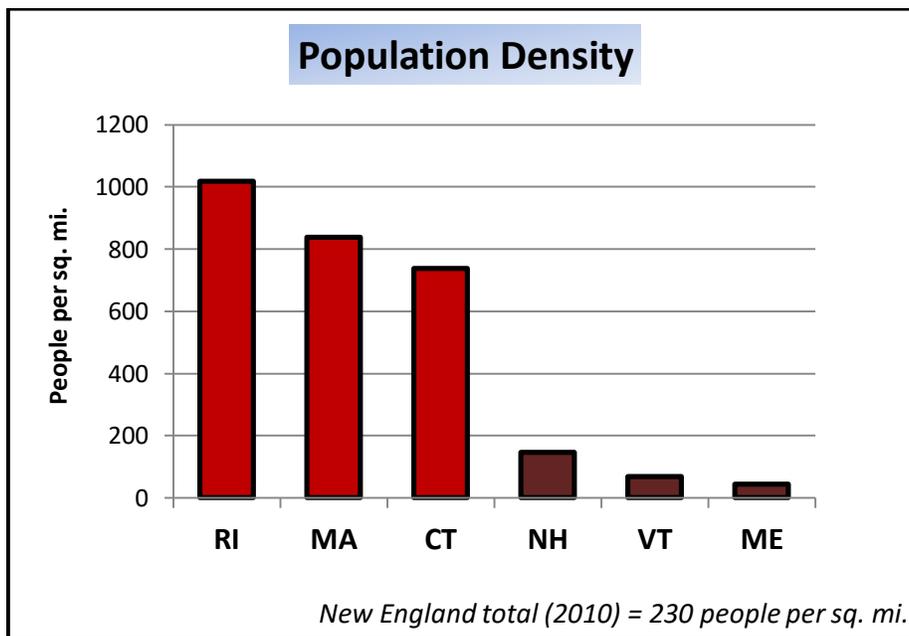
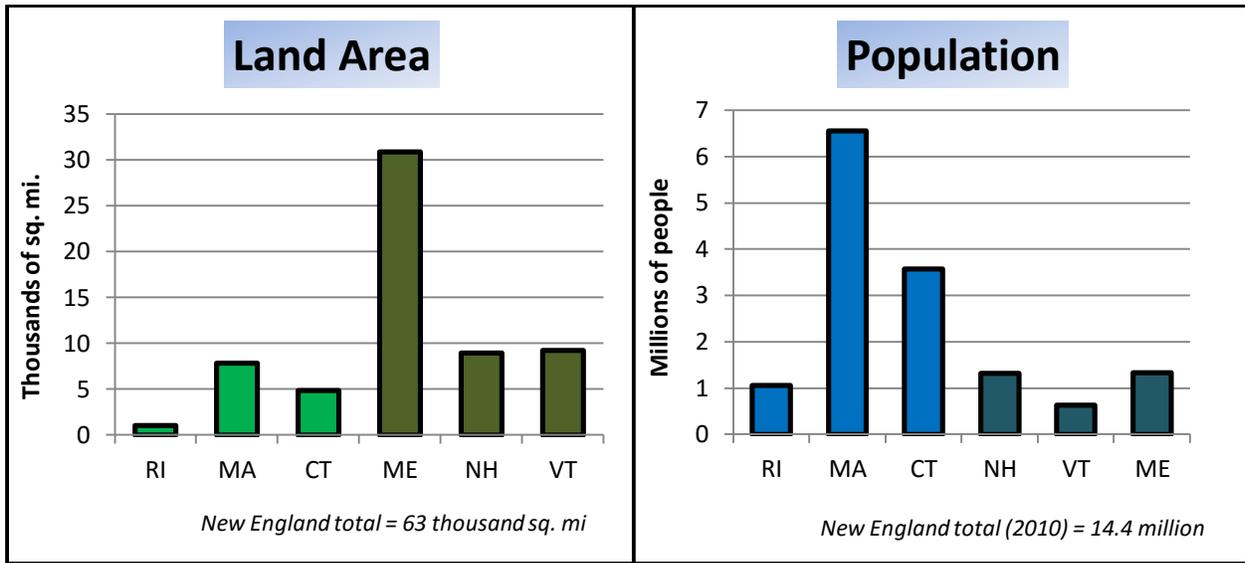


From a demographic point of view, however, New England is far less purely or simply urban than it may first appear.

Though the states share a small size and proximity to urban centers, there are important differences among them. For example, Rhode Island is very densely populated, but its land area is also a tiny share of the region. Conversely, more than half of the total area of New England lies within a single state, Maine, which is about ninety percent forest-covered, more than any other state in the U.S. It ranks near the bottom in population density, behind Oklahoma. Differences in geography and population distribution in effect provide New England with at least two variants, roughly north (Maine, New Hampshire and Vermont) and south (Connecticut, Massachusetts and Rhode Island).

³⁰ U.S. Department of Agriculture, Agricultural Marketing Service (USDA/AMS), Northeast Marketing Area – Federal Order 1, [Map of Differentials for the Northeast Area](#) (2009).

Population Density of New England States³¹



From this perspective, New England does not quite fit its metropolitan reputation. Northern New England (ME, VT, NH) is much more rural, a landscape in which forests and farms seem more fitting than beltways, tenements, and skyscrapers. Southern New England (RI, MA, CT) is more urban and suburban, a place where consumers are more common than cows and feed corn. Food processing plants could be expected to locate near highway exits in between. And that is roughly the reality.

³¹ U.S. Census Bureau, [2010 Census Data](#) (2011) and [State and County Quick Facts](#) (2009).

From another perspective, however, New England seems less unique – less like one consistent sort of place or a pair of distinctly complementary ones – than collectively, in effect, like one “regular” American state. If New England were, in fact, one state rather than six, its total size, number of residents, and population density would be near the national norm. By such demographic measures, New England would rank about twentieth among the remaining 44 states, about the same as Illinois, which has its own, roughly north-south, urban-rural divide.

OVERVIEW OF THE NEW ENGLAND DAIRY INDUSTRY

It is difficult to overstate the depth of the relationship between New England and its dairy farms. The first “American” cows – originally all-purpose but later specialized for milk, beef, and breeding – came to this area with the first Europeans about four centuries ago. They have lived together and depended on each other ever since. The region, its cattle, its people, their economy and culture remain profoundly linked. Although only livestock are susceptible to infection, an outbreak of FMD could be catastrophic for New England as a whole.

The links between cows, their keepers and culture was forged not only in Colonial rations and routines but also in the ways that people occupied, cultivated, and built upon the land and that endure. In many areas, local roads still follow the old cow paths.

Contrary to popular belief, industrialization, immigration, and urbanization over subsequent centuries strengthened these bonds. For example, the number of dairy farms, cows, farmers, and processors, the amount and value of their produce, and consumer demand for fresh milk rose in New England along with the population of its cities through the first decades of the twentieth century. The dairy industry and most major cities, once hitched by rail, reached a peak of prosperity together in the 1920s. Whatever perils have subsequently arisen, they cannot be considered necessary with the passage of time or the rise of modern technology. Neither the value nor the vulnerability of New England dairies is particularly “natural,” but they are both important facts of local life.

As New England and its people have become yet more urban, dairying has remained central to the region’s sense of itself. It is most easily detected in stock images promoted in guidebooks, postcards, calendars, ads and labels for local products: A small herd of contented Holsteins grazes on rolling pasture, surrounded by stone walls, with red or white-washed barns, bucolic villages, clear streams and hillside forests in the background.

Stock Images of New England³²



The reliability or ultimate value of such imagery may be contestable, but its hold on the popular imagination is not. It is embraced even among people who otherwise greatly differ. For example, both boosters and critics of modern agriculture regularly assume that in one way or another – through recovery, reform, preservation, or invention – New England ought to fit such a dairy-centered vision.

In such ways, dairy farming has heartfelt emotional as well as economic and social significance. It is precious for the region, central to the economy and close to the heart in urban and suburban hopes for the future no less (or maybe even more) than in rural tradition. Dairies provide more than precious food, income, and open space; they are part of what makes life worth living in this part of the world and therefore, too, part of what is most profoundly at stake in anticipating a challenge like FMD. Everything “dairy” ultimately depends on healthy cattle and commerce from farm to market.

There is, in fact, great diversity among the various elements of that commerce in New England. Participants (from farms, cooperatives, haulers, and processors) go about their daily business and interact according to no one pattern. Nevertheless, some broad

³² All images from on-line sources, April 2011. Top left: Photograph of Liberty Hill Farm Inn, Rochester, VT in Smarter Travel, [10 Great Farm Stays in America](#). Top right: Photograph of two Holsteins in New England Dairy Promotion Board, [Dairy Facts](#). Bottom left: Painting by John C. Traynor, [New England Farm](#). Bottom right: Painting by Larry Schultz in 2006 print sale by the Holstein Association USA, Brattleboro, VT, [Holstein Royalty](#).

generalizations hold (See also the appended “Statistical Overview of New England Dairies Compared to the U.S. as a Whole”):

- Milk cows can be found on many sorts of farms in New England (more than 2,500 in all). About two-thirds of those farms (1,700) are “primarily engaged in milking dairy cattle,” that is, officially (by North American Industry Classification, NAIC #1121) “dairy farms.” Over half their receipts are from milk (almost exclusively Grade-A) that their cows produce for licensed commerce.
- Milk production varies significantly from state to state, farm to farm, and season to season. It tends to rise with spring thaws and to lag with summer heat. Production also varies with feed quality, the age, and especially lactation cycle of each cow. Production peaks a couple of months after freshening (calving) and falls till dry off, a couple of months before calving again, leaving about 300 milking days per year per head. Annual yields resemble the national norm, about 18,000 pounds (180 cwt. or 2,100 gallons) per cow.
- Dairy farms are widely dispersed in the region, with a higher concentration in northern New England, especially in major river valleys, upstream of population centers.
- Dairy farm properties range widely in characteristics and size. The overwhelming majority (where most people in the industry work) are relatively small operations. They typically milk 50-100 cows on a farm with a property value of less than \$1 million. But the regional average (where more livestock and production are concentrated) is much higher. An “average” farm milks well over 100 cows on over 400 acres valued at \$1.4 million, with more than \$400 thousand in machinery and equipment. Average dairy receipts total \$400-500,000 per year.
- Dairy farms typically reserve 1-2 acres of land to support each cow and its replacement heifer. That ground may be tilled for forage (corn, hay), grazed as pasture, or rotated between the two purposes on monthly, seasonal, or yearly schedules.
- Preferred housing for milk cows is in free-stall barns, where they feed at will. They are normally machine-milked twice per day, yielding 25-35 pounds at a time. (A gallon weighs 8.6 pounds.)
- As in the U.S. as a whole, the vast majority of dairy farms are family operations (either a sole proprietorship or family corporation), with the principal operator also the male head-of-household who benefits from support – both paid and unpaid – from other household members. For about ninety percent of them, farm is also home. Daily chores are typically handled by that principal operator plus a hired hand or two. Hired hands generally receive housing and about \$8-10 per hour. Finding and retaining able hands is ordinarily a challenge, often met with men who are recent U.S. immigrants.
- Operators buy feed supplements, chiefly grain or other protein concentrate and mineral, most often delivered by truck once per week or two. They also regularly purchase other supplies (e.g., equipment, fertilizer) and services (e.g., veterinary

care) as well as interact with government regulators. These are among the sorts of exchanges that would need to be maintained for farms to survive an FMD outbreak.

- Some milk is fed to livestock, consumed or marketed directly on the farm or via a local independent processor, but most production is sold to cooperatives with ties to particular processing and marketing operations. In New England, 2-3 cooperatives (DFA, Agri-Mark, and St. Albans) and 2-3 processors (Dean Foods, Agri-Mark, and Hood), their subsidiaries and affiliates are by far the largest. There are over 100 processors of dairy products in the region but only about 50 that receive raw liquid milk directly from farms. They are the processors of greatest concern in the event of an FMD outbreak.
- Milk haulers connect farms to processing plants. In most cases, hauling is requested and paid for by cooperatives (albeit via deduction from the milk check that the cooperative writes to the producer). Tank trucks (most with a capacity of about 55,000 pounds, near surrounding state road limits) travel regular routes, picking up 5-10,000 pounds of raw milk at each stop, typically once each day or every other day, depending on the herd size and holding tank capacity. The largest farms require pick-up several times per day. Although there is no official tabulation, informal estimates count about 70 milk hauling companies in New England. The vast majority of hauling is via contract with the major cooperatives. Territories are informally established among hauling companies, within range of processing plants, limited by regulations affecting holding times for raw milk and maximum hours for long-distance truckers.
- In the past decade, although nearly all dairy farmers have struggled, there has been a bit of boom for one subset, often with younger operators and ties to independent, also relatively small processing and marketing operations. According to advocates, they are America's new generation of "agpreneurs." A favorite exemplar is Hardwick, Vermont, "the town that food saved." The future of this "local food" sector is much debated, as is its vulnerability to stressors, such as FMD, but it is a much-valued emerging part of agriculture in the region.

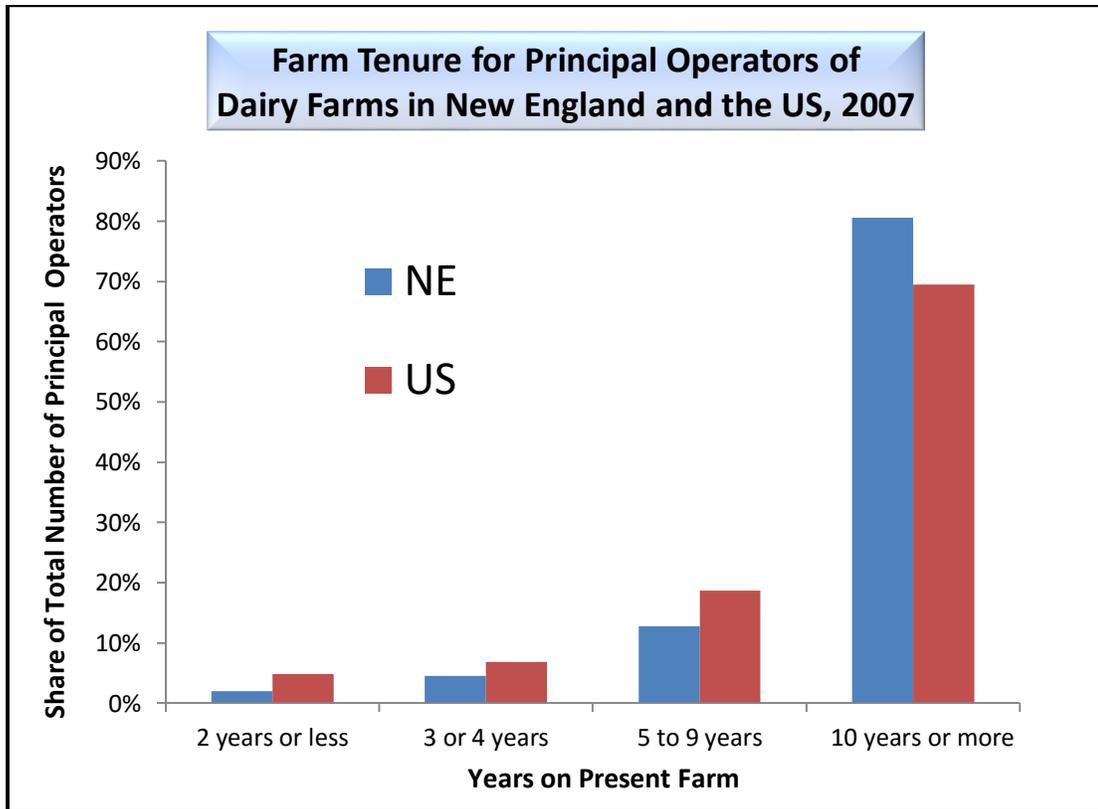
These norms are mainly variants on those that can be found in the rest of the United States. For example, dairy farm production is at least as important for New England as for the rest of the country. In the U.S., its economic value rivals beef and corn, and in New England, it is second to none. In other respects, however, New England can be considered unique.

Some of its distinctions are incontestably important, but others are prone to exaggeration. Most people who own a business, including farmers, can be expected to stress how survival is especially tough for them, and the climate comes quickly to mind. The winters in New England can, in fact, be harsh, but they are not significantly colder or longer than elsewhere along the latitude, including such leading dairy states as Wisconsin and New York. Surely, in New England preparations for FMD should anticipate the possibility of sub-freezing temperatures (e.g., in cleaning and decontaminating vehicles), but that challenge would confront other regions, as well.

Likewise, the people who operate New England dairy farms are stereotypically "old-timers." Their average age and experience are, in fact, impressively high. If, say, FMD

were to prove discouraging, operators nearing retirement age, as most are, could well decide to call it quits. Recruiting young replacements would be challenging; but again, not uniquely so. Operator age and tenure are only slightly higher in New England than in the rest of the U.S. In just about every variety of farming, operators average nearly 60 years of age, and that number has been increasing for years. Nationally, the fastest growing group of farmers are 65 or older. In fact, the aging of Americans is hardly limited to agriculture. Dairying is actually among the youngest of American farm sectors, though not by much.

Years on Present Dairy Farm for Operators in New England and the U.S., 2007³³



New England farms are also famous for their modest size. In fact, their human scale is a treasured part of their legacy. That impression, however, is also prone to overstatement. When compared to giant row-crop or ranching operations that cover much of Midwestern, Southern, and Western states, most dairy farms seem small just about everywhere. Depending on the precise criteria, New England operations may seem yet smaller by a lot or a little or in some respects even larger than national norms. The basis of comparison is crucial.

At first glance, for example, the difference in average herd size is huge. In 2007, dairy farms in New England milked an average of 99 cows versus 157 in the U.S. as a whole. By this count, regional dairies are more than a third smaller. But since the distribution of

³³ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62.

farm sizes is far from symmetrical and very different from the distribution of cattle, this “average” can be a far cry from on-the-ground reality.

Number of Dairy Farms and Milk Cows by Herd Size in the New England and the United States, 2007³⁴

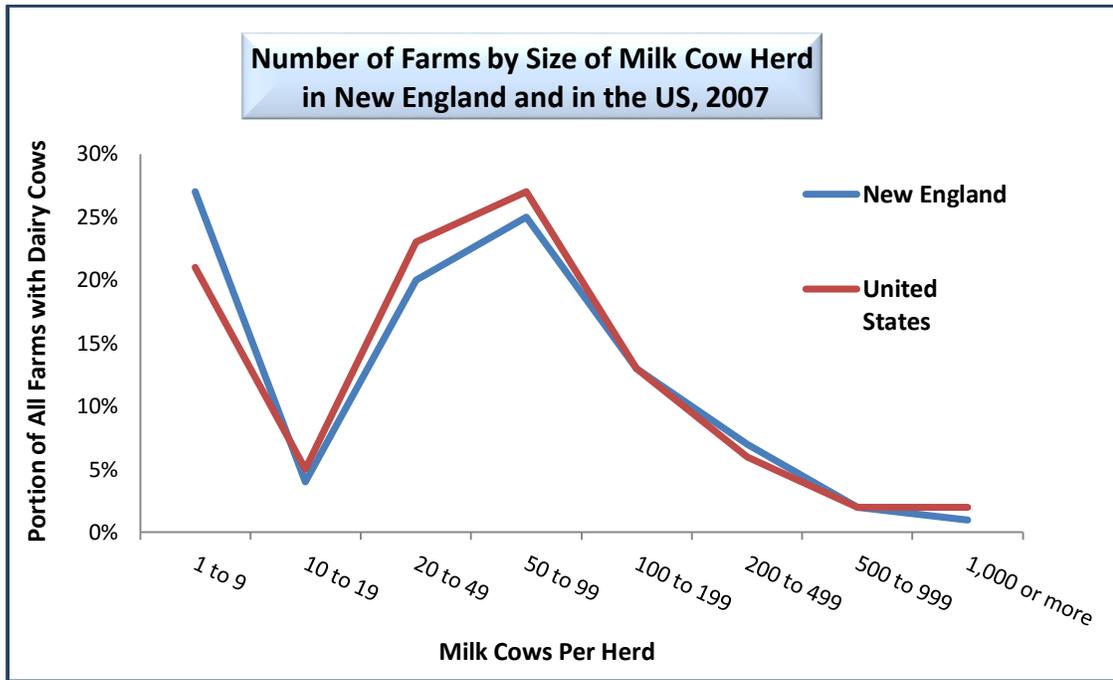
Dairy Farm Size (milk cows per herd)	Number of Farms	Share of Farms	Number of Milk Cows	Share of Milk Cows	Average Number of Milk Cows per Farm
New England					
All sizes	2,227		220,941		99
1 to 9	443	19.9%	(D)	(D)	(D)
10 to 19	78	3.5%	1,056	0.5%	14
20 to 49	482	21.6%	17,283	7.8%	36
50 to 99	626	28.1%	43,394	19.6%	69
100 to 199	339	15.2%	(D)	(D)	(D)
200 to 499	188	8.4%	53,252	24.1%	283
500 to 999	53	2.4%	34,368	15.6%	648
1,000 or more	18	0.8%	24,401	11.0%	1,356
United States					
All sizes	56,725		8,927,856		157
1 to 9	6,324	11.1%	20,334	0.2%	3
10 to 19	2,693	4.7%	37,258	0.4%	14
20 to 49	14,440	25.5%	515,386	5.8%	36
50 to 99	17,517	30.9%	1,181,985	13.2%	67
100 to 199	8,336	14.7%	1,099,342	12.3%	132
200 to 499	4,156	7.3%	1,238,138	13.9%	298
500 to 999	1,687	3.0%	1,151,793	12.9%	683
1,000 or more	1,572	2.8%	3,683,620	41.3%	2,343

The New England average is skewed lower because of an extraordinarily large share of farms (20 percent versus 11 percent in the U.S.) that qualify as “dairy farms” for census purposes but that milk fewer than 10 cows. They include some operations that are more focused on breeding than milking dairy cattle or on non-commercial ends. Their role in the dairy industry or significance for its sustainability is probably less than crucial.

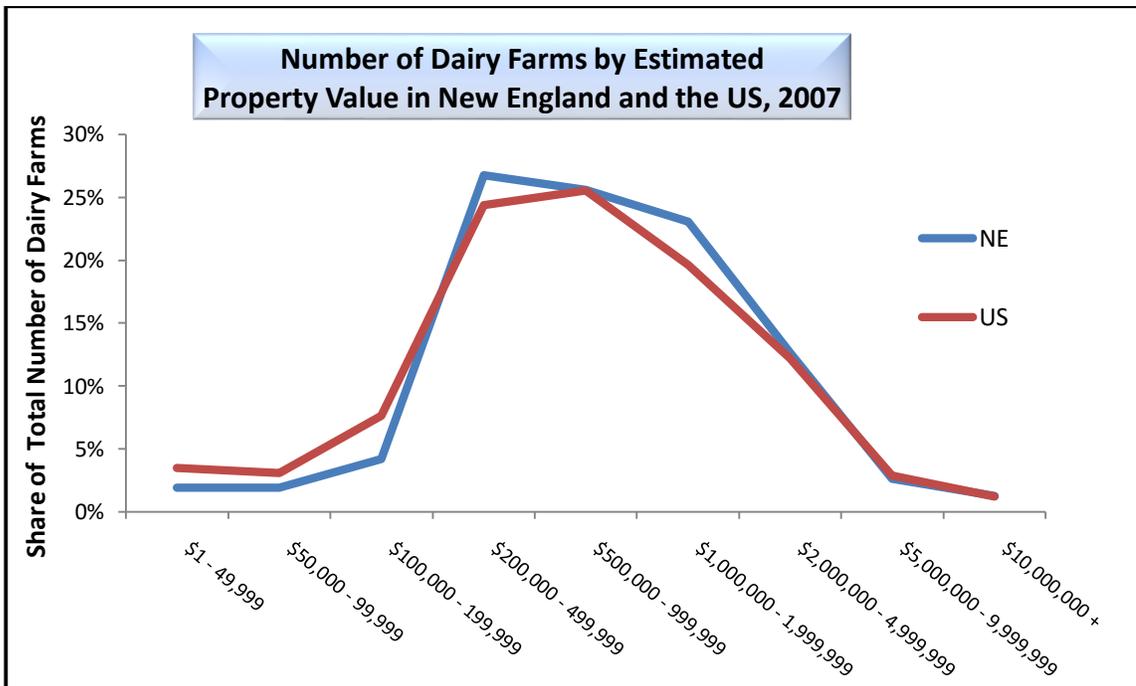
Conversely, as measured by real-estate value, the size of New England dairy farms is skewed higher, probably not because of operation profitability, but because of nearby, urban-driven demand for housing and commercial development.

³⁴ Robert Hood of Data Lab Section of USDA/NASS, special tabulation from U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#) (March 31, 2011). “Dairy farms” refers to the North American Industry Classification “Dairy Cattle and Milk Production” (1121) which NAICS defines as “establishments primarily engaged in milking dairy cattle.” “(D)” indicates a count “withheld to avoid disclosing data for individual farms.” The number of dairy farms is slightly lower here than in other tables (e.g., 2227 rather than 2235 for New England) because the count here excludes from “Dairy Farms” operations that have no milk cows (e.g., operations that exclusively raise replacement heifers).

Number of Farms by Size of Milk Cow Herd in New England and in the U.S., 2007³⁵



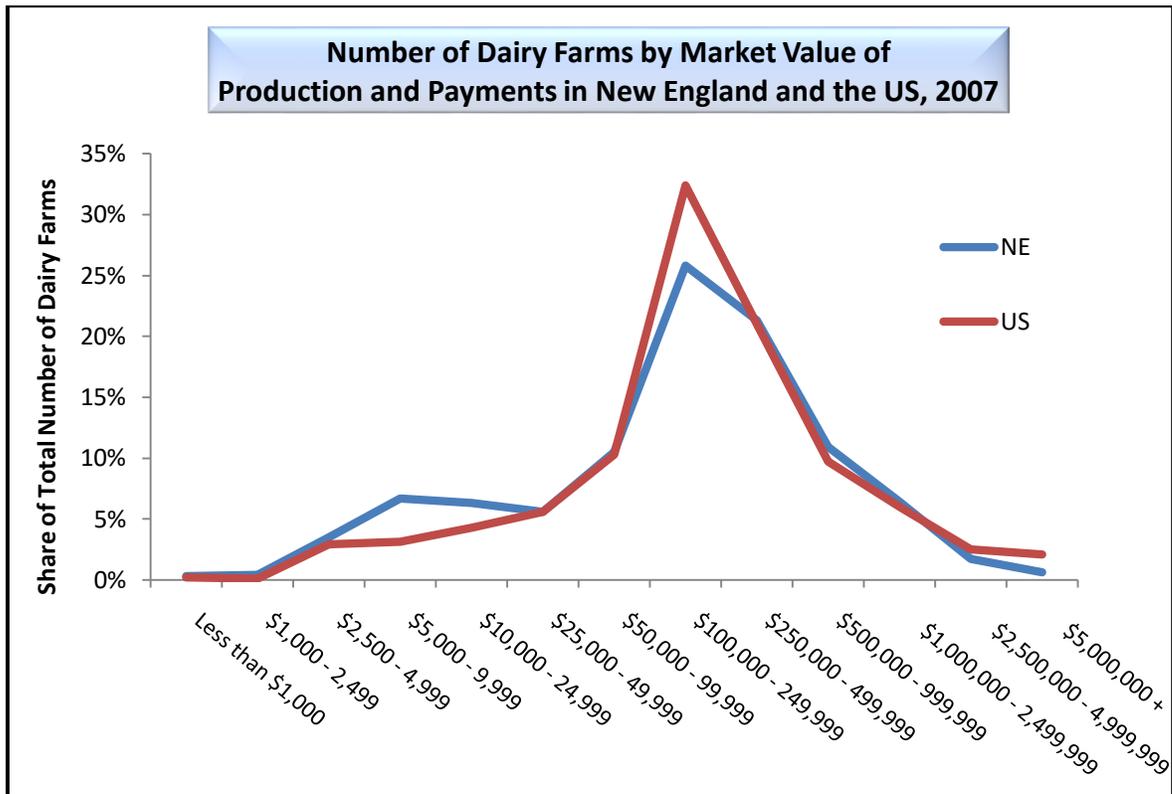
Number of Dairy Farms by Estimated Property Value in New England and the U.S., 2007³⁶



³⁵ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level](#) and [United States](#) (2011).

³⁶ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62 (2011).

Number of Dairy Farms by Value of Production and Payments in New England and the U.S., 2007³⁷



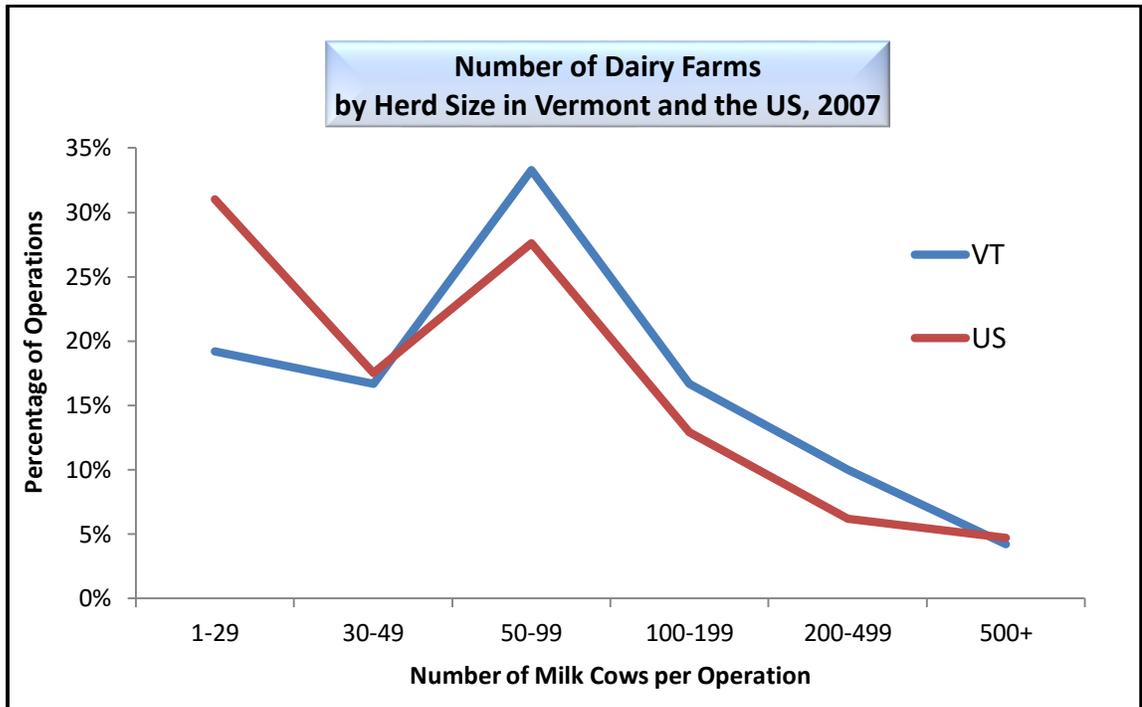
In general, then, by rough standard measures and disregarding marginal operations, the distribution of farm sizes in New England is not all that different than in the U.S. as a whole. Small and mid-sized dairy farms (milking 20-200 cows) predominate. But limits on that generalization – differences in the tails of the distributions – have important implications, including how best to prepare and respond to emergencies like FMD.

A key factor has been the much greater size of the operations outside the region. Currently, the scale of farms that so dominates dairy production in other parts of the U.S. is rare in New England. For example, less than one percent of the dairy farms in New England milk 1,000 cows or more. In the U.S., that share is three times higher. Moreover, those large New England operations are on average about 1,000 head per farm smaller than their U.S. counterparts (1,356 versus 2,343 dairy cows per farm with over 1,000 head in 2007).

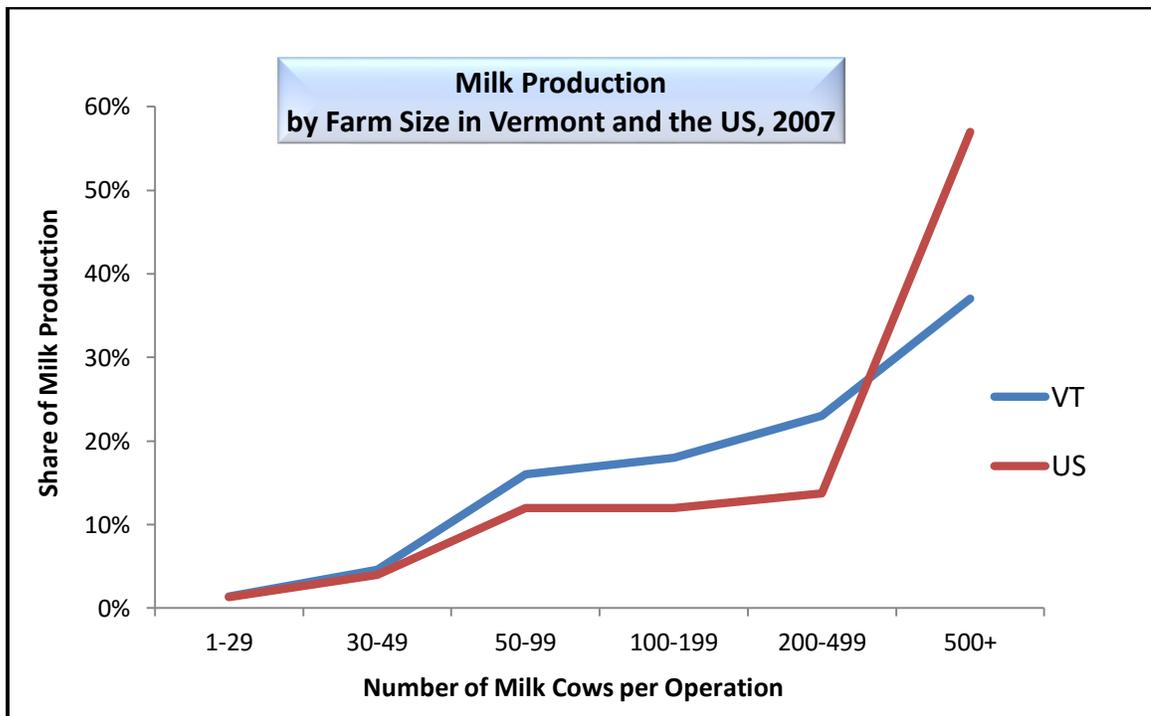
Even Vermont, the region’s largest producer, has very few of the size farms that lead national production in general. Elsewhere, that small share of the total number of farms – the largest ones – accounts for an even larger share of total milk production.

³⁷ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62 (2011).

Share of Number of Dairy Farms by Herd Size in Vermont and the U.S., 2007³⁸



Share of Milk Production by Herd Size in Vermont and the U.S., 2007³⁹



³⁸ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), Quick Stats: [U.S. and All States Data – Dairy](#) (2007).

³⁹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), Quick Stats: [U.S. and All States Data – Dairy](#) (2007).

The relevance of farm scale to a hazard like FMD is the likelihood that farms of different sizes will experience different kinds and amounts of stress. For example, in the U.S. operations that milk over 1,000 head are home to more than forty percent of the nation's milk cows. In New England, farms of that size are home to about eleven percent. In the U.S., from a policy-making point of view, most milk cows (the majority) could be reached by targeting farms with 500 or more of them; in New England, the same policy would reach only about a quarter – fewer, in fact, than if farms with 20-100 head were targeted.

For logistical efficiency, priorities for readiness or response to the hazard are apt to favor farms with the greatest concentration of cattle and production. For example, per-head costs of protection could be lower by focusing on premises with the most cattle. In so doing, however, the largest size of operations (versus the largest number of farms, farmers or cattle) may in effect monopolize resources. Free of normal market forces, albeit unintentionally, emergency triage can become an instrument of consolidation and concentration in the industry, at the expense of other sectors that could actually be more important for animal health, the industry, or the region in the long run.

This trade-off (between favoring counts of cows and production versus counts of farms and farm families, the two tails of the distribution) is especially perilous for New England, where there are so few operations of the size that is so rapidly increasing its share of national production.

In other respects – those that are more a function of farm ties than farm size – New England remains an agricultural leader. For example, the six states rank near the top in key measures of community-oriented agriculture as well as agri-tourism.

New England States National Rankings:⁴⁰

- Percentage of all farms that have direct sales
 - New Hampshire, 1st
 - Connecticut, 2nd
 - Massachusetts, 4th
 - Vermont, 5th
 - Maine, 6th
 - Rhode Island, 7th

- Direct market sales as a percentage of all farm sales
 - Rhode Island, 1st
 - Massachusetts, 2nd
 - Connecticut, 4th
 - New Hampshire, 3rd
 - Vermont, 5th
 - Maine, 7th

⁴⁰ Gary Keough, [Trends in New England Agriculture](#), Presentation for the New England Field Office of USDA National Agricultural Statistics Service (USDA/NASS), 2010.

- Average direct market sales per farm
 - Connecticut, \$27,072 per farm, 1st
 - Massachusetts, \$25,356 per farm, 2nd
 - Rhode Island, \$25,270 per farm, 3rd
 - New Hampshire, \$13,615 per farm, 5th
 - Vermont, \$15,541 per farm, 8th
 - Maine, \$10,803 per farm, 12th

In these ways, the region is at the very forefront of a larger movement toward “local foods,” a system of more tightly connected production, marketing, and consumption that could well be more sustainable in this region than its predecessors. In New England, while more intensive livestock and row-crop operations have been declining for decades, the total number of farms, their cash receipts, and the incomes that they realize have actually been growing. Mid- and small-sized and more locally-oriented operations appear to be more attractive to younger farmers. In other words, the sorts of operations that currently champion per-farm production in both New England and the U.S. are not necessarily most important for the region’s future.

Plainly, the survival of both large, nationally-oriented and smaller, more locally-oriented dairy sectors are important now, and the future cannot be certain. Protecting, sustaining or restoring New England’s dairy industry after an emergency may well require targeting, not just one type but a range of types of operations.

These common and distinctive qualities – the value and the diversity of the dairy industry in New England – provide an important background for understanding the region’s vulnerability to a challenge like FMD.

VULNERABILITY TO FMD IN NEW ENGLAND

FMD chiefly endangers New England economically, one, two, or three steps removed from actual infection. For example, judging from prior outbreaks and the non-agricultural character of the region as a whole, the sector with the most to lose is tourism. FMD-response normally requires restrictions on the movement of people and vehicles as well as some inconvenience and panic that could keep tourists and related revenue away.

It is worth emphasizing, though: The only ones whose health would be significantly, directly at-risk in an FMD outbreak have cloven hoofs. Still, in New England they total well over a billion individuals in all.

Estimated Population of FMD-Susceptible Animals in New England, 2010-11⁴¹

	Cattle ⁴²	Swine ⁴³	Sheep ⁴⁴	Goats ⁴⁵	Livestock Total	White-Tailed Deer ⁴⁶
CT	49,000	3,400	-	-	52,400 +	62,000
ME	90,000	4,700	-	-	94,700 +	255,000
MA	40,000	11,000	-	-	51,000 +	90,000
NH	34,000	3,300	-	-	37,300 +	77,000
RI	4,900	1,800	-	-	6,700 +	16,000
VT	270,000	2,700	-	-	272,700 +	160,000
Region	487,900	26,900	51,000	27,000	592,800	660,000

Since cattle constitute considerably less than half of the total number of susceptible animals, they will not necessarily monopolize FMD response or remediation efforts, but they probably will.

Normally, though large in number, wildlife are a very small part of FMD response. Medical care of deer, for example, is very difficult to manage, and they do not seem to represent a crucial vector, multiplier, or even reservoir of infection. Sheep and goats are more of a concern but their number and economic significance in the region is relatively small. Swine, however, are extremely susceptible to FMD infection, and they are virus multipliers, but they are also considerably less common in New England than in the rest of the country. The inventory for the whole region (about 27,000 head) is smaller than a typical township or even a single state-of-the-art Concentrated Animal Feeding Operation (CAFO) in the American swine belt.

Cattle are by far the most valuable and populous species of FMD-susceptible livestock in New England. Their value to the region is certainly greater than the dollars they might fetch when sold (especially in an emergency), but their market value (excluding their production capacity) is reasonably estimated to total over \$100 million.

⁴¹ Livestock totals here include all types (e.g., for cattle, beef as well as dairy, heifers and cows as well as calves); likewise for sheep and goats, for which only region-level data are available from USDA/NASS. U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), New England Field Office, State Agriculture Overviews, [New England Statistics](#) (2011).

⁴² U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Cattle Inventory](#) (January 28, 2011), p. 5.

⁴³ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Quarterly Hogs and Pigs](#) (December 27, 2010).

⁴⁴ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Sheep and Goats](#) (January 28, 2011), p. 3.

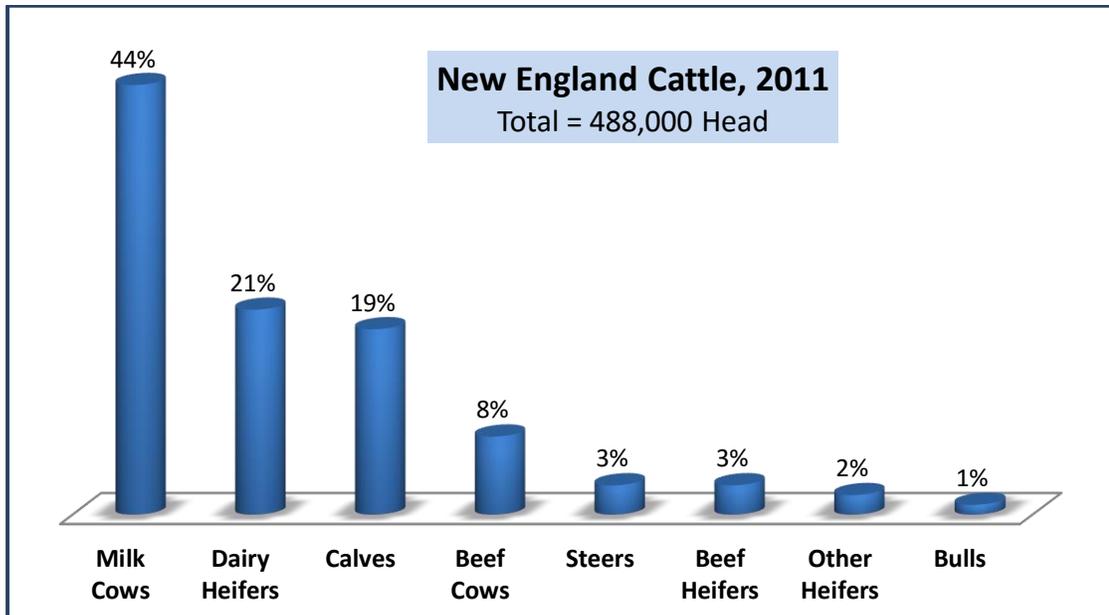
⁴⁵ Total for all six states reported in U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Sheep and Goats](#) (January 28, 2011), pp. 12-14.

⁴⁶ Very rough estimates cited on-line by wildlife management agencies in each of the six states (February, 2011)

FMD-Susceptible Livestock and Their Market Value, 2007⁴⁷

	CT	ME	MA	NH	RI	VT	NE
Cattle and calves							
Farms	805	1,447	1,066	599	148	1,937	6,002
Market Value (\$1,000)	9,405	15,660	12,444	6,743	846	57,581	102,679
Inventory							
Farms	1,210	2,112	1,832	1,027	276	2,459	8,916
Head	50,213	88,191	46,852	36,880	5,085	264,823	492,044
Milk Cows	20,685	32,527	15,050	14,611	1,325	139,719	223,917
Hogs and pigs							
Farms	251	460	350	298	81	239	1,679
Market Value (\$1,000)	616	813	2,108	518	354	697	5,106
Inventory							
Farms	244	437	453	266	103	249	1,752
Head	3,645	4,401	11,553	2,792	2,316	2,701	27,408
Sheep, goats and other products							
Farms	434	709	697	514	97	645	3,096
Market Value (\$1,000)	1,094	1,979	(D)	(D)	168	3,851	(D)
Total (Cattle and Swine only)							
Head	53,858	92,592	58,405	39,672	7,401	267,524	519,452
Market Value (\$1,000)	10,021	16,473	14,552	7,261	1,200	58,278	107,785

Types of Cattle in New England, 2011⁴⁸



⁴⁷ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 40. Farms by Concentration of Market Value of Agricultural Products Sold (2007). (D) indicates a count “withheld to avoid disclosing data for individual farms.”

⁴⁸ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [U.S. and All States Data – Cattle and Calves](#), January 1, 2011.

Granted, not all of these cattle are dairy stock, and some of them are on hobby farms. But, still, licensed operators in New England are milking about 215,000 cows, plus rearing nearly an equal number of replacements. In all, then, about eighty percent of the region's cattle (more than 400,000 at the beginning of 2011) are currently part of – the core of – commercial dairy operations, and they are susceptible to FMD.

Shifting attention from disease susceptibility to disaster vulnerability, from bovine to human impacts, three characteristics of the New England dairy industry make it distinctly vulnerable:

- General economic distress,
- Divided authority, and
- The separation of production and processing.

- **Economic distress**

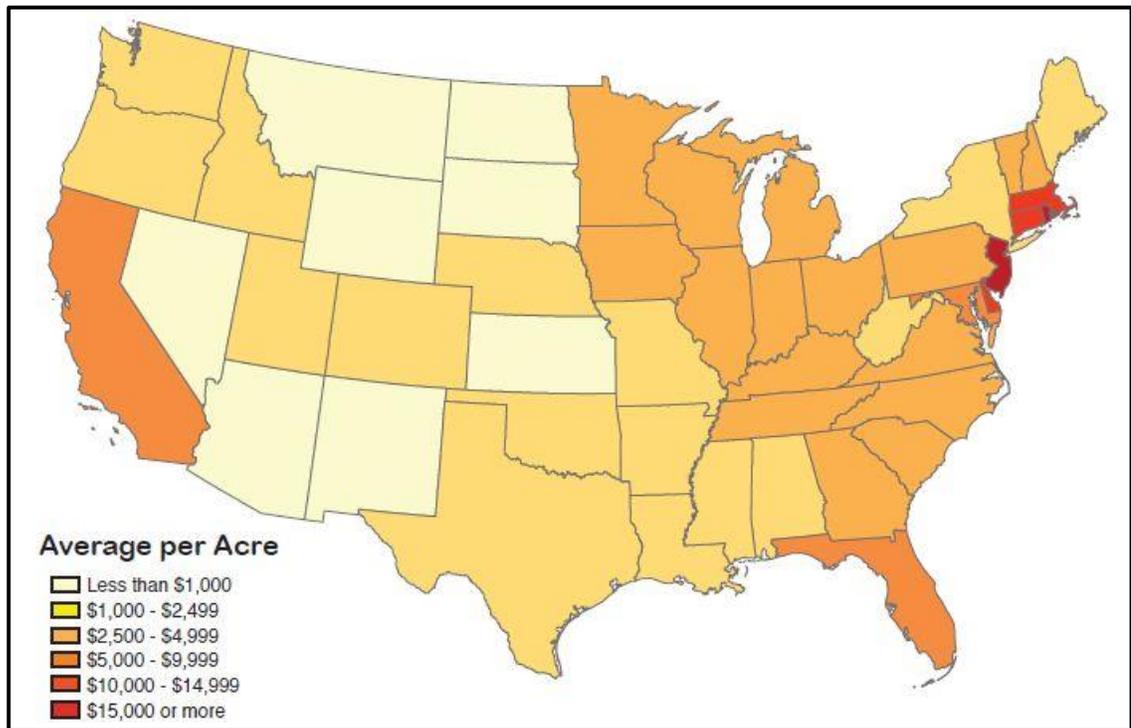
Lower profitability, higher property values and intense development pressure increase the challenge of protecting farms and restoring any that become emergency casualties.

Just about everywhere, dairy farmers have been facing tough economic times. Nearly every year for decades, the number of start-up operations has failed to keep pace with the number that have ceased. Low or nonexistent profit margins are but one of many factors. (See also the appended “Statistical Overview of New England Dairies Compared to the U.S. as a Whole.”)

As more and more operators are reaching retirement age, the temptation to move on is mounting. Development pressures mount, too. Factors that increase the difference between potential profit in farmland sales and farm continuity include:

- The concentration of population and high demand for real estate in southern New England;
- The lure of vacation homes, open-space, and recreational developments in northern New England;
- Increases in real estate values and hence costs of land acquisition, property and inheritance taxes; and
- The relative ease and low cost of converting farm land (vs. other open space) to residential or commercial uses.

Estimated Market Value of Land and Buildings on Farms, 2007⁴⁹



There is unrelenting pressure for farmers to sell out to a developer, to stop absorbing the invisible cost of lost opportunity for real estate profit. Development pressure also squeezes actual cash reserves. As property values rise, taxes and mortgage payments can become unbearable. (Relief that entails the sale of development rights to the state or a land trust can be more effective at preserving open space than preserving farm operations.) The temptation to sell out for residential or commercial development can become irresistible, especially when compared to the demanding labor and slim return in milking cows.

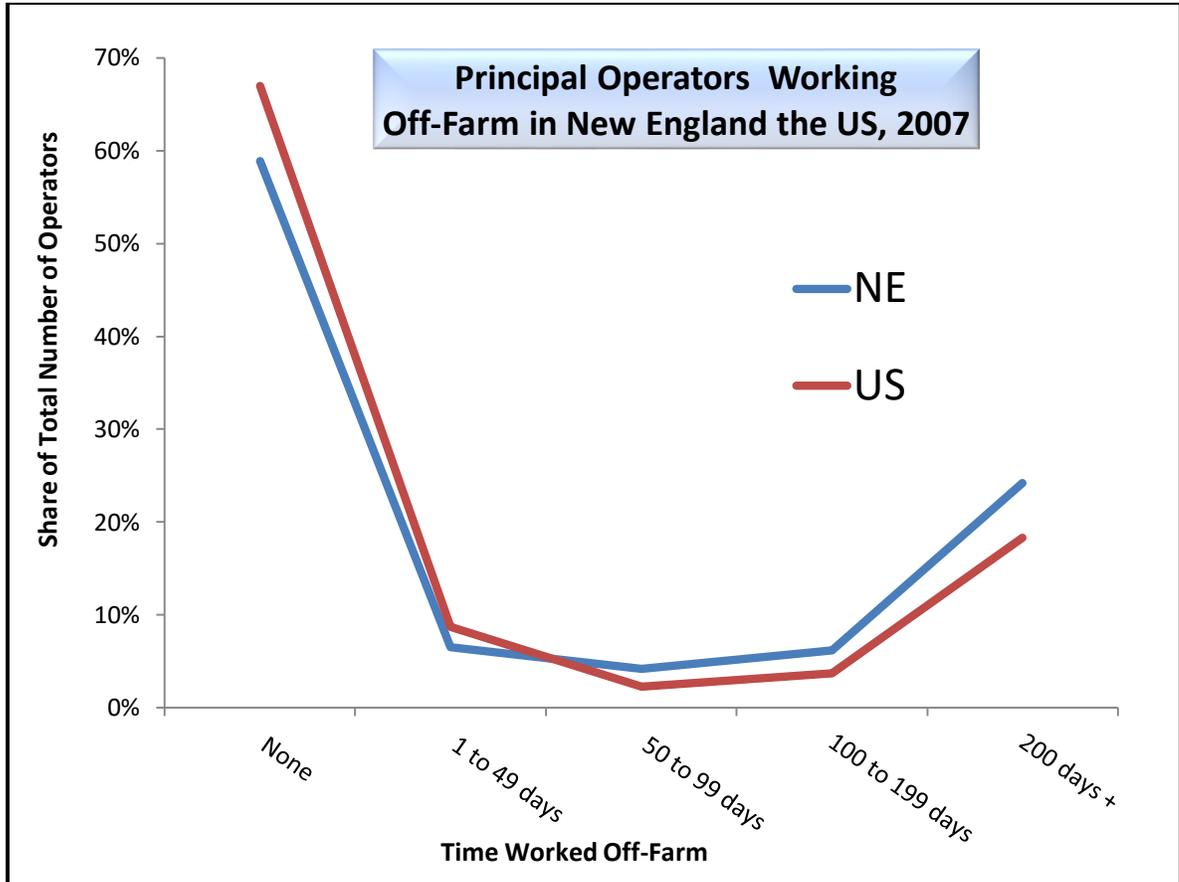
Unfortunately, measuring actual farm profitability is tough, an inexact science at best. At least once every five years, farmers volunteer an overview of their finances for census takers. Statisticians crunch those numbers to compose more general impressions. Economists add or subtract and fiercely dispute the value of each input and output, which is observed, calculated or modeled in yet more arguable ways. As market prices plummet or soar, econometric wisdom varies, as well. The difference between estimates and real bottom lines is worth bearing in mind.

For example, just about everybody knows that dairy farms in New England are hurting, and just about everybody has a plausible explanation. Given a local bonus (the Federal Milk Order price differential for the Boston market), it is hard to argue that the region suffers from regulated milk-price discrimination, but it is also hard to argue that milking cows makes much money.

⁴⁹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), 2007 Census of Agriculture, [Value of Farm Land and Buildings](#) (2007).

For example, although most dairy farmers are “mainly” farm operators, a greater share of them in New England than in the rest of the U.S. also spend a greater share of their work week at a second or third job. Plainly, for an unusually large number of New Englanders who know the business first-hand, operating a dairy farm is not enough to secure a living.

Off-farm Work of Dairy Farm Operators in New England the U.S., 2007⁵⁰



So, with milk receipts off the table and net distress undeniable, explanations tend to turn on regional differences in operating costs. (See again the appended “Statistical Overview of New England Dairies Compared to the U.S. as a Whole.”)

For example, it is often alleged that New England has distinctly high costs for dairy inputs. That may be true for many or even most operations, but it does not appear to be true for the industry as a whole. By the most recent USDA estimates, for example, production costs for Vermont are close to national norms. (Vermont is the region’s largest producer and its only state for which there are such official estimates.) Costs for feed, bedding, and fuel as well as labor are high, but not singularly so. In general, at least in these figures, operating expenses for Vermont dairy farms are actually lower and production receipts higher than for other leading dairy states and for the U.S. as a whole.

⁵⁰ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62.

Costs and Returns of Dairy Production in Vermont, the U.S. and Its Largest Milk-Production States, 2009-2010⁵¹

		Dollars per Hundred Pounds of Milk (\$ per cwt)				
		VT	CA	WI	NY	US
Operating Cost	Total feed costs	10.22	12.43	10.22	11.33	10.90
	Purchased feed	6.65	11.09	6.63	6.08	7.54
	Homegrown harvest feed	3.37	1.29	3.51	5.14	3.27
	Grazed feed	0.20	0.05	0.08	0.11	0.09
	Veterinary and medicine	0.92	0.64	1.16	0.98	0.94
	Bedding and litter	0.43	0.05	0.28	0.53	0.25
	Marketing	0.29	0.34	0.25	0.27	0.31
	Custom services	0.48	0.36	0.46	0.57	0.49
	Fuel, lube, and electricity	0.90	0.56	0.77	1.00	0.57
	Repairs	0.62	0.40	0.75	0.90	0.66
	Other operating costs	0.00	0.00	0.00	0.00	0.00
	Interest on operating capital	0.02	0.02	0.02	0.02	0.02
		Total operating costs	13.89	14.79	13.91	15.61
Allocated Overhead	Hired labor	1.89	1.59	1.78	2.14	1.71
	Opportunity cost of unpaid labor	3.11	0.42	3.39	3.41	2.28
	Capital recovery of machinery and equipment	3.97	2.14	3.62	4.39	3.31
	Opportunity cost of land (rental rate)	0.07	0.00	0.03	0.03	0.03
	Taxes and insurance	0.43	0.19	0.37	0.35	0.24
	General farm overhead	1.21	0.27	0.82	0.88	0.57
		Total allocated overhead	10.68	4.61	10.02	11.19
Total Cost		24.57	19.40	23.92	26.81	22.28
Value of Production	Milk sales	18.20	14.88	16.50	18.30	12.81
	Cattle	1.08	1.02	1.43	1.08	1.14
	Other income	0.84	0.83	0.80	0.84	0.83
		Total value of production	20.12	16.73	18.73	20.22
Milk receipts less operating cost		4.31	0.09	2.59	2.69	-1.33
Milk receipts less total cost		-6.37	-4.52	-7.42	-8.51	-9.47
Total production less operating costs		6.23	1.94	4.82	4.61	0.64
Total production less total cost		-4.45	-2.67	-5.19	-6.59	-7.50

⁵¹ The U.S. Department of Agriculture, Economic Research Service (USDA/ERS), [Milk Production Costs and Returns from the 2005 AMS](#)) and [Monthly Milk Costs of Production, 2006-2010](#), (January 25, 2011); U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Agricultural Prices](#) (January 31, 2011).

These estimates, however, are figured as dollars per hundredweight of milk rather than per cow, per farm, or per operator. Whatever the totals on official ledgers, then, an operation may still be deeply in the red, especially if its estimated “overhead” is drawn on cash flow (e.g., if the operator actually receives a salary). From this viewpoint, New England’s main advantage may be that its farms can lose money a little less rapidly or obviously than elsewhere.

By other estimates, however, New England dairy farms are doing downright poorly. For example, according to the 2007 Census of Agriculture, they produced about \$840 million worth of milk, but when measured per farm, both the market value of dairy production and net income were well below the national average.

Net Income of Dairy Farms in New England and the U.S., 2007⁵²

	New England	United States
Average net income per farm (\$)	110,556	184,165
Share of farms with net gains	80.6%	88.0%
Average gain (\$)	145,897	218,339
Share of farms with net losses	19.4%	12.0%
Average loss (\$)	39,580	66,452

It is worth emphasizing, too, that these earnings occurred on real estate which alone (not counting livestock, machinery, equipment, and the value of the business) was worth well over \$75 billion – a return of 0.0001% on readily liquidated equity. Again, the lure of selling out and the disincentive for new investment are obvious.

For New England, an FMD outbreak, with yet higher cost and lower returns, could be just enough reason for most dairy farmers to call it quits, to cash out the farm and be spared those second and third jobs as well as milking twice-a-day. It is unimaginable that equivalent new farmland could be acquired and that young people could be convinced to fill the void. FMD could well wipe out many of the region’s dairies once and for all.

- **Divided authority**

The small size of New England states and weakness of county government increases the challenge of coordinating emergency response across relevant jurisdictions.

A key, troublesome difference between New England and the rest of the United States – especially as here, when anticipating the need for unified response to an emergency – is the division of relevant authority.

⁵² U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). “Dairy farms” refers to the North American Industry Classification “Dairy Cattle and Milk Production” (1121) which NAICS defines as “establishments primarily engaged in milking dairy cattle.”

Government functions such as the regulation of agriculture or public health over large expanses are normally coordinated from a single statehouse, often effected through local county courthouses. Quarantines and restrictions on movement of animals and animal products – keys to control of contagious disease – are normally state rather than local powers, and they are in New England, too. (See “Statutes, Regulations, and Guidance Documents for FMD Response in New England” appended to this document.) But in New England, unlike a single state of comparable dimensions, such actions would have to be initiated in six different state capitols, and county governments in the region are weak, insofar as they exist at all.

Regulatory Environment

With minor variations, in New England each state Department of Agriculture (or its equivalent) has similar regulatory responsibility for dairy farming and milk production. In most cases, its authority extends to milk movement from the cow to the processor, and often beyond the processor to grading, bottling, labeling, storage, and sales. The precise bounds of authority, the name of the department and its chief administrator vary a bit from state to state, but the only significant variation is in the degree and kind of shared authority with the state Department of Public Health (or its equivalent) and with cities or towns. In some states, inspection or licensing responsibilities are normally shared with local officials, and in some states overall milk regulatory authority is shared with or shifts entirely to Public Health after farm pick-up or processing.

In all New England states, however, existing statutes and administrative code are intended to avoid conflict with federal standards (e.g., from USDA, FDA, and DHS through the [Grade “A” Pasteurized Milk Ordinance](#) and the [Emergency Management Assistance Compact](#)) which are, in turn, intended to avoid conflict with international standards (e.g., from OIE and FAO). Ultimate responsibility and authority for both regulation of the movement of unprocessed, liquid milk and for animal care in an emergency (e.g., stamping out, vaccination, culling, indemnification, testing, and quarantine) rests with the Secretary of Agriculture (or his/her equivalent or designee). Moreover, minor policies differences are sure to become mute under unified command in an emergency. In all New England states, the regulatory authority of the Department of Agriculture greatly increases in response to an infectious or contagious disease such as FMD. Powers to respond massively expand if the Governor declares a state emergency. In short, regulatory policies could be more uniform, but as is, they allow multiple jurisdictions – local, state, regional, national – to coordinate their response to FMD.⁵³

Of course, emergency management (especially at Stafford-Act, “declared-emergency” scale) often requires coordination across jurisdictional lines. But the challenge in New England could be especially great, if only because of the large number of variations in regulatory fine print and fundamentally divided sovereignty.

New England has comparable responsibilities but less of both the intermediate, local capacities and the unifying, higher level authority of a single state government. These are among the reasons that regional preparations – as through the USDA-APHIS Area Office,

⁵³ See appended “Statutes, Regulations, and Guidance Documents for FMD Response in New England.”

the New England State Animal Agriculture Security Alliance (NESAASA), and this planning effort – could be essential for effective response to an FMD outbreak.

- **Separation of production and processing**

Dependence on frequent interstate milk transport increases the challenge to business continuity in an emergency.

New outbreaks of FMD can often be traced back to unintentional breaches in biosecurity, particularly the careless movement of infected animals or animal products from one area (a nation, zone, or premises) that has the disease to one that does not.

Dairy operations seem particularly likely to be victims and perpetrators of contagion, given the heavy traffic that they host. Epidemiologists generally agree that FMD infection in the U.S. is most likely to spread via material unintentionally carried on the tires or undercarriage of tanker trucks on their regular routes, servicing farms, cooperatives, and processors.

Among the first and best ways to contain a new outbreak is to halt traffic to and from a site of infection. That is among the reasons State Veterinarians and/or Commissioners of Agriculture are empowered to stop movement of animals and animal products. When a case of FMD is found or under investigation anywhere in the U.S., these officials are apt to “err on the safe side” by fortifying state lines.

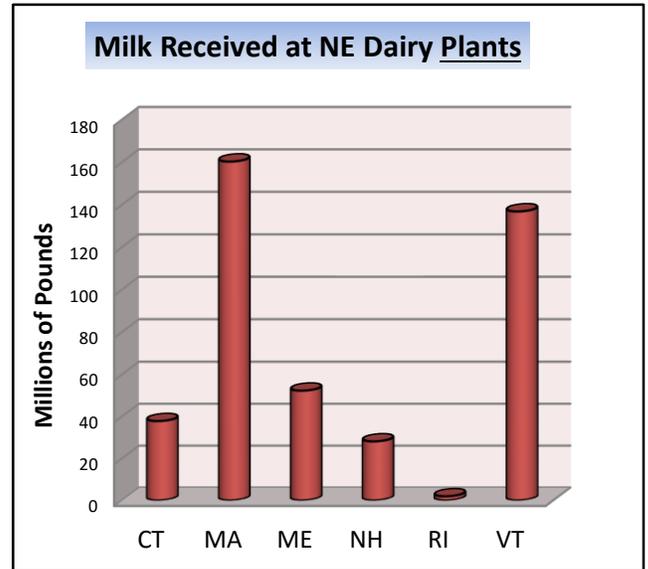
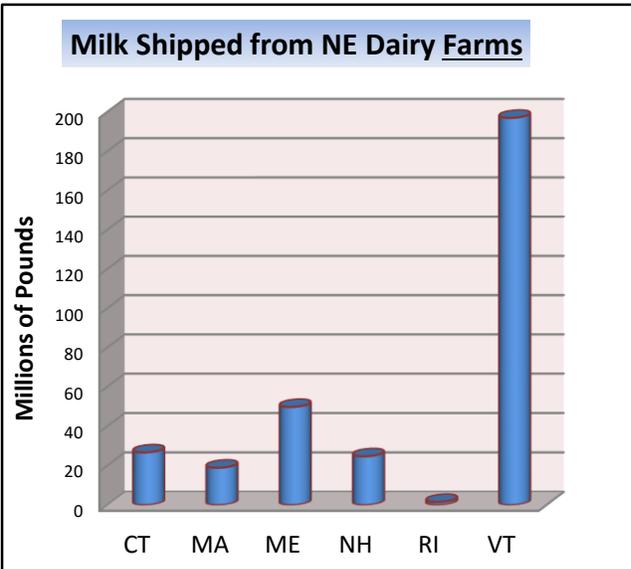
Stopping the movement of all potentially contaminated animals, animal products, vehicles, clothing, and other fomites can, in fact, prevent the spread of disease. But for a dairy farm, the “safe side” is hardly safe. Even a one-day interruption in farm traffic could threaten that farm’s very existence as well as the welfare of its animals and increase costs to associated businesses, nutritional resources, environmental protections, and the public treasury. Unlike other essentials, consumer demand for fresh milk cannot be filled from warehouses or foreign imports. Milk is so perishable and so dependent on transport that isolation from FMD infection can be even tougher on dairies, consumers, and the environment than the disease itself.

In the case of New England, risks to dairies are particularly acute because state lines – those readily authorized barriers to the movement of farm products – are extraordinarily close together. Every day, tankers move milk from farms in one state to processors in another. Halting interstate traffic (e.g., to ward off infection suspected elsewhere), risks transforming milk on a disease-free farm from a source of sustenance to a stream of potentially harmful waste. Such a proactive measure can yield little benefit for disease prevention and huge costs to dairy survival.

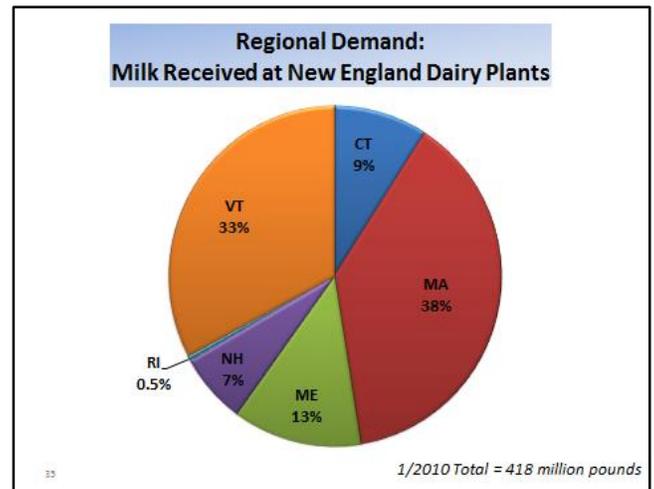
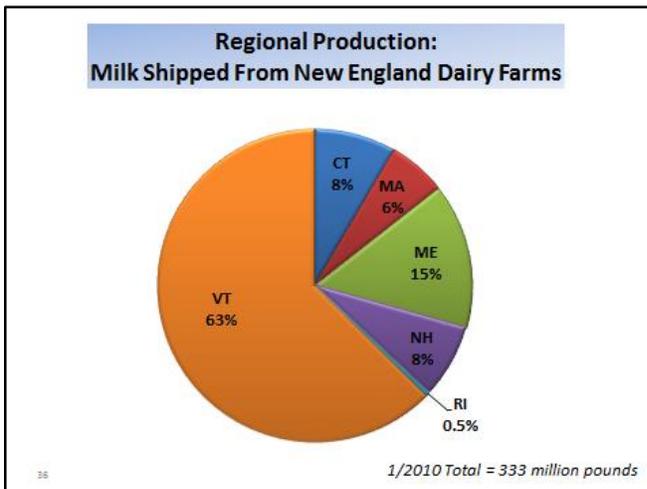
In cooperation with the Animal and Plant Health Inspection (APHIS) and the Agricultural Marketing Service (AMS) of the USDA, a study was conducted for this project to determine just how much is at stake in routine milk movements and alternative movement controls. (See “Patterns of Milk Movement and Vulnerability of New England Dairies during Foreign Animal Disease (FAD) Response” appended to this document.)

Judging from normal milk movement in a recent month, the analysis finds:⁵⁴

- The six states vary greatly in the amount of milk that is produced and processed in-state.



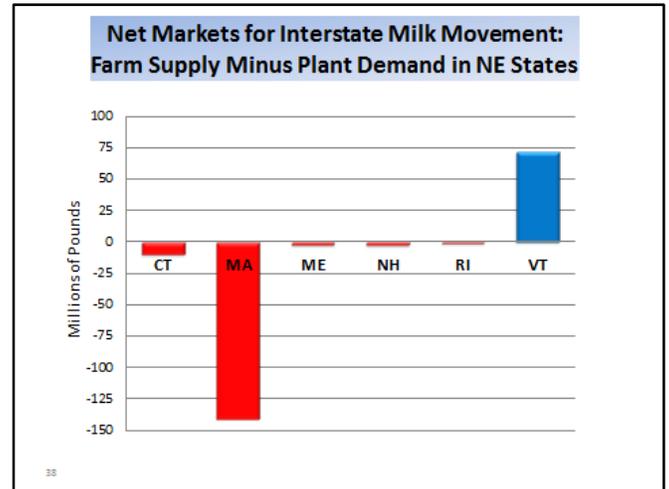
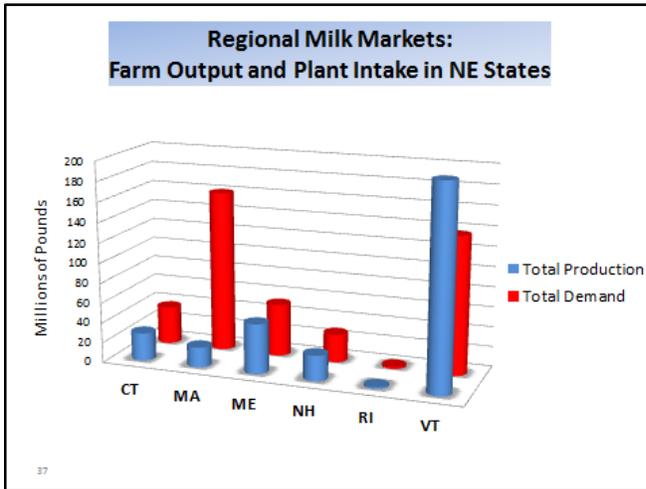
- New England states also vary greatly in their individual share of total regional production and processing and hence, too, their routine reliance on inter-state milk movement.



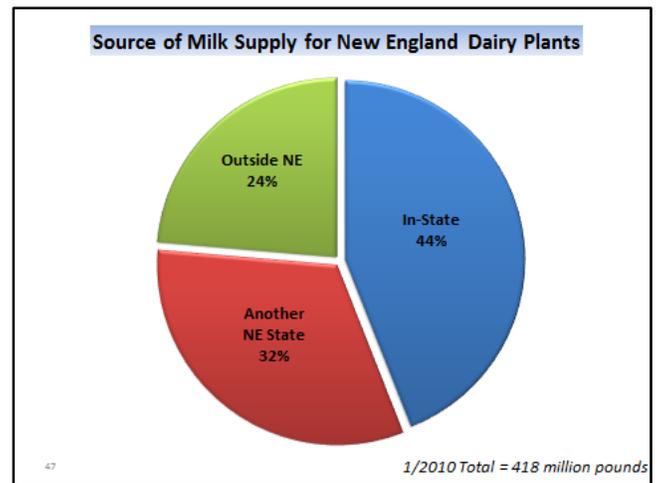
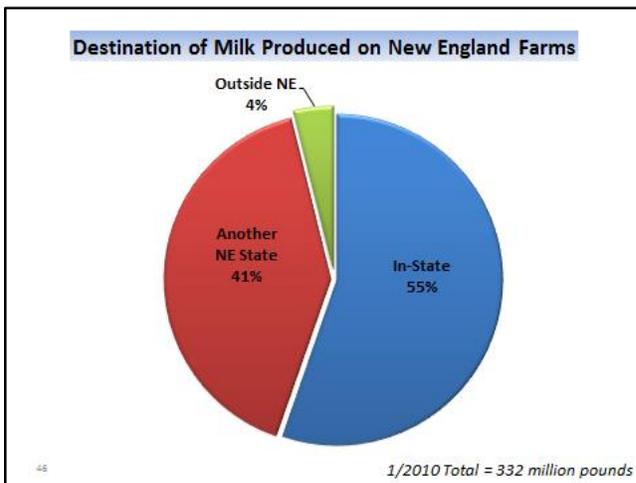
- Vulnerability to infection and continuity of operations vary with the role of each state in an interdependent, regional production and marketing system.

⁵⁴ For an explanation of data for these charts, see “Patterns of Milk Movement and Vulnerability of New England Dairies during Foreign Animal Disease (FAD) Response” appended to this document.

Some states (especially MA) are milk importers; other states (especially VT) are milk exporters. In all New England states, both markets for farm sales and supplies for processors depend on interstate commerce.



- With important exceptions, the region is less dependent on inter-regional than interstate transport of raw milk.



- Regional raw milk exports constitute a small share of the total market for milk production in New England. For example, in January 2010, they totaled just 13 of 333 million pounds. Out-of-region plants increased the demand for New England milk by only 4% (peaking at just 5% in VT).
- Regional raw milk imports are a significant but still relatively small share of the total supply for milk processing in New England. For example, in January, 2010, they totaled 99 of 418 million pounds. Out-of-region farms supplied 24% of all the milk processed in New England plants (peaking at 34% of the supply for CT, 31% for VT and 27% for MA).

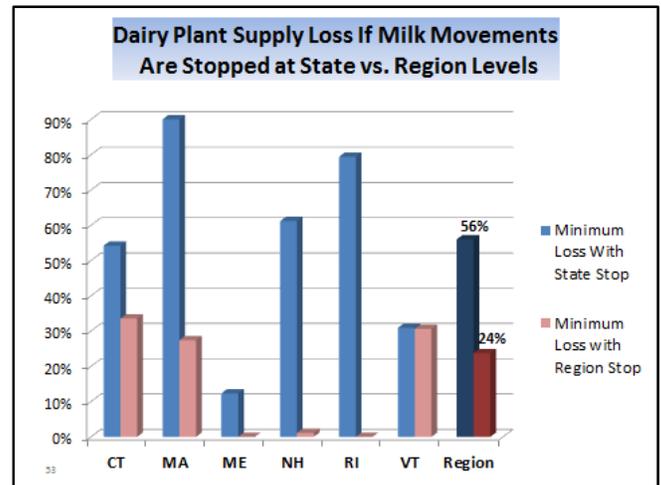
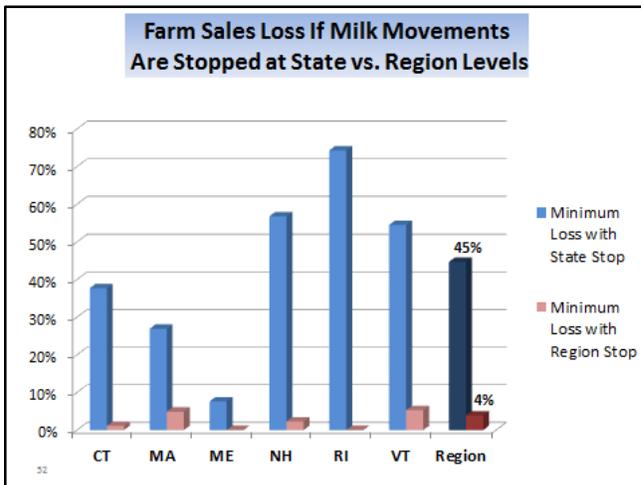
- For both supply and demand of raw milk, New York is by far the most important trade partner for New England.

Raw Milk Movement To and From New England

Raw Milk Exports from NE (1/2010)			Raw Milk Imports to NE (1/2010)		
NE Farm Origin	Outside Plant Destination	Export Pounds	Outside Farm Origin	NE Plant Destination	Import Pounds
CT	NJ	12,193	IN	CT	44,574
CT	NY	304,610	NY	CT	12,511,561
MA	NJ	986,975	PA	CT	118,354
NH	NY	587,219	NY	MA	43,863,897
VT	NJ	195,784	PA	MA	129,199
VT	NY	10,717,528	NY	NH	309,542
VT	OH	9,278	NY	VT	41,869,171
Total Pounds		12,813,587	Total Pounds		98,846,298

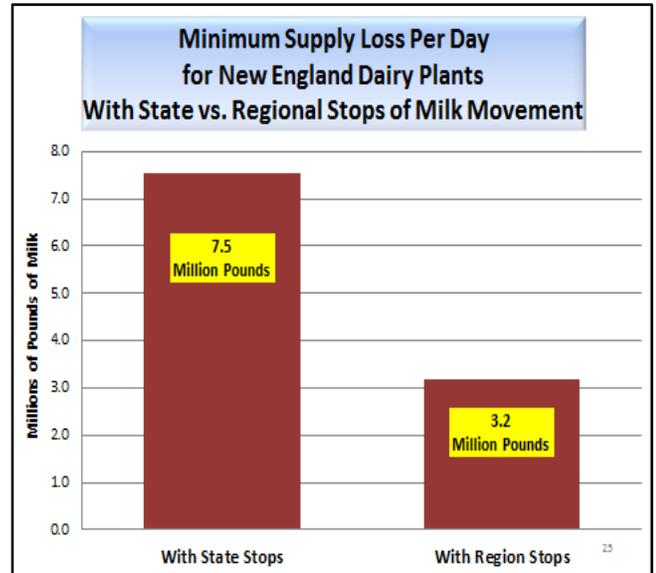
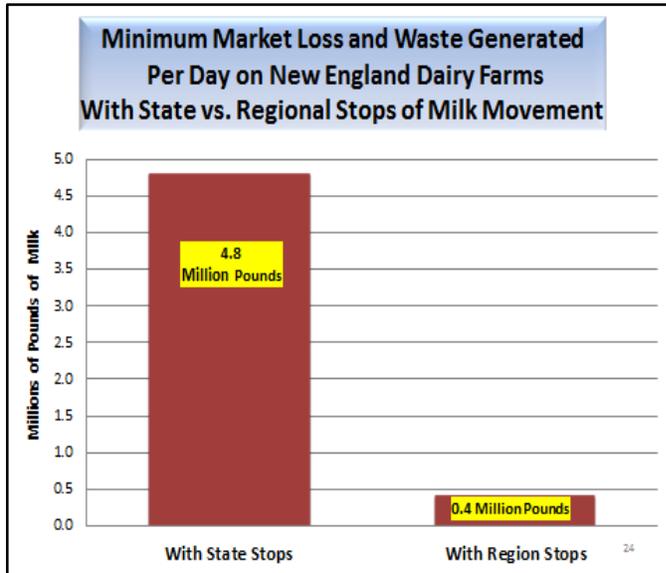
43

- Effects of restrictions on milk movement, as in an FMD response, would be severe for all stakeholders but also vary greatly among states and sectors of the dairy industry in New England.



- If milk movement were stopped at state borders rather than allowed to move within the region, environmental challenges and market-share losses would be particularly heavy for New England dairy farms: at least 45% with state stops versus 4% with region stops.

- Stopping milk movement at the region level would be more immediately challenging for New England dairy processors (especially in CT, VT, and MA) than farmers: at least 24% with region stops versus 56% with state stops.



It is worth emphasizing that farms and processors are interdependent, whatever the variation in their vulnerability to movement controls. Plants need a reliable milk supply, producers need buyers, and both ultimately require healthy cattle and consumer confidence. Continuity of business for all stakeholders would be much less vulnerable if milk movement restrictions were applied at the border of the region than the border of each state.

In an FMD outbreak, continuity of business for dairy farmers and processors as well as fortunes for consumers, taxpayers and the environment would be much less vulnerable if milk movement restrictions were applied at the border of the region than the border of each state.

RECOMMENDATIONS FOR FMD READINESS IN NEW ENGLAND

New England dairies and their broader social, economic, and environmental connections will be best served by supporting national and international efforts to remain free of FMD. The region is distinctly vulnerable to an outbreak and collateral damage of response efforts. Nevertheless, if there is an outbreak of FMD, New England could reduce its vulnerability by preparing to optimize the inherently conflicting objectives of disease control and continuity of dairy operations.

Three strategic principles should guide preparations to increase the sustainability of New England dairies:

- 1. Tighten the coordination of state preparations for responding to Foot-and-Mouth Disease (e.g., endorse the USDA-APHIS “Red Book” as the center of all response plans in the region).**

- 2. Develop, adopt and exercise a single region-wide plan for issuing permits to move milk – both intra- and inter-state – from farms to processors with precautions that minimize the risk of contagion (e.g., in coordination with the national Secure Milk Supply Plan).**

- 3. Plan to preserve the diversity of existing dairy farms and processors, especially a mix of large and small, national and locally oriented operations (e.g., in priorities for issuing permits and support of biosecurity improvements).**

Appendix 1: STATISTICAL OVERVIEW OF NEW ENGLAND DAIRIES COMPARED TO THE U.S. AS A WHOLE

Statistical Overview of New England Dairies Compared to the U.S. as a Whole

Contents

REGIONAL MILK PRODUCTION, PROCESSING AND MARKETING	62
Milk Producers, Sales, and Processors by State and Region, 2009-2010	62
Milk Quantities Used and Marketed by Producers by State and Region, 2007	62
Marketing, Income, and Value of Milk Production, by State and Region, 2007	63
FARMS, FARM LAND, AND PROPERTY VALUE	63
Dairy Farms and Operations with Milk Cows in New England, 2010	63
Farms Primarily Engaged in Dairy Cattle and Milk Production in New England and the U.S., 2007	64
Milk Cows, Production and Sales in New England, 2010	64
Total Milk Production in New England and the U.S., 2007	64
Owned and Rented Land on Dairy Farms in New England and the U.S., 2007	65
Land Use on Dairy Farms in New England and the U.S., 2007	66
Estimated Market Value of Real Estate, Machinery and Equipment of Dairy Farms in New England and the U.S., 2007	67
Milk Cows per Operation in Vermont and the US, 2007	67
FARM OPERATORS	68
Number, Gender, Specialization, and Tenure of Dairy Farm Operators in New England and the U.S., 2007	68
PAYMENTS, EXPENSES, AND INCOME	69
Market Value of Milk and Other Dairy Products from Cows in New England and the U.S., 2007	70

Market Value of Agricultural Products Sold and Government Payments to Dairy Farms in New England and the U.S., 2007	70
Costs and Returns of Dairy Production in Vermont, the U.S. and Its Largest Milk-Production States, 2009-2010	72
Production Expenses for Dairy Farms in New England and the U.S., 2007	74
Net Income of Dairy Farms in New England and the U.S., 2007	75
FARM SIZE AND CONCENTRATION	75
Number of Farms (All Types) with Milk Cows by Herd Size in the U.S. and New England, 2007	75
Number of Dairy Farms and Milk Cows by Herd Size in the New England States, 2007	76
Number of Dairy Farms and Milk Cows by Herd Size in the New England and the United States, 2007	78
Number of Milk Cows by Farm Size in New England and the U.S., 2007	79
Income Distribution and Sources for Dairy Farms and Operators in New England and the U.S., 2007	80
Concentration of Market Value of Milk and Other Dairy Products Sold by Farms in New England and the U.S., 2007	82
Concentration of Market Share Among Dairy Farms in New England States the U.S., 2007	83
Share of Milk Production by Farm Size in Vermont and the US, 2007	84
FMD-SUSCEPTIBLE LIVESTOCK	84
FMD-Susceptible Livestock Population in New England, 2010-11	84
Deer Population in New England , 2010	85
Types of Cattle in New England , 2011	85
Cattle Inventory in New England and the U.S., January 1, 2011	86
FMD-Susceptible Livestock and Their Market Value in New England and the U.S., 2007	86

REGIONAL MILK PRODUCTION, PROCESSING AND MARKETING

Milk Producers, Sales, and Processors by State and Region, 2009-2010⁵⁵

	Number of Milk Producers	Monthly Milk Production (Million Pounds)	Daily Average Output per Farm (pounds)	Number of Plants Purchasing Raw Liquid Milk	Number of Plants Processing Dairy Products
CT	124	29.5	7,672	8	23
ME	316	48.9	4,995	15	22
MA	140	17.1	3,934	5	22
NH	129	23.5	5,888	4	7
RI	16	1.2	2,450	6	4
VT	973	211.3	7,006	15	25
New England	1,698	331.5	6,299	53	103

Milk Quantities Used and Marketed by Producers by State and Region, 2007⁵⁶

	Milk Used Where Produced (million pounds)			Milk Marketed by Producer	
	Fed to Calves	Used for milk, cream, & butter	Total	Total Quantity (million pounds)	Sold as Grade A (percent)
CT	2.5	0.5	3.0	362	100
ME	4.0	1.0	5.0	582	100
MA	1.5	0.5	2.0	253	100
NH	3.5	0.5	4.0	286	100
RI	0.1	0.0	0.1	18	100
VT	14.5	2.5	17.0	2,514	100
New England	26.1	5.0	31.1	4,015	100

⁵⁵ U.S. Department of Agriculture, Agricultural Marketing Service (USDA/AMS) Federal Milk Order No. 1, Northeast Marketing Area, [Monthly Statistical Report, December 2010](#), p. 3; and U.S. Department of Agriculture, National Agricultural Statistics Service (USD/NASS). [Dairy Products: 2009 Summary](#) (2010), p. 47. Note that the plant counts are one year older than the other counts (December 2009 vs. December 2010). See also "Sources and Caveats" at the beginning of the appended "Patterns of Milk Movement and Vulnerability of New England Dairies During Foreign Animal Disease (FAD) Response."

⁵⁶ Fed to calves excludes milk sucked by calves, but milk marketed includes both milk sold to plants and small amounts sold directly to consumers. U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Dairy and Poultry Statistics](#), Agricultural Statistics, Chapter 8 (2009), p. VIII-10.

Marketing, Income, and Value of Milk Production, by State and Region, 2007⁵⁷

	Milk Marketed (million pounds)	Cash Receipts from Milk Marketed (million dollars)	Total Value of Milk Produced (million dollars)
CT	362	75.7	76.3
ME	582	127.5	128.6
MA	253	53.1	53.6
NH	286	60.1	60.9
RI	18	3.8	3.8
VT	2,514	517.0	521.4
New England	4,015	837.2	844.6

FARMS, FARM LAND, AND PROPERTY VALUE

Dairy Farms and Operations with Milk Cows in New England, 2010⁵⁸

	CT	ME	MA	NH	RI	VT	New England
Number of dairy farms	130	317	147	128	16	995	1,733
All operations with milk cows	270	480	310	220	40	1,200	2,520

⁵⁷ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Dairy and Poultry Statistics](#), Agricultural Statistics, Chapter 8 (2009), p. VIII-11. Note that cash receipts reflect a price (about \$20.85 per cwt) that has been unusually high, albeit still consistently below price parity.

⁵⁸ "Operations with milk cows" refers to any place with one or more milk cows on-hand in 2007. U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Dairy and Poultry Statistics](#), Agricultural Statistics, Chapter 8 (2009), p. VIII-3. "Commercial producers" refers to farms selling raw milk to federally regulated haulers as of December 200 (which is roughly equal to the number of farms milking more than 20 cows). U.S. Department of Agriculture, Agricultural Marketing Service (USDA/AMS) Federal Milk Order No. 1, Northeast Marketing Area, [2009 Annual Statistical Bulletin](#) (2010), p. 12.

Farms Primarily Engaged in Dairy Cattle and Milk Production in New England and the U.S., 2007⁵⁹

	CT	ME	MA	NH	RI	VT	NE	US
Dairy farms	212	396	258	194	34	1,141	2,235	57,318
Percent of all farms	4.3	4.9	3.4	4.7	2.8	16.3	6.8	2.6
Land in farms (acres)	69,826	168,077	65,645	72,167	4,449	539,371	919,535	21,270,780
Average size of farm (acres)	329	424	254	372	131	473	411	371

Milk Cows, Production and Sales in New England, 2010⁶⁰

	CT	ME	MA	NH	RI	VT	New England
Approximate inventory of milk cows	19,000	33,000	13,000	15,000	1,100	134,000	215,100
Production per cow (pounds)	18,684	18,061	17,571	19,533	17,818	18,289	18,328
Total production (million pounds)	355	596	246	293	20	2,469	3,979
Dairy product sales (million \$)	72.3	126.4	50.5	59.1	4.6	493.9	806.8
Sales rank among 50 states	35	32	41	38	49	15	[12]

Total Milk Production in New England and the U.S., 2007⁶¹

	CT	ME	MA	NH	RI	VT	NE	US
--	----	----	----	----	----	----	----	----

⁵⁹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

⁶⁰ The Region's national rank [12] represents a simulation, comparing total dairy product sales of New England farms with the remaining 44 states in 2009-2010. U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Milk Cow Inventory – All States](#) (2011); USDA/NASS, New England Field Office, State Agriculture Overviews, [New England Statistics](#) (2011); U.S. Department of Agriculture, Economic Research Service (USDA/ERS), [Milk Cows and Production by State and Region](#) (September 28, 2010); U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS), [Milk Production, Disposition, and Income, 2009 Summary](#) (April 29, 2010).

⁶¹ U.S. Department of Agriculture, National Agriculture Statistical Service (USDA/NASS), [Milk Disposition and Income Final Estimates, 2003-2007](#), Statistical Bulletin 2017 (May, 2009). "Gross producer income" is the cash receipts from sales of milk and cream plus the value of milk used for

Milk cows (1,000)	19	33	15	15	1.1	140	223	9,189
Milk per cow (pounds)	19,211	17,788	17,000	19,333	16,455	18,079	18,143	20,204
Total milk production (million pounds)	365	587	255	290	18	2,531	4,046	185,654
Gross producer income (\$1,000)	75,763	127,677	53,235	60,165	3,798	518,399	839,037	35,480,472
Value of milk produced (\$1,000)	76,285	128,553	53,550	60,900	3,819	521,386	844,493	35,665,894

Owned and Rented Land on Dairy Farms in New England and the U.S., 2007⁶²

	CT	ME	MA	NH	RI	VT	NE	US		
Tenure										
Farms with full owners	287	112	103	57	16	288	863	36.6%	21,660	37.8%
Farms with part owners	34	275	138	124	18	774	1,363	57.9%	30,844	53.8%
Farms with tenants	12	9	17	13	0	79	130	5.5%	4,814	8.4%
Land owned										
Farms	321	387	241	181	34	1,063	2,227		52,578	
Acres	17,707	119,704	43,471	52,130	2,706	363,635	599,353		14,421,223	
Land rented or leased from others										
Farms	46	286	155	137	18	853	1,495		35,808	
Acres	1,197	49,587	22,416	20,258	1,755	179,377	274,590		7,367,144	
Land rented or leased to others										
Farms	20	12	11	6	2	56	107		3,693	
Acres	896	1,214	242	(D)	(D)	3,641	(D)		517,587	

home consumption. "Value of milk produced" includes the value of milk fed to calves. "Value" is calculated from the average returns per 100 pounds of milk and cream, combined.

⁶² U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." "(D)" indicates a count "withheld to avoid disclosing data for individual farms." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

Land Use on Dairy Farms in New England and the U.S., 2007⁶³

	CT	ME	MA	NH	RI	VT	NE	US
Total cropland								
Farms	190	354	209	172	28	1,068	2,021	52,360
Acres	43,792	91,774	32,614	35,778	2,640	309,002	515,600	14,616,513
Harvested cropland								
Farms	185	349	181	163	23	1,034	1,935	50,149
Acres	41,070	85,022	29,605	32,859	2,170	284,042	474,768	13,291,838
Cropland for pasture or grazing only								
Farms	66	349	82	51	12	373	933	17,664
Acres	2,021	85,022	2,066	1,710	417	17,116	108,352	904,264
Land enrolled in conservation reserve, wetlands reserve, farmable wetlands, or conservation reserve enhancement programs								
Farms	7	23	4	1	0	71	106	3,519
Acres	79	1,045	(D)	(D)	0	2,047	(D)	141,858
Land enrolled in crop insurance programs								
Farms	67	92	63	46	11	440	719	16,351
Acres	14,554	18,581	8,617	8,603	1,057	98,531	149,943	4,859,086
Land used for organic production								
Farms	3	66	8	20	0	182	279	1,854
Acres	174	15,698	1,751	2,795	0	43,702	64,120	420,795
Total organic product sales								
Farms	3	62	7	15	0	158	245	1,617
Value (\$1,000)	(D)	11,255	(D)	(D)	0	25,175	(D)	427,729

⁶³ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." "(D)" indicates a count "withheld to avoid disclosing data for individual farms." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

Estimated Market Value of Real Estate, Machinery and Equipment of Dairy Farms in New England and the U.S., 2007⁶⁴

	CT	ME	MA	NH	RI	VT	NE	US		
Land and buildings										
Farms	212	396	258	194	34	1,141	2,235	57,318		
Value (\$1,000)	757,245	385,502	407,746	278,751	31,153	1,168,686	3,029,083	75,260,109		
Average per farm (\$)	3,571,910	973,490	1,580,410	1,436,860	916,264	1,024,265	1,355,294	1,313,027		
Average per acre (\$)	10,845	2,294	6,211	3,863	7,002	2,167	3,294	3,538		
Farms by value group										
\$1 - 49,999	3	5	6	5	3	21	43	1.9%	1,996	3.5%
\$50,000 - 99,999	0	12	11	1	3	16	43	1.9%	1,772	3.1%
\$100,000 - 199,999	3	29	5	4	1	52	94	4.2%	4,369	7.6%
\$200,000 - 499,999	35	112	63	57	7	324	598	26.8%	13,957	24.4%
\$500,000 - 999,999	33	112	52	43	8	324	572	25.6%	14,636	25.5%
\$1,000,000 - 1,999,999	59	79	57	44	8	268	515	23.0%	11,259	19.6%
\$2,000,000 - 4,999,999	43	43	49	30	3	115	283	12.7%	6,981	12.2%
\$5,000,000 - 9,999,999	16	4	10	9	1	19	59	2.6%	1,656	2.9%
\$10,000,000 +	20	0	5	1	0	2	28	1.3%	692	1.2%
Machinery and equipment										
Farms	212	396	258	194	34	1,141	2,235	57,315		
Value (\$1,000)	32,479	81,504	32,097	40,083	3,958	230,596	420,717	12,802,344		

Milk Cows per Operation in Vermont and the US, 2007⁶⁵

Total	Number of Milk Cows per Operation								
	1-29	30-49	50-99	100-199	200-499	500+	500-999	1000-1999	2000+

⁶⁴ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

⁶⁵ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), Quick Stats: [U.S. and All States Data – Dairy](#) (2007).

VT										
Number of farms	1,200	230	200	400	200	120	50			
Percentage of farms	100%	19.2%	16.7%	33.3%	16.7%	10.0%	4.2%			
US										
Number of farms	69,995	21,705	12,270	19,330	9,011	4,359	3,320	1,720	920	680
Percentage of farms	100%	31.0%	17.5%	27.6%	12.9%	6.2%	4.7%	2.5%	1.3%	1.0%

FARM OPERATORS

Number, Gender, Specialization, and Tenure of Dairy Farm Operators in New England and the U.S., 2007⁶⁶

	CT	ME	MA	NH	RI	VT	NE		US	
Operators										
Total number of operators	558	714	477	379	66	2,150	4,344		101,601	
Farms by number of operators:										
1 operator	148	163	98	63	16	399	887	37.6%	25,389	44.3%
2 operators	154	165	115	94	11	534	1,073	45.5%	23,058	40.2%
3 operators	25	60	35	24	4	163	311	13.2%	6,652	11.6%
4 operators	3	4	7	10	1	34	59	2.5%	1,532	2.7%
5+ operators	3	4	3	3	2	11	26	1.1%	687	1.2%
Women operators										
Number of women operators	217	213	147	114	21	619	1,331		26,013	
Farms by number of women operators:										
1 operator	176	182	126	200	13	533	1,230	93.5%	22,378	93.1%
2 operators	16	8	9	7	2	33	75	5.7%	1,416	5.9%
3 operators	3	5	1	0	0	0	9	0.7%	187	0.8%
4 operators	0	0	0	0	1	0	1	0.1%	39	0.2%
5 + operators	0	0	0	0	0	0	0	0.0%	14	0.1%
Gender of principal operator										

⁶⁶ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

Male	275	359	201	163	32	1,044	2,074	88.0%	53,955	94.1%
Female	58	37	57	31	2	97	282	12.0%	3,363	5.9%
Primary occupation										
Farming	156	329	188	147	17	1,022	1,859	78.9%	49,878	87.0%
Other	177	67	70	47	17	119	497	21.1%	7,440	13.0%
Place of residence										
On farm operated	276	373	216	175	27	1,058	2,125	90.2%	52,133	91.0%
Not on farm operated	57	23	42	19	7	83	231	9.8%	5,185	9.0%
Days worked off farm										
None	95	248	147	109	11	777	1,387	58.9%	38,406	67.0%
Any	238	148	111	85	23	364	969	41.1%	18,912	33.0%
1 to 49 days	35	25	7	8	1	78	154	6.5%	4,964	8.7%
50 to 99 days	34	9	12	8	5	30	98	4.2%	1,312	2.3%
100 to 199 days	43	23	14	9	4	54	147	6.2%	2,145	3.7%
200 days +	126	91	78	60	13	202	570	24.2%	10,491	18.3%
Years on present farm										
2 years or less	6	4	12	3	0	22	47	2.0%	1,701	4.9%
3 or 4 years	24	12	17	8	0	42	103	4.5%	2,392	6.9%
5 to 9 years	64	51	32	22	4	121	294	12.8%	6,466	18.7%
10 years or more	176	329	197	161	30	956	1,849	80.6%	24,084	69.5%
Average years on present farm	27.0	25.9	24.2	25.3	25.1	24.9	25.3		23.2	

PAYMENTS, EXPENSES, AND INCOME

Market Value of Milk and Other Dairy Products from Cows in New England and the U.S., 2007⁶⁷

	CT	ME	MA	NH	RI	VT	NE	US
All farms with milk cows	261	461	310	225	39	1,222	2,518	69,763
Total value (\$1,000)	72,338	126,392	50,485	59,132	4,599	493,926	806,872	31,848,029
Sales of \$50,000 +								
Farms	141	300	148	129	17	981	1,716	50,792
Value (\$1,000)	70,418	124,398	48,488	58,003	4,441	490,017	795,765	31,558,210
Average per farm (\$)	499,418	414,660	327,622	449,636	261,235	499,508	463,733	621,322

Market Value of Agricultural Products Sold and Government Payments to Dairy Farms in New England and the U.S., 2007⁶⁸

	CT	ME	MA	NH	RI	VT	NE	US		
Total market value of sales and government payments										
Farms	212	396	258	194	34	1,141	2,235	57,318		
Value (\$1,000)	79,481	138,113	55,829	65,525	5,007	543,960	887,915	35,065,603		
Average per farm (\$)	374,909	348,771	216,393	337,757	147,264	476,740	397,227	611,773		
Farms by economic class:										
Less than \$1,000	0	7	0	0	0	0	7	0.3%	103	0.2%
\$1,000 - 2,499	0	0	3	3	0	3	9	0.4%	69	0.1%
\$2,500 - 4,999	12	14	33	3	8	8	78	3.5%	1,643	2.9%
\$5,000 - 9,999	18	24	28	28	3	48	149	6.7%	1,792	3.1%
\$10,000 - 24,999	18	28	32	13	5	45	141	6.3%	2,481	4.3%
\$25,000 - 49,999	23	22	13	20	1	46	125	5.6%	3,204	5.6%
\$50,000 - 99,999	18	34	27	10	2	144	235	10.5%	5,879	10.3%
\$100,000 - 249,999	44	117	43	38	8	327	577	25.8%	18,547	32.4%

⁶⁷ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 61. Summary by Type of Organization (2007).

⁶⁸ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." "(D)" indicates a count "withheld to avoid disclosing data for individual farms." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

\$250,000 - 499,999	29	88	43	47	6	263	476	21.3%	12,034	21.0%
\$500,000 - 999,999	29	33	28	17	0	137	244	10.9%	5,533	9.7%
\$1,000,000 +	21	29	8	15	1	120	194	8.7%	6,033	10.5%
\$1,000,000 - 2,499,999	17	23	7	13	1	81	142	6.4%	3,412	6.0%
\$2,500,000 - 4,999,999	4	5	1	1	0	27	38	1.7%	1,419	2.5%
\$5,000,000 +	0	1	0	1	0	12	14	0.6%	1,202	2.1%
Total sales										
Farms	212	396	258	194	34	1,141	2,235		57,318	
Total sales (\$1,000)	77,195	134,291	54,153	64,205	4,972	538,243	873,059		34,754,031	
Grains, oilseeds, dry beans, and dry peas										
Farms	23	25	21	11	5	93	178		22,967	
Value (\$1,000)	(D)	(D)	283	(D)	45	1,336	(D)		949,511	
Other crops and hay										
Farms	59	98	67	65	5	373	667		7,332	
Value (\$1,000)	542	694	(D)	(D)	(D)	5,086	(D)		126,387	
Cattle and calves										
Farms	170	329	195	158	16	1,041	1,909		51,686	
Value (\$1,000)	4,792	7,006	3,509	(D)	(D)	38,365	(D)		2,586,343	
Sales of \$50,000 +										
Farms	28	28	16	15	2	176	265		9,299	
Value (\$1,000)	2,667	3,124	1,552	(D)	(D)	25,657	(D)		1,950,502	
Milk and other dairy products from cows										
Farms	212	389	258	194	34	1,141	2,228		57,237	
Value (\$1,000)	70,773	124,990	49,056	58,421	4,570	492,444	800,254		30,872,020	
Sales of \$50,000 +										
Farms	136	297	141	127	17	970	1,688		46,822	
Value (\$1,000)	69,351	123,562	47,708	(D)	4,441	(D)	(D)		30,678,172	
Hogs and pigs										
Farms	29	33	19	30	1	42	154		2,882	
Value (\$1,000)	42	51	(D)	35	(D)	83	(D)		42,603	
Sheep, goats, and their products										
Farms	23	32	15	16	2	36	124		2,109	
Value (\$1,000)	47	57	27	(D)	(D)	34	(D)		7,684	

Horses, ponies, mules, burros, and donkeys								
Farms	1	6	2	2	0	9	20	1,623
Value (\$1,000)	(D)	(D)	(D)	(D)	0	38	(D)	4,702
Value of government payments								
Farms	108	261	126	120	13	903	1,531	40,381
Value (\$1,000)	2,285	3,822	1,676	1,320	35	5,718	14,856	311,573
Landlord's share of total sales								
Farms	4	2	2	2	0	14	24	1,414
Value (\$1,000)	31	(D)	(D)	(D)	0	301	(D)	70,948
Agricultural products sold directly to individuals for human consumption								
Farms	28	47	52	51	4	106	288	3,221
Value (\$1,000)	(D)	185	682	(D)	(D)	5,212	(D)	52,594

Costs and Returns of Dairy Production in Vermont, the U.S. and Its Largest Milk-Production States, 2009-2010⁶⁹

	Dollars per Hundred Pounds of Milk (\$ per cwt)
--	--

⁶⁹ The U.S. Department of Agriculture, Economic Research Service (USDA/ERS) estimates costs of production (COP) via adjustments to a baseline from the most recent survey (in this case, [Milk Production Costs and Returns from the 2005 AMS](#)) and reports them in [Monthly Milk Costs of Production, 2006-2010](#), (January 25, 2011). Here, figures are for the latest month available: for states, December 2010; for the U.S. as a whole, the average in 2009. Of the 23 states covered, Vermont is the only New England representative. California, Wisconsin, and Vermont are included here because they produce the most milk in the U.S. (numbers one, two, and three, respectively). Milk prices here are from U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Agricultural Prices](#) (January 31, 2011). Sources of "other income" include "renting or leasing dairy stock to other operations, renting space to other dairy operations, and co-op patronage dividends associated with the dairy; assessment rebates, refunds, and other dairy-related resources; and the fertilizer value of manure production." Since state totals for those values in 2010 are not available, value of cattle and other income are the regional average for the most recent year available, 2009. Note also that milk receipts here (a) are average price paid in just one month, December 2010, when prices returned to longer-term norms after spiking low earlier in 2010; and (b) do not yet reflect the usual deduction from farmers' checks to repay a cooperative for hauling the milk to a processor. So, insofar as the selected time frames are atypical of 2010, they err on the side of understating average farm losses (that is, assuming that producers sell to processors in their own state). USDA/ERS estimates that the 2010 parity price (the price that milk would require to yield equivalent purchasing power in 1910-14) would be about \$44 per cwt.

		VT	CA	WI	NY	US
Operating Cost	Total feed costs	10.22	12.43	10.22	11.33	10.90
	Purchased feed	6.65	11.09	6.63	6.08	7.54
	Homegrown harvest feed	3.37	1.29	3.51	5.14	3.27
	Grazed feed	0.20	0.05	0.08	0.11	0.09
	Veterinary and medicine	0.92	0.64	1.16	0.98	0.94
	Bedding and litter	0.43	0.05	0.28	0.53	0.25
	Marketing	0.29	0.34	0.25	0.27	0.31
	Custom services	0.48	0.36	0.46	0.57	0.49
	Fuel, lube, and electricity	0.90	0.56	0.77	1.00	0.57
	Repairs	0.62	0.40	0.75	0.90	0.66
	Other operating costs	0.00	0.00	0.00	0.00	0.00
	Interest on operating capital	0.02	0.02	0.02	0.02	0.02
	Total operating costs	13.89	14.79	13.91	15.61	14.14
Allocated Overhead	Hired labor	1.89	1.59	1.78	2.14	1.71
	Opportunity cost of unpaid labor	3.11	0.42	3.39	3.41	2.28
	Capital recovery of machinery and equipment	3.97	2.14	3.62	4.39	3.31
	Opportunity cost of land (rental rate)	0.07	0.00	0.03	0.03	0.03
	Taxes and insurance	0.43	0.19	0.37	0.35	0.24
	General farm overhead	1.21	0.27	0.82	0.88	0.57
		Total allocated overhead	10.68	4.61	10.02	11.19
Total Listed Costs		24.57	19.40	23.92	26.81	22.28
Value of Production	Milk sales	18.20	14.88	16.50	18.30	12.81
	Cattle	1.08	1.02	1.43	1.08	1.14
	Other income	0.84	0.83	0.80	0.84	0.83
		Total value of production	20.12	16.73	18.73	20.22
Milk receipts less operating cost		4.31	0.09	2.59	2.69	-1.33
Milk receipts less total cost		-6.37	-4.52	-7.42	-8.51	-9.47

Total value of production less operating costs	6.23	1.94	4.82	4.61	0.64
Total value of production less total cost	-4.45	-2.67	-5.19	-6.59	-7.50

Production Expenses for Dairy Farms in New England and the U.S., 2007⁷⁰

	CT	ME	MA	NH	RI	VT	NE	US
Total farm production expenses(\$1,000)	61,943	105,017	41,777	50,817	30,307	397,050	686,911	24,968,314
Farms	212	396	258	194	252	1,141	2,453	57,318
Average per farm (\$)	292,182	265,194	161,927	261,943	120,266	347,984	280,028	435,610

⁷⁰ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

Net Income of Dairy Farms in New England and the U.S., 2007⁷¹

	CT	ME	MA	NH	RI	VT	NE	US
Average net income per farm (\$)	99,996	89,619	60,980	84,768	95,729	135,821	110,556	184,165
Farms with net gains	73.6%	82.8%	69.8%	75.8%	61.8%	85.0%	80.6%	88.0%
Average gain (\$)	159,879	116,552	94,970	127,250	99,252	166,858	145,897	218,339
Farms with net losses	26.4%	17.2%	30.2%	24.2%	38.2%	15.0%	19.4%	12.0%
Average loss (\$)	66,821	40,297	17,456	48,101	11,755	40,240	39,580	66,452

FARM SIZE AND CONCENTRATION

Number of Farms (All Types) with Milk Cows by Herd Size in the U.S. and New England, 2007⁷²

Milk Cows Per Herd	CT	ME	MA	NH	RI	VT	New England	U.S.	Share of NE Herds	Share of US Herds
1 to 9	109	158	142	93	22	166	690	14,426	27%	21%
10 to 19	17	26	17	9	1	40	110	3,568	4%	5%
20 to 49	43	94	48	29	7	276	497	16,344	20%	23%
50 to 99	37	121	46	52	6	382	644	18,986	25%	27%
100 to 199	36	46	43	23	2	191	341	8,975	13%	13%
200 to 499	21	26	12	17	1	111	188	4,307	7%	6%
500 to 999	5	7	2	1	0	38	53	1,702	2%	2%
1,000 or more	1	1	0	1	0	15	18	1,582	1%	2%
1,000 - 2,499	1	1	0	1	0	14	17	1,104		

⁷¹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 62. Summary by North American Industry Classification System (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle."

⁷² U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level and United States](#) (2011).

2,500 +	0	0	0	0	0	1	1	478		
Total	269	479	310	225	39	1,219	2,541	69,890		

Number of Dairy Farms and Milk Cows by Herd Size in the New England States, 2007⁷³

Dairy Farm Size (milk cows per herd)	Number of Farms	Share of Farms	Number of Milk Cows	Share of Milk Cows	Average Number of Milk Cows per Farm
Connecticut					
All Sizes	210		19,852		95
1 to 9	62	29.5%	215	1.1%	3
10 to 19	15	7.1%	(D)	(D)	(D)
20 to 49	39	18.6%	(D)	(D)	(D)
50 to 99	33	15.7%	2,299	11.6%	70
100 to 199	34	16.2%	(D)	(D)	(D)
200 to 499	21	10.0%	5,844	29.4%	278
500 to 999	5	2.4%	(D)	(D)	(D)
1,000 or more	1	0.5%	(D)	(D)	(D)
Maine					
All Sizes	394		32,030		81
1 to 9	84	21.3%	276	0.9%	3
10 to 19	19	4.8%	(D)	(D)	(D)
20 to 49	93	23.6%	(D)	(D)	(D)
50 to 99	118	29.9%	7,923	24.7%	67
100 to 199	46	11.7%	6,232	19.5%	135
200 to 499	26	6.6%	8,155	25.5%	314

⁷³ Robert Hood of Data Lab Section of USDA/NASS, special tabulation from U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#) (March 31, 2011). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." "(D)" indicates a count "withheld to avoid disclosing data for individual farms." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10. The number of dairy farms is slightly lower here than in other tables (e.g., 2227 rather than 2235 for New England) because the count here excludes from "Dairy Farms" operations that have no milk cows (e.g., operations that exclusively raise replacement heifers).

500 to 999	7	1.8%	(D)	(D)	(D)
1,000 or more	1	0.3%	(D)	(D)	(D)
Massachusetts					
All Sizes	257		14,575		57
1 to 9	103	40.1%	235	1.6%	2
10 to 19	9	3.5%	(D)	(D)	(D)
20 to 49	45	17.5%	1,520	10.4%	34
50 to 99	43	16.7%	3,075	21.1%	72
100 to 199	43	16.7%	5,496	37.7%	128
200 to 499	12	4.7%	(D)	(D)	(D)
500 to 999	2	0.8%	(D)	(D)	(D)
1,000 or more	0	0.0%	0	0.0%	0
New Hampshire					
All Sizes	193		14,504		75
1 to 9	64	33.2%	199	1.4%	3
10 to 19	6	3.1%	(D)	(D)	(D)
20 to 49	29	15.0%	1,072	7.4%	37
50 to 99	52	26.9%	3,678	25.4%	71
100 to 199	23	11.9%	(D)	(D)	(D)
200 to 499	17	8.8%	4,688	32.3%	276
500 to 999	1	0.5%	(D)	(D)	(D)
1,000 or more	1	0.5%	(D)	(D)	(D)
Rhode Island					
All Sizes	34		1,316		39
1 to 9	17	50.0%	(D)	(D)	(D)
10 to 19	1	2.9%	(D)	(D)	(D)
20 to 49	7	20.6%	227	17.2%	32
50 to 99	6	17.6%	423	32.1%	71
100 to 199	2	5.9%	(D)	(D)	(D)
200 to 499	1	2.9%	(D)	(D)	(D)

500 to 999	0	0.0%	0	0.0%	0
1,000 or more	0	0.0%	0	0.0%	0
Vermont					
All Sizes	1,139		138,664		122
1 to 9	113	9.9%	344	0.2%	3
10 to 19	28	2.5%	426	0.3%	15
20 to 49	269	23.6%	9,846	7.1%	37
50 to 99	374	32.8%	25,996	18.7%	70
100 to 199	191	16.8%	26,156	18.9%	137
200 to 499	111	9.7%	31,296	22.6%	282
500 to 999	38	3.3%	24,509	17.7%	645
1,000 or more	15	1.3%	20,091	14.5%	1,339

Number of Dairy Farms and Milk Cows by Herd Size in the New England and the United States, 2007⁷⁴

Dairy Farm Size (milk cows per herd)	Number of Farms	Share of Farms	Number of Milk Cows	Share of Milk Cows	Average Number of Milk Cows per Farm
New England					
All sizes	2,227		220,941		99
1 to 9	443	19.9%	(D)	(D)	(D)
10 to 19	78	3.5%	1,056	0.5%	14
20 to 49	482	21.6%	17,283	7.8%	36
50 to 99	626	28.1%	43,394	19.6%	69
100 to 199	339	15.2%	(D)	(D)	(D)
200 to 499	188	8.4%	53,252	24.1%	283

⁷⁴ Robert Hood of Data Lab Section of USDA/NASS, special tabulation from U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#) (March 31, 2011). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." "(D)" indicates a count "withheld to avoid disclosing data for individual farms." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10. The number of dairy farms is slightly lower here than in other tables (e.g., 2227 rather than 2235 for New England) because the count excludes "Dairy Farms" that have no milk cows (e.g., operations that exclusively raise replacement heifers).

500 to 999	53	2.4%	34,368	15.6%	648
1,000 or more	18	0.8%	24,401	11.0%	1,356
United States					
All sizes	56,725		8,927,856		157
1 to 9	6,324	11.1%	20,334	0.2%	3
10 to 19	2,693	4.7%	37,258	0.4%	14
20 to 49	14,440	25.5%	515,386	5.8%	36
50 to 99	17,517	30.9%	1,181,985	13.2%	67
100 to 199	8,336	14.7%	1,099,342	12.3%	132
200 to 499	4,156	7.3%	1,238,138	13.9%	298
500 to 999	1,687	3.0%	1,151,793	12.9%	683
1,000 or more	1,572	2.8%	3,683,620	41.3%	2,343

Number of Milk Cows by Farm Size in New England and the U.S., 2007⁷⁵

Number of Milk Cows per Farm	CT	ME	MA	NH	RI	VT	New England	U.S. (thousands)	Share of U.S. Milk Cows
1 to 9	354	419	324	(D)	(D)	460	(D)	38	0%
10 to 19	194	339	(D)	(D)	(D)	590	(D)	49	1%
20 to 49	1,510	3,292	1,634	1,072	227	10,056	17,791	576	6%
50 to 99	2,604	8,133	3,250	3,678	423	26,561	44,649	1,281	14%
100 to 199	4,842	6,232	5,496	(D)	(D)	26,156	(D)	1,181	13%
200 to 499	5,844	8,155	(D)	4,688	(D)	31,296	(D)	1,279	14%
500 to 999	(D)	(D)	(D)	(D)	0	24,509	(D)	1,162	13%
1,000 or more	(D)	(D)	0	(D)	0	20,091	(D)	3,701	40%
1 K- 2,499	(D)	(D)	0	(D)	0	(D)	(D)	1,674	
2,500 +	(D)	(D)	0	0	0	(D)	(D)	2,027	
Total	20,685	32,527	15,050	14,611	1,325	139,719	223,917	9,267	

⁷⁵ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture: State Level](#), Volume 1, Chapter 1, Table 17, and [2007 Census of Agriculture: United States](#), Volume 1, Chapter 1, Table 17 (2011). (D) = "withheld to avoid disclosing data for individual farms."

Income Distribution and Sources for Dairy Farms and Operators in New England and the U.S., 2007⁷⁶

	CT	ME	MA	NH	RI	VT	NE	US
Net cash farm income of operations								
Farms	212	396	258	194	34	1,141	2,235	57,318
Value (\$1,000)	21,199	35,489	15,733	16,445	3,255	154,971	247,092	10,555,964
Average per farm (\$)	99,996	89,619	60,980	84,768	95,729	135,821	110,556	184,165
Farms with net gains								
Farms	156	328	180	147	21	970	1,802	50,440
Average net farm gain (\$)	159,879	116,552	94,970	127,250	99,252	166,858	145,897	218,339
Farms with net gain of								
Less than \$1,000	7	4	8	5	1	1	26	533
\$1,000 - 4,999	14	22	27	9	1	44	117	2,046
\$5,000 - 9,999	7	16	5	11	1	36	76	1,833
\$10,000 - 24,999	12	48	22	21	2	101	206	4,992
\$25,000 - 49,999	32	50	21	21	5	181	310	7,405
\$50,000 +	84	188	97	80	11	607	1,067	33,631
Farms with net losses								
Farms	56	68	78	47	13	171	433	6,878
Average farm net loss (\$)	66,821	40,297	17,456	48,101	11,755	40,240	39,580	66,452
Farms with net loss of								
Less than \$1,000	9	2	6	5	1	11	34	504
\$1,000 - 4,999	8	21	24	7	8	32	100	1,382
\$5,000 - 9,999	3	8	16	13	0	29	69	1,088
\$10,000 - 24,999	15	19	22	8	0	45	109	1,509
\$25,000 - 49,999	4	4	5	8	3	17	41	976
\$50,000 +	17	14	5	6	1	37	80	1,419
Net cash farm income of operators								

⁷⁶ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), "Table 62, Summary by North American Industry Classification System" (2007). "Dairy farms" refers to the North American Industry Classification "Dairy Cattle and Milk Production" (1121) which NAICS defines as "establishments primarily engaged in milking dairy cattle." "(D)" indicates a count "withheld to avoid disclosing data for individual farms." 2007 Census of Agriculture, Appendix B: [General Explanation and Census of Agriculture Report Form](#), p. B-10.

Farms	212	396	258	194	34	1,141	2,235	57,318
Value (\$1,000)	21,632	35,516	15,727	16,679	1,938	155,219	246,711	10,512,753
Average per farm (\$)	102,038	89,687	60,958	85,973	57,011	136,038	110,385	183,411
Operators reporting net gains								
Farms	157	327	180	147	21	965	1,797	50,333
Average net operator gain (\$)	161,188	117,086	94,938	128,608	99,580	168,005	146,802	218,086
Farms with operator net gain of								
Less than \$1,000	7	4	8	5	1	1	26	542
\$1,000 - 4,999	14	22	27	9	1	44	117	2,063
\$5,000 - 9,999	7	15	5	11	1	37	76	1,834
\$10,000 - 24,999	11	48	22	21	2	98	202	4,991
\$25,000 - 49,999	34	50	21	21	5	180	311	7,456
\$50,000 +	84	188	97	80	11	605	1065	33,447
Operators reporting net losses								
Farms	55	69	78	47	13	176	438	6,985
Average net operator loss (\$)	66,808	40,159	17,456	47,372	11,755	39,236	39,022	66,452
Farms with operator net loss of								
Less than \$1,000	8	2	6	5	1	11	33	508
\$1,000 - 4,999	8	21	24	7	8	35	103	1,387
\$5,000 - 9,999	3	8	16	13	0	31	71	1,102
\$10,000 - 24,999	16	20	22	8	0	45	111	1,532
\$25,000 - 49,999	3	4	5	8	3	17	40	994
\$50,000 +	17	14	5	6	1	37	80	1,462
Total income from farm-related sources (gross before taxes and expenses)								
Farms	108	172	127	110	16	771	1,304	36,379
Value (\$1,000)	3,661	2,392	1,681	1,737	179	8,061	17,711	458,674
Average value per farm (\$)	33,898	13,907	13,236	15,791	11,188	10,455	13,582	12,608
Custom work and other agricultural services								
Farms	27	14	20	13	0	113	187	6,559
Value (\$1,000)	463	66	129	45	0	1,254	1,957	87,571
Gross cash rent or share payments								
Farms	7	6	8	3	2	43	69	2,980
Value (\$1,000)	(D)	16	35	(D)	(D)	180	(D)	41,950

Sales of forest products, excluding Christmas trees, short rotation woody crops, and maple products								
Farms	6	6	19	33	0	152	216	2,180
Value (\$1,000)	14	16	65	235	0	1,201	1,531	23,851
Agri-tourism and recreational services								
Farms	4	6	4	7	3	11	35	387
Value (\$1,000)	95	16	21	(D)	(D)	238	(D)	4,076
Patronage dividends and refunds from cooperatives								
Farms	67	111	91	65	13	577	924	28,074
Value (\$1,000)	371	267	248	237	113	2,125	3,361	144,161
Crop and livestock insurance payments received								
Farms	5	8	7	3	0	45	68	4,582
Value (\$1,000)	(D)	81	29	(D)	0	469	(D)	79,524
Amount from state and local government agricultural program payments								
Farms	65	56	54	60	1	379	615	5,803
Value (\$1,000)	1,608	(D)	1,082	1,081	(D)	1,436	(D)	38,948
Other farm-related income sources								
Farms	20	24	15	9	0	70	138	5,034
Value (\$1,000)	1,019	562	72	47	0	1,157	2,857	38,595

Concentration of Market Value of Milk and Other Dairy Products Sold by Farms in New England and the U.S., 2007⁷⁷

	CT	ME	MA	NH	RI	VT	NE	US
All farms with milk cows								

⁷⁷ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), "Table 40, Farms by Concentration of Market Value of Agricultural Products Sold" (2007). Farms are sorted by their market value of agricultural products sold, from largest to smallest. Break points are then established where the smallest number accounts for 10%, 25%, 50% and 75% of the total value of agricultural products sold. "(D)" indicates a count "withheld to avoid disclosing data for individual farms."

Farms	261	461	310	225	39	1,222	2,518	69,763
Value (\$1,000)	72,338	126,392	50,485	59,132	4,599	493,926	806,872	31,848,029
Fewest Farms accounting for								
10 Percent of sales								
Farms	0	0	0	0	0	11	0	26
Value (\$1,000)	0	0	0	0	0	65,897	0	1,113,637
25 Percent of sales								
Farms	0	0	1	0	0	38	16	895
Value (\$1,000)	0	0	(D)	(D)	0	(D)	93,979	10,148,341
50 Percent of sales								
Farms	2	20	19	22	1	151	170	4,786
Value (\$1,000)	(D)	47,726	17,419	31,393	(D)	288,433	368,603	19,510,391
75 Percent of sales								
Farms	36	95	90	87	9	449	750	14,417
Value (\$1,000)	46,282	90,387	42,191	53,358	3,634	414,024	653,469	25,162,840

Concentration of Market Share Among Dairy Farms in New England States the U.S., 2007⁷⁸

	Total	Fewest number of farms accounting for-			
		10 percent of sales	25 percent of sales	50 percent of sales	75 percent of sales
Dairy Farms in New England					
Number of farms	2,518	0	16	170	750
Share of farms	100%	0	0.64%	6.75%	29.79%
Value (\$1,000)	806,872	0	93,979	368,603	653,469

⁷⁸ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), "Table 40. Farms by Concentration of Market Value of Agricultural Products Sold" (2007) and Robert Hood of Data Lab Section of USDA/NASS, special tabulation of "Farms by Concentration of Market Value" in "Table 40. Farms by Concentration of Market Value of Agricultural Products Sold: 2007" combined for the six New England States (March 17, 2011). Farms are sorted by their market value of agricultural products sold, from largest to smallest. Break points are then established where the smallest number accounts for 10%, 25%, 50% and 75% of the total value of agricultural products sold. "(D)" indicates a count "withheld to avoid disclosing data for individual farms."

Share of sales	100%	0	11.65%	45.68%	80.99%
Dairy Farms in the United States					
Number of farms	69,763	26	895	4,786	14,417
Share of farms	100%	0.04%	1.28%	6.86%	20.67%
Value (\$1,000)	31,848,029	1,113,637	10,148,341	19,510,391	25,162,840
Share of sales	100%	3.50%	31.86%	61.26%	79.01%

Share of Milk Production by Farm Size in Vermont and the US, 2007⁷⁹

	Number of Milk Cows per Operation					
	1-29	30-49	50-99	100-199	200-499	500+
VT	1.4%	4.6%	16.0%	18.0%	23.0%	37.0%
US	1.3%	4.0%	12.0%	12.0%	13.7%	57.0%

FMD-SUSCEPTIBLE LIVESTOCK

FMD-Susceptible Livestock Population in New England, 2010-11⁸⁰

	Cattle ⁸¹	Swine ⁸²	Sheep ⁸³	Goats ⁸⁴	Total
CT	49,000	3,400	-	-	52,400 +
ME	90,000	4,700	-	-	94,700 +

⁷⁹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), Quick Stats: [U.S. and All States Data – Dairy](#) (2007).

⁸⁰ Livestock totals here include all types (e.g., for cattle, beef as well as dairy, heifers and cows as well as calves); likewise for sheep and goats, for which only region-level data are available from USDA/NASS. U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), New England Field Office, State Agriculture Overviews, [New England Statistics](#) (2011).

⁸¹ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Cattle Inventory](#) (January 28, 2011), p. 5.

⁸² U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Quarterly Hogs and Pigs](#) (December 27, 2010).

⁸³ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Sheep and Goats](#) (January 28, 2011), p. 3.

⁸⁴ Total for all six states reported in U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [Sheep and Goats](#) (January 28, 2011), pp. 12-14.

MA	40,000	11,000	-	-	51,000 +
NH	34,000	3,300	-	-	37,300 +
RI	4,900	1,800	-	-	6,700 +
VT	270,000	2,700	-	-	272,700 +
Region	487,900	26,900	51,000	27,000	592,800

Deer Population in New England, 2010⁸⁵

Location	Number of White-Tailed Deer
CT	62,000
ME	255,000
MA	90,000
NH	77,000
RI	16,000
VT	160,000
Region	660,000

Types of Cattle in New England, 2011⁸⁶

	Head	Share of Total
Milk cows	215,600	44%
Dairy heifers	103,000	21%
Calves (cattle < 500 lbs.)	90,300	19%
Beef cows	37,000	8%
Steers	14,300	3%
Beef heifers	12,400	3%
Other heifers	8,600	2%
Bulls	6,700	1%

⁸⁵ Very rough estimates cited on-line by wildlife management agencies in each of the six states (February, 2011)

⁸⁶ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [U.S. and All States Data – Cattle and Calves](#), January 1, 2011.

All cattle	487,900	100%
------------	---------	------

Cattle Inventory in New England and the U.S., January 1, 2011⁸⁷

	CT	ME	MA	NH	RI	VT	NE	US
Calves (< 500 lbs.)	11,000	16,000	8,000	5,500	800	49,000	90,300	14,500,300
Bulls	600	1,500	1,000	500	100	3,000	6,700	2,153,100
Cows that calved – Beef	4,000	13,000	5,500	3,000	1,500	10,000	37,000	30,864,600
Cows that calved – Milk	19,000	32,000	13,500	15,000	1,100	135,000	215,600	9,149,600
Replacement heifers – Beef	2,000	3,500	1,500	1,000	400	4,000	12,400	5,157,600
Replacement heifers – Milk	9,500	17,000	7,500	7,500	500	61,000	103,000	4,557,200
Heifers – Other	500	2,500	1,000	500	100	4,000	8,600	9,818,000
Steers	2,400	4,500	2,000	1,000	400	4,000	14,300	16,382,000
Total cattle	49,000	90,000	40,000	34,000	4,900	270,000	487,900	92,582,400

FMD-Susceptible Livestock and Their Market Value in New England and the U.S., 2007⁸⁸

	CT	ME	MA	NH	RI	VT	NE	US
Cattle and calves								
Farms	805	1,447	1,066	599	148	1,937	6,002	798,290
Market value (\$1,000)	9,405	15,660	12,444	6,743	846	57,581	102,679	61,209,970
Inventory								
Farms	1,210	2,112	1,832	1,027	276	2,459	8,916	963,669
Head	50,213	88,191	46,852	36,880	5,085	264,823	492,044	96,347,858
Milk cows	20,685	32,527	15,050	14,611	1,325	139,719	223,917	9,266,574
Hogs and pigs								
Farms	251	460	350	298	81	239	1,679	18,056,981
Market value (\$1,000)	616	813	2,108	518	354	697	5,106	121,171

⁸⁷ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), Quick Stats: [U.S. and All States Data – Cattle and Calves](#) (January 1, 2011).

⁸⁸ U.S. Department of Agriculture, National Agricultural Statistics Service (USDA/NASS), [2007 Census of Agriculture, Volume 1, Chapter 1: State Level Data](#), Table 40. Farms by Concentration of Market Value of Agricultural Products Sold (2007). “(D)” indicates a count “withheld to avoid disclosing data for individual farms.”

Inventory								
Farms	244	437	453	266	103	249	1,752	75,442
Head	3,645	4,401	11,553	2,792	2,316	2,701	27,408	67,786,318
Sheep, goats and other products								
Farms	434	709	697	514	97	645	3,096	121,171
Market value (\$1,000)	1,094	1,979	(D)	(D)	168	3,851	(D)	704,855
Total (Cattle and Swine only)								
Head	53,858	92,592	58,405	39,672	7,401	267,524	519,452	164,134,176
Market value (\$1,000)	10,021	16,473	14,552	7,261	1,200	58,278	107,785	61,331,141

**Appendix 2: PATTERNS OF MILK MOVEMENT AND VULNERABILITY OF NEW ENGLAND
DAIRIES DURING FOREIGN ANIMAL DISEASE (FAD) RESPONSE**

**Milk Movement and Vulnerability of New England Dairies
During Foreign Animal Disease (FAD) Response**

Contents

Sources and Caveats	89
Statistics Derived From USDA AMS Data (January 2010)	91
Origins and Destinations of Milk Movement in New England States.....	91
Market for Milk Movement in New England States	97
New England Exports and Imports of Raw Milk.....	98
State vs. Region Bounds of Milk Movement in New England	99
State vs. Region Borders for Control of Milk Movement	99
Summary Presentation to NESASA, December 2010.....	101

Sources and Caveats

Data for this analysis were provided by the USDA Agricultural Marketing Services (AMS) Office of the Northeast Market Administrator through an inter-agency memorandum of understanding with USDA APHIS Veterinary Services (# 10-9623-1087MU). AMS supplied summary counts from confidential producer payroll reports submitted to the Market Administrator by handlers regulated under the Provisions of the Milk Marketing Order during one sample month (January 2010).

Data coverage is remarkably comprehensive, but it also has limitations.

The terms of the Northeast Order require that regulated handlers provide monthly reports of all farm-level production, receipts, and utilization of liquid, unprocessed (“raw”) milk. Hence, in the absence of sales to regulated handlers (e.g., when farmers feed raw milk to livestock or sell it directly to consumers), commercial production escapes AMS reporting.

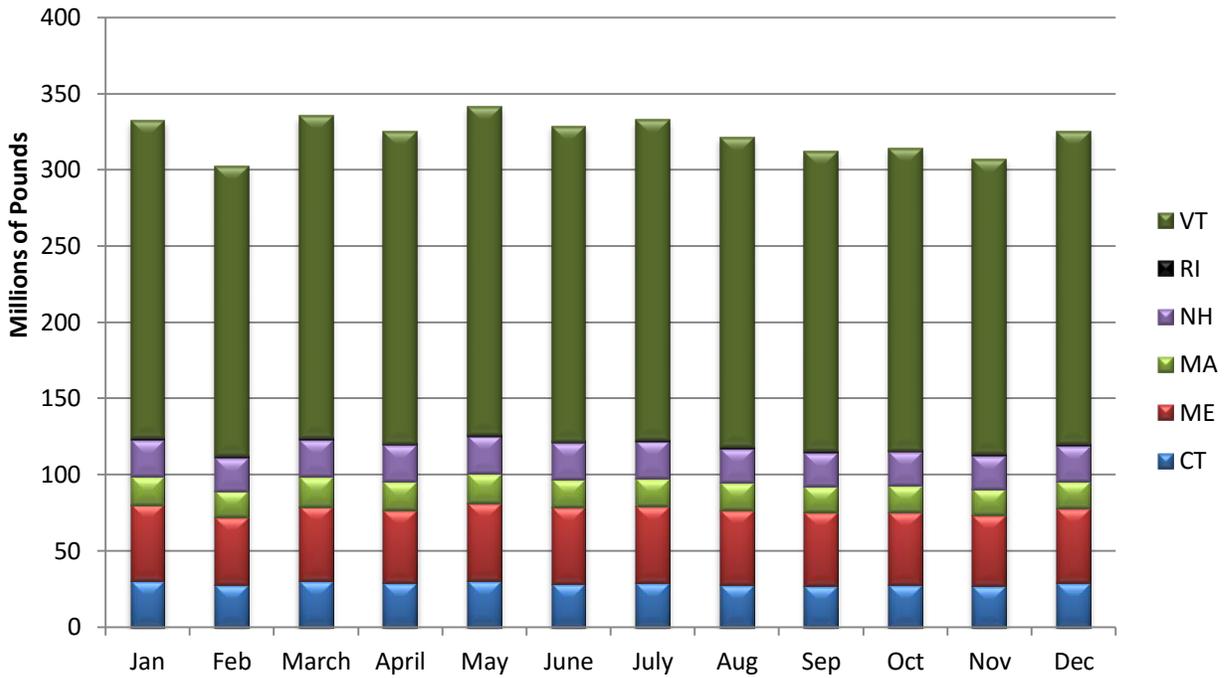
The General Provisions of Milk Marketing Orders also include reporting requirements only for Grade-A milk. However, since nearly all of the dairy farms in New England produce Grade-A milk, these AMS data are reasonably even if short of perfectly inclusive.

Geographically, the regulated Northeast Milk Marketing Area includes all of the six states in New England with the exception of Maine. Nevertheless, nearly all Maine farms are covered on the basis of the sale of their raw milk to handlers who are in the marketing area and therefore regulated under the rules of the Northeast Order.

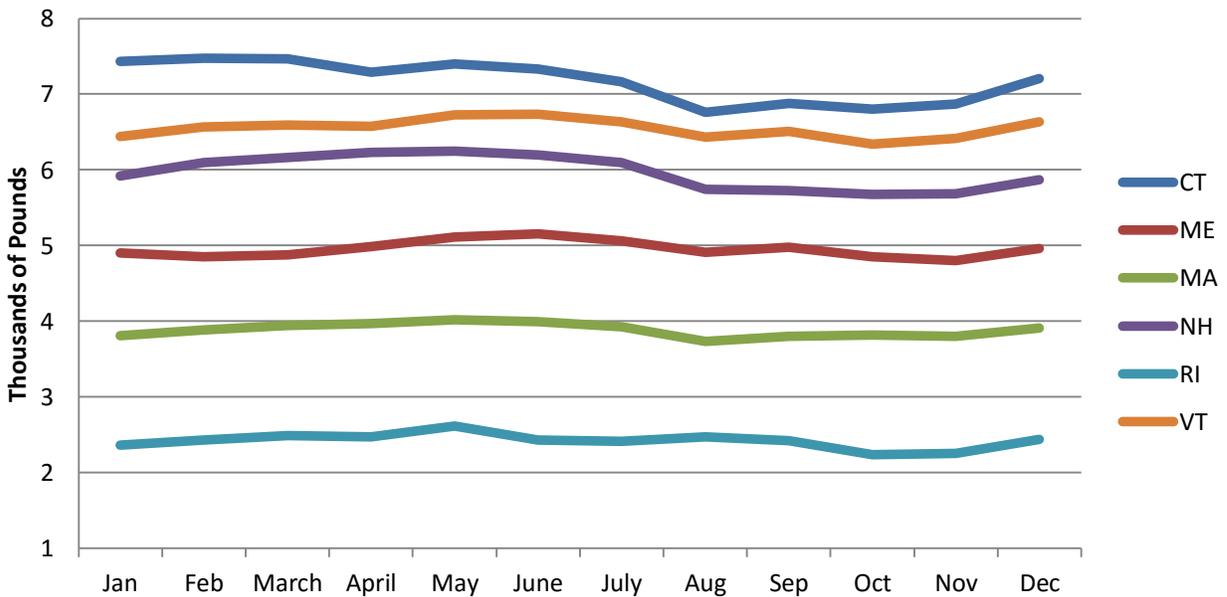
January 2010 was selected because, at the time of this study, it was the most recent month with data-quality controls completed and because January can be considered reasonably representative of normal dairy activity. As the charts below suggest, variation in total production and processing varies little month-to-month, and state as well as farm shares of production vary even less. The volume of milk produced and pooled in the Northeast Order tends to be a bit higher in the spring (April to May) and lower in the fall (September to October), but January 2010 totals were close to the 2009-2010 mean. State and farm-level contributions remain a fairly consistent, year-round proportion of the whole.

It is also worth emphasizing that total counts are assembled from one point in the supply chain (individual plant receipts), and that point has its limitations. For example, the variable “# Farms” in the data is the total of the number of farms delivering to each processor during the month. So, a farm could be double counted if its milk were also received by another processor in the same month. Likewise, “# Pickups” is the total of number of trips to each processor. So, if a single load were split among two processors, the same pickup could be double counted, from a farm or hauler perspective. The total pounds of milk production (“# Pounds”) is free of such potential for double counting; so that is the figure generally used in measuring “Share of Total” in summary statistics, tables, and charts.

Monthly Milk Receipts in NE States, 2009



Average Daily Production of NE Farms, 2009



Source: U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS), Northeast Marketing Area, Federal Order 1, The Market Administrator's Annual Statistical Bulletin, Volume 10, 2009, p. 11-13.

Statistics Derived From USDA AMS Data (January 2010)

Origins and Destinations of Milk Movement in New England States

Connecticut

Destinations for CT Dairy Farms: Where Milk Goes

	Pounds of Product	Share of State Total
In-state	17,365,683	62.3%
CT to MA	8,058,851	28.9%
CT to NH	826,354	3.0%
CT to NJ	12,193	0.0%
CT to NY	304,610	1.1%
CT to RI	1,306,893	4.7%
Total	27,874,584	100%

Suppliers for CT Dairy Plants: Where Milk Comes From

	Pounds of Product	Share of State Total
In-state	17,365,683	45.8%
IN to CT	44,574	0.1%
MA to CT	3,822,796	10.1%
NH to CT	826,354	2.2%
NY to CT	12,511,561	33.0%
PA to CT	118,354	0.3%
RI to CT	708,041	1.9%
VT to CT	2,487,957	6.6%
Total	37,885,320	100%

In-State, Regional Interstate, Inter-Regional Milk Movement in CT

Connecticut	Market for Dairy Farms		Supply for Dairy Plants	
	Pounds of Product	Share of State Total	Pounds of Product	Share of State Total
In-State	17,365,683	62.3%	17,365,683	45.8%
Other NE State	10,192,098	36.6%	7,845,148	20.7%
Outside New England	316,803	1.1%	12,674,489	33.5%
Total	27,874,584	100%	37,885,320	100%

Maine

Destinations for ME Dairy Farms: Where Milk Goes

	Pounds of Product	Share of State Total
ME to MA	1,493,274	3.0%
In-state	45,986,262	92.4%
ME to NH	2,313,222	4.6%
Total	49,792,758	100%

Suppliers for ME Dairy Plants: Where Milk Comes From

	Pounds of Product	Share of State Total
MA to ME	202,588	0.4%
In-state	45,986,262	87.7%
NH to ME	2,427,876	4.6%
VT to ME	3,794,399	7.2%
Total	52,411,125	100%

In-State, Regional Interstate, Inter-Regional Milk Movement in ME

Maine	Market for Dairy Farms		Supply for Dairy Plants	
	Pounds of Product	Share of State Total	Pounds of Product	Share of State Total
In-State	45,986,262	92.4%	45,986,262	87.7%
Other NE State	3,806,496	7.6%	6,424,863	12.3%
Outside New England	0	0%	0	0%
Total	49,792,758	100%	52,411,125	100%

Massachusetts

Destinations for MA Dairy Farms: Where Milk Goes

	Pounds of Product	Share of State Total
MA to CT	3,822,796	19.1%
In-state	14,587,823	73.1%
MA to ME	202,588	1.0%
MA to NH	58,543	0.3%
MA to NJ	986,975	4.9%
MA to RI	241,863	1.2%
MA to VT	62,281	0.3%
Total	19,962,869	100%

Suppliers for MA Dairy Plants: Where Milk Comes From

	Pounds of Product	Share of State Total
CT to MA	8,058,851	5.0%
In-state	14,587,823	9.1%
ME to MA	1,493,274	0.9%
NH to MA	10,176,553	6.3%
NY to MA	43,863,897	27.3%
PA to MA	129,199	0.1%
RI to MA	455,595	0.3%
VT to MA	81,630,734	50.9%
Total	160,395,926	100%

In-State, Regional Interstate, Inter-Regional Milk Movement in MA

Massachusetts	Market for Dairy Farms		Supply for Dairy Plants	
	Pounds of Product	Share of State Total	Pounds of Product	Share of State Total
In-State	14,587,823	73.1%	14,587,823	9.1%
Other NE State	4,388,071	22.0%	101,815,007	63.5%
Outside New England	986,975	4.9%	43,993,096	27.4%
Total	19,962,869	100%	160,395,926	100%

New Hampshire

Destinations for NH Dairy Farms: Where Milk Goes

	Pounds of Product	Share of State Total
NH to CT	826,354	3.3%
NH to MA	10,176,553	40.2%
NH to ME	2,427,876	9.6%
In-state	10,944,710	43.2%
NH to NY	587,219	2.3%
NH to VT	376,719	1.5%
Total	25,339,431	100%

Suppliers for NH Dairy Plants: Where Milk Comes From

	Pounds of Product	Share of State Total
MA to NH	58,543	0.2%
ME to NH	2,313,222	8.2%
In-state	10,944,710	38.8%
NY to NH	309,542	1.1%
VT to NH	14,559,860	51.7%
Total	28,185,877	100%

In-State, Regional Interstate, Inter-Regional Milk Movement in NH

New Hampshire	Market for Dairy Farms		Supply for Dairy Plants	
	Pounds of Product	Share of State Total	Pounds of Product	Share of State Total
In-State	10,944,710	43.2%	10,944,710	38.8%
Other NE State	13,807,502	54.5%	16,931,625	60.0%
Outside New England	587,219	2.3%	309,542	1.1%
Total	25,339,431	100%	28,185,877	100%

Rhode Island

Destinations for RI Dairy Farms: Where Milk Goes

	Pounds of Product	Share of State Total
RI to CT	708,041	45.2%
RI to MA	455,595	29.1%
In-state	402,209	25.7%
Total	1,565,845	100%

Suppliers for RI Dairy Plants: Where Milk Comes From

	Pounds of Product	Share of State Total
CT to RI	1,306,893	67.0%
MA to RI	241,863	12.4%
In-state	402,209	20.6%
Total	1,950,965	100%

In-State, Regional Interstate, Inter-Regional Milk Movement in RI

Rhode Island	Market for Dairy Farms		Supply for Dairy Plants	
	Pounds of Product	Share of State Total	Pounds of Product	Share of State Total
In-State	402,209	25.7%	402,209	20.6%
Other NE State	1,163,636	74.3%	1,548,756	79.4
Outside New England	0	0%	0	0%
Total	1,565,845	100%	1,950,965	100%

Vermont

Destinations for VT Dairy Farms: Where Milk Goes

	Pounds of Product	Share of State Total
VT to CT	2,487,957	1.2%
VT to MA	81,630,734	39.2%
VT to ME	3,794,399	1.8%
VT to NH	14,559,860	7.0%
VT to NJ	195,784	0.1%
VT to NY	10,717,528	5.2%
VT to OH	9,278	0.0%
In-state	94,592,925	45.5%
Total	207,988,465	100%

Suppliers for VT Dairy Plants: Where Milk Comes From

	Pounds of Product	Share of State Total
MA to VT	62,281	0.0%
NH to VT	376,719	0.3%
NY to VT	41,869,171	30.6%
In-state	94,592,925	69.1%
Total	136,901,096	100%

In-State, Regional Interstate, Inter-Regional Milk Movement in VT

Vermont	Market for Dairy Farms		Supply for Dairy Plants	
	Pounds of Product	Share of State Total	Pounds of Product	Share of State Total
In-State	94,592,925	45.5%	94,592,925	69.1%
Other NE State	102,295,456	49.2%	439,000	0.3%
Outside New England	10,922,590	5.3%	41,869,171	30.6%
Total	207,988,465	100%	136,901,096	100%

Market for Milk Movement in New England States

Regional Demand: Milk Received at New England Dairy Plants (January 2010)

Plant State	Product Pounds	Regional Share
CT	37,885,320	9.10%
MA	160,395,926	38.40%
ME	52,411,125	12.50%
NH	28,185,877	6.70%
RI	1,950,965	0.50%
VT	136,901,096	32.80%
Total	417,730,309	100%

Regional Production: Milk Shipped From New England Dairy Farms (January 2010)

Farm State	Product Pounds	Regional Share
CT	27,874,584	8.4%
MA	19,962,869	6.0%
ME	49,792,758	15.0%
NH	25,339,431	7.6%
RI	1,565,845	0.5%
VT	207,988,465	62.5%
Total	332,523,952	100%

Net Supply and Demand for Milk Movement Within New England

State	Total Production Farm Output	Total Demand Plant Intake	Net Production Minus Demand
CT	27,874,584	37,885,320	-10,010,736
MA	19,962,869	160,395,926	-140,433,057
ME	49,792,758	52,411,125	-2,618,367
NH	25,339,431	28,185,877	-2,846,446
RI	1,565,845	1,950,965	-385,120
VT	207,988,465	136,901,096	71,087,369
Total	332,523,952	417,730,309	-85,206,357

New England Exports and Imports of Raw Milk

Origins of Milk from New England Farms Shipping to Plants Outside New England

NE Origin	Product Pounds	Share of Regional Supply to Out-of-Region Plants
CT	316,803	2.5%
MA	986,975	7.7%
NH	587,219	4.6%
VT	10,922,590	85.2%
Total	12,813,587	100%

Destinations of Milk from New England Farms to Plants Outside New England

Outside of NE Destination	Product Pounds	Share of Out-of-Region Demand for NE Milk
NJ	1,194,952	9.3%
NY	11,609,357	90.6%
OH	9,278	0.1%
Total	12,813,587	100%

Origin of Milk from Farms Outside New England Shipping to New England Plants

Outside of NE Supply	Pounds	Share of Out-of-Region Supply to NE Plants
IN	44,574	0.05%
NY	98,554,171	99.7%
PA	247,553	0.25%
Total	98,846,298	100.0%

Destinations of Milk from Outside New England Shipping to New England Plants

NE Destination	Pounds	Share of NE Demand for Out-of-Region Supply
CT	12,674,489	12.8%
MA	43,993,096	44.5%
NH	309,542	0.3%
VT	41,869,171	42.4%
Total	98,846,298	100%

Raw Milk Movement To and From New England

Raw Milk Exports from NE			Raw Milk Imports to NE		
NE Farm Origin	Outside Plant Destination	Export Pounds	Outside Farm Origin	NE Plant Destination	Import Pounds
CT	NJ	12,193	IN	CT	44,574
CT	NY	304,610	NY	CT	12,511,561
MA	NJ	986,975	PA	CT	118,354
NH	NY	587,219	NY	MA	43,863,897
VT	NJ	195,784	PA	MA	129,199
VT	NY	10,717,528	NY	NH	309,542
VT	OH	9,278	NY	VT	41,869,171
Total		12,813,587	Total		98,846,298

State vs. Region Bounds of Milk Movement in New England

Location	Destination of Farm Production	Share	Origin of Supply for Dairy Plants	Share
In-State	183,879,612	55.3%	183,879,612	44.0%
Other NE State	135,653,259	40.8%	135,004,399	32.3%
Outside New England	12,813,587	3.9%	98,846,298	23.7%
Total	332,346,458	100.0%	417,730,309	100.0%

State vs. Region Borders for Control of Milk Movement

Vulnerability of Farms Due to Restrictions on Milk Movement

Farm Vulnerability		Minimum Loss If State Borders Closed			Minimum Loss If Region Border Closed		
Place	Total Production	Pounds Per Month	Pounds Per Day	Share of Production	Pounds per Month	Pounds Per Day	Share of Production
CT	27,874,584	10,508,901	338,997	37.7%	316,803	10,219	1.1%
MA	19,962,869	5,375,046	173,389	26.9%	986,975	31,838	4.9%
ME	49,792,758	3,806,496	122,790	7.6%	0	0	0.0%
NH	25,339,431	14,394,721	464,346	56.8%	587,219	18,943	2.3%
RI	1,565,845	1,163,636	37,537	74.3%	0	0	0.0%
VT	207,988,465	113,395,540	3,657,921	54.5%	11,100,084	358,067	5.3%
Region	332,523,952	148,644,340	4,794,979	44.7%	12,991,081	419,067	3.9%

Vulnerability of Dairy Plants Due to Restrictions on Milk Movement

Plant Vulnerability		Minimum Loss If State Borders Closed			Minimum Loss If Region Border Closed		
Place	Total Intake	Pounds Per Month	Pounds Per Day	Share of Intake	Pounds per Month	Pounds Per Day	Share of Intake
CT	37,885,320	20,519,637	661,924	54.2%	12,674,489	408,854	33.5%
MA	160,395,926	145,808,103	4,703,487	90.9%	43,993,096	1,419,132	27.4%
ME	52,411,125	6,424,863	207,254	12.3%	0	0	0.0%
NH	28,185,877	17,241,167	556,167	61.2%	309,542	9,985	1.1%
RI	1,950,965	1,548,756	49,960	79.4%	0	0	0.0%
VT	136,901,096	42,308,171	1,364,780	30.9%	41,869,171	1,350,618	30.6%
Region	417,730,309	233,850,697	7,543,571	56.0%	98,846,298	3,188,590	23.7%

Summary Presentation to NESAASA, December 2010

Slides for
New England State Animal Agriculture Security Alliance
(NESAASA)
Webinar
December 21, 2010

Patterns of Milk Movement and Vulnerability of New England Dairies During Foreign Animal Disease (FAD) Response

by
Richard P. Horwitz
December, 2010

Prepared through a Cooperative Agreement (CA #10-9623-1082, FFY 2010) between the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) and the Maine Department of Agriculture, Food, and Rural Resources, Animal Health and Industry (AHI), in cooperation with the New England States Animal Agriculture Security Alliance (NESAAASA) and the USDA Agricultural Marketing Service (AMS) Dairy Programs, Office of the Northeast Milk Market Administrator.

1

Vulnerability Assessment

Key Questions:

- How does milk ordinarily move in New England?
- If an FAD (in particular, Foot-and-Mouth Disease) strikes New England, how much dairy production is at risk in each state? In the region as a whole?
- How much is at risk if measures to control the spread of FAD include stops on inter-state movement? Versus region-level controls?

2

Data Quality and Caveats

Key Points:

- Data for this analysis were provided by the AMS Office of the Northeast Milk Market Administrator through an inter-agency memorandum of understanding with APHIS Veterinary Services (# 10-9623-1087MU).
- These data are used in federal regulation of dairy markets, for which they are well vetted.
 - *The Northeast Milk Marketing Order includes reporting requirements for all raw milk sold in New England states. Maine lies outside the regulated Northeast Area, but it is still covered because raw milk from Maine is sold to regulated handlers.
 - *The only dairy production systematically excluded is the "raw" (liquid, unpasteurized) milk that farmers directly sell to consumers or feed to livestock.
- Data are from just one month (January 2010), selected because it is:
 - *For this analysis, it was the most recent month with data quality-controls completed.
 - *January is reasonably representative of normal dairy activity (a month when production is usually close to the annual mean).
- Key variables are state of processor, state of farm, and pounds of milk (used to calculate shares of respective totals).

3

The Six New England States

Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

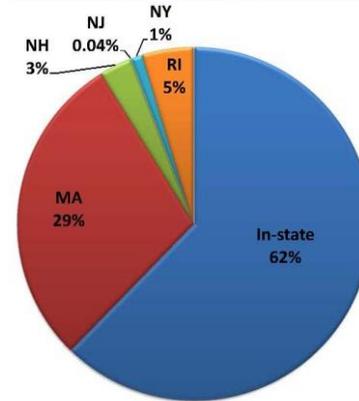
4

Connecticut



5

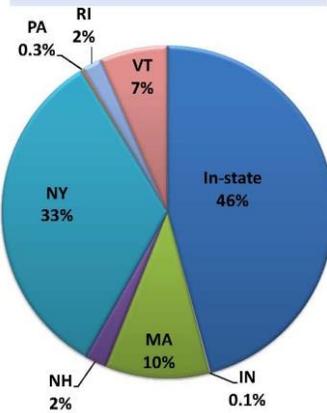
Destinations for CT Dairy Farms: Where Milk Goes



1/2010 Production = 28 million pounds

6

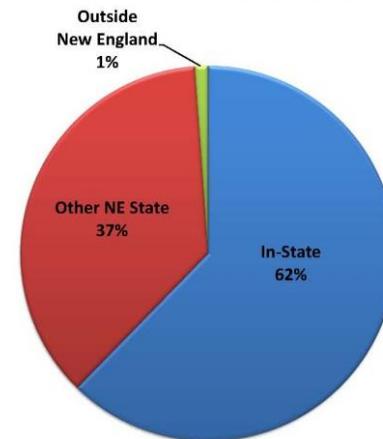
Suppliers for CT Dairy Plants: Where Milk Comes From



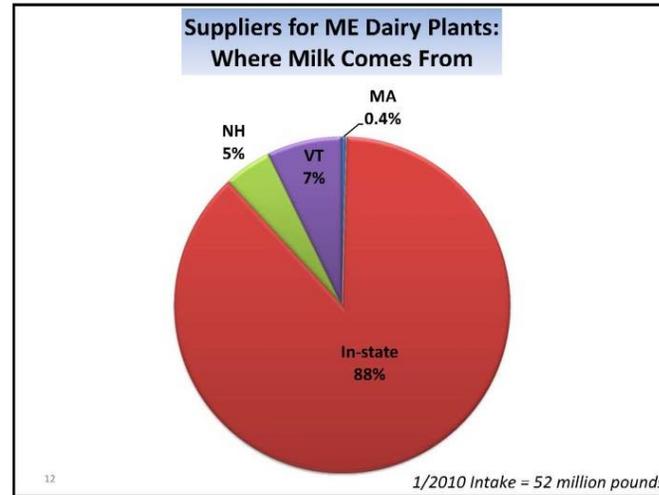
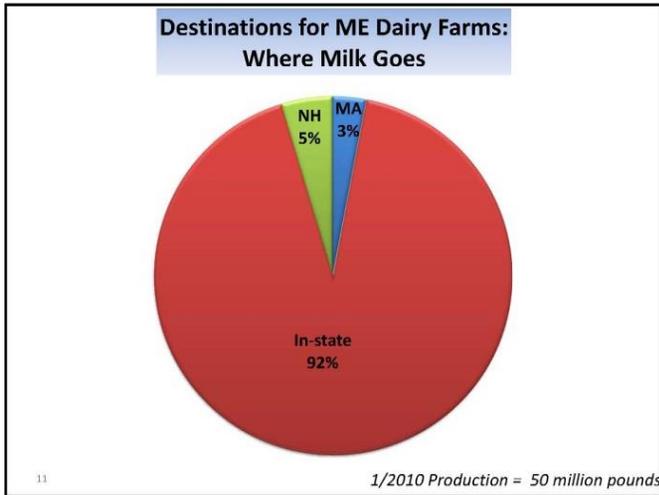
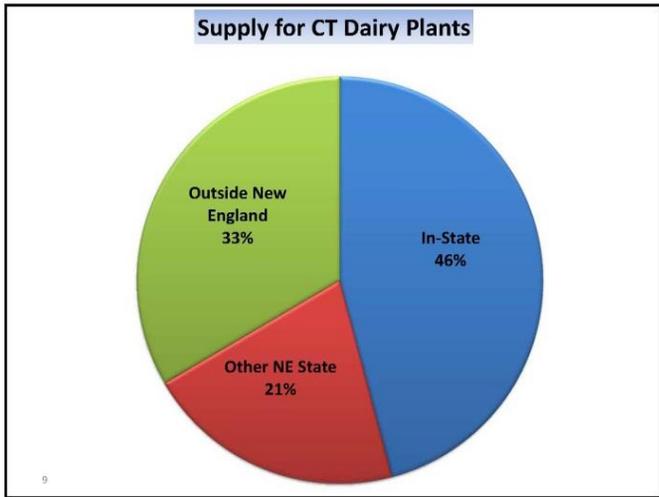
1/2010 Intake = 38 million pounds

7

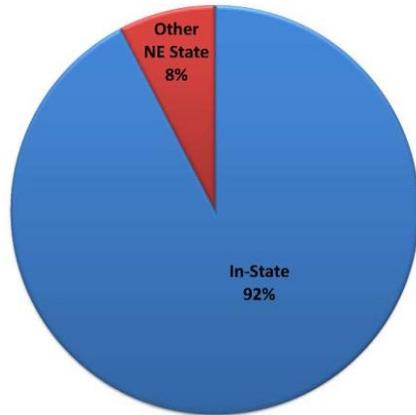
Demand for Milk from CT Dairy Farms



8

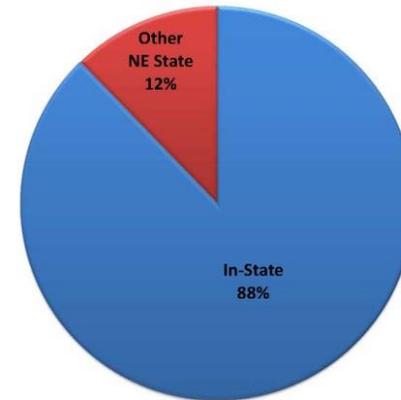


Demand for Milk from ME Dairy Farms



13

Supply for ME Dairy Plants



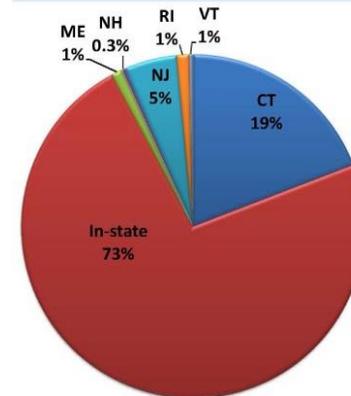
14

Massachusetts



15

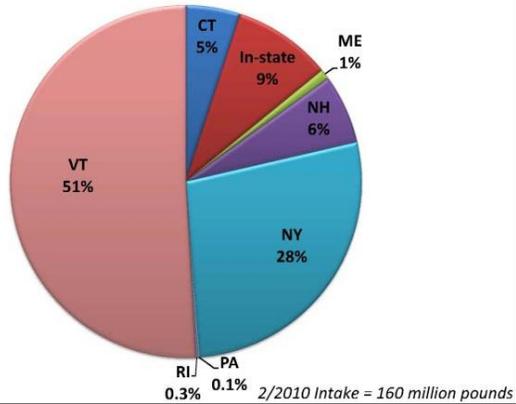
**Destinations for MA Dairy Farms:
Where Milk Goes**



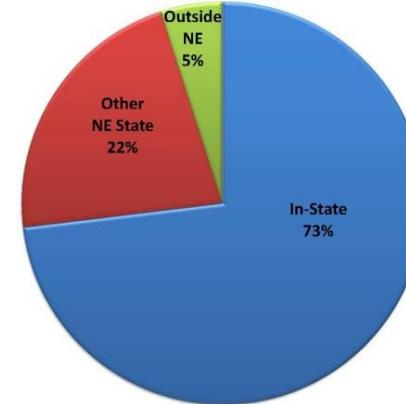
1/2010 Production= 20 million pounds

16

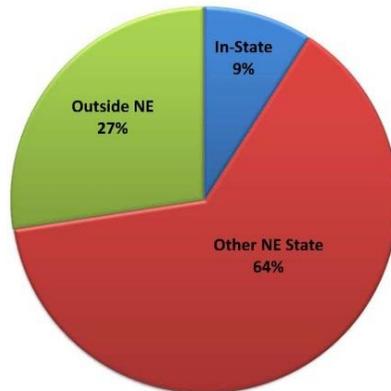
**Suppliers for MA Dairy Plants:
Where Milk Comes From**



Demand for Milk from MA Dairy Farms



Supply for MA Dairy Plants



New Hampshire

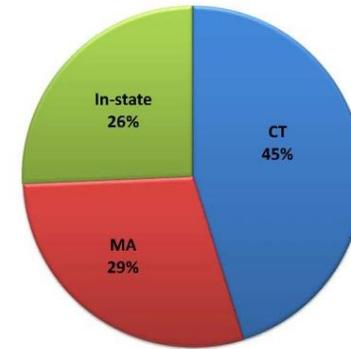


Rhode Island



25

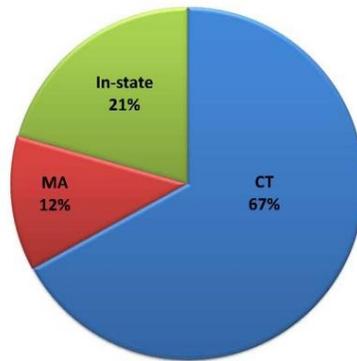
Destinations for RI Dairy Farms: Where Milk Goes



26

1/2010 Production = 1.6 million pounds

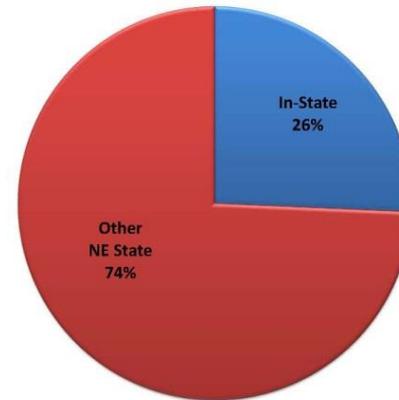
Suppliers for RI Dairy Plants: Where Milk Comes From



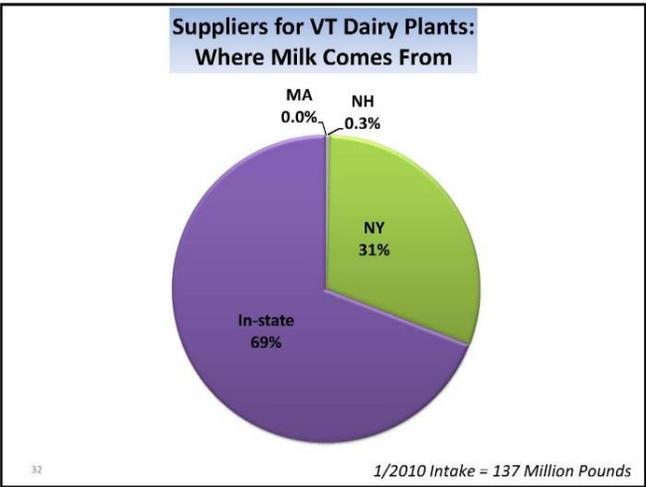
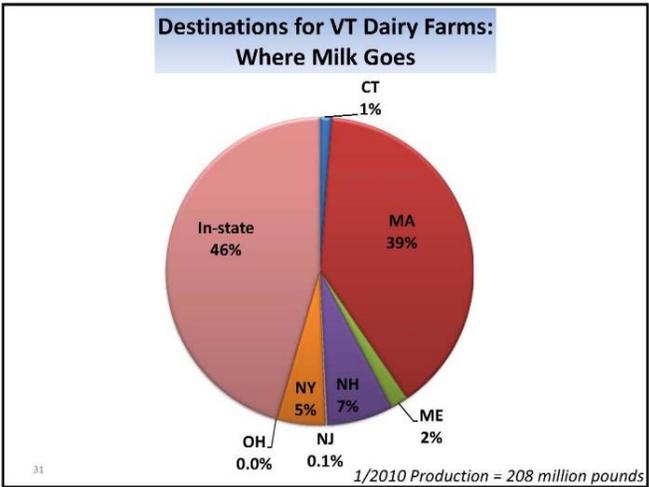
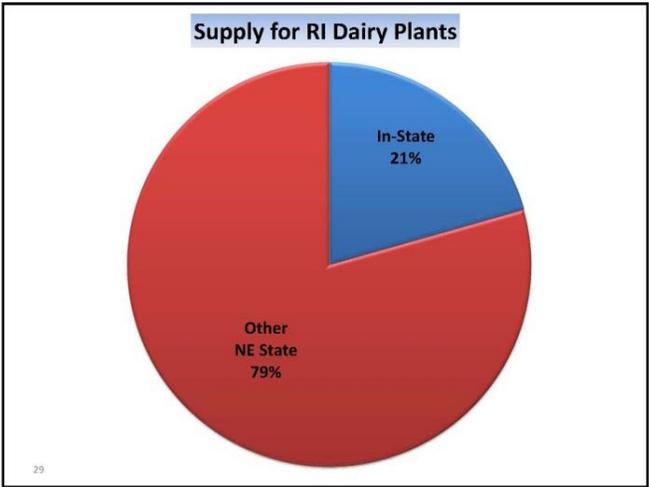
27

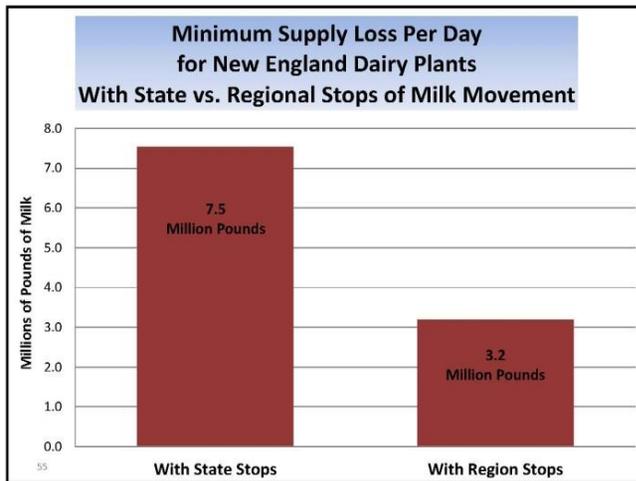
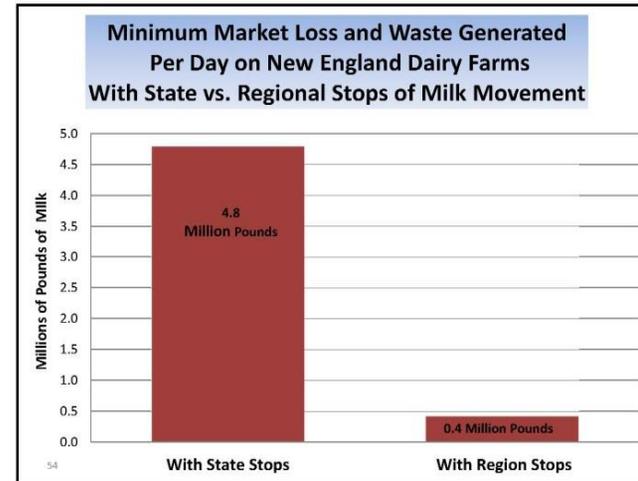
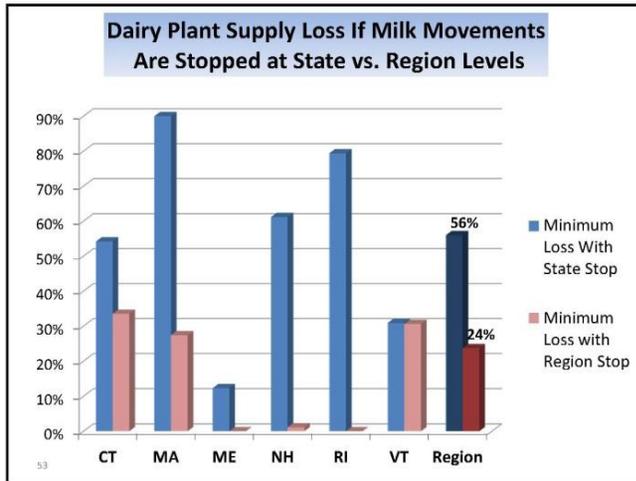
1/2010 Intake = 2 million pounds

Demand for Milk from RI Dairy Farms



28





Lessons of Comparing State and Regional Border Controls in FAD Response

- Effects of restrictions on milk movement, as in an FAD response, would be severe for all stakeholders but also vary greatly among states and sectors of the dairy industry in New England.
- If milk movement were stopped at state borders rather than allowed to move within the region, environmental challenges and market-share losses would be particularly heavy for New England dairy farms.
- Stopping milk movement at the region level would be more immediately challenging for New England dairy processors (especially in CT, VT, and MA) than farmers, but they are interdependent, and **continuity of business for all stakeholders would be much less vulnerable if milk movement restrictions were applied at the border of the region than the border of each state.**

Appendix 3: STATUTES, REGULATIONS, AND GUIDANCE DOCUMENTS FOR FMD RESPONSE IN NEW ENGLAND

Statutes, Regulations, and Guidance Documents for
FMD Response in New England

Contents

Summary	111
International Guidance Documents	112
National Regulations and Guidance Documents	113
Regional Laws and Regulations	117
CONNECTICUT	117
MAINE	130
MASSACHUSETTS	141
NEW HAMPSHIRE	151
RHODE ISLAND	159
VERMONT	169

Summary

With minor variations, in New England each state Department of Agriculture (or its equivalent) has similar regulatory responsibility for dairy farming and milk production. In most cases, its authority extends to milk movement from the cow to the processor, and often beyond the processor to grading, bottling, labeling, storage, and sales. The precise bounds of authority, the name of the department and its chief administrator vary a bit from state to state, but the only significant variation is in the degree and kind of shared authority with the state Department of Public Health (or its equivalent) and with cities or towns. In some states, inspection or licensing responsibilities are normally shared with local officials, and in some states overall milk regulatory authority is shared with or shifts entirely to Public Health after farm pick-up or processing.

In all New England states, however, existing statutes and administrative code are intended to avoid conflict with federal standards (e.g., from USDA, FDA, and DHS through the [Grade "A" Pasteurized Milk Ordinance](#) and the [Emergency Management Assistance Compact](#)) which are, in turn, intended to avoid conflict with international standards (e.g., from OIE and FAO). Ultimate responsibility and authority for both regulation of the movement of unprocessed, liquid milk and for animal care in an emergency (e.g., stamping out, vaccination, culling, indemnification, testing, and quarantine) rests with the Secretary of Agriculture (or his/her equivalent or designee). Moreover, minor policies differences are sure to become mute under unified command in an emergency. In all New England states, the regulatory authority of the Department of Agriculture greatly increases in response to an infectious or contagious disease such as FMD. Powers to respond massively expand if the Governor declares a state emergency. In short, regulatory policies could be more uniform, but as is, they allow multiple jurisdictions – local, state, regional, national – to coordinate their response to FMD.

The following are lists of standards that are intended to define responsibilities, powers, and procedures for responding to Foot-and-Mouth Disease (FMD). The lists are selective, emphasizing public policy for dealing with dairy cattle and milk movement from farm to processor in New England during an FMD outbreak. Insofar as possible, citations are hot linked to full texts on-line. For each New England state, laws and administrative codes (rules, regulations) are named and then relevant passages are excerpted as well as linked to full texts. The entry for each state begins with a general citation and then specific citations for (a) The expansion of authority for responding to an emergency such as an FMD outbreak, and (b) Authority to enter into agreement with federal response partners.

International Guidance Documents

- Food and Agriculture Organization (FAO) of the United Nations, Agriculture and Consumer Protection Department, Animal Production and Health Division, [Guidelines: Progressive Control Pathway \[PCP\] for Foot and Mouth Disease](#) (2010)
- Food and Agriculture Organization of the United Nations (FAO). [Milking, Milk Production Hygiene and Udder Health](#), FAO Animal Production and Health Paper 78 (1989).
- Food and Agriculture Organization of the United Nations (FAO) and European Commission for the Control of Foot-and-Mouth disease (EuFMD), [Training Material](#) (2010) , especially [Foot-and-Mouth \(FMD\) Disease Training Manual](#) (2009) and [Diagnostic and Sampling Procedures for FMD](#) (2010).
- Geering, William A., and Juan Lubroth. [Preparation of Foot-and-Mouth Disease Contingency Plans](#), FAO Health Manual 16 (Rome: Food and Agriculture Organization of the United Nations, 2002).
- Horwitz, William, and George Latimer, Jr., eds. *Official Methods of Analysis of AOAC International*, 18th Edition, Revision 3. Association of Official Analytical Chemists (2010).
- World Health Organization (WHO), Cluster on Health Security and Environment, Department of Food Safety, Zoonoses and Foodborne Diseases. [Terrorist Threats to Food: Guidelines for Establishing and Strengthening Prevention and Response Systems](#), Revised version (May 2008).
- World Organization for Animal Health / Office International des Epizooties (OIE), "[Foot and Mouth Disease](#)," *Manual of Diagnostic Tests and Vaccines For Terrestrial Animals* ("Terrestrial Manual"), Chapter 2.1.5 (2009).
- World Organization for Animal Health / Office International des Epizooties (OIE). "[Foot and Mouth Disease](#)," *Terrestrial Animal Health Code* Chapter 8.5, Article 8.5.46 (2009).

National Regulations and Guidance Documents

American Association of Bovine Practitioners, Animal Welfare Committee. [Practical Euthanasia of Cattle: Considerations for the Producer, Livestock Market Operator, Livestock Transporter, and Veterinarian](#) (2010).

American Veterinary Medical Association (AVMA). [AVMA Guidelines on Euthanasia](#) (June, 2007).

Center for Food Security and Public Health, Iowa State University. [Prevention Practices for Foot-and-Mouth Disease \(FMD\)](#) (2006).

Center for Food Security and Public Health, Iowa State University. [Foot-and-Mouth Disease Response Package](#) (2006).

Dairy Practices Council (DPC). [Guidelines](#) No. 1-106 (1991-2010).

National Emergency Management Association (NEMA). [Emergency Management Assistance Compact](#) (EMAC) (2010).

National Milk Producers Federation. [Animal Care Manual](#) (2009).

National Veterinary Stockpile. [Foot-and-Mouth Disease Countermeasures Working Group Report](#) (November 7, 2007).

U.S. Animal Health Association (USAHA). [Vehicle Restrictions in Foot-and-Mouth Disease Quarantine Regions of High Density Food Animal Populations, Resolution Number 33 and Responses](#) (October, 2007).

[U.S. Code](#) (USC).

Title 7: Agriculture. Chapter 109: Animal Health Protection, Sections 8301-8321, also known as The Animal Health Protection Act (AHPA). [7 USC 8301 et seq.](#)

[U.S. Code of Federal Regulations](#) (CFR).

Title 7: Agriculture, Chapter I: Agricultural Marketing Service, Department of Agriculture, Part 58: Grading and Inspection, General Specifications for Approved Plants and Standards for Grades of Dairy Products. [7 CFR 58](#) (2010).

Title 7: Agriculture, Chapter I: Agricultural Marketing Service, Department of Agriculture, Part 331: Possession, Use, and Transfer of Select Agents and Toxins. [7 CFR Part 331](#) (2010).

**Title 9: Animals and Animal Products, Chapter I: Animal and Plant Health Inspection Service, Department of Agriculture, Part 53: Foot-And-Mouth Disease, Pleuropneumonia, Rinderpest, and Certain Other Communicable Diseases of Livestock or Poultry. [9 CFR 53](#) (2010).

**Title 9: Animals and Animal Products, Chapter 1: Animal and Plant Health Inspection Service, Department of Agriculture, Subchapter C: Interstate Transportation of Animals (Including Poultry) and Animal Products, Part 71: General Provisions. [9 CFR 71](#) (2010)

Title 9: Animals and Animal Products, Chapter I: Animal and Plant Health Inspection Service, Department of Agriculture, Part 121: Possession, Use, and Transfer of Select Agents and Toxins. [9 CFR Part 121](#) (2010).

- Title 21: Food and Drugs, Chapter I: Food and Drug Administration, Department of Health and Human Services, Part 110: Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food. [21 CFR 110](#) (2010).
- Title 21: Food and Drugs, Chapter I: Food and Drug Administration, Department of Health and Human Services, Part 133: Cheeses and Related Cheese Products. [21 CFR 133](#) (2010).
- Title 23: Highways, Part 658: Truck Size and Weight, Route Designations – Length, Width and Weight Limitations. [23 CFR Part 658](#) (2010).
- Title 49: Transportation, Subtitle B: Other Regulations Relating To Transportation, Chapter III: Federal Motor Carrier Safety Administration, Department of Transportation, Subchapter B: Federal Motor Carrier Safety Regulations, Part 395: Hours of Service of Drivers. [49 CFR 395](#) (2010).
- U.S. Department of Agriculture, Agricultural Marketing Service (AMS). [Grading, Certification, and Verification: Dairy Standardization](#) (2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). The Egg Sector Working Group. [Draft SES \[Secure Egg Supply\] Plan](#) (May 24, 2010), with associated documents at [The Secure Egg Supply Webpage](#) (2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). “Disinfectants for Foot-and-Mouth Disease – Field Use” in the Executive Summary, [National Emergency Response to a Highly Contagious Animal Disease](#) (March 30, 2001), Appendix III, p. 14.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Emergency Management Tools](#) (2009).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Emergency Plans and Guides](#) including [APHIS Emergency Response Integration Plan](#), and [APHIS Health and Safety Plan](#) (2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). Foot-and-Mouth Disease Preparedness and Response Plan (FMD–PReP), [Summary Response Plan to the Detection of FMD in the United States](#), and Appendix B: [Federal, State, and Local Actions, Timelines, and Responsibilities for Responding to FMD Outbreaks](#) (Draft – October 2008).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Import and Export: U.S. State and Territory Animal Import Regulations](#) (2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [National Animal Health Emergency Management System](#) (NAHEMS) (2010), including NAHEMS Guidelines: [Biosecurity](#) (March 2, 2010), [Cleaning and Disinfection \(C&D\)](#) (2010), [Health and Safety](#) (March 2, 2010), [Personal Protective Equipment \(PPE\)](#) (March 2, 2010); [APHIS Framework for Foreign Animal Disease Preparedness and Response](#) (Draft July 2010); and [Dairy Industry Manual](#) (Draft July 2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Animal Health Emergency Management System (NAHEMS) FMD Dairy Research Working Group. *Draft Minutes FMD Dairy Research Working Group, June 21-22, 2007, Riverdale, MD* (2007). [Available from Allen Saylor, asaylor@idfa.org]
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Animal Health Emergency Management System (NAHEMS), FMD Dairy

- Research Working Group. *FMD Prototype Filter Field Testing Protocol* (2007). [Available from Allen Saylor, asayler@idfa.org]
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Animal Health Emergency Management System (NAHEMS), FMD Dairy Research Working Group. *Proposed Area Reserved For FMD Filter; Installed On a Lid With Two Connections* (2007). [Available from Allen Saylor, asayler@idfa.org]
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Animal Health Emergency Management System (NAHEMS). [Foot-and-Mouth Disease Response Plan \(The Red Book\)](#), FAD PReP, Foreign Animal Disease Preparedness and Response Plan (November 2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Veterinary Stockpile (NVS). [Checklist for Evaluating Readiness](#), Version 1.0 (April 2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Veterinary Stockpile (NVS). [Planning Guide for Federal, State, and Local Authorities](#), Version 2 (June 2009).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Veterinary Stockpile (NVS). [Template for a State NVS Plan](#), Version 1.2 (October 2009).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [National Emergency Response to a Highly Contagious Animal Disease](#), Executive Summary, "Appendix III – Disinfectants for Foot-and-Mouth Disease – Field Use" (March 30, 2001), p. 14.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Proposed changed in regulation 9 CFR Part 94, \[Docket No. 01-040-1\], RIN 0579-AB38 for "Importation of Milk and Milk Products From Regions Affected With Foot-and-Mouth Disease,"](#) *Federal Register* 68:32 (February 18, 2003), pp 7722-7728.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Surveillance Unit. [Foot-and-Mouth Disease \(FMD\) Case Definition](#) (Draft January 20, 2010) and [Standard Template for Case Definitions](#) (Draft – March 3, 2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA-APHIS-VS). [Procedures for the Investigation of Potential Foreign Animal Disease / Emerging Disease Incidents \(FAD/EDI\)](#), Veterinary Services Memorandum No. 580.4 (October 22, 2008).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Centers for Epidemiology and Animal Health (USDA-APHIS-VS/CEAH). *Risk Assessment of Foot-and-Mouth Disease Virus Spread via Pasteurized Dairy Products from Cattle in the United States after an FMD Incursion* (May 2003). [Source: Aaron Scott, aaron.e.scott@aphis.usda.gov]
- U.S. Department of Health and Human Services (HHS), Public Health Service, U.S. Food and Drug Administration (FDA) and the National Conference on Interstate Milk Shipments (NCIMS). [Procedures Governing the Cooperative State-Public Health Service/Food and Drug Administration Program of the National Conference on Interstate Milk Shipments](#) (2009 Revision).

- U.S. Department of Health and Human Services (HHS), Public Health Service, U.S. Food and Drug Administration (FDA), Center for Food Safety and Applied Nutrition, Food Defense Oversight Team. [Guidance for Industry: Dairy Farms, Bulk Milk Transporters, Bulk Milk Transfer Stations and Fluid Milk Processors: Food Security Preventive Measures Guidance](#) (October 2007).
- U.S. Department of Health and Human Services (HHS), Public Health Service, U.S. Food and Drug Administration (FDA), Milk Safety Branch. [Biosecurity Guidance for the Food and Drug Administration's \(FDA\) Regional Milk Specialists \(RMS's\), Milk Safety Branch \(MSB\) and State Training Team \(STT\) Staff when Visiting Dairy Farms \(M-I-03-2\)](#) (March 19, 2003, updated June 18, 2009).
- U.S. Department of Health and Human Services (HHS), Public Health Service, U.S. Food and Drug Administration (FDA), National Conference on Interstate Milk Shipments (NCMIS). [Model Documents: Procedures Governing the Cooperative State-Public Health Service/Food and Drug Administration Program of the National Conference on Interstate Milk Shipments](#) (2007 Revision). See especially discussion of Certified Sampling Surveillance Officer (SSO).
- U.S. Department of Health and Human Services, Public Health Services, and Food and Drug Administration (USPHS/FDA). [Grade "A" Pasteurized Milk Ordinance \[PMO\]](#) (2009 Revision). Available online with other [National Conference on Interstate Milk Shipments \(NCIMS\) Model Documents](#). See especially: Appendix B. "Milk Sampling, Hauling and Transportation," pp. 129-137.
- U.S. Department of Health and Human Services, Public Health Service, U.S. Food and Drug Administration (FDA). [FDA Food Code](#) (2009).
- U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA). [National Incident Management System](#) (NIMS) (2010).
- U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA). [National Response Framework](#) (NRF) (2010).
- U.S. Department of Transportation, Federal Highway Administration (FHWA). [Federal Size Regulations for Commercial Motor Vehicles](#) (2010). See also [23 CFR Part 658](#).
- U.S. Department of Transportation, Federal Highway Administration (FHWA). "[Truck Size and Weight Limits](#)," Comprehensive Truck Size and Weight Study (2010), Volume 2, Chapter 2. See also Freight Agents Network, [Road Weight and Size limitations: By State](#) (August 29, 2005).
- U.S. Department of Transportation, Federal Motor Carrier Safety Administration (FMCSA). [Hours-of-Service Regulations](#); [Interstate Truck Driver's Guide to Hours of Service](#); and [HOS Frequently Asked Questions](#) (2010). See also: [49 CFR Part 395](#).
- U.S. Environmental Protection Agency (EPA). [EPA-Approved Pesticides for Use against the Causative Agents of Selected Foreign Animal Diseases](#) (October 27, 2008).
- Wehr, H. Michael and Joseph F. Frank, eds. *Standard Methods for the Examination of Dairy Products*, 17th Ed. New York: American Public Health Association, 2004.

State Laws and Regulations

Connecticut

Authority for expanding the role of the Department of Agriculture in regulating farms, livestock and milk production, handling, testing, movement, and processing during FMD response can be found in:

[Conn. Gen. Stat. § 22-278 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-278. Orders and regulations for control of livestock diseases.

For the purposes of this chapter "livestock" is defined as any camelid or hooved animal raised for domestic or commercial use. The Commissioner of Agriculture is authorized, subject to sections 4-168 to 4-174, inclusive, to make orders and regulations concerning the importation, transportation, trailing, riding, driving, exhibiting, examining, testing, identification, quarantining or disposing of livestock to prevent the spread of contagious and infectious diseases among livestock and to protect the public from such diseases as may be transmissible to human beings, either directly or through the products of such animals, and orders and regulations for the conservation of livestock the products from which are used for food or clothing.

[Conn. Gen. Stat. § 22-26f \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 422. Department of Agriculture

Section 22-26f. State Veterinarian. . . .

- (c) The State Veterinarian shall (1) act as the official state epidemiologist for animal and poultry diseases, (2) coordinate state and federal governmental agencies and livestock and poultry producers to control diseases, and (3) administer and guide the development and management of disease control and eradication programs performed by the department. The State Veterinarian shall act as liaison with other units in the department, other state agencies and other officials regarding policies concerning disease control and cruelty to animals and shall supervise the quarantine and disposal of animals and poultry condemned because of disease.
- (d) The State Veterinarian may issue orders to prevent the spread of contagious and infectious diseases among animals and poultry and may protect the public from such diseases as may be transmissible to human beings, either directly or through the products of such animals. . . .

[Conn. Gen. Stat. § 22-286 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-286. Cooperation with United States government.

The Commissioner of Agriculture shall have authority to cooperate with the Animal and Plant Health Inspection Service, Veterinary Services, of the United States Department of Agriculture in any national plan adopted by said department or service for the control and eradication of livestock and avian contagious or infectious diseases. Said commissioner may accept from the United States such assistance, financial or otherwise, for the condemnation of diseased animals, for

remunerating the owners thereof and for carrying out the provisions of this chapter as may be available from time to time. Upon the acceptance of said national plan by the Governor, after consultation with the commissioner, the officials of the Animal and Plant Health Inspection Service, Veterinary Services, of the United States Department of Agriculture, at the request of the commissioner, shall have the right to inspect, quarantine and condemn animals affected with any contagious, infectious or communicable disease or suspected to be affected with, or that have been exposed to, any such disease, and may enter any grounds or premises for these purposes. The commissioner may call upon law enforcement officials including, but not limited to, state police and municipal police officials to assist them in the discharge of their duties in carrying out the provisions of such national plan and of this section, and law enforcement officials shall render such assistance when so called upon.

See also:

[General Statutes of Connecticut](#) (2009), especially:

Volume 8, [Title 22. Agriculture. Domestic Animals.](#)

Volume 9, [Title 28. Civil Preparedness And Emergency Services, Chapter 517. Civil Preparedness. Department of Emergency Management and Homeland Security.](#)

Regulations of Connecticut State Agencies (2010, not yet available on-line but available for purchase from the [Commission on Official Legal Publications](#)), especially:

Title 22. Regulations of the Connecticut Department of Agriculture. [Milk, Production, Processing and Storage of Pasteurized Grade A Milk, Retail Raw Milk, and Cheese](#) (unofficial summary, May 2006. For help on agricultural regulations, call Melanie Attwater-Young at 860-713-2509).

[Conn. Gen. Stat. § 22-6 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 422. Department of Agriculture

Sec. 22-6. Powers and duties of commissioner.

The Commissioner of Agriculture shall be the administrative head of the Department of Agriculture. He shall encourage and promote the development of agriculture within the state and collect and publish information and statistics in regard to the agricultural and animal industries and interests of the state and submit the same to the Governor in his annual report. He shall, annually, visit different sections of the state and investigate the methods and wants of practical husbandry, the adaptation of agricultural products to soil, climate and markets

[Conn. Gen. Stat. § 22-26f \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 422. Department of Agriculture

Section 22-26f. State Veterinarian.

- (a) There shall be a State Veterinarian who shall be an employee of the Department of Agriculture and shall serve as the chief livestock health official for the state.
- (b) The State Veterinarian shall possess and retain during employment a license to practice veterinary medicine in this state. The State Veterinarian shall possess and retain federal

accreditation in this state through the United States Department of Agriculture Animal and Plant Health Inspection Service and shall have not less than three years experience in large animal practice

- (c) The State Veterinarian shall (1) act as the official state epidemiologist for animal and poultry diseases, (2) coordinate state and federal governmental agencies and livestock and poultry producers to control diseases, and (3) administer and guide the development and management of disease control and eradication programs performed by the department. The State Veterinarian shall act as liaison with other units in the department, other state agencies and other officials regarding policies concerning disease control and cruelty to animals and shall supervise the quarantine and disposal of animals and poultry condemned because of disease.
- (d) The State Veterinarian may issue orders to prevent the spread of contagious and infectious diseases among animals and poultry and may protect the public from such diseases as may be transmissible to human beings, either directly or through the products of such animals.
- (e) The State Veterinarian shall annually issue a list of reportable animal and avian diseases and reportable laboratory findings and amend such list as the State Veterinarian deems necessary. The State Veterinarian shall distribute such list as well as any necessary forms and instructions for use in the reporting of such diseases to each veterinarian licensed in this state and to each diagnostic laboratory that conducts tests on animals or birds in this state.

[Conn. Gen. Stat. § 22-127 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430. Milk and Milk Products

Sec. 22-127. Definitions.

The terms defined in this section shall, as used in this chapter, have the meanings set forth in this section unless otherwise clearly indicated in the context.

...

(8) **"Pasteurization"** or **"pasteurized"** has the same meaning, as defined in section 1 of the Pasteurized Milk Ordinance as promulgated by the United States Food and Drug Administration.

[Conn. Gen. Stat. § 22-128 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430. Milk and Milk Products

Sec. 22-128. Powers and duties of commissioner. Access to premises. Removal or abatement of insanitary condition. Civil penalty.

- (a) The commissioner may employ such agents and assistants as are necessary to enforce the provisions of this chapter and the provisions of the regulations of the Milk Regulation Board and the orders of the commissioner as authorized by said board, and he and his deputy or agents and assistants, for the purpose of examining into any suspected violation of the provisions of this chapter, shall have free access, at all reasonable hours, to all places and premises, apartments of private families keeping no boarders excepted, in which he suspects that the laws relating to milk or any other milk product under his jurisdiction are being violated.

[Conn. Gen. Stat. § 22-130 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals
Chapter 430. Milk and Milk Products
Sec. 22-130. Authority of commissioner limited.

The powers and duties of the Commissioner of Agriculture under this chapter shall not be construed to include the inspection of cheese foods and chocolate drinks.

[Conn. Gen. Stat. § 22-166 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430. Milk and Milk Products

Sec. 22-166. Sale of milk from emaciated or diseased animals. Civil penalty.

Any person who sells or exposes for sale milk, or any product of milk, from an animal which has reacted to the tuberculin test or which is emaciated or which shows physical symptoms of disease, which disease may, or may be reasonably suspected to, affect the healthfulness of such milk or any product thereof, after such animal has been adjudged by the commissioner or his deputy or agent to be so emaciated or diseased, shall be assessed a civil penalty in accordance with the provisions of section 22-7.

[Conn. Gen. Stat. § 22-167 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430. Milk and Milk Products

Sec. 22-167. Local regulations for the sale of milk.

No provision of section 22-133 shall affect the authority of any town, city or borough to enact ordinances concerning the sale or distribution, within its limits, of milk which may be detrimental to public health. In any town, city or borough where no local system of milk and cream control is provided for by charter, the local director of health or board of health may present, at a meeting of the electors warned and held for such purpose, proposed rules and regulations concerning the inspection of dairies and the production, care, handling, marketing or sale of milk or cream, the protection of the public from the use of milk or cream which may be detrimental to the public health and the granting of licenses to milk dealers. Upon approval by the town, city or borough, such rules and regulations shall be enforced in the town, city or borough by the director of health. Amendments of such rules and regulations shall be made in accordance with the procedure provided for their adoption. Such local directors of health or boards of health may revoke any license granted in accordance herewith after due notice and hearing for violation of any such rules and regulations. Any person who produces, handles, markets or sells milk or cream within the limits of any town, city or borough in which such rules and regulations are in effect, without a license as hereinbefore provided, shall be fined not more than one hundred dollars or imprisoned not more than thirty days or both. Any person aggrieved by the failure of the local director of health or board of health to grant a license in accordance with the foregoing provisions or by the action of such director of health or board in revoking a license may appeal from the action of such director of health or board to the Milk Regulation Board in accordance with the provisions of sections 22-169 and 22-170. . . .

[Conn. Gen. Stat. § 22-168 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430. Milk and Milk Products

Sec. 22-168. Damages.

Each local official issuing an order prohibiting the sale of milk shall ascertain the average daily quantity of milk produced by the cows or goats of each person affected by such order of prohibition, and the municipality wherein such sale is prohibited shall pay damages for the value of the milk which such person has been unable to sell because of such order, during the period of prohibition, upon proof that, at the time such order was issued, such milk was fit for such consumption and the premises where such milk was produced were free from contagious disease. Any person aggrieved by such order, in the event of failure to agree with the municipality as to the value of the milk produced during such period, may collect the value thereof from such municipality.

[Conn. Gen. Stat. § 22-203f \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430. Milk and Milk Products

Sec. 22-203f. Transportation of milk by bulk milk pickup tanker. Permit.

- (a) No person may engage in the transportation of milk or milk products by bulk milk pickup tanker to or from a farm, milk plant, receiving station or transfer station in this state unless: (1) The owner of the bulk milk pickup tanker has a valid permit for such tanker and a current inspection report; and (2) the permit and inspection report accompany the tanker.
- (b) The Commissioner of Agriculture may stop any bulk milk pickup tanker engaged in the transportation of milk or milk products to or from a farm, milk plant, receiving station or transfer station in this state to: (1) Determine whether a valid permit and inspection report accompany the tanker; or (2) conduct a safety and sanitation inspection. If the commissioner conducts a safety and sanitation inspection pursuant to such a stop, the commissioner may issue a new safety and sanitation inspection report. If an inspection conducted under this section reveals construction or repair defects or the need for significant cleaning, the commissioner may order a tanker removed from service until such deficiencies are corrected. If a tanker inspected under this section has a permit issued by another state, the commissioner may forward the results of the inspection to the issuing state.

[Conn. Gen. Stat. § 22-203aa \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 430a. Northeast Interstate Dairy Compact

Sec. 22-203aa. Compact

[Note: "Congressional authorization for the Northeast Dairy Compact has expired. The Commission is no longer doing business." Congressional authorization ended on September 30, 2001. See <http://www.dairycompact.org/> and [7 U.S. Code. § 7256.](#)]

Article I. Statement of Purpose, Findings and Declaration of Policy

Sec. 1.1. Statement of purpose, findings and declaration of policy.

The purpose of this compact is to recognize by constitutional prerequisite the interstate character of the northeast dairy industry and to form an interstate commission for the northeast region. The mission of the commission is to take such steps as are necessary to assure the continued viability of dairy farming in the northeast and to assure consumers of an adequate, local supply of pure and wholesome milk.

The participating states find and declare that the dairy industry is the paramount agricultural activity of the northeast, and further find that dairy farms and associated suppliers, marketers, processors and retailers are an integral

component of the region's economy and that their ability to provide a stable, local supply of pure, wholesome milk is a matter of great importance to the health and welfare of the region.

The participating states further find that dairy farms are essential to the region's rural communities and character and that such farms preserve open spaces, sculpt the landscape and provide the land base for a diversity of recreational pursuits and also provide a major draw for our tourist industries.

By entering into this compact, the participating states affirm that their ability to regulate the price which northeast dairy farmers receive for their product is essential to the public interest and that assurance of a fair and equitable price for dairy farmers ensures their ability to provide milk to the market and the vitality of the northeast dairy industry, with all the associated benefits.

The participating states find that recent, dramatic price fluctuations, with a pronounced downward trend, threaten the viability and stability of the northeast dairy region and that historically, individual state regulatory action has been an effective emergency remedy available to farmers confronting a distressed market. The participating states further find that the federal order system, implemented by the Agricultural Marketing Agreement Act of 1937, established only minimum prices for dairy products without preempting the power of states to regulate milk prices above minimum levels so established and that based on this authority, each state in the region has individually attempted to implement at least one regulatory program in response to the current dairy industry crisis.

The participating states find that in today's regional dairy marketplace, cooperative, rather than individual state action may address more effectively the market disarray and that under our constitutional system, properly authorized, states acting cooperatively may exercise more power to regulate interstate commerce than they may assert individually without such authority. For this reason, the participating states invoke their authority to act in common agreement, with the consent of Congress, under the compact clause of the Constitution.

In establishing their constitutional regulatory authority over the region's fluid milk market by this compact, the participating states declare that their purpose shall be that this compact neither displace the federal order system nor encourage the merging of federal orders. If the federal order system is discontinued, the interstate commission is authorized to regulate the marketplace in replacement of the order system. This contingent authority does not anticipate such a change, however, and should not be so construed. It is only provided should developments in the market other than establishment of this compact result in discontinuance of the order system.

....
Article IV. Powers of the Commission

Sec. 4.1. Powers to promote regulatory uniformity, simplicity and interstate cooperation. The commission is hereby empowered to:

- (1) Investigate or provide for investigations or research projects designed to review the existing laws and regulations of the participating states, to consider their administration and costs, to measure their impact on the production and marketing of milk and their effects on the shipment of milk and milk products within the region;
- (2) Prepare and transmit to the participating states model dairy laws and regulations dealing with the inspection of farms and plants, sanitary codes, labels for dairy products and their imitations, standards for dairy products, license standards, producer security programs and fair trade laws;

- (3) Study and recommend to the participating states joint or cooperative programs for the administration of the dairy laws and regulations and to prepare estimates of cost savings and benefits of such programs;
- (4) Encourage the harmonious relationships between the various elements, conduct symposiums or conferences designed to improve industry relations or a better understanding of problems;
- (5) Prepare and release periodic reports on activities and results of the commission's efforts to the participating states;
- (6) Review the existing marketing system for milk and milk products and recommend changes in the existing structure for assembly and distribution of milk which may assist, improve or promote more efficient assembly and distribution of milk; . . .

[Conn. Gen. Stat. § 22-204 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 431. Milk Industry

Sec. 22-204. Legislative findings, purpose and policy.

The production, sale and distribution of milk and certain milk products in this state are attended with serious conditions and practices affecting producers, dealers and consumers of milk; and, after due investigation of such conditions and practices, the following legislative findings of fact with respect thereto are hereby made.

- (1) Milk is the most necessary human food, vital for promotion of the public health; the health and growth of children are particularly dependent upon a constant and wholesome supply thereof. Since milk is a most fertile field for the growth of bacteria, its production and distribution have been surrounded by more costly sanitary requirements than those of any other food.
- (2) Milk consumers are not assured of a constant and sufficient supply of pure, wholesome milk when the high cost of maintaining sanitary conditions of production and high standards of purity is not returned to the producers of milk; or when a disparity between prices of milk and milk products and other commodities and services compels large numbers of producers to dispose of their herds or impairs the ability of producers to maintain such conditions and standards. Therefore, public health is menaced when milk dealers do not or cannot pay a price to producers commensurate with the cost of sanitary conditions of production and high standards of purity.
- (3) Milk dealers are required constantly to handle surpluses to meet the emergency requirements of unpredictable variations in fluid consumption and to meet seasonal variations in production, which milk in excess of fluid requirements must find an immediate market and tends to cause unfair, unreasonable and demoralizing trade and price practices, detrimental to the public health and interest. This excess milk is normally diverted into other uses at lower prices. Hence, producers who sell to a particular dealer or on a particular market should receive a proportionate share of the proceeds from the sale of milk in fluid form and in the lower price outlets if stable market conditions and equitable treatment of producers are to be assured.
- (4) Milk producers are required to make delivery of this highly perishable commodity immediately after it is produced and therefore must often accept any market at any price. Because of facts above stated, the value of milk cannot be determined until the dealer has sold such milk in fluid form or has disposed of it in surplus outlets; furthermore, only the dealers have convenient facilities for accurately weighing and

testing milk. Hence, prior and often exclusive knowledge of the value of milk is in the possession of the dealer. The producers' lack of control over their market is aggravated by the trade custom of dealers in paying weeks after delivery, which often keeps producers obligated to continue delivery in order to receive payment for previous sales and permits dealers to operate on the producers' capital without giving security therefor. Hence, milk producers are subject to fraud and imposition, and do not possess the freedom of contract necessary for the procuring of cost of sanitary production. The above and attendant conditions and practices pertain to and exist in a paramount industry upon which the health and welfare of the inhabitants of the state are largely dependent; and the public interest therefore requires efficiency, equitable conditions, and the reduction or prevention of unhealthful, uneconomic, deceptive and destructive trade and price practices with respect thereto among producers, dealers and consumers. In exercise of the state police power to protect and promote the public health and welfare and to prevent fraud and imposition upon producers, such conditions and practices require control and regulation of the production, transportation, manufacture, processing, storage, distribution, sale and handling of milk as a business affecting the public health and interest.

[Conn. Gen. Stat. § 22-206 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 431. Milk Industry

Sec. 22-206. Powers and duties of Commissioner of Agriculture.

The Commissioner of Agriculture shall have the power to investigate and regulate all phases of the milk industry in this state, including the production, handling, transportation, manufacture, storage, distribution, purchase and sale of milk and milk products; provided nothing herein shall affect other statutes pertaining thereto except as herein specified.

[Conn. Gen. Stat. § 22-278 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-278. Orders and regulations for control of livestock diseases.

For the purposes of this chapter "livestock" is defined as any camelid or hooved animal raised for domestic or commercial use. The Commissioner of Agriculture is authorized, subject to sections 4-168 to 4-174, inclusive, to make orders and regulations concerning the importation, transportation, trailing, riding, driving, exhibiting, examining, testing, identification, quarantining or disposing of livestock to prevent the spread of contagious and infectious diseases among livestock and to protect the public from such diseases as may be transmissible to human beings, either directly or through the products of such animals, and orders and regulations for the conservation of livestock the products from which are used for food or clothing. The commissioner shall give notice of any such order to any person named therein by leaving a copy of such order with, or at the last-known place of abode of, such person, if a resident of the state; if not a resident of the state, by leaving a copy with, or at the last-known place of abode of, an agent of such person, or the person having custody of the animals described in such order, if within the state, or by forwarding a copy of such order by registered or certified mail addressed to the last-known address of the person named therein. The commissioner, in case of emergency, may give notice of any regulation limiting or prohibiting the importation, transportation, trailing, riding, driving, exhibiting or disposing of livestock on any highway by publishing a copy of

such regulation in a newspaper published or having a substantial circulation in the town in which the highway affected by such regulation may be located. The commissioner shall give notice of any such order or regulation to any common carrier named therein or affected thereby by leaving a copy of such order or regulation with the president, secretary or treasurer of the company acting as common carrier, or by leaving a copy with any person or firm acting as a common carrier, or at the last-known residence of any such person or a member of such firm in charge of any office of such carrier. The commissioner is authorized to employ assistants needed to enforce any such order or regulation. Any person or any officer or agent of any corporation who violates any provision of any such order or regulation, or who obstructs or attempts to obstruct the commissioner or any assistant engaged in the discharge of any duty hereunder, may be fined not more than one hundred dollars or may be assessed an administrative civil penalty in accordance with section 22-7.

[Conn. Gen. Stat. § 22-279 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-279. Quarantine of animals. Penalties.

- (a) The Commissioner of Agriculture or his deputy or authorized agents may quarantine all animals that they have reasonable grounds to believe (1) are infected with a communicable disease, (2) do not meet import, export or disease testing requirements of the department or (3) are kept under unsanitary conditions which, in the opinion of the commissioner or his deputy or authorized agents, endanger the public health or the health of such animals. The quarantine may (A) prohibit or regulate the sale of such quarantined animals and all the products of such quarantined animals, and (B) require that such animals and the products of such animals be confined in a place designated by the commissioner or his deputy or authorized agents, for such time as the commissioner judges necessary.

[Conn. Gen. Stat. § 22-279a \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-279a. Quarantine of animals being tested for disease or biological or chemical residue.

Any livestock animal or poultry being tested for any disease in accordance with the Uniform Methods and Rules of the United States Department of Agriculture or for any biological or chemical residue shall be quarantined on the premises where the test is made until the test results are available and the test chart is signed by a veterinarian or an employee of the Department of Agriculture administering the test, provided the commissioner may release such livestock animal or poultry from quarantine at any time. Any blood, tissue or milk sample taken from any livestock animal or poultry pursuant to this section shall be submitted for analysis to a laboratory approved by the Commissioner of Agriculture. The laboratory shall report the results of the test to the commissioner who shall notify the person administering the test of such results

[Conn. Gen. Stat. § 22-280 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-280. Control of communicable diseases. Fees.

All veterinary work concerning the control of communicable diseases in, and the examination of, domestic animals, except poultry, which is carried out under state or federal supervision in accordance with the provisions of the general statutes, shall be performed by an approved veterinarian who has been accredited by the Animal Health Division of the United States Department of Agriculture and licensed to practice veterinary medicine in this state and who is included on a list approved for such purpose by the Commissioner of Agriculture, whom the owner of such animals may designate. If such owner fails to express a preference or the work is not done within sixty days, such veterinary work may be performed by a veterinarian designated by the Commissioner of Agriculture, who shall be a licensed accredited veterinarian, a veterinarian employed by the Department of Agriculture or a veterinarian employed by the United States Department of Agriculture. The commissioner shall, by regulations adopted in accordance with the provisions of chapter 54, establish fees for the performance of such veterinary work. Nothing in this section shall be construed as interfering with the supervision and control of such work by the commissioner or with the performance, supervision or control of such work by the Animal Health Division of the United States Department of Agriculture, or with research work conducted by any state or federal agency.

[Conn. Gen. Stat. § 22-285 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-285. Emergency appropriations for suppression of diseases.

The Governor is authorized, in the case of an emergency arising from the prevalence of any contagious disease among domestic animals, to appropriate such sum or sums as may be necessary to defray the state's share of the expense incurred in cooperating with the federal authorities in the suppression and extirpation of any such disease, which cooperation by said federal authorities is authorized under an Act of Congress approved May 29, 1884.

[Conn. Gen. Stat. § 22-286 \(2009\)](#)

General Statutes of Connecticut, Volume 8

Title 22. Agriculture. Domestic Animals

Chapter 433. Diseases of Domestic Animals

Sec. 22-286. Cooperation with United States government.

The Commissioner of Agriculture shall have authority to cooperate with the Animal and Plant Health Inspection Service, Veterinary Services, of the United States Department of Agriculture in any national plan adopted by said department or service for the control and eradication of livestock and avian contagious or infectious diseases. Said commissioner may accept from the United States such assistance, financial or otherwise, for the condemnation of diseased animals, for remunerating the owners thereof and for carrying out the provisions of this chapter as may be available from time to time. Upon the acceptance of said national plan by the Governor, after consultation with the commissioner, the officials of the Animal and Plant Health Inspection Service, Veterinary Services, of the United States Department of Agriculture, at the request of the commissioner, shall have the right to inspect, quarantine and condemn animals affected with any contagious, infectious or communicable disease or suspected to be affected with, or that have been exposed to, any such disease, and may enter any grounds or premises for these purposes. The commissioner may call upon law enforcement officials including, but not limited to, state police and municipal police officials to assist them in the discharge

of their duties in carrying out the provisions of such national plan and of this section, and law enforcement officials shall render such assistance when so called upon.

[Conn. Gen. Stat. § 28-1 \(2009\)](#)

General Statutes of Connecticut, Volume 9

Title 28. Civil Preparedness And Emergency Services, Chapter 517. Civil Preparedness. Department Of Emergency Management And Homeland Security

Sec. 28-1. Definitions. As used in this chapter:

....

(2) “**Major disaster**” means any catastrophe including, but not limited to, any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm or drought, or, regardless of cause, any fire, flood, explosion, or manmade disaster in any part of this state that, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 USC 5121 et seq., as amended from time to time, to supplement the efforts and available resources of this state, local governments thereof, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

(3) “**Emergency**” means any occasion or instance for which, in the determination of the President, federal assistance is needed to supplement state and local efforts and capabilities to save lives and protect property, public health and safety or to avert or lessen the threat of a disaster or catastrophe in any part of this state.

(4) “**Civil preparedness**” means all those activities and measures designed or undertaken (A) to minimize or control the effects upon the civilian population of major disaster, (B) to minimize the effects upon the civilian population caused or which would be caused by an attack upon the United States, (C) to deal with the immediate emergency conditions which would be created by any such attack, major disaster or emergency, and (D) to effectuate emergency repairs to, or the emergency restoration of, vital utilities and facilities destroyed or damaged by any such attack, major disaster or emergency. Such term shall include, but shall not be limited to, (i) measures to be taken in preparation for anticipated attack, major disaster or emergency, including the establishment of appropriate organizations, operational plans and supporting agreements; the recruitment and training of personnel; the conduct of research; the procurement and stockpiling of necessary materials and supplies; the provision of suitable warning systems; the construction and preparation of shelters, shelter areas and control centers; and, when appropriate, the nonmilitary evacuation of the civilian population; (ii) measures to be taken during attack, major disaster or emergency, including the enforcement of passive defense regulations prescribed by duly established military or civil authorities; the evacuation of personnel to shelter areas; the control of traffic and panic; and the control and use of lighting and civil communication; and (iii) measures to be taken following attack, major disaster or emergency, including activities for fire fighting; rescue, emergency medical, health and sanitation services; monitoring for specific hazards of special weapons; unexploded bomb reconnaissance; essential debris clearance; emergency welfare measures; and immediately essential emergency repair or restoration of damaged vital facilities.

[Conn. Gen. Stat. § 28-9 \(2009\)](#)

General Statutes of Connecticut, Volume 9

Title 28. Civil Preparedness and Emergency Services

Chapter 517. Civil Preparedness. Department of Emergency Management and Homeland Security

Sec. 28-9. Civil preparedness emergency; Governor's powers.

In the event of serious disaster, enemy attack, sabotage or other hostile action or in the event of the imminence thereof, the Governor may proclaim that a state of civil preparedness emergency exists, in which event he may personally take direct operational control of any or all parts of the civil preparedness forces and functions in the state. Any such proclamation shall be effective upon filing with the Secretary of the State. Any such proclamation, or order issued pursuant thereto, issued by the Governor because of a disaster resulting from man-made cause may be disapproved by majority vote of a joint legislative committee consisting of the president pro tempore of the Senate, the speaker of the House of Representatives and the majority and minority leaders of both houses of the General Assembly, provided at least one of the minority leaders votes for such disapproval. Such disapproval shall not be effective unless filed with the Secretary of the State within seventy-two hours of the filing of the Governor's proclamation with the Secretary of the State. As soon as possible after such proclamation, if the General Assembly is not then in session, the Governor shall meet with the president pro tempore of the Senate, the speaker of the House of Representatives, and the majority and minority leaders of both houses of the General Assembly and shall confer with them on the advisability of calling a special session of the General Assembly. Upon such proclamation, the following provisions of this section and the provisions of section 28-11 shall immediately become effective and shall continue in effect until the Governor proclaims the end of the civil preparedness emergency:

- (a) The Governor is authorized and empowered to modify or suspend in whole or in part, by order as hereinafter provided, any statute, regulation or requirement or part thereof whenever in his opinion it is in conflict with the efficient and expeditious execution of civil preparedness functions. The Governor shall specify in such order the reason or reasons therefor and any statute, regulation or requirement or part thereof to be modified or suspended and the period, not exceeding six months unless sooner revoked, during which such order, modification or suspension shall be enforced. Any such order shall have the full force and effect of law upon the filing of the full text thereof in the office of the Secretary of the State. The Secretary of the State shall, within four days after receipt of the order, cause such order to be printed and published in full in at least one issue of a newspaper published in each county and having general circulation therein, but failure to publish shall not impair the validity of such order. Any statute, regulation or requirement inconsistent therewith shall be inoperative for the effective period of such order or suspension. Any such order shall be communicated by the Governor at the earliest date to both houses of the General Assembly.
- (b) The Governor may order into action all or any part of the department or local or joint organizations for civil preparedness mobile support units or any other civil preparedness forces.
- (c) The Governor shall order and enforce such blackouts and radio silences as are authorized by the United States Army or its duly designated agency and may take any other precautionary measures reasonably necessary in the light of the emergency.
- (d) The Governor may designate such vehicles and persons as shall be permitted to move and the routes which they shall follow.
- (e) The Governor shall take appropriate measures for protecting the health and safety of inmates of state institutions and children in schools.
- (f) The Governor may order the evacuation of all or part of the population of stricken or threatened areas and may take such steps as are necessary for the receipt and care of such evacuees.

- (g) The Governor may take such other steps as are reasonably necessary in the light of the emergency to protect the health, safety and welfare of the people of the state, to prevent or minimize loss or destruction of property and to minimize the effects of hostile action.
- (h) In order to insure the automatic and effective operation of civil preparedness in the event of enemy attack, sabotage or other hostile action, or in the event of the imminence thereof, the Governor may, at his discretion, at any time prior to actual development of such conditions, issue such proclamations and executive orders as he deems necessary, such proclamations and orders to become effective only under such conditions.

[Conn. Gen. Stat. § 28-11 \(2009\)](#)

General Statutes of Connecticut, Volume 9

Title 28. Civil Preparedness And Emergency Services

Chapter 517. Civil Preparedness. Department of Emergency Management and Homeland Security

Sec. 28-11. Taking of property during emergency.

- (a) During the existence of a civil preparedness or public health emergency, as defined in section 19a-131, the Governor may, in the event of shortage or disaster making such action necessary for the protection of the public, take possession (1) of any land or buildings, machinery or equipment; (2) of any horses, vehicles, motor vehicles, aircraft, ships, boats, rolling stock of steam, diesel or electric railroads or any other means of conveyance whatsoever; (3) of any antitoxins, pharmaceutical products, vaccines or other biological products; and (4) of any cattle, poultry or any provisions for persons or beast, and any fuel, gasoline or other means of propulsion necessary or convenient for the use of the military or naval forces of the state or of the United States, or for the better protection of the welfare of the state or its inhabitants according to the purposes of this chapter.
- (b) He may use and employ all property of which possession is taken, for such times and in such manner as he deems for the best interests of the state or its inhabitants, and may, in particular, when in his opinion the public exigency so requires, lease, sell or, when conditions warrant, distribute gratuitously to or among any or all of the persons within the state anything taken under this section. . . .

Regional Laws and Regulations

Maine

Authority for expanding the role of the Department of Agriculture, Food and Rural Resources in regulating farms, livestock and milk production, handling, testing, movement, and processing during FMD response can be found in:

[Me. Rev. Stat. Ann. tit. 7, § 1753 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 303: Control of Diseases

Section 1753. Duties of commissioner

The commissioner shall, so far as possible, prevent the introduction and spread of contagious, infectious and parasitic diseases, and exposure thereto, among domestic animals in the State, especially those diseases transmitted to man, either directly or indirectly, and those of greatest economic importance.

The commissioner shall cause investigation and diagnosis to be made by approved methods as to the existence of contagious, infectious and parasitic diseases among domestic animals in the State, and the commissioner may enter any premises, buildings or places, including stockyards, cars, trucks, planes and vessels within any county or part of the State in or at which the commissioner has reason to believe there exists any such disease, and make such investigation, diagnosis or diagnostic tests as to the existence of disease that the commissioner may consider necessary.

The commissioner shall formulate and apply programs for the control or eradication of any diseases or pathogens as required by the United States Department of Agriculture and any other diseases or pathogens the commissioner considers necessary or practicable to control or eradicate so far as funds are available.

[Me. Rev. Stat. Ann. tit. 7, § 1810 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1810. Agreements

The commissioner is authorized to enter into agreements of cooperation in the name of the State with the United States Department of Agriculture, other states, the Canadian Food Inspection Agency and Canadian provinces for the prevention, control and eradication of diseases among domestic animals

See also:

[Maine Revised Statutes \(MRSA\)](#) , especially:

[Title 7: Agriculture and Animals](#) and [Rule Governing Maine Milk and Milk Processing](#)

[Title 37-B: Defense, Veterans and Emergency Management, Chapter 13: Maine Emergency Management Agency](#)

Code of Maine Rules (CMR), [Rule Chapters for the Department of Agriculture, Food and Rural Resources](#) (unofficial version, 2009. The official Code of Maine Rules is not

yet available on-line but is available for purchase from Weil Publishing through the [APA Office](#) of the Secretary of State), especially:

[Chapter 136: Official State of Maine Grades and Standards for Milk and Milk Products for Use with the State of Maine Quality Trademark.](#)

[Chapter 206: Prevention and Control of Certain Diseases of Domestic Animals and Poultry.](#)

[Chapter 208: Handling of Domestic Animal and Poultry Vaccines.](#)

[Chapter 211: Rules and Regulations Relating to Disease Control of Domestic Animals and Poultry: Rules for the Disposal of Animal Carcasses.](#)

[Chapter 329: Rule Governing Maine Milk and Milk Products.](#)

[Me. Rev. Stat. Ann. tit. 7, § 19-1A \(2009\)](#)

Maine Revised Statutes (M RSA)

Title 7: Agriculture and Animals

Part 1: Administration

Chapter 1: Department of Agriculture, Food and Rural Resources Heading: PL 1979, C. 751, Section 19 (AMD)

Section 1-A. Legislative intent

The Legislature finds agriculture to be a major industry in the State, contributing substantially to the state's overall economy, essential to the maintenance and strengthening of rural life and values and necessary to the preservation of the health, safety and welfare of all of the people of this State.

The survival of the family farm is of special concern to the people of the State, and the ability of the family farm to prosper, while producing an abundance of high quality food and fiber, deserves a place of high priority in the determination of public policy. For this purpose there is established the Department of Agriculture, Food and Rural Resources

[Me. Rev. Stat. Ann. tit. 7, § 1707 \(2009\)](#)

Maine Revised Statutes (M RSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 301: General Provisions

Section 1707. Intentional, knowing or reckless introduction of a disease or pathogen

A person who intentionally, knowingly or recklessly introduces or takes a substantial step or action that could introduce a disease or pathogen to livestock or poultry commits a Class D crime.

[Me. Rev. Stat. Ann. tit. 7, § 1753 \(2009\)](#)

Maine Revised Statutes (M RSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 303: Control of Diseases

Section 1753. Duties of commissioner

The commissioner shall, so far as possible, prevent the introduction and spread of contagious, infectious and parasitic diseases, and exposure thereto, among domestic animals in the State, especially those diseases transmitted to man, either directly or indirectly, and those of greatest economic importance.

The commissioner shall cause investigation and diagnosis to be made by approved methods as to the existence of contagious, infectious and parasitic diseases among

domestic animals in the State, and the commissioner may enter any premises, buildings or places, including stockyards, cars, trucks, planes and vessels within any county or part of the State in or at which the commissioner has reason to believe there exists any such disease, and make such investigation, diagnosis or diagnostic tests as to the existence of disease that the commissioner may consider necessary.

The commissioner shall formulate and apply programs for the control or eradication of any diseases or pathogens as required by the United States Department of Agriculture and any other diseases or pathogens the commissioner considers necessary or practicable to control or eradicate so far as funds are available.

[Me. Rev. Stat. Ann. tit. 7, § 1755 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 303: Control of Diseases

Section 1755. Quarantine

The commissioner may, upon discovery or upon suspicion of the existence of any disease or pathogen among domestic animals or poultry in the State, take whatever action the commissioner considers necessary to prevent possible spread and to control or eradicate the disease or pathogen. Such action may include quarantine of domestic animals, birds, wild animals in captivity and products derived from them, including the quarantine of articles, materials and premises, equipment or areas, for a time and under conditions as the commissioner considers necessary to eradicate or control the disease or pathogen. This quarantine may not be considered licensing or an adjudicatory proceeding, as defined by the Maine Administrative Procedure Act.

Any positive diagnosis of a disease made by recognized procedures by recognized diagnostic laboratories, or by recognized qualified persons, must be considered as official diagnosis until proved otherwise.

Quarantine may be made by registered mail or in person by an authorized agent of the commissioner, or by any other person authorized to do so.

The commissioner may use placards or any other methods considered necessary to give notice or warning of the quarantine.

It is illegal to violate any quarantine by any person, and such violation is punishable by penalties as outlined in section 1706.

[Me. Rev. Stat. Ann. tit. 7, § 1756 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 303: Control of Diseases

Section 1756. Appraisal, destruction and indemnity

Upon discovery of any contagious or infectious disease or pathogen among domestic animals, the commissioner may cause the affected or exposed animals to be appraised and destroyed, and a proper disposition of the carcasses made in accordance with rules and adopted by the commissioner in a manner consistent with the Maine Administrative Procedure Act, Title 5, chapter 375. The commissioner shall appraise each domestic animal at its true market value at the time it is condemned, provided that no indemnity may be paid except as established in section 1757 or in state-federal cooperative eradication programs for domestic animals and in those amounts as set by those agreements. In no case may the combined amount received from salvage and state and federal indemnity exceed the amount of appraisal.

Indemnity may not be paid on any domestic animals imported into the State if the importation was in violation of the laws of the State or rules in effect at the time of importation

[Me. Rev. Stat. Ann. tit. 7, § 1801 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1801. Reportable diseases

The commissioner shall, by rule adopted in a manner consistent with the Maine Administrative Procedure Act, determine which diseases or pathogens must be classified as "reportable." . . . It is a violation of this chapter for any owner, agent of any owner, veterinarian or other person having knowledge of the existence of such disease or pathogen or the exposure of domestic animals to such disease or pathogen not to properly report the existence of such disease or pathogen or exposure of domestic animals to the department immediately after knowledge of such disease or pathogen or exposure of domestic animals to such disease or pathogen.

It is a violation of this chapter for any person to cause a domestic animal to be driven, trucked or otherwise moved intrastate or interstate when that person has knowledge that the animal is infected with or has been exposed to a reportable disease or pathogen. It is a violation of this chapter for any person to cause a domestic animal to be driven, trucked or otherwise moved intrastate or interstate when that person has knowledge that the animal has been treated with a vaccine or other substance that might make that animal capable of spreading a reportable disease or pathogen among susceptible domestic animals. A domestic animal infected with or exposed to a reportable disease or pathogen may be moved only under the direction of the commissioner.

[Me. Rev. Stat. Ann. tit. 7, § 1802 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1802. Condemnation of diseased animals

The commissioner may, when he deems it necessary, condemn and take possession of diseased or exposed domestic animals, or domestic animals suspected of being diseased or exposed, for diagnostic purposes, and may pay the owner for the same, health, condition and market value being considered. This condemnation shall not be considered licensing or an adjudicatory proceeding, as defined by the Maine Administrative Procedure Act.

[Me. Rev. Stat. Ann. tit. 7, § 1803 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1803. Transportation of diseased animals

It is a violation of this chapter for a person to cause a domestic animal to be driven, trucked or otherwise moved into the State when that person has knowledge that the animal is infected with or has been exposed to any contagious disease or to a pathogen that is classified as a reportable pathogen under section 1801.

[Me. Rev. Stat. Ann. tit. 7, § 1805 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1805. Securing animals for treatment

It is a violation of this chapter for an owner of domestic animals or that owner's agent to refuse or neglect to secure and restrain domestic animals to be tested, vaccinated, branded or tattooed to indicate vaccination or infection status, or otherwise treated as the commissioner may direct.

The commissioner may require proper disinfecting by the owner of stables and premises where condemned diseased domestic animals are found and may withhold indemnity until satisfied that proper cleaning and disinfecting of premises have been completed.

[Me. Rev. Stat. Ann. tit. 7, § 1806 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1806. Disease control notifications

It is a violation of this chapter to tamper with, remove or alter eartags, labels, placards or notices affixed or posted by the commissioner to notify of and assist in the control of disease.

[Me. Rev. Stat. Ann. tit. 7, § 1806-A \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1806-A. Restrictions of sales

The commissioner may restrict the sale of milk or milk products in the State from any herd of any species having any reportable disease or exposed to a reportable pathogen that may be transmitted in milk or milk products. A livestock product or byproduct may not be sold or offered for sale from any herd having a reportable disease or exposed to a reportable pathogen that may be transmitted in those products.

[Me. Rev. Stat. Ann. tit. 7, § 1807 \(2009\)](#)

Maine Revised Statutes (MRS)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1807. Illegal vaccinations

.....

2. Prohibition on certain vaccines.

The commissioner may prohibit a vaccination because the use of the vaccine being administered might cause the presumption that an actual disease or pathogen is present in the State.

3. Commissioner's discretion to vaccinate.

Notwithstanding subsection 2, the commissioner may authorize any vaccination necessary to control an outbreak of a disease or to diminish the threat of an outbreak of a disease.

[Me. Rev. Stat. Ann. tit. 7, § 1810 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1810. Agreements

The commissioner is authorized to enter into agreements of cooperation in the name of the State with the United States Department of Agriculture, other states, the Canadian Food Inspection Agency and Canadian provinces for the prevention, control and eradication of diseases among domestic animals

[Me. Rev. Stat. Ann. tit. 7, § 1815 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1815. Disposal of infected animals

Any animal infected with or exposed to foot and mouth disease shall be killed, buried, destroyed, rendered, processed or otherwise disposed of under the direct supervision of the commissioner or his duly authorized agent.

[Me. Rev. Stat. Ann. tit. 7, § 1816 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 7: Agriculture and Animals

Part 4: Livestock Disease Control

Chapter 305: Eradication of Diseases

Section 1816. Tests and equipment

The commissioner or his agent is authorized to conduct approved diagnostic tests, procure necessary animals, personnel, equipment and facilities and take other necessary precautions for the suppression and eradication of any disease among domestic animals.

[Me. Rev. Stat. Ann. tit. 7, § 2910 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 7: Agriculture and Animals

Part 7: Milk and Milk Products

Chapter 601: Milk and Milk Products Heading: PL 1999, C. 362, Section1 (RPR)

Section 2910. Standards for milk and milk products

[Requires “standards by rule for the inspection and examination, licensing, permitting, testing, labeling and sanitation of milk and milk product production and distribution. The standards must be consistent with the requirements of the official standards, known as the Pasteurized Milk Ordinance, as issued by the Secretary of the United States Department of Health and Human Services, Food and Drug Administration, except that the standards may not prohibit the sale of unpasteurized milk and milk products in the State.”]

[Me. Rev. Stat. Ann. tit. 37B, § 742 \(2009\)](#)

Maine Revised Statutes (MRSA)

Title 37-B: Defense, Veterans and Emergency Management Heading: PL 1997, C. 455, Section9 (RPR)

Chapter 13: Maine Emergency Management Agency Heading: PL 1987, C. 370, Section13 (RPR)

Subchapter 2: State Emergency Management Provisions Heading: PL 2001, C. 614, Section10 (RPR); C. 662, Section77 (RPR)

Section 742. Emergency proclamation

1. Emergency proclamation. Emergency proclamations must be issued as follows.

A. Whenever a disaster or civil emergency exists or appears imminent, the Governor shall, by oral proclamation, declare a state of emergency in the State or any section of the State. If the Governor is temporarily absent from the State or is otherwise unavailable, the next person in the State who would act as Governor if the office of the Governor were vacant may, by oral proclamation, declare the fact that a civil emergency exists or appears sufficiently imminent to activate emergency plans in any or all areas of the State. A written copy of the proclamation must be filed with the Secretary of State within 24 hours of the oral proclamation.

B. Subject at all times to the further direction and order of the Governor, an executive proclamation of emergency activates the emergency plans applicable to the affected areas and is the authority for the deployment and use of any forces or resources to which the plan or plans apply.

C. After the filing of the emergency proclamation and in addition to any other powers conferred by law, the Governor may:

(1) Suspend the enforcement of any statute prescribing the procedures for conduct of state business, or the orders or rules of any state agency, if strict compliance with the provisions of the statute, order or rule would in any way prevent, hinder or delay necessary action in coping with the emergency;

(2) Utilize all available resources of the State Government and of each political subdivision of the State as reasonably necessary to cope with the disaster emergency;

(3) Transfer the direction, personnel or functions of state departments and agencies, or units thereof, for the purposes of performing or facilitating emergency services;

(4) Authorize the obtaining and acquisition of property, supplies and materials pursuant to section 821;

(5) Enlist the aid of any person to assist in the effort to control, put out or end the emergency or aid in the caring for the safety of persons;

(6) Direct and compel the evacuation of all or part of the population from any stricken or threatened area within the State, if the Governor determines this action necessary for the preservation of life or other disaster mitigation, response or recovery;

(7) Prescribe routes, modes of transportation and destinations in connection with evacuations;

(8) Control ingress and egress to and from a disaster area, the movement of persons within the area and the occupancy of premises therein;

(9) Suspend or limit the sale, dispensing or transportation of alcoholic beverages, firearms, explosives and combustibles;

(10) Make provision for the availability and use of temporary emergency housing;

(11) Order the termination, temporary or permanent, of any process, operation, machine or device which may be causing or is understood to be the cause of the state of emergency for which this proclamation was made; and

(12) Take whatever action is necessary to abate, clean up or mitigate whatever danger may exist within the affected area.

[01-001 CMR \(2009\)](#)

Code of Maine Rules

01: Department of Agriculture, Food & Rural Resources

001: Division of Quality Assurance and Regulations

Chapter 136: Official State of Maine Grades and Standards for Milk and Milk Products for Use with the State of Maine Quality Trademark. [01-001 CMR Ch. 136](#)

[01-001 CMR Ch. 206 \(2009\)](#)

Code of Maine Rules

01: Department of Agriculture, Food & Rural Resources

001: Division of Quality Assurance and Regulations

Chapter 206: Prevention and Control of Certain Diseases of Domestic Animals and Poultry: . . .

Section 3: General Requirements for Domestic Animals and Poultry

- A. Domestic animals or poultry infected with or exposed to any contagious or infectious disease, or any domestic animals or birds from any sick herd, flock or area under quarantine in any state or country shall not be imported into the state of Maine.
- B. Domestic animals or poultry that have been given a biological product capable of spreading disease and capable of causing an antibody titer for reportable diseases among susceptible animals or poultry shall not be imported without first obtaining written permission from the commissioner.
- C. All conveyances and equipment used for the transportation of livestock and poultry shall be maintained in a sanitary condition as determined by the commissioner.
- D. The owners and operators of all conveyances and equipment used for movement of any livestock or poultry infected with or exposed to any reportable diseases shall have the conveyances and equipment cleaned and disinfected as the commissioner may direct.
- E. Imported domestic animals or poultry not in compliance with these rules may, at the discretion of the commissioner, located in 7 M.R.S.A. §1753;
 - 1. be returned to the state or country of origin; or
 - 2. be placed under quarantine or;
 - 3. be slaughtered or condemned.
- F. States having a written agreement with the state of Maine may be exempt from testing requirements as the commissioner may direct.
- G. All qualifying tests for importation of domestic animals and poultry shall be conducted at USDA approved laboratories, or as approved by the commissioner.

[01-001 CMR Ch. 208 \(2009\)](#)

Code of Maine Rules

01: Department of Agriculture, Food & Rural Resources

001: Division of Quality Assurance and Regulations

Chapter 208: Handling of Domestic Animal and Poultry Vaccines

[01-001 CMR Ch. 211 \(2009\)](#)

Code of Maine Rules

01: Department of Agriculture, Food & Rural Resources

001: Division of Quality Assurance and Regulations

Chapter 211: Rules and Regulations Relating to Disease Control of Domestic Animals and Poultry: Rules for the Disposal of Animal Carcasses

[01-001 CMR Ch. 329 \(2009\)](#)

Code of Maine Rules

01: Department of Agriculture, Food & Rural Resources

001: Division of Quality Assurance and Regulations

Chapter 329: Rule Governing Maine Milk and Milk Products

Section I. General

A. Definitions

65. Officially Designated Laboratory

An “officially designated laboratory” is a commercial laboratory authorized to do official work by the Department, or a milk industry laboratory officially designated by the Department for the examination of producer samples of Grade A raw milk for pasteurization and commingled milk tank truck samples of raw milk for drug residues and bacterial limits.

66. Official Laboratory

An “official laboratory” is a biological, chemical or physical laboratory which is under the direct supervision of the Department.

67. Pasteurization

The terms “pasteurization”, “pasteurized” and similar terms shall mean the process of heating every particle of milk or milk product in properly designed and operated equipment, to one of the temperatures given in the following chart and held continuously at or above that temperature for at least the corresponding specified time:

Temperature	Time
*63°C (145°F)	30 minutes
*72°C (161°F)	15 seconds
*89°C (191°F)	1.0 second
*90°C (194°F)	0.5 second
*94°C (201°F)	0.1 second
*96°C (204°F)	0.05 second
*100°C (212°F)	0.01 second

*If the fat content of the milk product is 10 percent or more, or if it contains added sweeteners, the specified temperature shall be increased by 3°C (5°F):

Provided, that eggnog shall be heated to at least the following temperature and time specifications:

Temperature	Time
69°C (155°F)	30 minutes
80°C (175°F)	25 seconds
83°C (180°F)	15 seconds

Provided further, that nothing in this definition shall be construed as barring any other pasteurization process which has been recognized by the U.S. Food and Drug Administration to be equally effective and which is approved by the Commissioner. Guidelines for properly designed and operated equipment may be found in the Grade A Pasteurized Milk Ordinance.

Section III. Licensing and Permits

. . .

C. Permits

Every milk producer, bulk milk hauler and sampler, milk transportation company, receiving station, transfer station and portable/temporary milking parlor shall hold a valid permit in accordance with the requirements of this rule and state law. A permit may be suspended for any failure to comply with these requirements. Permits are issued at no cost and are not transferable between person, businesses or farms.

Permits are issued to:

1. Milk Producer: A permit authorizes the milk producer to ship, sell and/or receive milk
2. Bulk Milk Hauler/Sampler: A permit authorizes the bulk milk hauler/sampler to collect official samples and/or transport raw milk from a farm and/or raw milk products to or from a farm, milk plant, receiving station or transfer station.
3. Receiving stations: A permit authorizes the receiving station to receive, collect, handle, store or cool and prepare raw milk for further transporting.
4. Milk Tank Truck Cleaning Facilities: A permit authorizes the milk tank truck cleaning facility to clean and sanitize a milk tank truck.
5. Transfer Stations: A permit authorizes a transfer station to transfer milk or milk products directly from one milk tank truck to another.
6. Milk Transportation Company: A permit authorizes the milk transportation company to transport raw milk in a milk transport tank driven by a milk tank truck driver. Milk tank truck drivers are not required to obtain individual permits.
7. Portable/temporary milking parlor: A permit authorizes the operator of a portable/temporary milking parlor to ship, sell or receive milk.

.....

Section V. Standards for Milk and Milk Products.

All Grade A raw milk for pasteurization, ultra-pasteurization or aseptic processing and all Grade A pasteurized, ultra-pasteurized or aseptically processed milk and milk products shall be produced, processed, and pasteurized, ultra-pasteurized or aseptically processed to conform with the following chemical, bacteriological and temperature standards, and the sanitation requirements of Section VI. Milk and milk products not pasteurized, shall be produced and processed to conform with the following chemical, bacteriological and temperature standards, and the sanitation requirements of Section VI.

No process or manipulation other than pasteurization, ultra-pasteurization or aseptic processing and appropriate refrigeration shall be applied to milk and milk products for the purpose of removing or deactivating microorganisms. Milk for aged cheese is exempt from this requirement. All cheese products, except for aged cheese, shall be made from milk that has been heat-treated. Heat-treated means processed by heating every particle of milk to a temperature of 145 degrees Fahrenheit for at least 30 minutes. All cheese products may list heat-treated milk as an ingredient on the label. All cheese products that are not pasteurized must be labeled as "not pasteurized" in accordance with Section XIV. Provided, that in the bulk shipment of cream, skim milk or low-fat milk, the heating of the raw milk, one time, to temperatures greater than 52°C (125°F), but less than 72°C (161°F), for separation purposes is permitted when the resulting bulk shipments of cream, skim milk or low-fat milk are labeled heat-treated. In the case of heat-treated cream, the cream may be further heated to less than 75°C (166°F) in a continuing heating process and immediately cooled to 7°C (45°F) or less when necessary for enzyme deactivation (such as lipase reduction) for a functional reason.

Section VII. Animal Health.

.....

C. Other Testing Requirements.

For diseases other than brucellosis and tuberculosis, the Department shall require such physical, chemical or bacteriological tests as it deems necessary. The diagnosis of other diseases in dairy cattle shall be based upon the findings of a licensed veterinarian or a veterinarian in the employ of an official agency. Any diseased animal disclosed by such test(s) shall be disposed of as the Department directs.

Section IX: Milk and Milk Products from Points beyond the Limits of Routine Inspection

Milk and milk products from points beyond the limits of routine inspection of the State of Maine, may be sold in Maine, provided they are produced and pasteurized, ultra-pasteurized or aseptically processed under regulations which are substantially equivalent to this rule and have been awarded an acceptable milk sanitation compliance and enforcement rating, made by a State Milk Sanitation Rating Officer certified by the Food and Drug Administration.

Regional Laws and Regulations

Massachusetts

Authority for expanding the role of the Department of Food and Agriculture in regulating farms, livestock and milk production, handling, testing, movement, and processing during FMD response can be found in:

[330 Code Mass. Rules § 27.10\(B\)3 \(2009\)](#)

Code of Massachusetts Regulations (CMR)

330 CMR. Department of Food and Agriculture.

Section 27. Standards and Sanitation Requirements for Grade A Raw Milk

Subsection 10. Administration and Enforcement

Part B. State Enforcement

.

(3) Notwithstanding any other provision of 330 CMR 27.00, if the Commissioner [of the Department of Food and Agriculture] or her/his agent determines that an imminent health hazard exists, resulting from the operation of a dairy farm, she/he may without prior notice to the board of health take whatever action is necessary to effect compliance with 330 CMR 27.00.

[Mass. Gen. Laws ch. 129, § 2 \(2009\)](#)

General Laws of Massachusetts (MGL).

Part I. Administration of the Government.

Title XIX. Agriculture and Conservation.

Chapter 129. Livestock Disease Control

Section 2.

The director may make and enforce reasonable orders, rules and regulations relative to the following: the sanitary condition of neat cattle, other ruminants and swine and of places where such animals are kept; the prevention, suppression and extirpation of contagious diseases of domestic animals; the establishing of disease-free herds of cattle and the issuing of certificates in connection therewith; the inspection, examination, quarantine, care and treatment or destruction of domestic animals affected with or which have been exposed to contagious disease, the burial or other disposal of their carcasses, and the cleansing and disinfection of places where contagion exists or has existed. No rules or regulations shall take effect until approved by the governor and council.

See also:

[General Laws of Massachusetts \(MGL\), Part I. Administration of the Government](#), especially:

Title II. Executive and Administrative Officers of the Commonwealth.

[Chapter 17. Department of Public Health.](#)

Title XV. Regulation Of Trade. [Chapter 94. Inspection and Sale Of Food, Drugs And Various Articles.](#)

Title XVI. Public Health. [Chapter 17. Department of Public Health.](#)

Title XIX. Agriculture and Conservation. [Chapter 128. Agriculture.](#)

Title XIX. Agriculture and Conservation. [Chapter 129. Livestock Disease Control.](#)

[Code of Massachusetts Regulations](#) (Code Mass. Rules), especially:

[330 CMR. Department of Food and Agriculture.](#)

[Mass. Gen. Laws ch. 17, § 2A \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government

Title II. Executive and Administrative Officers of the Commonwealth

Chapter 17. Department of Public Health

Section 2A. Powers of commissioner upon declaration of emergency.

Upon declaration by the governor that an emergency exists which is detrimental to the public health, the commissioner may, with the approval of the governor and the public health council, during such period of emergency, take such action and incur such liabilities as he may deem necessary to assure the maintenance of public health and the prevention of disease.

The commissioner, with the approval of the public health council, may establish procedures to be followed during such emergency to insure the continuation of essential public health services and the enforcement of the same.

Upon declaration by the governor that such emergency has terminated, all powers granted to and exercised by the commissioner under this section shall terminate.

[Mass. Gen. Laws ch. 94, § 12 \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XV. Regulation of Trade

Chapter 94. Inspection and Sale of Food, Drugs and Various Articles.

Section 12. Milk and cream, definitions, standards; rules

The commissioner of public health shall, subject to the provisions of chapter thirty A, adopt and promulgate rules and regulations establishing other legal standards as well as labeling requirements and sanitary standards for milk, cream and products thereof, including foods containing such ingredients, as sold or offered for sale in final package form, and may, in like manner and from time to time, amend, modify or repeal the same. Such rules and regulations shall be consistent with all applicable regulations effective from time to time pursuant to issuance by the Food and Drug Administration, Public Health Service, United States Department of Health, Education and Welfare, or any successor agency with like regulatory powers; provided, that requirement by said commissioner of more stringent bacterial and temperature standards shall not be precluded; and provided, further, that said commissioner may modify the application of said federal regulations to such degree as he may determine to be appropriate where only intrastate commerce in such products is involved.

[Mass. Gen. Laws ch. 94, § 13 \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XV. Regulation of Trade

Chapter 94. Inspection and Sale of Food, Drugs and Various Articles.

Section 13. Rules for milk and raw milk products

The commissioner shall, subject to the provisions of chapter thirty A, adopt and promulgate rules and regulations governing the production, transportation, receiving, handling, storage, processing, distribution and sale of raw milk for pasteurization and raw products thereof being shipped or offered for shipment into or within the commonwealth, including all pertinent sanitary standards and uniform minimum requirements for the inspection of dairy farms, milk plants and receiving stations, wherever located, and pasteurization plants located outside the commonwealth, and may, in like manner and from time to time, amend, modify or repeal the same. Such rules and regulations shall be

consistent with applicable provisions of the Grade “A” Pasteurized Milk Ordinance and related publications of the Food and Drug Administration, Public Health Service, United States Department of Health, Education and Welfare, or any successor agency with like regulatory powers; provided, that requirement by the commissioner of more stringent bacterial and temperature standards shall not be precluded.

[Mass. Gen. Laws ch.94 , § 13E \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XV. Regulation of Trade

Chapter 94. Inspection and Sale of Food, Drugs and Various Articles.

Section 13E. Bacterial standards; milk and cream sales and deliveries

Boards of health of cities and towns may adopt bacterial standards for milk which are numerically less but not greater than such standards as may be established therefor under sections twelve and thirteen.

[Mass. Gen. Laws ch. 94, § 16D \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XV. Regulation of Trade

Chapter 94. Inspection and Sale of Food, Drugs and Various Articles.

Section 16D. Refusal, revocation or suspension of certificate

A certificate of registration for any dairy farm may be refused, or, if issued, may be suspended or revoked by the commissioner for failure to maintain compliance with the rules and regulations established pursuant to section thirteen; provided, that the commissioner may, in his discretion, allow the parties concerned a period of not more than thirty days in which to achieve such compliance; and provided, further, that, if compliance is not so achieved, the operator of the dairy farm involved shall be entitled to a hearing before the commissioner, or a person designated by him, prior to the final refusal, suspension or revocation of such certificate, such hearing to be held after reasonable notice specifying the day, hour and place thereof and accompanied by a statement of the alleged failure to comply, or the reasons for such refusal, suspension or revocation.

A certificate of registration which has been suspended shall be plainly stamped:—“Suspended until ___ (date)”; and the operator of the dairy farm involved may make written application to the commissioner for reinspection at the expiration of the period of suspension. A certificate of registration which has been revoked shall be plainly stamped:—“Revoked”; and the operator of the dairy farm involved may make written application to the commissioner for reinspection only after a period of one year from the date of revocation has elapsed. Immediate notice of suspension or revocation of a certificate of registration shall be given by the commissioner to each dealer, receiving station or plant handling milk produced on the dairy farm involved, and to the board of health of each city or town where such milk is sold, offered or exposed for sale. In case of emergency, directly and immediately threatening the public, the commissioner of public health may suspend a certificate of registration, and shall notify the commissioner forthwith of any such suspension.

[Mass. Gen. Laws ch. 94, § 117F \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XV. Regulation of Trade

Chapter 94. Inspection and Sale of Food, Drugs and Various Articles.

Section 117F. Powers of commissioner of agriculture

The commissioner, in person or by deputy, shall have free access at all reasonable hours to any building or other place wherein it is reasonably believed that farm products marked, branded or labelled in accordance with official grades or standards established and promulgated by the commissioner are being marketed or held for commercial purposes. He shall also have power in person or by deputy to open any bags, crates, or other containers containing said farm products and examine the contents thereof, and may, upon tendering the market price, take samples therefrom.

[Mass. Gen. Laws ch. 128, § 12 \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XIX. Agriculture and Conservation.

Chapter 128. Agriculture:

Section 12. Powers and duties of division of regulatory services

The division of regulatory services shall investigate all dairy products bought or sold, enforce the laws for the manufacture, transfer and sale of such products, and take such action as will tend to produce better quality thereof and to improve the dairy industry. It may co-operate with the department of public health and with inspectors of milk, but it shall not interfere with the duties of such department or officers.

[Mass. Gen. Laws ch. 129, § 1 \(2009\)](#)

General Laws of Massachusetts (MGL).

Part I. Administration of the Government.

Title XIX. Agriculture and Conservation.

Chapter 129. Livestock Disease Control

Section 1. Definitions

The following words as used in this chapter, unless the context otherwise requires, shall have the following meanings:

“**Agents**”, employees of the division of animal health in the department of food and agriculture especially designated as agents by the director.

“**Contagious disease**”, such disease as is recognized by the United States department of agriculture, animal health division, to be contagious or infectious.

“**Director**”, director of animal health.

[Mass. Gen. Laws ch. 129, § 2 \(2009\)](#)

General Laws of Massachusetts (MGL).

Part I. Administration of the Government.

Title XIX. Agriculture and Conservation.

Chapter 129. Livestock Disease Control

Section 2.

The director may make and enforce reasonable orders, rules and regulations relative to the following: the sanitary condition of neat cattle, other ruminants and swine and of places where such animals are kept; the prevention, suppression and extirpation of contagious diseases of domestic animals; the establishing of disease-free herds of cattle and the issuing of certificates in connection therewith; the inspection, examination, quarantine, care and treatment or destruction of domestic animals affected with or which have been exposed to contagious disease, the burial or other disposal of their carcasses, and the cleansing and disinfection of places where contagion exists or has existed. No rules or regulations shall take effect until approved by the governor and council.

[Mass. Gen. Laws ch. 129, § 7 \(2009\)](#)

General Laws of Massachusetts (MGL).
Part I. Administration of the Government.
Title XIX. Agriculture and Conservation.
Chapter 129. Livestock Disease Control
Section 7. Entry on premises.

For the purpose of inspecting or examining animals or the places where they are kept, the director, any of his agents or an inspector, duly qualified, may enter any building or part thereof or any enclosure or other place, and may examine or inspect such animals or places.

[Mass. Gen. Laws ch. 129, § 14 \(2009\)](#)

General Laws of Massachusetts (MGL)
Part I. Administration of the Government.
Title XIX. Agriculture and Conservation
Chapter 129. Livestock Disease Control

Section 14. Destruction of animals affected with foot and mouth disease; disinfection or destruction of buildings

All neat cattle and other domestic animals, which are affected with, or have been exposed to, foot and mouth disease, shall be destroyed when, in the opinion of the director, the public good so requires, and their carcasses shall be buried or otherwise disposed of. An order for killing and for the disposal of carcasses shall be issued in writing by said director, and may be directed to an agent, an inspector, or other person. The said director shall also issue such directions for the cleansing and disinfection of buildings, premises and places in which foot and mouth disease exists or has existed, and of property which may be on or contained therein, as in his opinion may be necessary or expedient. Any property on such premises which may be, in the opinion of the director or of his agents, a source of contagion may be destroyed by order of the director. The necessary expenses incurred in carrying out this section may be paid from the annual appropriation for the extermination of contagious diseases among domestic animals. The director may appoint persons to make appraisals on live stock and other property the destruction of which is ordered under this section, and fifty per cent of the full value of such live stock and other property, as determined by the appraisal, may be paid from the annual appropriation aforesaid. If the United States government makes an appropriation for payment of a certain portion of the value of any animals and property destroyed under this section, the payment by the commonwealth for such animals or property shall be limited to the difference between such portion and the full value thereof determined as herein provided, which shall not be in excess of fifty per cent of such value.

[Mass. Gen. Laws ch. 129, § 19 \(2009\)](#)

General Laws of Massachusetts (MGL)
Part I. Administration of the Government.
Title XIX. Agriculture and Conservation
Chapter 129. Livestock Disease Control
Section 19. Inspections of domestic animals

Inspectors shall make regular and thorough inspections of all neat cattle, sheep and swine found within the limits of their respective towns. Such inspections shall be made at such times and in such manner as the director shall from time to time order. They shall also from time to time make inspections of all other domestic animals within the limits of their respective towns if they know, or have reason to suspect, that such animals are affected with or have been exposed to any contagious disease, and they shall immediately inspect

all domestic animals and any place where any such animals are kept whenever directed so to do by the director; but this section shall not apply to the inspection of sheep or swine slaughtered in wholesale slaughtering establishments, or to the obtaining of a license for the slaughtering of such sheep or swine.

[Mass. Gen. Laws ch. 129, § 21 \(2009\)](#)

General Laws of Massachusetts (MGL)

Part I. Administration of the Government.

Title XIX. Agriculture and Conservation

Chapter 129. Livestock Disease Control

Section 21. Quarantine of diseased animals; notice or order; records

An inspector who, upon an examination of a domestic animal, suspects, or has reason to believe, that it is affected with a contagious disease shall immediately cause it to be quarantined or isolated for at least ten days upon the premises of the owner or of the person in whose charge it is found, or in such other place as he may designate, and shall take such other sanitary measures to prevent the spread of such disease as may be necessary or as shall be prescribed by any order or regulation of the director. He shall also deliver to the owner or person in charge of such animal, or to any person having an interest therein, a written notice or order of quarantine signed by him, in such form as the director shall prescribe, and shall enter a copy of said notice upon his records.

[330 Code Mass. Rules § 4 \(2009\)](#)

Code of Massachusetts Regulations (CMR)

330 CMR. Department of Food and Agriculture.

Section 4. Cattle

4.01: Definitions

Unless the context requires otherwise, terms not defined below or at M.G.L. c. 129 take the applicable USDA definition in 9 CFR Sections 71.1 and 78.1.

....

Department: The Commonwealth of Massachusetts Department of Food and Agriculture.

Director: Either the Director of the Department's Division of Regulatory Services, or the Chief of the Department's Bureau of Animal Health.

Immediate Slaughter: Movement directly to a recognized slaughtering center, with slaughter occurring within 72 hours. For compelling public policy reasons or other extraordinary circumstances, and solely at the Director's discretion and in writing, the Director may approve a longer waiting period.

Official ID: A unique set of numbers, letters and/or symbols that is securely affixed to a bovine animal by ear tag, tattoo, brand, or microchip, or other method approved in writing by the Director, that will positively identify that bovine animal.

Recognized Slaughtering Center: Any point where slaughtering facilities are provided and to which animals are regularly shipped and slaughtered.

4.02: General

USDA agents, when authorized by the Department, may inspect all cattle and any premises where cattle are kept within Massachusetts for compliance with 330 CMR 4.00.

4.03: Dealing and Transportation of Cattle

(1) License Required: No person may engage in the business of dealing in cattle in Massachusetts without a valid livestock dealer license issued by the

Department, and no such person may transport cattle in any vehicle lacking a valid dealer license plate on the driver's side.

4.04: Importation of Cattle into Massachusetts

Except when eligible for an exemption described below, anyone bringing cattle into Massachusetts must meet the following requirements:

(1) Notice: Notify the Department in advance of the approximate number of cattle, each animal's origin, and the date that the cattle will arrive in Massachusetts.

(2) Health Certificate: Ensure that the cattle are accompanied throughout transport by the shipping copy of a Valid Health Certificate, and ensure that an official copy of the Valid Health Certificate is forwarded to the Department promptly following approval by the Chief Livestock Health Official in the state of origin.

(3) Transport: In order to meet the import requirements of 330 CMR 4.04, cattle may not be transported in any vehicle containing cattle that do not meet these requirements.

(4) Quarantine: All cattle coming into Massachusetts without meeting the above requirements are hereby declared to be quarantined and must be held at the risk and expense of the owner until released in writing by the Department.

(5) Testing of Cattle Imported in Violation of Health Certificate Requirements: Any animal brought into Massachusetts which is neither consigned for immediate slaughter nor accompanied by the shipping copy of a Valid Health Certificate must be held and tested by a federally-accredited veterinarian at the expense of the animal's owner or possessor. The Department shall determine which tests are required.

(6) Retesting: The Department may require any animal to be retested after entry into Massachusetts for tuberculosis, brucellosis, and/or any other contagious disease as deemed necessary by the Department.

(7) Exemptions. Cattle going to immediate slaughter are exempt from the notice, Health Certificate and testing requirements of 330 CMR 4.04 if they are accompanied by a USDA waybill and have Official ID or backtags. Cattle intended for exhibition purposes only are exempt from the notice requirements of 330 CMR 4.04.

[330 Code Mass. Rules § 27 \(2009\)](#)

Code of Massachusetts Regulations (CMR)

330 CMR. Department of Food and Agriculture.

Section 27. Standards and Sanitation Requirements for Grade A Raw Milk

27.02: Definitions

Board of Health – means the appropriate and legally designated health authority of the city, town, or other legally constituted governmental unit within the Commonwealth of Massachusetts having the usual powers and duties of the board of health of a city or town.

Bulk Milk Pickup Tanker – means a vehicle, including the truck and tank and those appurtenances necessary for its use, used by a milk hauler to transport bulk raw milk for pasteurization from a dairy farm to a transfer station, receiving station or pasteurization plant.

Bureau – shall mean the Bureau of Dairying in the Division of Regulatory Services of the Massachusetts Department of Food and Agriculture.

Certificate of Registration and Certification - means approval by the Commonwealth of Massachusetts to produce and sell milk as provided by M.G.L. c. 94, § 16.

Commissioner – means the Commissioner of the Department of Food and Agriculture.

Dairy Farm – means a place or premises where more than two cows are kept and a part or all of the milk produced thereof is sold or delivered for sale to any person.

Department – means the Massachusetts Department of Food and Agriculture.

Director – means the Director of the Division of Regulatory Services.

Official Laboratory – an official laboratory is a biological, chemical, or physical laboratory which is under the direct supervision of the state or a local regulatory agency.

Officially Designated Laboratory – an officially designated laboratory is a commercial laboratory authorized to do official work by the regulatory agency, or a milk industry laboratory officially designated by the regulatory agency for the examination of producer samples of Grade A raw milk for pasteurization and commingled milk tank truck samples of raw milk for antibiotic residues and bacterial limits.

Pasteurization or Pasteurized – or a similar term means the process of heating every particle of milk or milk product, in properly designed and operated equipment, to one of the applicable temperatures described in 105 CMR 541.010(P) and holding every such particle continuously at or above that temperature for at least the corresponding time specified.

Regulatory Agency – means the Massachusetts Department of Food and Agriculture and its subdivisions.

Ultra Pasteurized – means thermally processed at or above 280°F (138°C) for at least two seconds, either before or after packaging, so as to produce a product that has an extended shelf life when kept at 45°F or below.

27.03: Animal Health

.....

(C) For diseases other than brucellosis and tuberculosis, the Commissioner may require such physical, chemical or bacteriological tests as he deems necessary. The diagnosis of other diseases in dairy cattle shall be based upon the findings of a licensed veterinarian or a veterinarian in the employ of the Department of Food and Agriculture. Any diseased animal disclosed by such test(s) shall be disposed of as the Department directs.

27.04: Personnel Health

(A) Prohibition. No person affected with any disease in a communicable form, or while a carrier of such disease, shall work at any dairy farm in any capacity which brings him into contact with the production, handling, storage, or transportation of milk, milk products, containers, equipment and utensils; and no dairy farm operator shall employ in any such capacity any such person, or any person suspected of having any disease in a communicable form, or of being a carrier of such disease. Any producer or distributor of milk or milk products, upon whose dairy farm any communicable disease occurs, or who suspects that any employee has contracted any disease in a communicable form, or has become a carrier of such disease, shall notify the department immediately.

(B) Procedure when Infection is Suspected. When reasonable cause exists to suspect the possibility of transmission of infection from any person concerned with the handling of milk and/or milk products, the department is authorized to require any or all of the following measures:

(1) The immediate exclusion of that person from milk handling.

(2) The immediate exclusion of the milk supply concerned from distribution and use.

(3) Adequate medical and bacteriological examination of the person, of her/his associates, and of her/his and their body discharges.

27.05: Standards for Grade "A" Raw Milk for Pasteurization, Ultra Pasteurization and Aseptic Processing

All Grade A raw milk for pasteurization, ultra pasteurization or aseptic processing shall be produced to conform with the following chemical, bacteriological, and temperature standards, and the sanitation requirements of 330 CMR 27.07.

Temperature: Cooled to 40°F (4.45°C) or less within two hours after milking, provided that the blend temperature after the first and subsequent milkings does not exceed 50°F (10°C).

.....

27.07: Sanitation Requirements For Grade "A" Raw Milk

The following requirements shall be applicable to raw milk for pasteurization, ultrapasteurization or aseptic processing and Grade A raw milk for retail sale.

(A) Abnormal Milk. Cows which show evidence of the secretion of abnormal milk in one or more quarters, based upon bacteriological, chemical, or physical examination, shall be milked last or with separate equipment and the milk shall be discarded.

27.10: Administration and Enforcement

.....

(B) State Enforcement

(1) The Department may enforce 330 CMR 27.00 by suspension or revocation of certificates of registration in accordance with 330 CMR 27.016.

(2) If the Commissioner or her/his agent determines, as a result of any study, inspection or survey made by the Department, that compliance with 330 CMR 27.00 has not been effected, she/he shall take appropriate action to effect compliance.

(3) Notwithstanding any other provision of 330 CMR 27.00, if the Commissioner or her/his agent determines that an imminent health hazard exists, resulting from the operation of a dairy farm, she/he may without prior notice to the board of health take whatever action is necessary to effect compliance with 330 CMR 27.00.

(C) Interpretation of Regulations.

The Department may from time to time issue written interpretations and guidelines as necessary to promote uniform application of 330 CMR 27.00. The Department may advise the certificatee or the board of health on particular questions regarding interpretations of 330 CMR 27.00.

[330 Code Mass. Rules § 28 \(2009\)](#)

Code of Massachusetts Regulations (CMR)

330 CMR. Department of Food and Agriculture.

Section 28 Milk and Milk Products

28.01: General Provisions

(1) Purpose 330 CMR 28.00 has been prepared for the purpose of insuring the quality and safety of milk and milk products consumed in Massachusetts. 330 CMR 28.00 establish administrative and enforcement procedures for the inspection of milk plants and out-of-state pasteurization plants; and the permitting of receiving stations, transfer stations and out-of-state pasteurization plants. For the purpose of 330 CMR 28.00 out-of-state pasteurization plants which process ultra-pasteurized and/or aseptic milk or milk products are not subject to 330 CMR 28.00

at this time. 330 CMR 28.00 is consistent with regulations issued by the Food and Drug Administration, Public Health Service, United States Department of Health and Human Services; however, the bacteriological and temperature standards may be more stringent in some cases.

(2) Scope. 330 CMR 28.00 applies to every milk plant and out-of-state pasteurization plant which offers for sale or transports milk or milk products in final package form into Massachusetts. Out-of-state pasteurization plants which process ultra-pasteurized and/or aseptic milk or milk products are not subject to 330 CMR 28.00 at this time.

28.02: Definitions

For the purpose of 330 CMR 28.00, the Department adopts the definitions for the items in the most recent edition of the Grade "A" Pasteurized Milk Ordinance as promulgated by the United States Department of Health and Human Services. The following additional definitions shall apply in the interpretation and enforcement of 330 CMR 28.00.

Bureau – shall mean the Bureau of Animal Health and Dairying of the Massachusetts Department of Food and Agriculture.

Commissioner – means the Commissioner of the Department of Food and Agriculture.

Department – means the Massachusetts Department of Food and Agriculture.

Raw Milk For Pasteurization – means Grade "A" milk and raw products thereof which comply with the sanitary standards for their production, transportation, receiving, handling, storage, processing, distribution and sale as determined by the Commissioner of Food and Agriculture in 330 CMR 27.00 through 29.00.

Regulatory Agency – is any out-of-state regulatory agency with functions, powers, and authority similar to that accorded the Massachusetts Department of Food and Agriculture or its subdivisions.

28.03: Adoption of the Pasteurized Milk Ordinance (PMO)

(1) The Department hereby adopts and incorporates by reference the Grade "A" Pasteurized Milk Ordinance (PMO) as promulgated by the United States Department of Health and Human Services along with its appendixes and any updates, amendments and changes, and including any documents referenced or incorporated by the PMO, as they relate to milk processors, except for those provisions specifically omitted by 330 CMR 28.03.

(2) The Department does not adopt any part of the PMO, along with any updates, amendments and changes, and any documents referenced or incorporated by the PMO, for the sole purpose of regulating dairy farms.

28.20: General Administration

(1) Scope. The following provisions shall cover the administration and enforcement of 330 CMR 28.00.

(2) State Enforcement.

(a) The Department may enforce 330 CMR 28.00 by suspension or revocation of permits in accordance with 330 CMR 28.23.

(b) If the Commissioner or his designee determines, as a result of any study, inspection or survey made by the Department, that compliance with 330 CMR 28.00 has not been effected, he shall take appropriate action to effect compliance.

(c) Notwithstanding any other provision of 330 CMR 28.00, if the Commissioner or his agent determines that an imminent health hazard exists, resulting from the operation of an out-of-state pasteurization plant, milk plant, transfer station or receiving station, he may take whatever action is necessary to effect compliance with 330 CMR 28.00.

(3) Interpretation of 330 CMR 28.00. The Department may from time to time publish interpretations of 330 CMR 28.00 and guidelines as necessary to promote uniform application of 330 CMR 28.00, and may make them available to those persons holding permits under these provisions. The Department may advise the permittee on particular questions regarding interpretations of 330 CMR 28.00.

28.22: Inspections

(1) General.

(a) The Department may inspect every milk plant or out-of-state pasteurization plant as necessary for the enforcement of 330 CMR 28.00.

(b) The Commissioner or agents of the Department, after identifying themselves, may enter all parts of any milk plant, receiving station, transfer station, or out of state pasteurization plant at any reasonable time for the purpose of making an inspection to ascertain whether the plant is in compliance with 330 CMR 28.00. They may examine the records of the plant or station to obtain information pertaining to milk, milk products, ingredients thereof and supplies purchased, received or used.

(c) The permittee or person in charge at the time of the inspection shall furnish an agent of the Department, upon request, a true statement of the actual quantities of each grade of milk and milk products purchased and sold by the plant, a list of all sources of such milk and milk products, and records of inspections, tests and pasteurization times and temperatures.

(d) If the permittee or person in charge at the time of the inspection refuses entry to an agent of the Department, or refuses entry to the Commissioner to permit an authorized inspection, the Commissioner or his agent may immediately suspend the permit of the receiving station, transfer station, or out-of-state pasteurization plant, without prior notice or hearing, in accordance with 330 CMR 28.23(1).

(e) If the permittee or any of his employees interferes with the Commissioner or an agent of the Department in the performance of its duties, the Commissioner or agent of the Department may take steps to suspend or revoke the permit of the receiving station, transfer station or out-of-state pasteurization plant in accordance with 330 CMR 28.23(3) or (4).

(f) It shall be unlawful for any person who, in any official capacity, obtains any information under 330 CMR 28.00 which is entitled to protection as a trade secret (including information as to the quantity, quality, source or disposition of milk and milk products or results of inspections or tests thereof) to use such information to his or her advantage or to reveal it to any unauthorized person.

Regional Laws and Regulations

New Hampshire

Authority for expanding the role of the Department of Agriculture, Markets, and Food in regulating farms, livestock and milk production, handling, testing, movement, and processing during FMD response can be found in:

[N.H. Admin. Rules Agr 103.4 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter Agr. Department of Agriculture, Markets, and Food

Section 100. Commissioner, Department of Agriculture, Markets, and Food

Chapter Agr 103.04. Division of Animal Industry.

The division of animal industry shall be responsible for the control and eradication of all contagious and infectious diseases of domestic animals and poultry in the state. It shall protect people, livestock and poultry from disease through testing, vaccination and regulation of entry of animals and poultry into New Hampshire. The division shall enforce the humane laws of the state, and liaise with appropriate local and federal agencies in animal health matters.

and [N.H. Rev. Stat. Ann. § 436:6 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.

Chapter 436: Diseases of Domestic Animals – Importation of Bovines

Section 6: Federal Cooperation.

The commissioner is authorized to accept, on behalf of the state, the rules and regulations prepared by the Secretary of Agriculture under and in pursuance of section 3 of an act of Congress approved May 29, 1884, entitled “An act for the establishment of a bureau of animal industry to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuropneumonia and other contagious diseases among domestic animals,” or of any other such act of Congress, and he may cooperate with the authorities of the United States government within this state in the carrying out of such rules and regulations and the enforcement of the provisions of any such act or acts so passed which are not in conflict with the statutes of this state.

See also:

[New Hampshire Statutes](#), especially:

[Title I: The State and Its Government. Chapter 21-P. Department of Safety – General Provisions.](#)

[Title VIII: Public Defense and Veterans' Affairs. Chapter 108 Emergency Management Assistance Compact and Northeastern American/Canadian Emergency Management Assistance Compact.](#)

[Title XIV: Milk And Milk Products. Chapter 184 Inspection And Sale of Dairy Products Milk Sanitation Code Section 184:79.](#)

[Title XL: Agriculture, Horticulture and Animal Husbandry.](#)

[New Hampshire Code of Administrative Rules](#) (N.H. Admin. Rules), especially:

[Chapter Agr. Department of Agriculture, Markets, and Food](#)

[Chapter He-P. Former Division of Public Health Services](#)

[Chapter Mil. Milk Sanitation Board](#)

[N.H. Rev. Stat. Ann. § 21-P:5-a \(2009\)](#)

New Hampshire Statutes

Title I: The State and Its Government

Chapter 21-P. Department of Safety – General Provisions

Section 21-P:5-a. Director of Homeland Security and Emergency Management.

...

II. The director of homeland security and emergency management, under the supervision of the commissioner and the governor, shall devote full time and attention to overseeing the state-level planning, preparation, exercise, response to and mitigation of terrorist threats and incidents and natural and human-caused disasters. He or she shall serve as the state's primary contact with the federal Department of Homeland Security, and shall have authority to oversee and coordinate planning, response, and recovery efforts of all

state agencies to terrorist events and natural and human-caused disasters and wide-scale threats to public safety. He or she shall collaborate with the department of health and human services and shall coordinate the efforts of other state agencies in preventing and responding to epidemics and other significant threats to the public health. All state agencies shall and are authorized to cooperate with the director in carrying out his or her duties as enumerated in this section.

[N.H. Rev. Stat. Ann. § 108:1 \(2009\)](#)

New Hampshire Statutes.

Title VIII: Public Defense and Veterans' Affairs. Chapter 108 Emergency Management Assistance Compact and Northeastern American/Canadian Emergency Management Assistance Compact

Section 108:1 Authority.

The Emergency Management Assistance Compact, as approved by the United States Congress, P.L. 104-321, hereinafter "EMAC," and the Northeastern American/Canadian Emergency Management Assistance Compact, as authorized by Article IV(c) of the 1986 Agreement between the United States and Canada on Cooperation in Comprehensive Emergency Planning and Management, hereinafter "NAEMAC," is made and entered into by and between the participating party jurisdictions. The state of New Hampshire, through its governor, duly authorized, solemnly agrees with any other jurisdiction which is or may become a signatory to these compacts as provided herein.

[N.H. Rev. Stat. Ann. § 184:30-e \(2009\)](#)

New Hampshire Statutes

Title XIV: Milk and Milk Products

Chapter 184. Inspection and Sale of Dairy Products – Milk for Drinking

Section 184:30-e Enforcement.

The department of health and human services and local boards of health shall be charged with the enforcement of the provisions of this subdivision.

[N.H. Rev. Stat. Ann. § 184:62 \(2009\)](#)

New Hampshire Statutes

Title XIV: Milk and Milk Products

Chapter 184. Inspection and Sale of Dairy Products – Receiving Stations for Milk, etc.

Section 184:62 Inspection, Dairies.

If the commissioner, or his deputy, has reason to believe that milk or cream, or part thereof, is produced or kept under unsanitary conditions he shall inspect the dairy and premises of the producer thereof, and shall issue such instructions as in his judgment will effect improvement to a satisfactory standard. In case his instructions are not complied with he may order, in writing, the owners, operators or managers of any station receiving such milk or cream and of neighboring receiving stations, to refuse to receive such milk or cream until permitted so to do by order of the commissioner. Whoever disobeys such order or any instruction issued under the provisions of this section shall be guilty of a violation.

[N.H. Rev. Stat. Ann. § 184:79 \(2009\)](#)

New Hampshire Statutes.

Title XIV: Milk and Milk Products.

Chapter 184 Inspection And Sale of Dairy Products Milk Sanitation Code

Section 184:79. Terms Defined.

As used in this subdivision the following terms shall have the following meanings:

.....

XXII-b. “**New Hampshire fresh milk**” means milk consisting entirely of fresh milk produced in New Hampshire.

XXII-c. “**Northeastern fresh milk**” means milk consisting entirely of fresh milk produced in Delaware, Maryland, New Jersey, Pennsylvania, New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, or Maine.

XXIII. The terms “**pasteurization**”, “**pasteurized**”, and similar terms mean the process of heating every particle of milk or milk product to at least 145 degrees F., and holding it continuously at or above this temperature for at least 30 minutes, or to at least 161 degrees F., and holding it continuously at or above this temperature for at least 15 seconds, in equipment which is properly operated and approved by the health authority. The milk products which have a higher milkfat content than milk and/or contain added sweeteners shall be heated to at least 150 degrees F., and held continuously at or above this temperature for at least 30 minutes, or to at least 166 degrees F., and held continuously at or above this temperature for at least 15 seconds. Nothing in this definition shall be construed as barring any other pasteurization process which has been recognized and demonstrated to be equally efficient and which is approved by the milk sanitation board.

[N.H. Rev. Stat. Ann. § 184:97 \(2009\)](#)

New Hampshire Statutes

Title XIV: Milk and Milk Products

Chapter 184. Inspection and Sale of Dairy Products – Milk Sanitation Code

Section 184:97 Emergency Powers.

In the event of a serious disaster, such as a conflagration, enemy attack, earthquake, flood, hurricane, tornado, drought, or other emergency, which shall result in an unusual nonseasonal shortage of milk or milk products, the milk sanitation board shall have power to suspend any part or all of the regulations made under the authority of this subdivision; to promulgate other or additional emergency regulations; to suspend part or all of the requirements of this subdivision pertaining to inspection and the requirement relating to the licensure of out-of-state milk plants from which milk or milk products are derived and pertaining to the inspection of all out-of-state milk producers and milk distributors; provided, however, that the milk sanitation board shall be satisfied that any such source of milk and milk products so admitted shall not constitute a public health threat to the people of this state. Any such suspension and any such emergency regulations shall be for the duration of the emergency.

[N.H. Rev. Stat. Ann. § 425:2 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.

Chapter 425. The Department of Agriculture, Markets, and Food

Section 425:2 General Functions.

The department of agriculture, markets, and food shall be responsible for the following general functions:

- I. Promoting and regulating agriculture in all its branches.
- II. Regulating all commercial transactions involving the measurement of weight, distance, volume, or time.
- III. Regulating the quality and grade of agricultural crops and supplies and food products. Nothing in this paragraph shall be construed to apply to dietary supplements as defined in 21 U.S.C. 321, as amended by the Dietary Supplement Health and Education Act of 1994, and as may be amended from time to time.

- IV. Gathering and disseminating information on agriculture, crop production, market activity, and other subjects consistent with the responsibilities of the department.
- V. Cooperating with other agencies of the state and federal governments, the university of New Hampshire, commodity and consumer groups in the public interest and all who are engaged within this state in any form of agriculture, or its allied vocations, for advice on those activities.
- VI. Conducting such other activities as the statutes shall direct.

[N.H. Rev. Stat. Ann. § 436:6 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.

Chapter 436: Diseases of Domestic Animals – Importation of Bovines

Section 6: Federal Cooperation.

The commissioner is authorized to accept, on behalf of the state, the rules and regulations prepared by the Secretary of Agriculture under and in pursuance of section 3 of an act of Congress approved May 29, 1884, entitled “An act for the establishment of a bureau of animal industry to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuropneumonia and other contagious diseases among domestic animals,” or of any other such act of Congress, and he may cooperate with the authorities of the United States government within this state in the carrying out of such rules and regulations and the enforcement of the provisions of any such act or acts so passed which are not in conflict with the statutes of this state.

[N.H. Rev. Stat. Ann. § 436:16 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.

Chapter 436: Diseases of Domestic Animals – Importation of Bovines

Section 436:16 Diseased Animals.

Such animals as shall be found to have any infectious or contagious disease shall immediately be slaughtered by and at the expense of the importer or owner or held in strict quarantine, if the disease is curable, under rules adopted by the commissioner; provided that registered purebred bovine animals, reacting to the tuberculin or other approved test, but showing no marked physical indications of tuberculosis, may be retained by the importer or owner in quarantine and be subject to the provision of RSA 436:62-68.

[N.H. Rev. Stat. Ann. § 436:17 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.

Chapter 436: Diseases of Domestic Animals – Importation of Bovines

Section 436:17 Disposal of Carcasses.

When slaughtered, the carcasses, under rules adopted by the commissioner, shall be burned or covered with lime and buried, or may be shipped to a fertilizer or rendering plant; provided that the meat of animals reacting to the tuberculin or other approved test, but showing no physical indications of tuberculosis or brucellosis, may be used or sold for food under rules adopted by the department of health and human services or in accordance with the rules and regulations of the Bureau of Animal Industry of the United States Department of Agriculture under the federal meat inspection law.

[N.H. Rev. Stat. Ann. § 436:31 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.
Chapter 436: Diseases of Domestic Animals – Investigations and Reports
Section 436:31. Investigations.

The commissioner shall cause systematic investigation, insofar as available funds will permit, to be made as to the existence of pleuropneumonia, foot and mouth disease, glanders, hog cholera, anthrax, black leg, hemorrhagic septicemia, rabies, scrapie, fowl cholera, European fowl pest, or any other infectious or contagious disease among cattle, horses, asses, mules, sheep, swine and all other domestic animals, and the commissioner or the commissioner's duly authorized agent may enter any premises, including stockyards within any part of the state in or at which the commissioner has reason to believe that there exists or may exist any such disease and make search, investigation and inquiry in regard to the existence thereof.

[N.H. Rev. Stat. Ann. § 436:34 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.
Chapter 436: Diseases of Domestic Animals – Animals Quarantine
Section 436:34 Quarantine of Animals.

Whenever the commissioner, upon investigation or upon notification, has reason to believe that a domestic animal or captive wildlife is infected with a contagious or infectious disease the commissioner shall immediately cause it to be quarantined or isolated upon the premises of the owner or the person in whose possession it is found, or in such other place or enclosure as the commissioner may designate, and the removal of the animal from any premises where it may be ordered to be kept shall be forbidden.

[N.H. Rev. Stat. Ann. § 436:35 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.
Chapter 436: Diseases of Domestic Animals – Quarantine
Section 436:35 Quarantine of Premises.

The commissioner may quarantine the premises upon which there is a domestic animal or captive wildlife infected with any contagious or infectious disease, or that is suspected of being so infected, or that has been exposed to such disease, and may forbid the removal of any such animal or wildlife or any animals or wildlife susceptible to such disease by serving a written order upon the owner or person in possession of said premises or by posting a copy of such order at the premises' usual entrance. Such animal or wildlife or animals or wildlife shall be kept under quarantine for such periods of time as the commissioner may deem necessary to prevent the spread of the suspected disease to other animals off the quarantined premises. The commissioner may determine the length of quarantine based upon the recommendations of the United States Animal Health Association and the United States Department of Agriculture.

[N.H. Rev. Stat. Ann. § 436:45 \(2009\)](#)

New Hampshire Statutes.

Title XL: Agriculture, Horticulture and Animal Husbandry.
Chapter 436: Diseases of Domestic Animals – Tests on Application of Owner; Vaccination
Section 436:45 Expense; Indemnity.

The cost of examination or test shall be borne by the state; but if the owner, after signing the above agreement, shall knowingly fail to carry out its terms, he shall forfeit any indemnity to which he would otherwise be entitled for any animals found to be infected.

[N.H. Admin. Rules Agr 100 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter Agr. Department of Agriculture, Markets, and Food

Section 100. Commissioner, Department of Agriculture, Markets, and Food

Chapter Agr 100. Organizational Rules

Part Agr 101. Purpose

Agr 101.01. Purpose.

The rules of this title implement the statutory responsibilities of the New Hampshire department of agriculture created by RSA 425 which include, but are not limited to:

- (a) Promoting and regulating agriculture in all its branches;
- (b) Regulating all commercial transactions involving the measurement of weight, distance, volume or time;
- (c) Regulating the quality and grade of agricultural crops and supplies and food products;
- (d) Gathering and disseminating information on agriculture, crop production, market activity, and other subjects consistent with the responsibilities of the department;
- (e) Cooperating with other agencies of the state and federal governments, the university of New Hampshire and commodity and consumer groups in the public interest; and
- (f) Conducting such other activities as the statutes shall direct.

[N.H. Admin. Rules Agr 103.4 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter Agr. Department of Agriculture, Markets, and Food

Section 100. Commissioner, Department of Agriculture, Markets, and Food

Agr 103.04. Division of Animal Industry.

The division of animal industry shall be responsible for the control and eradication of all contagious and infectious diseases of domestic animals and poultry in the state. It shall protect people, livestock and poultry from disease through testing, vaccination and regulation of entry of animals and poultry into New Hampshire. The division shall enforce the humane laws of the state, and liaise with appropriate local and federal agencies in animal health matters.

[N.H. Admin. Rules Agr 1900 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter Agr. Department of Agriculture, Markets, and Food

Section 1900. Livestock Dealer Licensing

[N.H. Admin. Rules Agr 2100 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter Agr. Department of Agriculture, Markets, and Food

Section 2100. Importation of Bovines and Other Domestic Animals Into the State of New Hampshire

Part Agr 2101. Purpose and Scope

Agr 2101.01 Purpose.

The purpose of this chapter is to ensure that domestic animals brought into this state are healthy and free from contagious and infectious diseases.

Part Agr 2103. Requirements of Importation of Bovines and Other Domestic Animals

Agr 2103.01 All Domestic Animals and Poultry Entering the State of New Hampshire.

- (a) All domestic animals and poultry entering New Hampshire shall:
 - (1) Be in compliance with federal regulations; and
 - (2) Not be known to be infected with or exposed to any contagious or infectious disease or from a quarantined area.

Agr 2103.02. Who Inspects.

Any accredited veterinarian from the state of origin may inspect the animals for interstate movement and fill out the certificates of veterinary inspection.

Agr 2103.03. Permits for Entry.

(a) No poultry, swine, ratites, buffalo, camelidae, cervidae, yaks and/or psittacine birds shall be shipped into New Hampshire without a prior permit.

(b) Permits shall be issued by telephone or in writing for the importation of poultry, swine, ratites, buffalo, camelidae, cervidae, yaks and/or psittacine birds when all testing requirements have been complied with and a certificate of veterinary inspection is being prepared by the inspecting accredited veterinarian. The permit number shall appear on the certificate of veterinary inspection, one copy of which shall accompany the animal to the state of destination. Subsequent approval by the chief regulatory official of the state of origin shall be required.

.....
Agr 2103.05. Laboratory Tests and Other Tests.

(a) All laboratory tests of animals intended for interstate movement into New Hampshire shall be performed at diagnostic laboratories approved by Veterinary Services, United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS).

[N.H. Admin. Rules He-P 2700 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter He-P. Former Division of Public Health Services

Section 2700. Milk Producers, Milk Plants, Producer/Distributors, and Distributors

[N.H. Admin. Rules Mil 300 \(2009\)](#)

New Hampshire Code of Administrative Rules.

Chapter Mil. Milk Sanitation Board

Section 300. Milk Sanitation

Part Mil 301. Inspection

301.01 *Pasteurized Milk Ordinance.*

(a) Under the authority of RSA 184:93, I and RSA 184:103, the New Hampshire milk sanitation board hereby adopts as a rule, with amendments as indicated in (c) below, the "Grade 'A' Pasteurized Milk Ordinance," 2007 revision, publication number 229, of the United States Department of Health and Human Services, Public Health Service, Food and Drug Administration.

(b) Each milk producer, milk plant, producer/distributor and distributor of milk products as defined in RSA 184:79 shall comply with the Pasteurized Milk Ordinance (PMO) as amended pursuant to Mil 301.01

Regional Laws and Regulations

Rhode Island

Authority for expanding the role of the DEM Division of Agriculture and Resource Marketing in regulating farms, livestock and milk production, handling, testing, movement, and processing during FMD response can be found in:

[R.I. Gen. Laws § 4-4-23 \(2009\)](#):

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-23: Regulations for suppression of disease.

The director of environmental management may make all necessary regulations for the prevention, treatment, cure, and extirpation of any disease, and any person who fails to comply with any regulation made shall be fined not exceeding three hundred dollars (\$300) or be imprisoned not exceeding one year.

[R.I. Gen. Laws § 4-4-12 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-12: Cooperation with federal government in suppression of diseases.

The governor is authorized to accept on behalf of the state the rules and regulations prepared by the secretary of agriculture under and in pursuance of § 3, 21 U.S.C. § 114, of an act of congress approved May 29, 1884, entitled "An act for the establishment of a bureau of animal industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuropneumonia and other contagious diseases among domestic animals", 21 U.S.C. § 113 *et seq.*, and to cooperate with the authorities of the United States in the provisions of that act.

See also:

[State of Rhode Island General Laws](#), especially:

[Title 2: Agriculture and Forestry.](#)

[Title 4: Animals and Animal Husbandry.](#)

[Title 21: Food And Drugs.](#)

[State of Rhode Island Regulations](#), especially:

[Agriculture and Resource Marketing,](#)

Department of Environmental Management

[Department of Health](#)

[R.I. Gen. Laws § 2-1-8 \(2009\)](#)

State of Rhode Island General Laws.

Title 2: Agriculture and Forestry.

Chapter 2-1: Agricultural Functions of Department of Environmental Management

Part 2-1-1: General Provisions

Section 2-1-8: Marketing functions of director.

The director of environmental management is vested with authority as follows:

- (1) To collect and diffuse timely information relative to the seasonal supply, demand and prevailing prices of farm products, both at wholesale and retail, the movement of farm products through commercial channels, and the quantities and conditions of farm products in dry and cold storage.
- (2) To assist and advise in the organization and maintenance of producers' and consumers' cooperative selling and buying associations.
- (3) To investigate the cost of distributing farm products, both at wholesale and retail, and to publish these findings that may be of practical interest to the public.
- (4) To furnish advice and assistance to the public with reference to buying of farm products and other matters relative to farm products.
- (5) To take those lawful measures that may be deemed advisable to prevent waste or uneconomical use of farm products.
- (6) To co-operate with various state and federal agencies having to do with farm products.

[R.I. Gen. Laws § 2-1-10 \(2009\)](#)

State of Rhode Island General Laws.

Title 2: Agriculture and Forestry.

Chapter 2-1: Agricultural Functions of Department of Environmental Management

Part 2-1-1: General Provisions

Section 2-1-10: Inspection powers.

For the purpose of conducting inspections, the director of environmental management and the director of health, or any of his or her agents or deputies, have authority to enter at any reasonable time, any building, storehouse, warehouse, cold storage plant, packing house, stockyard, railroad yard, railroad car, or any other building or place where farm products are produced, kept, stored or offered for sale, or to enter upon any farm land for the purpose of inspecting farm products

[R.I. Gen. Laws § 4-4-1 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-1: Appointment of commissioners to inspect diseased animals – Quarantine – Veterinarians.

The director of environmental management may appoint one or more commissioners in each county of the state, whose duty it is to visit and inquire into the condition of any domestic animal in their respective counties whenever there is reason to suspect that any domestic animal, or the carcass of any domestic animal, is affected with tuberculosis, or other contagious, infectious, or communicable disease; and the commissioners in their counties are authorized to quarantine any diseased domestic animal, or the carcass of any diseased domestic animal, until inspected by the veterinarian employed by the director. The director may also employ from time to time any number of veterinary surgeons that he or she may find necessary to carry out the purposes of this chapter.

[R.I. Gen. Laws § 4-4-3 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-3: Reporting of diseased animals – Destruction.

Any owner of an animal suspected of having an animal disease determined by the director of environmental management to be contagious or injurious to public health or to the health of other animals, or any veterinarian who treats that animal, or any other person or institution having knowledge of a diseased animal, shall make a report of that information to the state department of environmental management in any manner and form as the department prescribes by regulation. The director of environmental management shall promulgate by rule a list of those animals determined to be contagious or injurious. The director of environmental management, if he or she determines an animal to have a contagious or communicable disease, shall cause that animal to be killed and the carcass to be disposed of in any manner as not to be detrimental to the public health.

[R.I. Gen. Laws § 4-4-5 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-5: Right of entry where disease suspected.

The director of the department of environmental management or the director's duly authorized representatives, having reason to suspect the existence of any of the diseases mentioned in this chapter upon any grounds or premises, are hereby authorized and empowered to enter upon those grounds or premises for the enforcement of the provisions of this chapter.

[R.I. Gen. Laws § 4-4-8 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-8: Exposure of diseased animals to contact with healthy animals.

No person having the care or custody of any animal having any one of the diseases mentioned in this chapter or chapter 5 of this title, shall, knowing the animal to have any of the diseases mentioned in this chapter or chapter 5 of this title, sell or exchange, or permit the removal, use or driving of that animal upon any public highway, or the exposure of that animal to contact with any other healthy animal of the same kind, except by permission of the director of environmental management.

[R.I. Gen. Laws § 4-4-9 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-9: Sale, use, or exposure of diseased animals – Refusal to destroy.

A person who willfully sells or offers to sell, uses, exposes, or causes or permits to be sold, offered for sale, used or exposed, any horse or other animal having the disease known as glanders or farcy, or other contagious or infectious disease dangerous to the life or health of human beings or animals, or which is diseased past recovery, or who refuses upon demand of the general agent or any special agent of the society for the prevention of cruelty to animals humanely to destroy an animal affected with any of those diseases shall, for each offense, be punished in the manner provided in § 4-1-2.

[R.I. Gen. Laws § 4-4-10 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-10: Sale of diseased or disabled animals.

It is unlawful for any person holding an auctioneer's license knowingly to receive or offer for sale or to sell at public auction, other than at a sheriff's or judicial sale under a court order, or for any person to sell or offer for sale at private sale, any animal which is suffering from any disability, lameness or disease, and any person violating any provision of this section shall, for each offense, be punished in the manner provided in § 4-1-2.

[R.I. Gen. Laws § 4-4-11 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-11: Interference with enforcement – Violation of quarantine.

Any person or persons who shall willfully or intentionally interfere with any officers, duly authorized to carry out the provisions of this chapter is deemed guilty of a misdemeanor, and upon conviction is liable to imprisonment not exceeding three (3) months, or a fine not exceeding one hundred dollars (\$100), or both, at the discretion of the court.

[R.I. Gen. Laws § 4-4-12 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-12: Cooperation with federal government in suppression of diseases.

The governor is authorized to accept on behalf of the state the rules and regulations prepared by the secretary of agriculture under and in pursuance of § 3, 21 U.S.C. § 114, of an act of congress approved May 29, 1884, entitled "An act for the establishment of a bureau of animal industry, to prevent the exportation of diseased cattle, and to provide means for the suppression and extirpation of pleuropneumonia and other contagious diseases among domestic animals", 21 U.S.C. § 113 *et seq.*, and to cooperate with the authorities of the United States in the provisions of that act.

[R.I. Gen. Laws § 4-4-13 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-13: Powers of federal and state inspectors – Assistance by peace officers.

The inspectors of the state department of environmental management and the department of agriculture of the United States, in cooperation with the state department of environmental management, or with any agent of the state, has the right of inspection, quarantine, and condemnation of animals affected with any contagious, infectious, or communicable disease, or suspected to be affected, or that have been exposed to any contagious, infectious, or communicable disease, and for these purposes are authorized and empowered to enter upon any grounds or premises. The director of agriculture or inspectors of the United States department of agriculture, in cooperation with the state department of environmental management, or with any agent of the state department of environmental management have the power to call on sheriffs, constables, and peace officers to assist them in the discharge of their duties in carrying out the provisions of the act of congress approved May 29, 1884, 21 U.S.C. § 113 *et seq.*, establishing the bureau of animal industry, or the provisions of the department of environmental management, and it is made the duty of sheriffs, constables, and peace officers to assist those inspectors or agents when requested, and those inspectors or agents have the same power and protection as peace officers while engaged in the discharge of their duties.

[R.I. Gen. Laws § 4-4-17 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-17: Importation or exposure of diseased animals.

Any person bringing into the state any neat cattle or other animals which he or she knows to be infected with any infectious or contagious disease, or who exposes the cattle or other animals, known to him or her to be infected, to other cattle and animals not infected with an infectious or contagious disease, shall be fined not less than one hundred dollars (\$100) nor more than five hundred dollars (\$500).

[R.I. Gen. Laws § 4-4-19 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-19: Orders prohibiting importation of animals.

The director of environmental management may prohibit the introduction of any cattle or other domestic animals into the state. Any person who brings, transports or introduces any cattle or other domestic animals into the state, after the director has issued an order forbidding the introduction of that cattle or other domestic animal into the state, or after the director has published for five (5) successive days in any newspapers published in this state as the director may direct, an order forbidding that introduction, shall be fined not exceeding three hundred dollars (\$300) for every offense, and every officer or agent of any company or other person, who violates that order, is subject to the fine. In case of the introduction into the state of cattle or other domestic animals, contrary to the order of the director, the introduction of each animal is deemed a separate and distinct offense.

[R.I. Gen. Laws § 4-4-20 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-20: Publication of information on diseases.

The director of environmental management shall endeavor to obtain full information in relation to any contagious disease which may prevail among cattle or other domestic animals near the borders of the state, and shall publish and circulate that information in his or her discretion. Should any contagious disease break out, or should there be reasonable suspicion of its existence among cattle or other domestic animals in any city or town in the state, he or she shall examine the cases, and publish the result of his or her examination, for the benefit of the public.

[R.I. Gen. Laws § 4-4-22 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-22: Sale of infected animals or milk.

Any person who sells or offers to sell any cattle or other domestic animals, or any part of these animals, known to him or her to be infected with any contagious disease, or with any disease dangerous to the public health, or who sells or offers to sell any milk from any infected cattle or other domestic animals, shall be fined not exceeding one thousand

dollars (\$1,000) or be imprisoned not exceeding two (2) years, or both, in the discretion of the court.

[R.I. Gen. Laws § 4-4-23 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-23: Regulations for suppression of disease.

The director of environmental management may make all necessary regulations for the prevention, treatment, cure, and extirpation of any disease, and any person who fails to comply with any regulation made shall be fined not exceeding three hundred dollars (\$300) or be imprisoned not exceeding one year.

[R.I. Gen. Laws § 4-4-24 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-4: Animal Diseases in General

Section 4-4-24: State rules paramount to local.

Whenever the director of environmental management makes and publishes any regulations concerning the extirpation, cure, or treatment of cattle or other domestic animals infected with, or which have been exposed to any contagious disease, those regulations shall supersede the regulations made by the authorities of the several towns and cities upon that subject, and the operation of those regulations made by those authorities shall be suspended during the time those made by the director are in force.

[R.I. Gen. Laws § 4-6.1-1 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-6.1: Inspection and Control of Cattle Produced Milk

Section 4-6.1-1: Definitions. – As used in this chapter:

(1) “**Director**” means the director of health of the state and also his or her agents and servants authorized by law or by lawful direction of the director to perform any act or to do any thing under the terms of any particular provision of this title or chapter 2 of title 21 with respect to powers, duties or obligations specifically imposed upon the director

[R.I. Gen. Laws § 4-6.1-5 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-6.1: Inspection and Control of Cattle Produced Milk

Section 4-6.1-5: Dairy farms to be open to inspection.

All dairy farms of any permittee are open to inspection by the director and his or her authorized agents at all reasonable times.

[R.I. Gen. Laws § 4-6.1-7 \(2009\)](#)

State of Rhode Island General Laws

Title 4: Animals and Animal Husbandry

Chapter 4-6.1: Inspection and Control of Cattle Produced Milk

Section 4-6.1-7: Director empowered to require information.

The director has power reasonably to require from any producer holding a permit any information concerning that producer and/or his or her herds and animals as he or she may require.

[R.I. Gen. Laws § 21-2-11 \(2009\)](#)

State of Rhode Island General Laws.

Title 21: Food and Drugs

Chapter 21-2: Milk Sanitation Code

Section 21-2-11: Emergency powers.

(a) In the event of any serious disaster, such as conflagration, enemy attack, earthquake, flood, hurricane, tornado, drought, or other emergency, which shall result in an unusual nonseasonal shortage in the milk supply in the state of Rhode Island, the director shall have power, upon issuance of an order by him or her specifying the nature and extent of the emergency and without notice: (1) to suspend part or all of the regulations made under authority of this chapter; (2) to promulgate other or additional emergency regulations; and (3) to suspend part or all of the requirements of this chapter pertaining to inspection and the obtaining of permits by milk plants located outside the state of Rhode Island from which milk is derived for sale in the state of Rhode Island and pertaining to inspection of their milk producers and haulers.

(b) In the case of any special emergency, the director may issue emergency permits for the importation of milk into the state of Rhode Island which has not been inspected at the source in accordance with this statute and the regulations pursuant to this chapter; provided, that the director shall be satisfied that any source of milk admitted by emergency permit shall not constitute a threat to the health of the people of Rhode Island, and provided that environmental conditions surrounding the production, transportation, and processing of the imported milk shall reasonably have been subject to inspection at its source under authority of law other than that of the state of Rhode Island.

(c) The suspension and emergency regulations shall be for the duration of the emergency or forty (40) days, whichever period shall be shorter.

(d) The director is empowered in the event of any contamination or threat of contamination of the milk supply alone to promulgate additional emergency regulations pertaining to the treatment and conditions of production, distribution, and sale of milk, the regulations to go into effect immediately without a hearing. The emergency regulations shall be in effect forty (40) days or the duration of the emergency, whichever period shall be shorter. The director shall promulgate the emergency regulations by filing a copy of the regulations in the secretary of state's office and having copies available for public inspection. As soon as practicable, the director shall give notice of the promulgation of the emergency regulations.

[R.I. Gen. Laws § 21-2-22 \(2009\)](#)

State of Rhode Island General Laws.

Title 21: Food And Drugs

Chapter 21-2: Milk Sanitation Code

Section 21-2-22: Inspection of animals and milk.

(a) Responsibility for the inspection of herds and animals of milk producers within the state of Rhode Island shall be imposed upon the director of environmental management who shall enforce compliance on the part of Rhode Island producers with the provisions of, and as provided in chapters 4, 5, 6, and 7 of title 4. With respect to the herds of producers of milk sold or destined for sale in the state of Rhode Island whose herds or establishments are located outside the state, it shall be the duty of the director of environmental management, either personally or through the director's subordinates or veterinarians or technicians approved by the director, to make inspection of the herds and animals, wherever located, to assure himself or herself that they comply in all respects with the same requirements pertaining to the herds and animals of Rhode Island producers under

the provisions of chapters 4, 5, 6, and 7 of title 4, or in the event that the director is satisfied as to the competence and reliability of an entire inspection service or of individual inspectors of cattle available in the state where the herds or establishments of the out-of-state producers are located, he or she may approve the service or the inspectors, as the case may be, and solicit and accept the certification of those inspectors to the health of the herds and animals of out-of-state producers furnishing milk to out-of-state milk plant permittees and compliance with the standards provided for Rhode Island producers; provided, that in the case of any producer outside of the state of Rhode Island who desires certification for the production of grade A milk, all inspections for animal disease and compliance with the provisions of chapters 4, 5, 6, and 7 of title 4, and for compliance with the requirements for grade A producers provided in § 21-2-6(b) – (d), shall be made by the director of health himself or herself, his or her own subordinates, or by veterinarians or technicians approved by him or her. It shall be the duty of the director of health to procure any necessary information with respect to the herds of producers located outside the state of Rhode Island, milk from which is processed or sold in Rhode Island, required to ensure that the herds substantially comply with the same requirements as in the case of Rhode Island producers imposed upon them by the provisions of chapters 4, 5, 6, and 7 of title 4.

(b) The director of the department of environmental management shall provide all information and reports necessary to the director of department of health for the enforcement of chapter 6.1 of title 4 and this chapter.

[R.I. Gen. Laws § 21-2-51 \(2009\)](#)

State of Rhode Island General Laws.

Title 21: Food And Drugs

Chapter 21-2: Milk Sanitation Code

Section 21-2-51: Access of enforcement officers.

The director and the director's duly authorized milk inspectors, deputies, and assistants, or any of them, shall have access, at all reasonable hours, to all premises and places where milk or milk products are produced, handled, or processed or where the process of pasteurization is carried on, for the purpose of the enforcement of the provisions of this chapter.

[Rules and Regulations Governing the Importation of Animals](#)

Regulation, Agriculture and Resource Marketing, Department of Environmental Management

ERLID Number: 5243 (2008)

Rule 1.00 Purpose

The purpose of these rules and regulations is to permit the importation into Rhode Island of only those animals which are disease free or which originate from herds or flocks that have qualified as disease free according to State or Federal Standards.

Rule 2.00 Authority

These rules and regulations are promulgated pursuant to Chapter 42-17.1, Environmental Management, and Chapter 4-4-23 in accordance with 42-35, Administrative Procedures, of the Rhode Island General Laws of 1956, as amended.

Rule 3.00 Administrative Findings

Animals harboring infectious diseases present a health threat to the livestock, native wildlife and human populations of Rhode Island. Many infectious, contagious diseases of animals are not readily detected through physical

examination and anamnesis, but require the application of approved laboratory diagnostic procedures by professionally trained and supervised personnel. Therefore, only animals that have been tested negative or originate from qualified negative herds or flocks of origin may be allowed entry into Rhode Island. It is necessary that any animal testing positive to such procedures may be denied entrance into Rhode Island.

Rule 5.00 Definitions

For the purpose of these regulations, the following terms shall have the following meanings:

(a) "**Accredited Veterinarian**" shall mean a veterinarian approved by the Administrator of the Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA), to perform functions required by animal disease control and eradication programs.

.....

Rule 6.00 General Requirements

6.01 No person shall import, or cause to be imported into the state any domestic animal, including but not limited to goats, cattle, swine, sheep, equine as well as camelids, poultry, ratites and farmed cervidae, unless such animal is accompanied by a Certificate of Veterinary Inspection and an Import Permit, or a waybill as these regulations require.

6.02 No person shall import, or cause to be imported into the state any animal(s)/bird(s) which is under, or originates from any state or region, which is under, any state or federal quarantine due to the presence or suspected presence of a contagious disease without the specific and written approval of the State Veterinarian.

6.03 No person shall import or cause to be imported into the state any animal(s)/bird(s) that is affected with, or has been exposed to any contagious disease including, but not limited to: tuberculosis, brucellosis, anaplasmosis, psoroptic scabies, hog cholera, pseudorabies, rabies, equine infectious anemia, salmonella pullorum, salmonella enteritidis, psittacoses or scrapie.

6.04 Import Permits are required for each shipment of animals. Import Permits will be valid for ten (10) days from the date of issuance. The completed, signed Import Permit must be submitted with copy of all required Certificates of Veterinary Inspection and testing results within 48 hours of arrival of the animals in the State of Rhode Island.

.....

Rule 7.00 Certificate Of Veterinary Inspection

7.01 No person shall import, or cause to be imported any domestic animal, camelid, cervidae, ratite, poultry or waterfowl as specified in Section 7.00, unless each animal is accompanied by an Official Certificate of Veterinary Inspection issued within thirty (30)

days of import and signed by a veterinarian licensed and accredited in the state of origin, and by identification, as required by state and federal animal identification laws, and as set out herein. One copy of such Certificate must be approved and signed by the official having jurisdiction over the disease of animals in the state of origin and forwarded to the Rhode Island State Veterinarian.

[Grade "A" Pasturized Milk Ordinance, 2009 Revision](#)

Regulation, Department of Health

ERLID Number: 5954 (2009)

Regional Laws and Regulations

Vermont

Authority for expanding the role of the Department of Agriculture, Food and Markets in regulating milk production, handling, testing, movement, and processing during FMD response can be found in:

[Vt. Stat. Ann. tit. 6, § 1160 \(2009\)](#)

Vermont Statutes,

Title 6: Agriculture

Part 5. Livestock Disease Control

Chapter 102. Control of Contagious Livestock Diseases

Subchapter 1. General Provisions

Section 1160. Appropriations; emergency outbreak of contagious disease

....

(b) In case of the outbreak within this state of some contagious disease of domestic animals, or whenever there is reason to believe that there is danger of the introduction into the state of any contagious disease prevailing among domestic animals outside the state, the secretary may take such action and issue such emergency rules as are necessary to prevent the introduction or spread of the disease.

[Vt. Stat. Ann. tit. 6, § 1152 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Part 5. Livestock Disease Control

Chapter 102. Control of Contagious Livestock Diseases

Subchapter 1. General Provisions

Section 1152. Administration

(a) The secretary shall be responsible for the administration and enforcement of the livestock disease control program. The secretary may appoint the state veterinarian to manage the program, and other personnel as are necessary for the sound administration of the program.

(b) The secretary shall maintain a public record of all permits issued, and of all animals tested under this chapter, for a period of three years.

(c) The secretary may conduct any inspections, investigations, tests, diagnoses or other reasonable steps necessary to discover and eliminate contagious diseases existing in domestic animals or cultured trout in this state.

(d) The secretary may contract and cooperate with the United States Department of Agriculture and other federal agencies or other states for the control and eradication of contagious diseases of animals. The secretary shall consult and cooperate, as appropriate, with the commissioner of fish and wildlife and the commissioner of health regarding the control of contagious diseases.

(e) If necessary, the secretary shall set priorities for the use of the funds available to operate the program established by this chapter

(f) The taking and possessing of an animal which is imported, possessed, or confined for the purpose of hunting shall be regulated by the fish and wildlife board and commissioner of fish and wildlife under the provisions of part 4 of Title 10. However, the secretary shall have jurisdiction over the animal for the purposes described in section 1153 of this title.

See also:

[Vermont Statutes](#), especially:

[Title 6: Agriculture](#)

[Title 20: Internal Security and Public Safety](#)

[Code of Vermont Rules](#) (Code Vt. R.), especially:

[Agency 20. Department of Agriculture, Food And Markets](#)

[Vermont Dairy Regulations](#)

[Animal Health Regulations](#)

[Vt. Stat. Ann. tit. 6, § 1 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Part 1. Agency of Agriculture, Food and Markets

Chapter 1. General Powers; Secretary of Agriculture, Food and Markets

Section 1. General powers of agency; secretary of agriculture, food and markets.

(a) The agency of agriculture, food and markets shall be administered by a secretary of agriculture, food and markets. The secretary shall supervise and be responsible for the execution and enforcement of all laws relating to agriculture and standards of weight and measure

(b) The following entities shall exist and operate within the agency of agriculture, food and markets under the general supervision of the secretary:

- (1) The Vermont milk commission
- (2) The state dairy council
- (3) The Vermont dairy industry council
- (4) The agricultural development commission . . .

[Vt. Stat. Ann. tit. 6, § 1151 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Part 5. Livestock Disease Control

Chapter 102. Control of Contagious Livestock Diseases

Subchapter 1. General Provisions

Section 1151. Definitions.

...
(7) **“Contagious disease,” “communicable disease,” “infectious disease” or “disease”** means any disease found in domestic animals which is capable of spreading from one domestic animal to another with or without actual contact. **“Contagious disease”** includes, but is not limited to, all reportable diseases.

[Vt. Stat. Ann. tit. 6, § 1152 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Part 5. Livestock Disease Control
Chapter 102. Control of Contagious Livestock Diseases
Subchapter 1. General Provisions
Section 1152. Administration

- (a) The secretary shall be responsible for the administration and enforcement of the livestock disease control program. The secretary may appoint the state veterinarian to manage the program, and other personnel as are necessary for the sound administration of the program.
- (b) The secretary shall maintain a public record of all permits issued, and of all animals tested under this chapter, for a period of three years.
- (c) The secretary may conduct any inspections, investigations, tests, diagnoses or other reasonable steps necessary to discover and eliminate contagious diseases existing in domestic animals or cultured trout in this state.
- (d) The secretary may contract and cooperate with the United States Department of Agriculture and other federal agencies or other states for the control and eradication of contagious diseases of animals. The secretary shall consult and cooperate, as appropriate, with the commissioner of fish and wildlife and the commissioner of health regarding the control of contagious diseases.
- (e) If necessary, the secretary shall set priorities for the use of the funds available to operate the program established by this chapter
- (f) The taking and possessing of an animal which is imported, possessed, or confined for the purpose of hunting shall be regulated by the fish and wildlife board and commissioner of fish and wildlife under the provisions of part 4 of Title 10. However, the secretary shall have jurisdiction over the animal for the purposes described in section 1153 of this title.

[Vt. Stat. Ann. tit.6 , § 1158 \(2009\)](#)

Vermont Statutes
Title 6. Agriculture
Part 5. Livestock Disease Control
Chapter 102. Control of Contagious Livestock Diseases
Subchapter 1. General Provisions
Section 1158. Quarantine district

- (a) The secretary may establish a quarantine district whenever it is determined that a contagious disease is widely spread throughout an area of the state and that a quarantine district is necessary to contain or prevent the further spread of the disease.
- (b) In establishing a quarantine district, the secretary may, by order
 - (1) regulate, restrict or restrain movements of animals or vehicles and equipment associated with animals into, out of, or within the district
 - (2) detain all animals within the district which might be infected with or have been exposed to the disease for examination at any place specified by the quarantine order; and
 - (3) take other necessary steps to prevent the spread of and eliminate the disease within the quarantine district. . . .

[Vt. Stat. Ann. tit. 6, § 1159 \(2009\)](#)

Vermont Statutes,
Title 6. Agriculture
Part 5. Livestock Disease Control
Chapter 102. Control of Contagious Livestock Diseases
Subchapter 1. General Provisions
Section 1159. Disposal of diseased animals

(a) The secretary may condemn and order destroyed any animal that is infected with or has been exposed to a contagious disease. An order to destroy an animal shall be based on a determination that the destruction of the animal is necessary to prevent or control the spread of the disease. The secretary shall order any condemned animal to be destroyed and disposed of in accordance with approved methods as specified by rule. The secretary's order may extend to some or all of the animals on the affected premises.

(b) The secretary may order that any real property, building, vehicle, piece of equipment, container or other article associated with a diseased animal be disinfected and sanitized. Any cost of disinfection incurred by the secretary shall be deducted from any compensation paid to an animal owner under this section. . . .

[Vt. Stat. Ann. tit. 6, § 1160 \(2009\)](#)

Vermont Statutes,

Title 6: Agriculture

Part 5. Livestock Disease Control

Chapter 102. Control of Contagious Livestock Diseases

Subchapter 1. General Provisions

Section 1160. Appropriations; emergency outbreak of contagious disease

. . . .

(b) In case of the outbreak within this state of some contagious disease of domestic animals, or whenever there is reason to believe that there is danger of the introduction into the state of any contagious disease prevailing among domestic animals outside the state, the secretary may take such action and issue such emergency rules as are necessary to prevent the introduction or spread of the disease.

[Vt. Stat. Ann. tit. 6, § 2671 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Part 6. Milk and Milk Products

Chapter 151. Supervision, Inspection and Licensing of Dairy Operations

Subchapter 1. General Provisions

Section 2671. Purpose

It is the policy of the state of Vermont to protect and promote the public interest by:

(1) Insuring the citizens of this state, and the general public an adequate supply of pure fresh milk and other dairy products of constantly improving quality.

(2) Establishing such appropriate dairy laws, regulations and administrative procedures, as will protect the public health and welfare.

(3) Improving the economy of the state and the welfare of dairy farmers and milk handlers by improving the competitive position of the dairy industry, and increasing the consumption of milk and other dairy products.

(4) Securing uniformity in dairy standards, labeling and sanitary procedures, and developing milk markets by cooperating and coordinating with the appropriate dairy agencies of other states and the federal government to the extent consistent with the interest of the state of Vermont.

(5) It is essential, in order to assure the continued production of milk and its handling and distribution, that prices to producers be such as to return reasonable cost of production, and at the same time assure an adequate supply of milk and dairy products to consumers at reasonable prices; and to these ends it is essential that consumers and others be adequately informed as to the dietary needs and advantages of milk and dairy products and as to the economics resulting from the use of milk and dairy products, and to command for milk and dairy products, consumer attention and demand consistent with

their importance and value. It is further declared that continued decline in the consumption of fluid milk and some other dairy products will jeopardize the production of adequate supplies of milk and dairy products because of increasing surpluses necessarily returning less to producers; and that continued adequate supplies of milk and dairy products is a matter of vital concern as affecting the health and general welfare of the people of this state. It is therefore declared to be the legislative intent and policy of the state:

(A) To enable milk producers and others in the dairy industry, with the aid of the state, to more effectively promote the consumption of milk and dairy products;

(B) To provide methods and means for the development of new and improved dairy products, and to promote their use; and

(C) To this end, eliminate the possible impairment of the purchasing power of the milk producers of this state and to assure an adequate supply of milk for consumers at reasonable prices.

[Vt. Stat. Ann. tit. 6, § 2676 \(2009\)](#)

Vermont Statutes,

Title 6, Agriculture

Part 6, Milk and Milk Products

Chapter 151. Supervision, Inspection and Licensing of Dairy Operations

Section 2676. Title to milk in tank truck

When milk is sampled, measured and transferred from a farm tank to a tank truck, the milk collector shall be deemed to be the agent of the buyer and title to the milk shall be deemed to pass to the buyer at the time of such transfer

[Vt. Stat. Ann. tit. 6, § 2701 \(2009\)](#)

Vermont Statutes,

Title 6. Agriculture

Part 6. Milk and Milk Products

Chapter 151. Supervision, Inspection and Licensing of Dairy Operations

Subchapter 2. Secretary of Agriculture, Food and Markets

Section 2701. Regulations

(a) The secretary, in accordance with chapter 25 of Title 3, shall promulgate, and may amend and rescind, dairy sanitation regulations relating to dairy products and imitation dairy products to enforce this chapter including but not limited to: labeling, weighing, measuring and testing facilities, buildings, equipment, methods, procedures, health of animals, health and capability of personnel and quality standards. In addition, the uniform regulation for sanitation requirements, as adopted by the National Conference on Interstate Milk Shippers, and published by the U.S. Department of Health and Human Services, Public Health Service, Food and Drug Administration, Grade A Pasteurized Milk Ordinance, together with amendments, supplements and revisions thereto, are adopted as Part of this chapter, except as modified or rejected by regulation. . . .

[Vt. Stat. Ann. tit. 6, § 3131 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Chapter 201. Humane Slaughter of Livestock

Section 3131. Definitions

...
(6) **“Humane method”** means either:

(A) A method whereby the animal is rendered insensible to pain by mechanical, electrical, chemical or other means that is rapid and effective before being shackled, hoisted, thrown, cast or cut.

(B) A method in accordance with ritual requirements of the Jewish faith or any other religious faith whereby the animal suffers loss of consciousness by anemia of the brain caused by the simultaneous and instantaneous severance of the carotid arteries with a sharp instrument

[Vt. Stat. Ann. tit. 6, §2777 \(2009\)](#)

Vermont Statutes

Title 6. Agriculture

Part 6. Milk and Milk Products

Chapter 152. Sale of Unpasteurized (Raw) Milk

Section 2777. Standards for the sale of unpasteurized (raw) milk

[Permits conditional sale of raw milk]

[Vt. Stat. Ann. tit. 20, § 1 \(2009\)](#)

Vermont Statutes

Title 20. Internal Security and Public Safety

Part 1. Emergency Management and Military Aid

Chapter 1. Emergency Management

Section 1. Purpose and policy

(a) Because of the increasing possibility of the occurrence of disasters or emergencies of unprecedented size and destructiveness resulting from all-hazards and in order to insure that preparation of this state will be adequate to deal with such disasters or emergencies, to provide for the common defense and to protect the public peace, health, and safety, and to preserve the lives and property of the people of the state it is hereby found and declared to be necessary.

(1) To create a state emergency management agency, and to authorize the creation of local and regional organizations for emergency management.

(2) To confer upon the governor and upon the executive heads or legislative branches of the towns and cities of the state the emergency powers provided herein.

(3) To provide for the rendering of mutual aid among the towns and cities of the state, and with other states and Canada, and with the federal government with respect to the carrying out of emergency management functions.

(4) To authorize the establishment of such organizations and the taking of such steps as are necessary and appropriate to carry out the provisions of this chapter.

(b) It is further declared to be the purpose of this chapter and the policy of the state that all emergency management functions of this state be coordinated to the maximum extent with the comparable functions of the federal government including its various departments and agencies, of other states and localities, and of private agencies of every type, to the end that the most effective preparation and use may be made of the nation's resources and facilities for dealing with any emergencies resulting from all-hazards.

[Vt. Stat. Ann. tit. 20, § 2 \(2009\)](#)

Vermont Statutes

Title 20. Internal Security and Public Safety

Part 1. Emergency Management and Military Aid

Chapter 1. Emergency Management

Section 2. Definitions

As used in this chapter:

- (1) **"All-hazards"** means any natural disaster, health or disease-related emergency, accident, civil insurrection, use of weapons of mass destruction, terrorist or criminal incident, radiological incident, significant event, and designated special event, any of which may occur individually, simultaneously, or in combination and which poses a threat or may pose a threat, as determined by the commissioner or designee, to property or public safety in Vermont
- (2) **"Commissioner"** means the commissioner of public safety
- (3) **"Director"** means the director of Vermont division of emergency management
- (4) **"Emergency functions"** include services provided by the department of public safety, firefighting services, police services, sheriff's department services, medical and health services, rescue, engineering, emergency warning services, communications, evacuation of persons, emergency welfare services, protection of critical infrastructure, emergency transportation, temporary restoration of public utility services, other functions related to civilian protection and all other activities necessary or incidental to the preparation for and carrying out of these functions.
- (5) **"EPCRA"** means the federal Emergency Planning and Community Right-To-Know Act, 42 U.S.C. § 11000-11050 (1986).
- (6) **"Emergency management"** means the preparation for and implementation of all emergency functions, other than the functions for which military forces or other federal agencies are primarily responsible, to prevent, plan for, mitigate, and support response and recovery efforts from all hazards. Emergency management includes the equipping, exercising, and training designed to insure that this state and its communities are prepared to deal with all-hazards.
- (7) **"Hazard mitigation"** means any action taken to reduce or eliminate the threat to persons or property from all-hazards.

[Code Vt. R. 20 021 003 \(2010\)](#)

Code of Vermont Rules

Agency 20. Department of Agriculture, Food and Markets

Sub-agency 021. Dairy Division

20 021 003. Milk and Milk Products

Regulation 1. Definitions

. . .

For use in the interpretation of this part and in the regulations hereinafter published the following definitions shall apply:

1. **"Commissioner"**, means Commissioner of Agriculture or his duly authorized agent
2. **"Milk Producer"** or **"producer"** is a person, partnership, unincorporated association or corporation who owns or controls one or more cows or dairy goats and sells or offers for sale a part or all of the milk produced by the animals.
3. **"Dairy farm"** is any place or premise where one or more cows or dairy goats are kept and where a part, or all of the milk from the animals is sold or offered for sale.
4. **"Milk plant"** is any place, premise, or establishment where milk or dairy products are collected, assembled, handled, processed, stored, pasteurized, aseptically processed, packaged or prepared for distribution.
5. **"Transfer Station"** is any place, premise, or establishment where milk or milk products are transferred directly from one milk tank truck to another.
6. **"Receiving Station"** is any place, premise, or establishment where raw milk is received, collected, handled, stored or cooled and prepared for further transporting.
7. **"Bulk Milk Pickup Tanker"** is a vehicle including the truck, tank and those appurtenances necessary for its use, used by a milk hauler to transport bulk raw milk from a dairy farm to a transfer station, receiving station, or milk plant

8. **“Milk Transport Tank”** is a vehicle including the truck and tank used by a milk hauler to transport bulk shipments of milk from a transfer station or milk plant

9. **“Milk handler”** or **“handler”** is a person, firm, unincorporated association or corporation engaged in the business of buying, selling, assembling, packaging or processing milk or other dairy products, for sale within or without the State of Vermont

10. **“Milk handler license”** is a license issued by the Commissioner which authorizes the licensee to carry on the business of a milk handler.

....
19. **“Official Laboratory”** is a biological, chemical, or physical laboratory which is under the direct supervision of the Vermont Department of Agriculture

20. **“Officially Designated Laboratory”** is a commercial laboratory authorized to do official work by the Vermont Department of Agriculture, or a milk industry laboratory officially designated by the Vermont Department of Agriculture for the examination of producer samples of raw milk and commingled milk tank truck samples of raw milk for antibiotic residues and bacterial limits. The Commissioner may terminate approval for cause

....
41. **“Pasteurized”** when used to describe a dairy product means that every particle of such product shall have been heated in the properly operated equipment to one of the temperatures specified in the table of this paragraph and held continuously at or above the temperature for the specified time (or other time/temperature relationship which has been demonstrated to be equivalent thereto in the microbial destruction.)

TEMPERATURE	TIME
145 °F.	30 minutes
161 °F.	15 seconds
191 °F.	1 second
194 °F.	0.5 second
201 °F.	0.1 second
204 °F.	0.05 second
212 °F.	0.01 second

If the dairy product has a fat content of 10 percent or more, or if it contains added sweeteners, the specified temperature shall be increased by 5 °F. Provided, That eggnog and ice cream mix shall be heated to at least the following temperature and time specification

TEMPERATURE	TIME
155 °F. (69 °C)	30 minutes
175 °F. (80 °C)	25 seconds
180 °F. (83 °C)	15 seconds

Provided, further, That nothing in this definition shall be construed as barring any other pasteurization process which has been recognized by the Vermont Department of Agriculture to be equally efficient.

42. **“Ultra-Pasteurized”** when used to describe a dairy product means that such product shall have been thermally processed at or above 280 °F. for at least 2 seconds, either before or after packaging, so as to produce a product which has an extended shelf life (under refrigerated conditions).

43. "**Aseptically Processed Milk and Milk Products**" are products hermetically sealed in a container and so thermally processed in conformance with "The Code of Federal Regulations" and the provisions of these Regulations so as to render the product free of microorganisms capable of reproducing in the product under normal unrefrigerated conditions of storage and distribution. The product shall be free of viable microorganisms (including spores) of public health significance.

44. "**Aseptic Processing**" - the term aseptic processing when used to describe a milk product means that the product has been subject to sufficient heat processing, and packaged in a hermetically sealed container, to conform to the applicable requirements of "**The Code of Federal Regulations**" and these Regulations, and maintain the commercial sterility of the product under normal unrefrigerated conditions.

45. "**Hermetically Sealed Container**" is a container that is designed and intended to be secure against the entry of microorganisms and thereby maintain the commercial sterility of its contents after processing.

[Code Vt. R. 20 021 003 \(2010\)](#)

Code of Vermont Rules

Agency 20. Department of Agriculture, Food and Markets

Sub-agency 021. Dairy Division

20 021 003. Milk and Milk Products

Regulation 10. The Examination of Milk and Milk Products

It shall be the responsibility of the milk hauler to collect a representative sample of milk from each farm bulk tank prior to transferring milk from a farm bulk tank, truck, or other container. All samples shall be collected and delivered to a milk plant, receiving station, transfer station, or other location approved by the Commissioner of Agriculture.

[Vermont Dairy Regulations \(2010\)](#)

[The Pasteurized Milk Ordinance \(PMO\)](#) - The Food & Drug Administration's (FDA) Pasteurized Milk Ordinance (PMO) is the accepted the operating guideline for the handling and production of milk and dairy products in Vermont.

Animal Health Regulations

Rule #98074 (2010)

[Rules Governing the Importation of Domestic Animals](#)

Section I. Definitions

.....

1. Accredited Veterinarian means a veterinarian who is approved by the U. S. Department of Agriculture and the Livestock Sanitary Official in the state or country of origin to inspect domestic animals and issue Certificates of Veterinary Inspection.

6. Approved Laboratories are laboratories which are acceptable to both the state of origin and USDA to utilize certain tests according to protocol.

12. Case Positive Premises means the premises on which a disease has been confirmed by appropriate test or other means.

14. Certificate of Veterinary Inspection means a declarative document issued by an accredited veterinarian of the state or country of origin, certifying to all statements required by these regulations concerning the importation of domestic animals, and certifying that all tests required by this rule have been performed.

15. Certified Farm means a facility/premises approved and certified annually by the commissioner to receive imported and native feeder cattle, feeder lambs, and feeder swine.

21. Commissioner means the Commissioner of Agriculture, Food & Markets for the State of Vermont or his designated representative including the State Veterinarian and animal health specialists.

22. Contagious Disease means any disease found in domestic animals which is capable of spreading from one domestic animal to another or to wild animals with, or without, actual contact including reportable diseases as defined in Title 6, Section 1151(13).

42. Herd of Origin means a group of animals under common ownership or supervision in which the animal was born or spent the past 90 days prior to importation. Herd of origin does not include a temporary assembly of animals for sale or shipment.

43. Immediate Slaughter means slaughter of livestock within 7 days from time of entry into Vermont.

44. Import means any act of transporting domestic animals into Vermont from any state or country. The term import does not apply to domestic animals residing in Vermont that temporarily leave the state for not more than 30 days, return to the premises of origin and have met the health requirements of the state(s) of destination in the interim.

45. Importer means any person transporting his/her own domestic animals into Vermont or any purchaser or consignee to whose premises or to whose custody such domestic animals are first delivered after such entry.

46. Import Permit means a form authorizing importation issued by the Commissioner to any person who intends to import domestic animals into Vermont. See Section II B of this rule.

50. Negative Test means a test not interpreted to be indicative of a particular disease under criteria approved by the United States Department of Agriculture.

54. Post-entry Retest and Examination shall mean the retesting and examining of imported domestic animals as deemed necessary by the commissioner.

56. Premises of Destination means the first premises within the state on which imported domestic animals are confined. Exceptions exist for cattle and bison purchased by livestock dealers under Section III A. 1.(b).

57. Premises of Origin means place of birth or last housing for at least 90 days prior to importation. Premises of origin does not include the location of a temporary assembly of animals for sale or shipment.

.....

Section II. General Information

A. General Requirements:

1. No person shall import, or cause to be imported, into Vermont any domestic animal unless the domestic animal is accompanied by proper documentation as required by this rule such as a certificate of veterinary inspection, an import permit, an owner shipper statement or is imported pursuant to a memorandum of understanding signed by the commissioner.
2. No person shall import, or cause to be imported, into Vermont any domestic animal which is under any state or federal quarantine due to the presence or suspected presence of a contagious disease.
3. No person shall import or cause to be imported into Vermont any domestic animal that is affected with, or has been exposed to, any contagious disease including, but not limited to, tuberculosis, brucellosis, anaplasmosis, psoroptic scabies, hog cholera, pseudorabies, rabies, equine infectious anemia, pullorum-typhoid, chlamydiosis (psittacosis) or scrapie.

4. In order to prevent the spread of contagious diseases, any domestic animal brought into the state without having been first tested and inspected as required by this rule may be returned to the state of origin within 48 hours of a determination by the commissioner that the domestic animal has been illegally imported. While in Vermont, the illegally imported domestic animal shall be strictly quarantined. In the event that the domestic animal cannot be returned to the state of origin, the animal shall be slaughtered or euthanized within 72 hours of a determination by the commissioner that the animal has been illegally imported. The owner of the domestic animal shall bear the full expense of its destruction or removal from Vermont, and shall not be entitled to any compensation from the state.
5. Domestic animals, imported into Vermont except for exhibition or immediate slaughter may be held in quarantine until released by the commissioner.

Appendix 4: DISINFECTANTS

Foot-and-Mouth Disease Virus is sensitive to the acidity of its environment (6<pH>9). Common household solutions, such as bleach or vinegar, can effectively deactivate FMDV but only if the surface is properly prepared and the solution properly applied to saturate the virus.

So, all surfaces to be disinfected must be:

1. Thoroughly pre-washed (grease, dung, mud, feed, soil, etc. removed) and
2. Thoroughly covered with an approved dilution for enough time to work.

For field applications in an FMD outbreak, USDA-APHIS has recommended the following:⁸⁹

Product	Dilution	Mixing Instructions	Notes
5.25% Sodium Hypochlorite (NaOCl) (Household bleach)	3%	Add 3 gallons of chlorine bleach to 2 gallons of water; mix thoroughly.	This concentration can damage clothes, shoes, rubber goods, and is mildly corrosive to steel surfaces.
Acetic Acid (Household vinegar)	4-5%	Add 6.5 ounces of glacial acetic acid to 1 gallon of water; mix thoroughly.	Vinegar is a 4% solution of acetic acid. Not good for general premises disinfection
Potassium Peroxymonosulfate and Sodium Chloride (i.e. Virkon-S)	1%	Follow label instructions	Virkon-S
Sodium Carbonate (Soda ash)	4%	Add 5.33 ounces of sodium carbonate to 1 gallon of hot water (or 1 pound to 3 gallons of hot water); mix thoroughly	The solution is mildly caustic but can dull paint and varnished surfaces.
Sodium Hydroxide (NaOH) (Lye)	2%	Add 1/3 cup of NaOH pellets (2.7 ounces of the lye) to 1 gallon of cold water; mix thoroughly	This solution is highly caustic. Use protective rubber clothing, gloves and safety glasses. Too caustic for general use. WARNING: Always add the lye to the water. Never pour the water over the lye.

⁸⁹ U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), "Disinfectants for Foot-and-Mouth Disease – Field Use" in the Executive Summary, *National Emergency Response to a Highly Contagious Animal Disease* (March 30, 2001), Appendix III, p. 14 <http://www.accem.org/pdf/usda-hcad.pdf>. See also: U.S. Environmental Protection Agency, *EPA-Approved Pesticides for Use Against the Causative Agents of Selected Foreign Animal Diseases* (October 27, 2008) http://www.aphis.usda.gov/emergency_response/downloads/nahems/Selected%20FAD%20table%20Oct%2008.pdf.

Appendix 5: DEFINITION OF CASES, PREMISES, AND ZONES IN FMD RESPONSE

Cases⁹⁰

Case	Definitions
Suspect case	An animal that has clinical signs consistent with FMD.
Presumptive positive case	An animal that has clinical signs consistent with FMD and positive laboratory results and epidemiological information indicative of FMD.
Confirmed positive case	An animal from which FMD virus has been isolated and identified in a USDA-approved laboratory.

Premises⁹¹

Premises	Definitions	Zone
Infected Premises (IP)	Premises where presumptive positive case or confirmed positive case exists based on laboratory results, compatible clinical signs, case definition, and international standards.	Infected Zone
Contact Premises (CP)	Premises with susceptible animals that have been exposed directly or indirectly to animals, contaminated animal products, fomites, or people from an IP.	Infected Zone Buffer Zone
Suspect Premises (SP)	Premises with susceptible animals under investigation for a report of compatible clinical signs for the FAD agent.	Infected Zone Buffer Zone
At-Risk Premises (ARP)	Premises that have susceptible animals but none of those susceptible animals have clinical signs compatible with the FAD. Premises objectively demonstrate that they are not Infected Premises, Contact Premises, or Suspect Premises.	Infected Zone Buffer Zone
Monitored Premises (MP)	Premises that objectively demonstrate that they are not Infected Premises, Contact Premises, Suspect Premises, or At-Risk Premises.	Infected Zone Buffer Zone
Vaccinated Premises (VP)	Premises where emergency vaccination has been performed. This is a secondary premises designation.	Containment Vaccination Zone Protection Vaccination Zone
Free Premises (FP)	Premises outside of the Control Area and are not Infected, Contact, Suspect, At-Risk, or Monitored Premises.	Surveillance Zone Free Zone

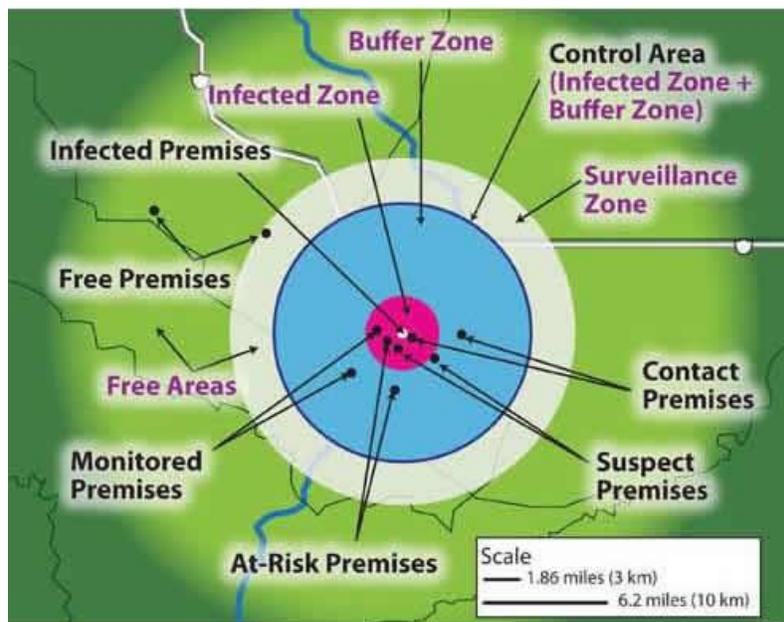
⁹⁰ U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Surveillance Unit, [Foot-and-Mouth Disease \(FMD\) Case Definition](#) (Draft January 20, 2010) and [Standard Template for Case Definitions](#) (Draft – March 3, 2010).

⁹¹ U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), The Egg Sector Working Group. [Highly Pathogenic Avian Influenza Secure Egg Supply Plan](#) (SES Plan, Draft August, 2010), p. 2-17.

Zones⁹²

Zone	Definition
Infected Zone (IZ)	Zone immediately surrounding the Infected Premises
Buffer Zone (BZ)	Zone immediately surrounding the Infected Zone
Control Area (CA)	Consists of an Infected Zone and a Buffer Zone
Surveillance Zone (SZ)	Zone established within and along the border of the Free Area, separating the remainder of the Free Area from the Control Area
Free Area (FA)	Includes a Surveillance Zone, but extends beyond the Surveillance Zone
Containment Vaccination Zone (CVZ)	Emergency Vaccination Zone within the Control Area
Protection Vaccination Zone (PVZ)	Emergency Vaccination Zone outside the Control Area

Map of Zones and Premises⁹³



⁹² USDA-APHIS, [SES Plan](#), pp. 2-17 and 2-18.

⁹³ USDA-APHIS, [SES Plan](#), Figure 2-4.

BIBLIOGRAPHY

Bibliography

A classified list of published sources of information that was consulted in researching and developing background for a Continuity of Business Plan for New England dairies in an outbreak of Foot-and-Mouth Disease.

See also appended “Statutes, Regulations, and Guidance Documents for FMD Response in New England.”

Contents

FMD in International History and Culture	184
Medical and Biological Perspectives on FMD	186
FMD in Emergency Management	190
FMD as a Terrorist Threat	195
FMD in Economic Risk Assessment	196
Structure and Norms of the Dairy Industry in New England and the U.S.....	199

FMD in International History and Culture

- Anderson, Iain [Foot and Mouth Disease: Lessons to be Learned Inquiry Report](#), HC888. London: House of Commons, 2002.
- Blancou, Jean. "History of the Control of Foot and Mouth Disease," *Comparative Immunology, Microbiology and Infectious Diseases* 25:5-6 (October, 2002), pp. 283-96.
- Brandling-Bennett, David. [Emerging Infectious Diseases Worldwide and in the Americas](#), Presentation on Emerging Infections of International Public Health Importance University of Washington (2004)
- Breeze, Roger G.. [Technology, Public Policy and Control of Transboundary Livestock Diseases in our Lifetimes](#), *Scientific and Technical Review* (OIE) 25:1 (2006), pp. 271-292.
- Brown, Fred. "The History of Research in Foot-and-Mouth Disease," *Virus Research* 91:1, (January 2003), pp. 3-7.
- Carroll, Michael. *Lab 257: The Disturbing Story of the Government's Secret Plum Island Germ Laboratory*. (New York: Morrow, 2004).
- Cook, Noble David. *Born To Die: Disease and New World Conquest, 1492-1650*. Cambridge: Cambridge University Press, 1998.
- Crawford, Dorothy H. *Deadly Companions: How Microbes Shaped Our History*. Oxford: Oxford University Press, 2007.
- Crispin, S.M., P.A. Roger, H. O'Hare, and S.H. Binns. "[The 2001 Foot and Mouth Disease Epidemic in the United Kingdom: Animal Welfare Perspectives](#)," *Scientific and Technical Review* (OIE) 21:3 (2002), pp. 877-883.
- Cuijpers, M.P. and K.J. Osinga. "[The Position of the Dutch Farmers' Union on Lessons Learned and Future Prevention and Control of Foot and Mouth Disease](#)," *Scientific and Technical Review* (OIE) 21:3 (2002), pp. 839-850.
- Cumbria Foot and Mouth Disease Inquiry Panel. [Cumbria \[U.K\] Foot and Mouth Disease Inquiry Report](#) (August 2002).
- Dobson, Mary J. *Disease: The Extraordinary Stories Behind History's Deadliest Killer*. London : Quercus, 2007.
- Drexler, Madeline. *Emerging Epidemics: The Menace of New Infections*. New York: PenguinBooks, 2003.
- Ferguson, N.M., C.A. Donnelly, and R.M. Anderson. "The Foot-and-Mouth Epidemic in Great Britain: Pattern of Spread and Impact of Interventions." *Science* 292:5519 (2001), pp. 1155-60.
- Garrett, Laurie. *The Coming Plague: Newly Emerging Diseases in a World Out of Balance* (New York: Penguin Books, 1994).
- Gottfried, Robert S. *The Black Death: Natural and Human Disaster in Medieval Europe*. New York: Simon and Schuster, 1983.
- Harrison, Mark. *Diseases and the Modern World: 1500 to the Present Day*. Cambridge, UK: Polity Press, 2004.
- Haydon, Daniel T., Rowland R. Kao, and R. Paul Kitching. "The UK Foot-and-Mouth Disease Outbreak – The Aftermath," *Nature Reviews Microbiology* 2 (August 2004), pp. 675-681.

- Hays, Jo Nelson. *The Burdens of Disease: Epidemics and Human Response in Western History*. New Brunswick, NJ: Rutgers University Press, 2009.
- Horwitz, Richard P. *Hog Ties: What Pigs Tell Us About America*. Minneapolis: University of Minnesota Press, 2002.
- Kaprey, J. *et al.* "Dynamics of the 2001 U.K. Foot and Mouth Epidemic: Stochastic Dispersal in Heterogeneous Landscape." *Science* 294 (October 2001), pp. 813–17.
- Karlen, Arno. *Disease and Plagues in History and Modern Times*. New York: G.P. Putnam's, 1995.
- Kelly, John. *The Great Mortality: An Intimate History of the Black Death, The Most Devastating Plague of All Time*. New York: HarperCollins, 2005.
- Laurence, C.J.. "[Animal Welfare Consequences in England and Wales of the 2001 Epidemic of Foot and Mouth Disease](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 863-868.
- Mahy, Brian W.J. "Introduction and History of Foot-and-Mouth Disease Virus," in *Foot-and-Mouth Disease Virus*, ed. Brian W.J. Mahy (Berlin: Springer-Verlag, 2005) pp. 1-8.
- Markel, Howard. *When Germs Travel: Six Major Epidemics That Have Invaded America and the Fears They Have Unleashed*. New York: Random House, 2005.
- McKenzie, David. "[Agriculture's Decade in Review](#)," *Weekly Times Now* (December 31, 2009)
- McNeill, William Hardy. *Plagues and People*. New York: Random House, 1998.
- Melo, E. Correa and A. López. "[Control of Foot and Mouth Disease: the Experience of the Americas](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 695-698.
- Missouri State University, Agricultural History Series. [Foot and Mouth Disease: A History of the Disease](#) and [Historic Treatment, Prevention, and Eradication](#) (2010).
- Mort, Maggie, Ian Convery, Cathy Bailey, and Josephine Baxter. [The Health and Social Consequences of the 2001 Foot and Mouth Disease Epidemic in North Cumbria](#) (2004).
- Oldstone, Michael B. A. *Viruses, Plagues, and History: Past Present and Future*. Oxford: Oxford University Press, 2010.
- Ozawa, Yoshihiro, *et al.* "[A Review of Recent Unexpected Animal Disease Events in Japan and Korea and the Follow-Up Action Taken](#)," *Reviews of Science and Technology (OIE)* 25:1 (April, 2006), pp 125-135.
- Pluimers, F.H., A.M. Akkerman, P. van der Wal, A. Dekker and A. Bianchi. "[Lessons from the Foot and Mouth Disease Outbreak in the Netherlands in 2001](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 711-721.
- Rosenberg, Charles E. *The Cholera Years: The United States in 1832, 1849, and 1866*. Chicago: The University of Chicago Press, 1987.
- Rossides, S.C. "[A Farming Perspective on the 2001 Foot and Mouth Disease Epidemic in the United Kingdom](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 831-838.
- Scudamore, J.M., D.G. Pritchard and G.M. Whitmore. "[Comments on the Paper: 'Animal Welfare Consequences in England and Wales of the 2001 Epidemic of Foot And Mouth Disease'](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 869-876.
- Scudamore, James M. [Origin of the UK Foot and Mouth Disease Epidemic in 2001](#), Report for the U.K. Department of Environment, Food, and Rural Affairs (DEFRA) (June. 2002).

- Ser Myo-ja. [With FMD Over, New Precautions Unveiled by Government](#), *Korea JoongAng Daily* (March 25, 2011).
- Sherman, Irwin W. *The Power of Plagues*. Washington, DC: ASM Press, 2006.
- Sherman, Irwin W. *Twelve Diseases That Changed Our World*. Washington, DC: ASM Press, 2007.
- Spinage, Clive A. *Cattle Plague: A History*. New York: Kluwer Academic/Plenum Press, 2003.
- Spratt, Brian G., Chairman of the Review Committee. [Independent Review of the Safety of U.K. Facilities Handling Foot-and-Mouth Disease Virus](#), for the U.K. Secretary of State for Environment, Food and Rural Affairs and the Chief Veterinary Officer(August 31, 2007).
- Thompson, Donald, P. Muriel, D. Russell, P. Osborne, A. Bromley, M. Rowland, S. Creigh-Tyte, and C. Brown. "Economic Costs of the Foot and Mouth Disease Outbreak in the United Kingdom in 2001," *Scientific and Technical Review* (OIE) 21:3 (December 2002), pp. 675–687.
- U.K. Department of Environment, Food, and Rural Affairs (DEFRA), Global Animal Health (GAH), Veterinary Science Team, International Disease Monitoring, Preliminary Outbreak Assessment. [Update of Foot and Mouth Disease in East Asia](#) (June 10, 2010).
- U.K. Department of Environment, Food, and Rural Affairs (DEFRA). [About Foot and Mouth Disease](#) (2010).
- U.K. Department of Environment, Food, and Rural Affairs (DEFRA). [FMD: 2007 Outbreak](#) (2010).
- U.K. Department of Environment, Food, and Rural Affairs (DEFRA). [FMD: Comparisons with the 1967 FMD Outbreak](#) (2010).
- U.K. House of Commons, Committee of Public Agendas. *The 2001 Outbreak of Foot and Mouth Disease*, Fifth Report, 2002-2003 (2003) and *Fifth Report of Foot and Mouth Disease: Applying the Lessons*, Ninth Report of Session, 2005-2006. London: House of Commons, 2005.
- Watts, Sheldon. *Epidemics and History: Disease, Power, and Imperialism*. New Haven: Yale University Press, 1997.
- Woods, Abigail. *A Manufactured Plague: The History of Foot and Mouth Disease in Britain*. Oxford: Routledge, 2004.

Medical and Biological Perspectives on FMD

- Aftosa, Fiebre. [Foot and Mouth Disease](#). Iowa State University and OIE, September 24, 2007.
- Alexandersen, Soren, Zhidong Zhang, Alex I. Donaldson, Anthony J. Garland. "The Pathogenesis and Diagnosis of Foot-and-Mouth Disease," *Journal of Comparative Pathology* 129:1 (July 2003), pp. 1-36.
- Armstrong, Robert, J. Davie, and R.S. Hedger. "Foot-and-Mouth Disease in Man," *British Medical Journal* 4:5578 (December 2, 1967), pp. 529-530.
- AusVet Animal Health Services Pty Ltd and CSIRO Livestock Industries, Australian Animal Health Laboratory. [Review of The Potential Impacts of New Technologies on Australia's Foot](#)

- [and Mouth Disease \(FMD\) Planning and Policies](#), Report to the Australian Government Department of Agriculture, Fisheries and Forestry (November 21, 2005).
- Bauer, Konrad. "Foot and Mouth Disease as Zoonosis," *Archives of Virology* 13 Supplement (1997), pp. 95-97.
- Biebricher, Christof K. and Manfred Eigen. "What is Quasispecies?" *Current Topics in Microbiology and Immunology* 299 (2006), pp. 1-31.
- Canada Food Inspection Agency. [Countries Officially Recognized by Canada as Free of Foot and Mouth Disease \(FMD\)](#) (2010).
- Center for Food Security and Public Health, Iowa State University. [Foot and Mouth Disease](#) (2011).
- Center for Infectious Disease Research and Policy (CIDRAP), University of Minnesota. [Foot-and-Mouth Disease](#) (2011).
- Dement, Angela I. [Foot and Mouth Disease](#), in *Quick Facts About FAZD*, National Center for Foreign Animal and Zoonotic Disease Defense, Texas A&M University (2010) pp. 55-56.
- Domingo Esteban, ed. *Quasispecies: Concepts and Implications for Virology*. New York: Springer, 2006.
- Domingo, Esteban, and Simon Wain-Hobson. [Quasispecies: Past, Present and Future](#), 30th Anniversary Meeting Report, *EMBO Reports* 10 (2009), pp. 444 – 448.
- Donaldson Alex I. "FMD Control Strategies," *The Veterinary Record* 153:16 (October 18, 2003), p. 507.
- Donaldson, Alex I. and R.F Sellers. "Transmission of FMD by People," *The Veterinary Record* 153:9 (August 30, 2003), pp. 279-80.
- Donaldson, Alex I. and Soren Alexandersen. "Predicting the Spread of Foot and Mouth Disease by Airborne Virus," *Scientific and Technical Review (OIE)* (December 2002), pp. 569-575.
- Ferris, Nigel P., Ann Nordengrahn, Geoffrey H. Hutchings, Scott M. Reid, Donald P. King, Katja Ebert, David J. Paton, Therese Kristersson, Emiliana Brocchi, Santina Grazioli, and Malik Merza. "[Development and Laboratory Validation of a Lateral Flow Device for the Detection of Serotype SAT 2 Foot-and-Mouth Disease Viruses in Clinical Samples](#)," *Journal of Virological Methods* 155:1 (January 2009), pp. 10–17.
- Harder, David T. and Larissa A. Minicucci, Consultation for Dairy Management Inc. (DMI). [Foot-and-Mouth Disease: Public Health Implications for Human Consumption of Pasteurized Milk](#), (November 7, 2008).
- Jones, T.O. "Foot-and-Mouth Disease and the Use of Face Masks," *The Veterinary Record* 161:25 (December 22-29, 2007), pp. 863-4. See also Alex I. Donaldson, Comment on "Foot-and-Mouth Disease and the Use of Face Masks," *The Veterinary Record* 162:4 (January 26, 2008), pp. 131-132.
- Keeling, M.J., M.E.J. Woolhouse, R M. May, G. Davies, and B.T. Grenfell. "Modelling Vaccination Strategies Against Foot-and-Mouth Disease," *Nature* 421 (January 9, 2003), pp. 136-142.
- Kitching, R. Paul. "[Identification of Foot and Mouth Disease Virus Carrier and Subclinically Infected Animals and Differentiation from Vaccinated Animals](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 531-538.

- Kitching, R. Paul, A.M. Hutber, and M.V. Thrusfiel. A Review of Foot-and-Mouth Disease with Special Consideration for the Clinical and Epidemiological Factors Relevant to Predictive Modelling of the Disease," *The Veterinary Journal* 169:2 (March 2005), pp. 197-209.
- Knowles, Nick J. [Molecular Epidemiology of Foot-and-Mouth Disease Virus – A Bibliography](#) (September 18, 2002).
- Knowles, Nick J., *et al.* "[Pandemic Strain of Foot and Mouth Disease Virus Serotype O](#)," *Emerging Infectious Diseases* 11:12 (December 2005), pp. 1887-1893.
- Knowles, Nick J., *et al.* [Emergence of a Pandemic Strain of Foot-and-Mouth Disease Virus Serotype O](#), Report of the Session of the Research Group of the Standing Technical Committee of the European Commission for the Control of Foot-and-Mouth Disease, Borovets, Bulgaria, (September, 5-8, 2000), Appendix 1, p. 20.
- Mackowiak, C., and R.H. Regamey, eds. "International, Symposium on Foot-and-Mouth Disease," *Proceedings of the 55th Symposium Organized by the International Association of Biological Standardization and Held at the École De Commerce, Lyon (France), 5-8 October 1976*, Developments in Biological Standardization, Vol. 35. Basel: S. Karger, 1977.
- Marshall, Edith S., Tim E. Carpenter, and Clair Thunes. "Results of a Survey to Estimate Cattle Movements and Contact Rates Among Beef Herds in California, With Reference to the Potential Spread and Control of Foot-and-Mouth Disease," *Journal of the American Veterinary Medical Association* 235:5 (September 1, 2009), pp. 573-579.
- National Research Council, Board on Agriculture, Committee on Animal Health, Subcommittee on Research and Diagnosis on Foreign Animal Disease, *Long-term Planning for Research and Diagnosis to Protect U.S. Agriculture from Foreign Animal Diseases and Ectoparasites*. Washington, DC: National Academy Press, 1983.
- Oem, Jae Ku, Nigel P Ferris, Kwang-Nyeong Lee, Yi-Seok Joo, Bang-Hun Hyun, and Jong-Hyeon Park. "Simple and Rapid Lateral-Flow Assay for the Detection of Foot-and-Mouth Disease Virus," *Clinical and Vaccine Immunology: CVI* 16:11 (November 2009), pp. 1660-1664.
- Rather, John. [Plum Island Reports Disease Outbreak](#), New York Times (August 22, 2004).
- Reference Laboratories Information System (ReLaIS) for the OIE/FAO Foot-and-Mouth Disease Reference Laboratories Network. [The Conjectured Status of FMD in 2009 Showing Approximate Distribution of Regional Virus Pools](#) (2010).
- Ribble, Carl, S. Iwasawa, T. Stitt, and Craig Stephen. [Report on the British Columbia Foot-and-Mouth Disease Invitational Forum and Workshop](#), Abbotsford, B.C., October 27-28, 2009 (February 12, 2010).
- Rowlands, David J., ed. *Foot-and-Mouth Disease*. Amsterdam, NL: Elsevier Science, 2003.
- Sellers, Robert F., A. I. Donaldson, and K. A. J. Herniman. "Inhalation, Persistence and Dispersal of Foot-and-Mouth Disease Virus by Man," *Journal of Hygiene (Cambridge)* 68 (1970), 565-573.
- Sobrino, Francisco, and Esteban Domingo, eds. *Foot and Mouth Disease: Current Perspectives*. Norfolk, UK: Horizon Bioscience, 2004.
- Sørensen, J. Havskov, C. O. Jensen, T. Mikkelsen, D. K. J. Mackay, and A. I. Donaldson, "Modelling the Atmospheric Dispersion of Foot-and-Mouth Disease Virus for Emergency Preparedness," *Physics and Chemistry of the Earth, Part B: Hydrology, Oceans and Atmosphere* 26:2 (2001), pp. 93-91.

- Sutmoller, P. and R. Casas Olascoaga. "[Unapparent Foot and Mouth Disease Infection \(Sub-clinical Infections and Carriers\): Implications for Control](#)," *Scientific and Technical Review* (OIE) 21:3 (2002), pp. 519-529.
- Thomson, Gavin R., B.D. Perry, A. Catley, T.J. Leyland, M.L. Penrith, and A.I. Donaldson. "Certification for Regional and International Trade in Livestock Commodities: The Need to Balance Credibility and Enterprise," *The Veterinary Record* 159:2 (July 8, 2006), pp. 53-57.
- Thunes, Clair, and Tim E. Carpenter. "Biosecurity Practices and Travel History of Individuals Exhibiting Livestock at the 2005 California State Fair." *Journal of the American Veterinary Medical Association* 231:4 (August 2007), pp. 581-585.
- Toja, Miguel, Cristina Escarmís, and Esteban Domingo. "Genomic Nucleotide Sequence of a Foot-and-Mouth Disease Virus Clone and Its Persistent Derivatives: Implications for the Evolution of Viral Quasispecies During a Persistent Infection" *Virus Research* 64:2 (November 1999), pp. 161-171.
- Tully, Damien C., and Mario A. Fares. "The Tale of a Modern Animal Plague: Tracing the Evolutionary History and Determining the Time-Scale for Foot and Mouth Disease Virus," *Virology* 382:2 (December 20, 2008), pp. 250-256.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Foot-and-Mouth Disease: A Foreign Threat to U.S.](#), Livestock, Program Aid No. 600 (March 2001).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Foot-and-Mouth Disease Fact Sheet](#) (February 2007).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Animal Health Emergency Management System (NAHEMS). [Foot-and-Mouth Disease Response Plan \(The Red Book\)](#), FAD PReP, Foreign Animal Disease Preparedness and Response Plan (November 2010).
- U.S. Environmental Protection Agency (EPA), with the Departments of Agriculture (USDA), Health and Human Services (HHS), Defense (DoD), and Homeland Security (DHS). [Federal Food and Agriculture Decontamination and Disposal Roles and Responsibilities](#) (August 2005).
- U.S. Environmental Protection Agency (EPA). NPDES Compliance Inspection Manual, Appendix AA: [Bio-Security Guidance](#), Memorandum by Michael M. Stahl on Routine Biosecurity Procedures for EPA Personnel Visiting Farms, Ranches, Slaughterhouses and other Facilities with Livestock and Poultry. (December 10, 2001),
- United States Animal Health Association (USAHA), Committee on Foreign and Emerging Diseases. "[Foot and Mouth Disease](#)," *Foreign Animal Diseases* [a.k.a. "The Gray Book"] 7th Edition (St. Joseph, MO: USAHA, 2008), pp. 261-275.
- Vallat, Bernard. "Foot and Mouth Disease: Facing the New Dilemmas," *Scientific and Technical Review* (OIE) 21:3 (December 2002), pp. 417-8.
- Weir, Erica. "Foot-and-Mouth Disease in Animals and Humans," *Journal of the Canadian Medical Association* 164:9 (May 1 2001) p. 1338.
- World Organization for Animal Health / Office International des Epizooties (OIE), World Animal Health Information Database (WAHID). [Animal Health Information](#) (2010).

- World Organization for Animal Health / Office International des Epizooties (OIE). "[Foot and Mouth Disease](#)," *Terrestrial Animal Health Code* Chapter 8.5, Article 8.5.46 (2009).
- World Organization for Animal Health / Office International des Epizooties (OIE). [List of Foot and Mouth Disease Free Countries](#) (2010).
- World Organization for Animal Health / Office International des Epizooties (OIE), World Animal Health Information Database (WAHID). [Weekly Disease Information](#) (2010).
- World Organization for Animal Health / Office International des Epizooties (OIE), World Animal Health Information Database (WAHID). [Disease Outbreak Map for FMD](#) (2010).
- World Organization for Animal Health / Office International des Epizooties (OIE), "[Foot and Mouth Disease](#)," *Manual of Diagnostic Tests and Vaccines For Terrestrial Animals* (a.k.a. "Terrestrial Manual"), Chapter 2.1.5 (2009).
- World Organization for Animal Health / Office International des Epizooties (OIE). "[Foot and Mouth Disease](#)," *Terrestrial Animal Health Code*, Chapter 8.5, Article 8.5.46 (2009).
- Zijpp, Akke J. van der, and M. J. E. Braker. *Foot and Mouth Disease: New Values, Innovative Research Agenda's and Policies*. Wageningen, NL: Wageningen Academic Publishers, 2004.

FMD in Emergency Management

- Alexandersen, Soren, and Donaldson Alex I. "Quantitative Estimates of the Risk of New Outbreaks of Foot-and-Mouth Disease as a Result of Burning Pyres," *The Veterinary Record* 154:9 (February 28, 2004), pp. 277-278.
- American Association of Bovine Practitioners. [Foot-and-Mouth Disease and the Dairy Industry's Emergency Preparedness](#) (2002).
- Bates, Thomas W., Mark C. Thurmond, and Tim E. Carpenter. "Direct and Indirect Contact Rates among Beef, Dairy, Goat, Sheep, and Swine Herds in Three California Counties, With Reference to Control of Potential Foot-and-Mouth Disease Transmission," *American Journal of Veterinary Research* 62:7 (July 2001), pp. 1121-1129.
- Bates, Thomas W., Mark C. Thurmond, and Tim E. Carpenter. "Results of Epidemic Simulation Modeling to Evaluate Strategies to Control an Outbreak of Foot-and-Mouth Disease." *American Journal of Veterinary Research* 64:2 (2003), pp. 206-10.
- Bourne, Debra, ed. [Foot-and-Mouth Disease](#) (2007).
- Canadian Food Inspection Agency. [Foot-and-Mouth Disease Hazard Specific Plan](#) (October 2007).
- Carpenter, Tim E., Lasse E. Christiansen, Bradley F. Dickey, Clair Thunes, and Pamela J. Hullinger. "Potential Impact of an Introduction of Foot-and-Mouth Disease into the California State Fair," *Journal of the American Veterinary Medical Association* 231: 8 (October, 2007), pp. 1231-1235.
- Center for Food Security and Public Health, Iowa State University. [Foot-and-Mouth Disease Prevention Practices](#) (2006).

- Dairy Management Inc. (DMI). [Communicating Dairy Safety during an FMD Outbreak](#): Best Practices Based on Dairy Industry Crisis Messaging Research (2011).
- Dairy Management Inc. (DMI). [Crisis Preparedness Toolkit](#) (2009).
- Dairy Management Inc. (DMI). [Research Brief: What Consumers Need to Hear in a Dairy Crisis](#) (October 2008).
- Delgado, Amy H., Bo Norby, Wesley Dean, William A. McIntosh, and Harvet M, Scott. [Dairy Producers' Perceptions of the Risk of Foot-and-Mouth Disease: Implications for Risk Communication](#), Proceedings of the 12th Symposium of the International Society for Veterinary Epidemiology and Economics (ISVEE), Durban, South Africa (August, 2009), p. 6.
- Delgado, Amy H., Bo Norby, Wesley Dean, William A. McIntosh, and Harvet M, Scott. [Evaluating Texas Dairy Producers' Attitudes and Intentions Towards Their Expected Roles in Foot-and-Mouth Disease Detection and Control](#), Proceedings of the 12th Symposium of the International Society for Veterinary Epidemiology and Economics (ISVEE), Durban, South Africa (August 2009), p. 5.
- Donaldson Alex I. "Eradication of FMD Virus," *The Veterinary Record* 158:16 (April 22, 2006), pp. 571-572.
- Donaldson, Alex I. "Risks of Spreading Foot and Mouth Disease Through Milk and Dairy Products," *Scientific and Technical Review* (OIE) 16:1 (April 1997), pp. 117-124.
- Environmental Agency (U.K.) [The Storage, Treatment and Disposal of Milk During a Foot and Mouth Disease \(FMD\) Outbreak](#), Regulatory Position Statement 40 (November 26, 2010).
- Food and Agriculture Organization of the United Nations (FAO), Emergency Prevention System (EMPRES). [Foot-and-Mouth Disease: Situation Worldwide and Major Epidemiological Events in 2005-2006](#)," *Focus On*, No. 1 (2007), pp. 1-11.
- Food and Agriculture Organization of the United Nations (FAO), European Commission for the Control of Foot-and-Mouth Disease (EuFMD). [Foot-and-Mouth \(FMD\) Disease Training Manual](#) (2009) and [Diagnostic and Sampling Procedures for FMD](#) (2010).
- Food and Agriculture Organization of the United Nations (FAO), European Commission for the Control of Foot-and-Mouth Disease (EuFMD). [Progressive Control Pathway for Foot and Mouth Disease \(PCP-FMD\): Principles, Stage Descriptions and Standards](#) (January 26, 2011).
- Food and Agriculture Organization of the United Nations (FAO), European Commission for the Control of Foot-and-Mouth Disease (EuFMD). [Technical Developments in FMD Control: 10 Years After the 2001 Epidemic in North-West Europe](#) (February 23, 2011).
- Garner, M. Graeme, and M.B. Lack. "An Evaluation of Alternative Control Strategies for Foot-and-Mouth Disease in Australia: A Regional Approach," *Preventive Veterinary Medicine*. 23 (May 1995), pp. 9-32.
- Garner, M. Graeme, and S.D. Beckett. "Modeling the Spread of Foot-and-Mouth Disease in Australia," *Australian Veterinary Journal* 83 (2005), pp. 758–66.
- Geering, William A., and Juan Lubroth. [Preparation of Foot-and-Mouth Disease Contingency Plans](#), FAO Health Manual 16. Rome: Food and Agriculture Organization of the United Nations, 2002.
- Harvey, Neil, Aaron Reeves, Mark A. Schoenbaum, Francisco J. Zagmutt-Vergara, Caroline Dubé, Ashley E. Hill, Barbara A. Corso, W. Bruce McNab, Claudia I. Cartwright, and Mo

- D. Salman. "The North American Animal Disease Spread Model: A Simulation Model to Assist Decision Making in Evaluating Animal Disease Incursions," *Preventive Veterinary Medicine* 82:3-4 (December 14, 2007), pp. 176-197.
- Haskins, Christopher, [Rural Recovery after Foot-and-Mouth Disease](#), Report to the U.K. Prime Minister (October 2001).
- Hennessey, Morgan, Brendan Lee, Timothy Goldsmith, Dave Halvorson, William Hueston, Kristina McElroy, and Katherine Waters. "Supporting Business Continuity During a Highly Pathogenic Avian Influenza Outbreak: A Collaboration of Industry, Academia, and Government," *Avian Diseases* 54:S1 (March, 2010), pp. 387–389.
- Honhold, Nick. [The Impact of Farm Gate Biosecurity on the Transmission of FMD in UK in 2001](#), International Control of Foot-And-Mouth Disease: Tools, Trends and Perspectives, 2006 Session of the Research Group of the Standing Technical Committee of the European Commission for the Control of Foot-and-Mouth Disease (EuFMD), Paphos, Cyprus (October 16-20, 2006), Appendix 3, pp. 26-34.
- Honhold, Nick, Tony Taucher, and Nick Taylor. [The Involvement of Milk Tankers in the Spread of Foot and Mouth Disease in Cumbria, 2001](#), Report for Veterinary Science Directorate (October 2004), and *International Symposia on Veterinary Epidemiology and Economics Proceedings 11: Proceedings of the 11th Symposium of the International Society for Veterinary Epidemiology and Economics (ISVEE)* , Cairns, Australia, Theme 6 - Global Response and Emerging Diseases: Foot and Mouth Disease Session, (August 2006), p. 396.
- Janni, Kevin A., Sara H. Christopherson, and David R. Schmidt. "Milk House Wastewater Flows and Characteristics for Small Dairy Operations," *Applied Engineering in Agriculture* 25:3 (2009), pp 417-423.
- Kobayashi, Mimako, Richard E. Howitt, and Tim E. Carpenter, "[Model Could Aid Emergency Response Planning for Foot-and-Mouth Disease Outbreaks](#)," *California Agriculture* 63:3, p. 140.
- Keeling, Matt J., Mike Tildesley, Nick Savill, Mark Woolhouse, Darren Shaw, Rob Deardon, Steve Brooks, and Bryan Grenfell. "FMD Control Strategies," *The Veterinary Record* 158:20 (May 20, 2006), pp. 707-708.
- Koziol, Joseph S., Jr., and Robert Hoaglund. "[Innovative Security Technologies for the Transport of Milk](#)," *Transportation Research Record: Journal of the Transportation Research Board* 1938 (2005), pp. 38–44.
- Magner, Lois N., Maury M. Breecher, and Linda Wasmer Andrews. "[Should the Threat of Foot-and-Mouth Disease Be Met by the Destruction of All Animals That Might Have Been Exposed to the Virus](#)," *Science Clarified* 1, Advameg (2010)
- McCarty, Rick. [Consumers Want a Human Health Reassurance Message in the Event of an FMD Outbreak](#), Research Brief for The National Cattlemen's Beef Association, Issues Update (September-October, 2007), pp. 47-48.
- Morris, R.S., R.L. Sanson, M.W. Stern, M. Stevenson., and J.W. Wilesmith. "[Decision-support Tools for Foot and Mouth Disease Control](#)," *Scientific and Technical Review (OIE)* 21:3 (2002), pp. 557-567.
- National Center for Foreign Animal and Zoonotic Disease Defense (FAZD), Texas A&M. [Protecting Agricultural Infrastructure: Defining the Needs and Requirements for](#)

- [Agricultural Screening Tools](#), Report from the Agricultural Screening Tools Workshop, Washington DC (Nov. 1-2, 2010).
- National Emergency Management Association (NEMA). [Emergency Management Assistance Compact \(EMAC\)](#) (2010).
- North Carolina Dairy Biosecurity Committee, Carolina/Virginia Dairy Products Association. [Foot and Mouth Outbreak Procedures](#), Parts 1-6 (November 14, 2008).
- North Carolina Dairy Biosecurity Committee, Carolina/Virginia Dairy Products Association. [Milk Tanker Decontamination of Foot and Mouth Disease](#), Parts 1-4 (November 14, 2008).
- Paixão, Tatiane A., Alcina V. Carvalho Neta, Naimes O. Paiva, Jorge R. Reis, Meirivan S. Barbosa, Claudia V. Serra, René R. Silva, Tammy R. Beckham, Barbara M. Martin, Neville P. Clarke, L. Garry Adams, and Renato L. Santos, "[Diagnosis of Foot-and Mouth Disease by Real Time Reverse Transcription Polymerase Chain Reaction under Field Conditions in Brazil](#)," *BMC Veterinary Research* 4:53 (December 31, 2008), pp. 1-6.
- Paton, David J., Keith J. Sumption, and Bryan Charleston. "[Options for Control of Foot-and-Mouth Disease: Knowledge, Capability and Policy](#)," *Philosophical Transactions of the Royal Society B: Biological Sciences* 364:1530 (September 2009), pp. 2657-2667.
- Payer, David C. and Brian J. Holmes. [Managing Waste Milk](#). University of Wisconsin-Extension Publication A3610 (1998).
- Pluimers, Frits H. "Foot-and-Mouth Disease Control Using Vaccination: The Dutch Experience in 2001," *Developments in Biologicals* 119 (2004), pp. 41-9.
- Pineda-Krch, Mario, Joshua M. O'Brien, Clair Thunes, and Tim E. Carpenter. "Potential Impact of Introduction of Foot-and-Mouth Disease From Wild Pigs into Commercial Livestock Premises in California," *American Journal of Veterinary Research* 71:1 (January 2010), pp. 82-88.
- Roth, James, *et al.* "Resolution 54 Update: Move to a Secure Egg Supply During HPAI Outbreak," in [Report of the Committee on Transmissible Diseases of Poultry and Other Avian Species](#), Chair Julie D. Helm (San Diego, CA, October 2009), pp. 30-31.
- Rubel, F. and K. Fuchs. "A Decision-Support System for Real-Time Risk Assessment of Airborne Spread of the Foot-And-Mouth Disease Virus," *Methods of Information in Medicine* 44:4 (2005), pp. 590-595.
- Schijven, Jack, Gerard B J Rijs, and Ana Maria de Roda Husman. "Quantitative Risk Assessment of FMD Virus Transmission via Water," *Risk Analysis: An Official Publication of the Society for Risk Analysis* 25:1 (February 2005), pp. 13-21.
- Schley, David, Laura Burgin, and John Gloster. "Predicting Infection Risk of Airborne Foot-and-Mouth Disease," *Journal of the Royal Society, Interface / the Royal Society* 6:34 (May 6, 2009), pp. 455-462.
- Springman, Roger E., David C. Payer, and Brian J. Holmes. *Pollution Control Guide for Milking Center Waste Water Management*. University of Wisconsin-Extension Publication A3592 (1995).
- Thomson, Gavin R., ed. "[Foot and Mouth Disease: Facing the New Dilemmas](#)," *Scientific and Technical Review (OIE)* 21:3 (December, 2002).
- Tomassen, F. H. M., A. de Koeijer, M. C. M. Mourits, A. Dekker, A. Bouma and R. B. M. Huirne. "A Decision-Tree to Optimise Control Measures During the Early Stage of a Foot-and-

- Mouth Disease Epidemic," *Preventive Veterinary Medicine* 54:4 (August 2002), pp. 301-32.
- Trampel, Darrell W., et al. "[A Federal and State Transport Plan for Movement of Eggs and Egg Products from Commercial Egg Production Premises in a High-Pathogenicity Avian Influenza Control Area](#)," *Journal of the American Veterinary Medical Association* 235:12 (December 15, 2009), pp. 1412-1419.
- Transportation Research Board, National Research Council. [A Guide to Traffic Control of Rural Roads in an Agricultural Emergency](#), National Cooperative Highway Research Program Report 525, Vol. 13 and [PowerPoint Presentation](#) (2008).
- U.K. Department for Environment, Food, and Rural Affairs (DEFRA). [Foot and Mouth Disease:Veterinary Risk Assessment](#) (October 19, 2007).
- U.K. Department for Environment, Food, and Rural Affairs (DEFRA). [Foot and Mouth Disease: Veterinary Risk Assessment and Protocol for Rights of Way Closure](#) (June 26, 2008).
- U.K. Department of Environment, Food, and Rural Affairs (DEFRA), Global Animal Health (GAH). [International Disease Monitoring: Preliminary Outbreak Assessments](#) (2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), The Egg Sector Working Group. [Highly Pathogenic Avian Influenza Secure Egg Supply Plan](#) (Draft August, 2010) with associated documents at [The Secure Egg Supply Webpage](#) (2011).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). "[Disinfectants for Foot-and-Mouth Disease – Field Use](#)" in the Executive Summary, *National Emergency Response to a Highly Contagious Animal Disease* (March 30, 2001), Appendix III, p. 14.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [National Animal Health Emergency Management System \(NAHEMS\) Guidelines](#) (2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Veterinary Stockpile (NVS). [Checklist for Evaluating Readiness](#), Version 1.0 (April 2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Veterinary Stockpile (NVS). [Planning Guide for Federal, State, and Local Authorities](#), Version 2 (June 2009).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Veterinary Stockpile (NVS). [Template for a State NVS Plan](#), Version 1.2 (October 2009).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). Foot-and-Mouth Disease Preparedness and Response Plan (FMD-PRoP), [Summary Response Plan to the Detection of FMD in the United States](#), and Appendix B: [Federal, State, and Local Actions, Timelines, and Responsibilities for Responding to FMD Outbreaks](#) (Draft – October 2008).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), National Surveillance Unit. [Foot-and-Mouth Disease \(FMD\) Case Definition](#) (Draft January 20, 2010) and [Standard Template for Case Definitions](#) (Draft – March 3, 2010).
- U.S. Department of Homeland Security (DHS). [National Incident Management System \(NIMS\)](#) (2010).

- U.S. Department of Homeland Security (DHS). [National Response Framework](#) (2010).
- U.S. Environmental Protection Agency (EPA). [EPA-Approved Pesticides for Use Against the Causative Agents of Selected Foreign Animal Diseases](#) (October 27, 2008).
- Van Haaften, E. Heleen, Miranda Olf, and Paul H. Kersten. [The Psychological Impact of the Foot and Mouth Disease Crisis on Dutch Dairy Farmers](#), *Netherlands Journal of Agricultural Science, NJAS - Wageningen Journal of Life Sciences* 51:4, (2004), pp. 339-349.

FMD as a Terrorist Threat

- Apatow, Stephen M. [Agricultural Security and Emergency Preparedness: Protecting One of America's Critical Infrastructures](#), Humanitarian Resource Institute (December, 2001).
- Jin, Yanhong, H., Bruce A. McCarl, and Levan Elbakidz. "Risk Assessment and Management of Animal Disease-Related Biosecurity," *International Journal of Risk Assessment and Management* 12:2-4 (2009), pp. 186-203.
- Kinsey, Jean R., Wes Harrison, Dennis Degeneffe, Gustavo Ferreira, and Sakiko Shiratori. "[Index of Consumer Confidence in the Safety of the United States Food System](#)," *American Journal of Agricultural Economics* 91:5 (December 2009), pp. 1470–1476.
- Kohnen, Anne. [Responding to the Threat of Agroterrorism: Specific Recommendations for the United States Department of Agriculture](#). BCSIA Discussion Paper 2000-29, ESDP Discussion Paper ESDP-2000-04, John F. Kennedy School of Government, Harvard University (October 2000).
- Lawrence Livermore National Laboratories. "[Assessing the Threat of Biological Terrorism](#)," *Science and Technology Review* (September 2007).
- Segarra, Alejandro E. and Jean M. Rawson. [Foot and Mouth Disease: A Threat to U.S. Agriculture](#) (Congressional Research Service, Library of Congress, April 16, 2001).
- U.S. General Accounting Office (GAO). [Foot and Mouth Disease: To Protect U.S. Livestock, USDA Must Remain Vigilant and Resolve Outstanding Issues](#), GAO Report to the Honorable Tom Daschle, GAO 02-808 (July 2002).
- Wein, Lawrence M. "[Got Toxic Milk?](#)" *The New York Times* (May 30, 2005) and Milton Leitenberg and George Smith, "[Got Toxic Milk?: A Rejoinder](#)," Open Letter to Federation of American Scientists (FAS), (June 14, 2005).
- Wein, Lawrence M. and Yifan Liu, and Barry R. Bloom. [Analyzing a Bioterror Attack on the Food Supply: The Case of Botulinum Toxin in Milk](#), *Proceedings of the National Academy of Sciences of the United States of America* 102:28 (July 12, 2005), pp. 9984-9989.
- Weiss, Rick. "[Report Warns of Threat to Milk Supply](#): Release of Study Citing Vulnerability to Bioterrorism Attack Was Opposed by U.S. Officials" *Washington Post* (June 29, 2005).
- World Health Organization (WHO), Cluster on Health Security and Environment, Department of Food Safety, Zoonoses and Foodborne Diseases. [Terrorist Threats to Food: Guidelines for Establishing and Strengthening Prevention and Response Systems](#), Rev. Ed. Geneva, Switzerland: World Health Organization, 2008.

FMD in Economic Risk Assessment

- Anderson, Iain. [The Economic Impact of FMD](#), in *Foot and Mouth Disease: Lessons to be Learned Inquiry Report HC888* (London: House of Commons, 2002), pp. 131-138.
- Bates, Thomas W., T.E. Carpenter, and Mark C. Thurmond. "Benefit-Cost Analysis of Vaccination and Preemptive Slaughter as a Means of Eradicating Foot-and-Mouth Disease," *American Journal of Veterinary Research* (2003) 64:7, pp. 805-12.
- Berentsen, P.B.M., A.A. Dijkhuizen, and A.J. Oskam. "A Dynamic Model for Cost-Benefit Analysis of Foot-and-Mouth Disease Control Strategies," *Preventive Veterinary Medicine* 12 (March 1992), pp. 229-43.
- Bourne, Debra. [Assessing the Costs \(Actual and Potential\) and Consequences of FMD and its Control](#) (2007).
- Burton, Michael and Trevor Young. "The Impact of BSE on the Demand for Beef and Other Meats in Great Britain," *Applied Economics* 28:6 (June, 1996), pp. 687-93.
- Dijkhuizen, A.A., J.B. Hardaker, and R.B.M. Huirne. "Risk Attitude and Decision Making in Contagious Disease Control," *Preventive Veterinary Medicine* 18:3 (February 1994), pp. 203-12.
- Economic History Association, Measuring Worth. [Purchasing Power of Money in the United States from 1774 to 2009](#) (2010).
- Ekboir, Javier M. [Potential Impact of Foot-and-Mouth Disease in California: The Role and Contribution of Animal Health Surveillance and Monitoring Services](#), Agricultural Issues Center Division of Agriculture and Natural Resources, University of California (1999).
- Elbakidze, Levan, and B. McCarl. "Animal Disease Pre-Event Preparedness versus Post Event Response: When Is It Economic to Protect?" *Journal of Applied Agricultural Economics* 38:2 (August 2006), pp. 327-36.
- Elbakidze, Levan, Linda Highfield, Michael Ward, Bruce A. McCarl and Bo Norby. "[Economics Analysis of Mitigation Strategies for FMD Introduction in Highly Concentrated Animal Feeding Regions](#)," *Applied Economic Perspectives and Policy / Review of Agricultural Economics* 31:4 (December 2009), pp. 931-950.
- Grannis, Jennifer L., John W Green, and Dana L. Hoag. *The Economics of Livestock Disease Insurance: Concepts, Issues and International Case Studies*. Wallingford, Oxfordshire, UK: Cabi Publishing, 2006.
- Green, John W., and Jennifer L. Grannis. Economic Impact of Alternative Management Strategies for Regulating Canadian Ruminant/Product Imports. Unpublished report, Centers for Epidemiology and Animal Health, 2003.
- Henson, Spencer J. and Mario Mazzocchi. "Impact of Bovine Spongiform Encephalopathy on Agribusiness in the United Kingdom: Results of an Event Study of Equity Prices," *American Journal of Agricultural Economics* 84:2 (May, 2002), pp. 370-386.
- Horton, Ken. [Business Continuity During Animal Disease Emergencies](#), Presentation at the Annual Meeting of the National Institute for Animal Agriculture (NIAA) in Indianapolis, IN, April 1, 2008.
- James, Andrew D., and J. Rushton. "[The Economics of Foot and Mouth Disease](#)," *Scientific and Technical Review* (OIE) 21:3 (December 2002), pp. 637-644.

- Jin, Yanhong, Bruce A. McCarl, and Levan Elbakidze. [Risk Assessment and Management of Animal Disease-related Biosecurity](#) *International Journal of Risk Assessment and Management* 12:2-4 (2009), pp. 186-203.
- Jonker, Jamie. [Maintaining Business Continuity in the Dairy Industry During an Animal Disease Disaster](#), Presentation at the Annual Meeting of the National Institute for Animal Agriculture (NIAA) in Indianapolis, IN, April 1, 2008.
- Kobayashi, Mimako, Richard E. Howitt, and Tim E Carpenter. [Investment in Infectious Disease Control Capacity: The Case of a Potential Foot-and-Mouth Disease Outbreak in California](#), Paper presented at the American Agricultural Economics Association Annual Meeting, Long Beach, CA, July 23-26, 2006.
- Krystynak, Ronald H. E. and Pierre A. Charlebois. [The Potential Economic Impact of an Outbreak of Foot-and-Mouth Disease in Canada](#). *Canadian Veterinary Journal* 28: 8 (August 1987), pp. 523-527.
- Mahul, O., and B. Durand. "Simulated Economic Consequences of Foot-and-Mouth Disease Epidemics and Their Public Control in France." *Preventive Veterinary Medicine*. 47:1-2 (October 1999), pp. 23–38.
- Marsh, Thomas L., Ted C. Schroeder, and James Mintert. "Impacts of Meat Product Recalls on Consumer Demand in the USA," *Applied Economics* 36:9 (2004), pp. 897–909.
- McCauley, E. Hunt, A.A. Nasser, J.C. New, W.B. Sundquist, and W.M. Miller. *A Study of Potential Economic Impact of Foot and Mouth Disease in the United States*. St. Paul: University of Minnesota Press, 1979.
- Morris, R.S., J.W. Wilesmith, M.W. Stern, R.L. Sanson, and M.A. Stevenson. "Predictive Spatial Modeling of Alternative Control Strategies for the Foot-and Mouth Disease Epidemic in Great Britain, 2001," *The Veterinary Record* 149 (August 2001), pp. 137–44.
- Paarlberg, Philip L., and John G. Lee. "Import Restrictions in the Presence of a Health Risk: An Illustration Using FMD." *American Journal of Agricultural Economics* 80 (February 1998), 175–83.
- Paarlberg, Philip L., John G. Lee, and Ann H. Seitzinger "Potential Revenue Impact of an Outbreak of Foot-and-Mouth Disease in the United States," *Journal of American Veterinary Medical Association* 220:7 (April 1, 2002), pp. 988-992.
- Paarlberg, Philip L., John G Lee, and Ann H. Seitzinger.. "Measuring Welfare Effects of an FMD Outbreak in the United States." *Journal of Agricultural and Applied Economics* 35 (2003), pp. 53-65.
- Pendell, Dustin L., John Leatherman, Ted C Schroeder, and Gregory S. Alward. "[The Economic Impacts of a Foot-And-Mouth Disease Outbreak: A Regional Analysis](#)," *Journal of Agricultural and Applied Economics* (October 1, 2007), pp 19-33.
- Piggott, Nicholas E., and Thomas L. Marsh. "Does Food Safety Information Impact U.S. Meat Demand?" *American Journal of Agricultural Economics* 86 (February 2004), pp. 154–74.
- PL 107-9 Federal Inter-Agency Working Group. [Animal Disease Risk Assessment, Prevention, and Control Act of 2001 \(PL 107-9\) Final Report](#) (January 2003).
- Pritchett, J., D. Thilmany, and K. Johnson. "Animal Disease Economic Impacts: A Survey of Literature and Typology of Research Approaches." *International Food Agribusiness Management Review* 8:1 (2005), pp. 23–39.

- Rich, K.M., and A. Winter-Nelson. "An Integrated Epiemiological-Economic Analysis of Foot-and-Mouth Disease: Application to the Southern Cone of South America," *American Journal of Agricultural Applied Economics* 89:3 (2007), pp. 682–97.
- Sahr, Robert C. [Individual Year Conversion Factor](#) (Political Science Department, Oregon State University, 2010).
- Schlenker, Wolfram, and Sofia B Villas-Boas, [Consumer and Market Responses to Mad-Cow Disease](#). University of California, Berkeley, Department of Agricultural and Resource Economics, UCB. CUDARE Working Paper No. 1023 (2008).
- Schley, David, Simon Gubbins, and David J. Paton. [Quantifying the Risk of Localised Animal Movement Bans for Foot-and-Mouth Disease](#) *PLoS ONE* 4:5 (May 8, 2009), e5481.
- Schoenbaum, Mark A., and W. Terry Disney. "Modeling Alternative Mitigation Strategies for a Hypothetical Outbreak of Foot-and-Mouth Disease in the United States," *Preventive Veterinary Medicine* 58:1-2 (April 2003). pp. 25-52.
- Sumner, Daniel A., Jose E. Bervejillo, and Lovell S. Jarvis. "Public Policy, Invasive Species and Animal Disease Management," *International Food and Agribusiness Management Review* 8:1 (2005), pp.78–97.
- Thompson, Donald, et al. "Economic Costs of the Foot and Mouth Disease Outbreak in the United Kingdom in 2001," *Scientific and Technical Review (OIE)* 21:3 (December 2002), pp. 675–687.
- U.K. House of Commons, National Audit Office (NAO). [The 2001 Outbreak of Foot And Mouth Disease](#), Report by the Comptroller and Auditor General, HC 939 Session 2001–2002 (June 21, 2002).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Centers for Epidemiology and Animal Health (USDA-APHIS-VS/CEAH). *Risk Assessment of Foot-and-Mouth Disease Virus Spread via Pasteurized Dairy Products from Cattle in the United States after an FMD Incursion* (May 2003). [Source: Aaron Scott, aaron.e.scott@aphis.usda.gov]
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA-APHIS-VS), National Center for Import and Export, Regionalization Evaluation Services. [Risk Analysis: Risk of Exporting Foot-and-Mouth Disease \(FMD\) in FMD-Susceptible Species from Argentina, South of the 42\(Parallel \(Patagonia South\), to the United States](#) (June 2005).
- U.S. Department of Agriculture, Economic Research Service (USDA/ERS). "[Dissecting the Challenges of Mad Cow and Foot-and-Mouth Disease](#)," *Agricultural Outlook* (August 2001), pp. 4-6.
- U.S. Department of Agriculture, Foreign Agriculture Service (USDA / FAS). [Global Agricultural Trade System \(GATS\)](#) (2011).
- U.S. Department of Homeland Security, National Bio and Agro Defense Center. [Biodefense Knowledge Center Rapid Response](#), Report (May 29, 2008).
- U.S. Department of Homeland Security, Protective Security Division, [Characteristics and Common Vulnerabilities Infrastructure Category: Agricultural Processing Facilities – Milk Processing](#) (Draft Version 1, January 15, 2004).

- Ward, Michael P., Linda D. Highfield, Pailin Vongseng, and M. Graeme Garner. "[Simulation of Foot-and-Mouth Disease Spread within an Integrated Livestock System in Texas, USA.](#)" *Prev. Vet. Med.* 88 (2009), pp. 286–97.
- Ward, Michael P., Linda D. Highfield, Pailin Vongseng, and M. Graeme Garner. "Potential Impact of Foot-and-Mouth Disease Incursions in the High Plains region of Texas." In *Proceedings of the 88th Annual Meeting of the Conference of Research Workers in Animal Diseases*, ed. R.P. Ellis, Ames: Iowa State University Press, Chicago, 2–4 December 2007, Abstract No. 23.
- Zhao, Zishun, Thomas I. Wahl, and Thomas L. Marsh. "Invasive Species Management: Foot-and-Mouth Disease in the U.S. Beef Industry," *Agricultural and Resource Economics Review* 35:1 (April 2006), pp. 98–115.

Structure and Norms of the Dairy Industry in New England and the U.S.

- Alexander, Craig, John Siebert, David Anderson, and Ron Knutson. [State Milk Marketing Order Regulation and Interstate Dairy Compacts](#), Cornell Program on Dairy Markets and Policy, Dairy Markets and Policy: Issues and Options, No. 0-11 (October 1998).
- Allen, Allen, Sitts, and Sitts v. Dairy Farmers of America, Dairy Marketing Services, Dean Foods Company and HP Hood*, Antitrust Litigation, U.S. District Court for the District of Vermont, Case Number 5:2009cv00230 (October 8, 2009).
- American Farmland Trust. [The Economic Importance of Agriculture: A Profile of Addison and Franklin Counties, Vermont](#) (2002).
- Ames, Molly. "[Understanding the Dairy Industry – It's Way More than Cows and Plows!](#)" The Rodale Institute (2003).
- Anderson, Eric. "[Trying to Keep Local Farms Solvent](#)," *The Times-Union*, Albany, NY (March 17, 2010), p. D1.
- Bailey, Ken. [U.S. Market Structure: The Dairy Industry in the 21st Century](#), Paper Presented at the 66th Annual Meeting of the International Association of Milk Control Agencies, Calgary, Alberta, Canada (July 14-17, 2002).
- Balagtas, Joseph V. and Daniel A. Sumner. [The Effect of the Northeast Dairy Compact on Producers and Consumers, with Implications of Compact Contagion.](#) *Review of Agricultural Economics* 25:1 (Spring/Summer2003), pp. 123-144.
- Blayney Don P. [The Changing Landscape of U.S. Milk Production, U.S. Department of Agriculture](#), U.S. Department of Agriculture, Economic Research Service (USDA / ERS), Statistical Bulletin No. 978 (June 2002). See especially regional statistics in [Appendix Tables](#).
- Blayney, Don P. and James J. Miller. [Concentration and Structural Change in Dairy Processing and Manufacturing](#), Presentation at "Looking Ahead...or Looking Behind? Dairy Policy Studies Mandated by the Farm Bill," 10th Annual Workshop for Dairy Economists and Policy Analysts, Memphis, Tennessee (April 24, 2003).
- Bragg, Lisa A. and Timothy J. Dalton. [The Cost of Producing Milk in Maine: Results from the 2005 Dairy Cost of Production Survey](#), Technical Bulletin 23, Maine Agricultural and Forest Experiment Station, University of Maine (September 2006).

- Burnett, John. [Independent Farmers Feel Squeezed By Milk Cartel](#), story with [Transcript](#) for “All Things Considered,” National Public Radio (August 20, 2009).
- Colman, David and David Harvey. [The Future of U.K. Dairy Farming](#), Report commissioned jointly by the MDC, DIAL and DEFRA, with project advice from the NFU, on behalf of the Dairy Supply Chain Forum (August 31, 2007).
- Connecticut Department of Economic and Community Development and the Department of Agriculture in cooperation with the University of Connecticut Department of Agricultural and Resource Economics. [The Economic and Fiscal Impacts of Connecticut’s Dairy Industry](#) (January 2009).
- Cotterill, Ronald W. [Pricing and Policy Problems in the Northeast Fluid Milk Industry](#). University of Connecticut, Food Marketing Policy Center, Research Report 93 (June 2006)
- Cotterill, Ronald W. [University of Connecticut Research on Dairy Compacts and Fluid Milk Pricing: Executive Summaries, Fact Sheets, and Price Charts](#), University of Connecticut Food Marketing Policy Center, Food Marketing Policy Paper No. 25 (August 1, 2001).
- Cotterill, Ronald W., Adam N. Rabinowitz, Michael A. Cohen, Melanie R. Murphy, and Charles R. Rhodes. [Toward Reform of Fluid Milk Pricing in Southern New England: Farm Level, Wholesale and Retail Prices in the Fluid Milk Marketing Channel: 2003-2006](#), Report to the Connecticut Legislature Committee on the Environment (February 12, 2007).
- Credit and Finance Risk Analysis. [Dairy Prices, Dairy Industry and Dairy Commodities Markets](#) (2010).
- [Crisis on the Farm: The State Of Competition and Prospects for Sustainability on the Northeast Dairy Industry](#), Hearing Before the Committee On the Judiciary, United States Senate, One Hundred Eleventh Congress, First Session, Serial No. J-111-47, St. Albans, Vermont (September 19, 2009)
- Cryan, Roger. [The Economic Impact of the Dairy Industry](#), U.S. Dairy Market and Outlooks 10:1 (May 2004).
- [Dairy 100](#), Dairy Foods (August 2009), pp. 38-54.
- [Dairy Farm Summary](#), Yankee Farm Credit (February 2011).
- Dalton, Timothy J. *et al.* [A Comparative Analysis of Organic Dairy Farms in Maine and Vermont: Farm Financial Information from 2004 to 2006](#), Bulletin 851 Maine Agricultural and Forest Experiment Station, University of Maine (July 2008).
- Dimitri, Carolyn, Anne Effland, and Neilson Conklin. [The 20th Century Transformation of U.S. Agriculture and Farm Policy](#), U.S. Department of Agriculture, Economic Research Service (USDA / ERS) Electronic Information Bulletin No. 3 (June 2005).
- Doyon, Maurice, G. Criner, and L. A. Bragg. “[Milk Marketing Policy Options for the Dairy Industry in New England](#),” *Journal of Dairy Science* 91:3 (March 2008), pp. 1229–1235.
- Dudlicek, James. “[Re-merging Markets Dairy 100: Acquisitions Continue to Change the Face of Our Annual Ranking](#),” *Dairy Foods* (August 1, 2009).
- DuPuis, E. Melanie. *Nature’s Perfect Food: How Milk Became America’s Drink* (New York University Press, 2002).
- Environmental Studies Department, Dartmouth College, [Economic Sustainability](#), Sustainable Agriculture in the Upper Valley (ENVS 50) Chapter VI (May 19, 2005).

- Erba, Eric M., and James E. Pratt. [The Geographic Structure of Milk Hauling: Cost and Efficiencies in New York State](#), Department of Agricultural Resource and Managerial Economics, College of Agriculture and Life Sciences Cornell University Publication (May 1994).
- Erba, Eric M., Walter M. Wasserman, and James E. Pratt. [All You Ever Wanted to Know About Milk Hauling](#). Department of Agricultural, Resource and Managerial Economics, Cornell University (August 11, 2009).
- Faber Harold. "[Judge Rules Paper Did Not Libel Dairy Group](#)," *New York Times* (August 1, 1982), p. 34.
- Food and Agricultural Policy Research Institute (FAPRI), University of Missouri. [U.S. Baseline Briefing Book: Projections for Agricultural and Biofuel Markets](#), FAPRI-MU Report #01-10 (March 2010).
- Galloway, Anne [The Cost Of Production Calculus](#), VT Digger (September 10, 2009).
- Governor's Task Force on the Sustainability of the Dairy Industry in Maine. [2009 Dairy Task Force Report](#) (November 2009).
- Greater Northeast Milk Marketing Federation. [Comments of the Greater Northeast Milk Marketing Federation to the U.S. Departments of Justice and Agriculture](#) on the Workshops to Explore Competition and Regulatory Issues in the Agriculture Industry (December 31, 2009).
- Hagerman, Amy D. and Bruce A. McCarl. [Movement Restriction Impacts in Response Zones](#). Foreign Animal and Zoonotic Disease Defense (FAZD) Center, Texas A&M University, (November 4, 2009).
- Hagerman, Amy D., Bruce A. McCarl, Tim Carpenter, Josh O'Brien. [Impact of Foot-and-Mouth Disease Management Alternatives in the California Dairy Industry](#). Foreign Animal and Zoonotic Disease Defense (FAZD) Center, Texas A&M University (October 30, 2009).
- Hagerman, Amy D., J. Chris Looney, Bruce A. McCarl, David P. Anderson, Michael Ward. [Rapid Effective Trace-Back Capability Value in Reducing the Cost of a Foot and Mouth Disease Event](#). Paper presented at the Southern Agricultural Economics Association Annual Meeting, Orlando, FL (February 6-9, 2010).
- Hardin, Peter L. [Dairy Farmers of America & Dean Foods \(#1 U.S. Farm Milk Marketer + #1 U.S. Milk Processor\) Dairy's Anti-Competitive Duo](#), Speech at the Dairy Concentration meeting in Syracuse, New York, April 1, 2004.
- Herbst, Brian, Joe L. Outlaw, David P. Anderson. The Effect of Volatility on Representative Dairy Farms, Presentation for the Agricultural and Food Policy Center of Texas A&M University (April 29, 2010).
- Hewitt, Ben. *The Town That Food Saved: How One Community Found Vitality in Local Food*. New York: Rodale, 2009.
- Hoe, F.G. and Pam L. Ruegg. [Opinions and Practices of Wisconsin Dairy Producers About Biosecurity and Animal Well-Being](#), *Journal of Dairy Science* 89:6 (June, 2006), pp. 2297-2308.
- Holm, David, Richard Rogers, and Daniel Lass. [Food Self-Sufficiency in the New England States, 1975–1997](#). Paper for the Department of Resource Economics, University of Massachusetts, Amherst (2001).

- Horner, Joe. [Trends in the U.S. Dairy Industry](#) and [Trends in Today's Dairy Industry](#), Missouri Dairy Grazing Conference, Joplin, MO (July 8-10, 2009).
- International Farm Comparison Network (IFCN) Dairy Research Center. [IFCN Press Release Dairy Report 2009](#) (Kiel, Germany, 2010)
- International Farm Comparison Network (IFCN) Dairy Research Center. [Dairy Report 2009 Extract](#). (Kiel, Germany, 2010)
- Jensen, Kim, Burton C. English, and Jamey Menard. [Projected Economic Impacts of a Foot and Mouth Disease \(FMD\) Outbreak in Tennessee](#), Agri-Industry Modeling and Analysis Group Industry Brief. Knoxville: University of Tennessee, 2003.
- Jesse, Ed, and Bob Cropp. [Basic Milk Pricing Concepts for Dairy Farmers](#), University of Wisconsin Extension (Oct 2008).
- Kane, Tom. "[Got Milk er Money?](#)" *The River Reporter* (Narrowsburg, NY) 36:13 (April 1, 2010).
- Keough, Gary. [Trends in New England Agriculture](#), Presentation for the New England Field Office of USDA National Agricultural Statistics Service (USDA/NASS), 2010.
- Kriegl, Tom. [Summary of Economic Studies of Organic Dairy Farming in Wisconsin, New England, and Quebec](#), Northeast Organic Producers Alliance (March 20, 2006).
- LaDue, Eddy, Brent Gloy, and Charles Cuykendall. [Future Structure of the Dairy Industry: Historical Trends, Projections and Issues](#), Cornell Program on Dairy Markets and Policy Publication (June 2003).
- Livermore v. Engels et al.*, [Complaint](#) (shareholder suit claiming "competition in the U.S. milk market has all but disappeared as a result of improper and illegal anticompetitive practices employed by Dean Foods), U.S. District Court Eastern District of Tennessee at Greeneville, Case 2:09-cv-00070 Document 4 (Filed April 28, 2009). See also: *United States of America, State of Wisconsin, State of Illinois and State of Michigan v. Dean Foods Company*, [Complaint](#) (anti-trust action), U.S. District Court for the Eastern District of Wisconsin at Milwaukee, Case 10-C-0059 (Filed January 22, 2010).
- Lopez, Rigoberto. [Testimony of Rigoberto Lopez Re: P.A. 08-164](#), Presented to the Connecticut Legislature Environment Committee (February 18, 2009).
- Lowe, Marcy and Gary Gereffi. [A Value Chain Analysis of the U.S. Beef and Dairy Industries](#). Report Prepared for the Environmental Defense Fund by the Center on Globalization, Competitiveness, and Governance, Duke University (February 16, 2009).
- MacDonald, James M., Erik J. O'Donoghue, William D. McBride, Richard F. Nehring, Carmen L. Sandretto, and Roberto Mosheim. [Profits, Costs, and the Changing Structure of Dairy Farming](#), U.S. Department of Agriculture, Economic Research Service (USDA / ERS), Economic Research Report (ERR) 47 (September 1, 2007).
- Maine Department of Agriculture, Food and Rural Resources, Maine Milk Commission. [How Prices are Established](#) (2011).
- Maltby, Ed. [Pay Price and Organic Milk Market in January 2011](#), Northeast Organic Producers Alliance (January 17, 2011).
- Manchester Alden C., and Don P. Blayney. [Milk Pricing in the United States](#). U.S. Department of Agriculture, Economic Research Service (USDA / ERS), Agriculture Information Bulletin No. 761 (February 2001).

- Manchester, Alden C., and Blayney, Don P. [Structure of Dairy Markets: Past, Present, and Future](#), U.S. Department of Agriculture, Economic Research Service (USDA / ERS) Agricultural Economic Report No. 757 (September 1997).
- Martin, Andrew. "[Yes, It's a Cooperative. But for Whom?](#)" *The New York Times* (May 18, 2008).
- McBride, William D., and Catherine Greene. [Organic Dairy Sector Evolves To Meet Changing Demand](#), *Amber Waves: The Economics of Food Farming, Natural Resources and Rural America*, U.S. Department of Agriculture, Economic Research Service (USDA / ERS) (March 2010).
- McKeon, Matt, Kate Sease, and Jesse Simmons. [Milk Pricing and the Vermont Dairy Industry](#). Report to Representative Kitty Toll by University of Vermont students under the supervision of Prof. Anthony Gierzynski, (May 6, 2010).
- McLean, Dan. "[Vermont Dairy Farmers Receive \\$5.7M in Federal Aid](#)," *Burlington Free Press* (January 3, 2010).
- Miller, James J. and Don P. Blayney. [Dairy Background](#). Outlook Report from the U.S. Department of Agriculture, Economic Research Service (USDA / ERS), LDP-M-145-01 (July 2006).
- Miyakawa, Hiromitsu. [Competitive Issues in the Dairy Industry: The Pending DFA/NDH/Hood Transaction](#). Washington, DC: AAI American Antitrust Institute (AAI), 2004.
- Naczi, Rick. [Strategies for a More Environmentally Responsible Dairy Industry](#), Presentation at the Cornell Conference on Dairy Markets and Product Research, Syracuse, NY (March 1, 2010).
- National Family Farm Coalition (NFFC), Dairy Subcommittee. [Memorandum on Jerry Kozak's October 30 Speech on Future of the Dairy Industry](#) to Jerry Kozak, President and Chief Executive Officer of National Milk Producers Federation (December 9, 2008).
- National Milk Producers Federation. [Animal Care Manual](#) (2009).
- Natzke, Dave. [30th annual Northeast Dairy Farm Summary Released](#), *Dairy Business* (May 29, 2009)
- Neville v. Dairy Farmers of America, Dairy Marketing Services, Dean Foods Company, and HP Hood*, Antitrust Litigation, U.S. District Court for the District of Vermont, Case Number 5:2010cv00009 (January 14, 2010)
- New England Extension Food Safety Consortium. [Federal Regulations](#) and [State Regulations](#) (2011).
- New York Department of Agriculture and Markets, Division of Milk Control and Dairy Services, [New York Milk Hauling Study: Impact of Hauling Costs on Dairy Farmers](#) (April 2008).
- Novakovic, Andrew M. [Changes in the Farm Price of Milk Over the Last 100 Years](#), Cornell Program on Dairy Markets and Policy Briefing Paper No. 09-1 (August 2009).
- Novakovic, Andrew M. [Current Situation and Outlook](#), presentation for the Cornell Program on Dairy Markets and Policy (December 2009).
- Novakovic, Andrew M. [Economic History of Dairy Markets](#) or How Economic and Political Events Transpired to Result in a Complex Web of Dairy Policies, presentation for the Cornell Program on Dairy Markets and Policy (May 22, 2009).
- Ollinger, Michael, Sang V. Nguyen, Donald Blayney, Bill Chambers, and Ken Nelson. [Structural Change in the Meat, Poultry, Dairy, and Grain Processing Industries](#), U.S. Department of

- Agriculture, Economic Research Service (USDA / ERS), Economic Research Report (ERR) No. 3 (March 2005).
- Packaging Machinery Manufacturers Institute (PMMI). "[U.S. Dairy Market Sales Continue to Increase Despite Concerns over Economy](#):" PMMI Dairy Industry Market Research Study Identifies Current Trends and Future Outlook for Dairy Industry," Press Release (June 16, 2009).
- Parsons, Bob . [Organic Dairy Study Results for the 2008 Production Year](#), Northeast Organic Producers Alliance (May, 2010).
- Parsons, Bob. [Vermont's Dairy Sector: Is There a Sustainable Future for the 800 lb. Gorilla?](#) Opportunities for Agriculture Working Paper 1:4, Food System Research Collaborative at the Center for Rural Studies, University of Vermont (2010).
- Parsons, Robert. [Economic Overview of the New England Organic Dairy Sector](#), presentation to Northeast Pasture Consortium, Fairlee VT (January 20, 2010).
- Pratt, James E., Andrew M. Novakovic, Phillip M. Bishop, Mark W. Stephenson, Eric M. Erba, and Craig S. Alexander. [Estimation of Regional Differences In Class I Milk Values Across U.S. Milk Markets](#). Cornell Program on Dairy Markets and Policy Publication (January 1988).
- Putnam, James N. [Dairy Farm Profitability and Finance: Northeast Perspective](#), Presentation to the Dairy Industry Advisory Committee (April 13-15, 2010).
- Putnam, Judy and Jane Allshouse. [Trends in US Per Capita Milk and Cheese Consumption 1909 to 2001](#), *Amber Waves: The Economics of Food Farming, Natural Resources and Rural America*, U.S. Department of Agriculture, Economic Research Service (USDA / ERS) (June 2003).
- Rabinowitz, Adam N., and Ronald W. Cotterill. [The Need for New Milk Pricing Policies](#), Presented to the Connecticut Legislature Environment Committee (February 18, 2009).
- Samuelson, Joanna. [2007 Northeast Dairy Farm Summary](#), A Joint Project of Northeast Farm Credit (May 2008)
- Short, Sara D. [Characteristics and Production Costs of U.S. Dairy Operations](#), Economic Research Service (USDA / ERS), Statistical Bulletin No. SB974-6 (February 2004).
- Smith, Peter Andrey. "[Lives: The Milk Haul](#)," *Gastronomica: The Journal of Food and Culture* 9:1, pp.69–74.
- Sumner, Daniel A. and Joseph V. Balagtas. "[United States' Agricultural Systems: An Overview of U.S. Dairy Policy](#)," in the *Encyclopedia of Dairy Sciences*, ed. Hubert Roginski, John W. Fuquay, Patrick F. Fox. (Maryland Heights, MO: Academic Press, 2002), pp. 20-25.
- U.K. Department of Environment, Food, and Rural Affairs (DEFRA), Dairy Supply Chain Forum. [The Work of the Dairy Supply Chain Forum: 2003-2007](#) (October 2007).
- U.S. Congress, House of Representatives. "Small Business Problems in the Dairy Industry," Hearings in Boston, MA, February 17-19, 1960, before the Special Subcommittee of the Select Committee on Small Business, 86th Congress, Second Session, Pursuant to H. Res. 51, a Resolution Creating a Select Committee to Conduct a Study and Investigation of the Problems of Small Business (Washington, DC: Government Printing Office, 1960), Volume IV.
- U.S. Congress, House of Representatives. [Review of the Market Structure of the Livestock Industry](#), Hearing before the Subcommittee on Livestock, Dairy, and Poultry of the

Committee on Agriculture, House of Representatives, 110th Congress, First Session (April 17, 2007), Serial No. 110-10.

- U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS). [Dairy Market Statistics: 2008 Annual Summary](#) (May 2009).
- U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS), Northeast Marketing Area, Federal Order 1. Index of [Northeast Marketing Area Pool Handler Locations](#) (2010).
- U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS), Northeast Marketing Area, Federal Order 1. [The Market Administrator's Monthly and Annual Statistical Bulletins](#) (2007-2010).
- U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS), Northeast Marketing Area, Federal Order 1. Map of [Northeast Marketing Area Pool Handler Locations](#) (2010).
- U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS), Northeast Marketing Area, Federal Order 1. Map of [Northeast States Class I Differentials, by County](#) (2010).
- U.S. Department of Agriculture, Agricultural Marketing Service (USDA / AMS), Market Administrator's Office, Lenexa, Kansas. [A Compilation of Current Dairy Marketing Research](#), *Researcher*, Issue No. 8 (2002-2003).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services (USDA-APHIS-VS), National Animal Health Monitoring System (NAHMS), [Dairy 2007: Biosecurity Practices on U.S. Dairy Operations, 1991-2007](#) (May 2010).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA / APHIS). [2008 Animal Health Report](#), USDA-APHIS Agriculture Information Bulletin No. 805 (December 2009).
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS). [Dairy Industry Manual](#) (Draft July 2010).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Milk Cows and Production by State and Region, 2002-06](#) (2010).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Dairy: Background](#) (March 19, 2009).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Operations with Milk Cows, by State and Region 1](#), compiled by ERS from NASS, "Milk Final Estimates" and "Milk Production" (July 14, 2005).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Per Capita Dairy Product Consumption in US 1975-2008](#) (September 30, 2009).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [U.S. Dairy Situation at a Glance](#) (May 25, 2010).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Number and Average Size of U. S. Fluid Milk Bottling Plants Operated by Commercial Processors, 1950-2008](#) (December 29, 2009).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Dairy Year Book](#) (2010).

- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [U.S. Milk Production, 1970-2004 by Month](#) (2010).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [U. S. Quarterly Milk Production and Related Data](#), 2005-2009 (March 2, 2010).
- U.S. Department of Agriculture, Economic Research Service (USDA / ERS). [Outlook for U.S. Agricultural Trade](#), (May 27, 2010) and Data Sets of the [Foreign Agricultural Trade of the United States \(FATUS\)](#) (2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Dairy and Poultry Statistics](#), Agricultural Statistics, Chapter 8 (2009).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [2007 Census of Agriculture](#) (2011).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Dairy Cattle and Milk Production](#), 2007 Census of Agriculture (2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Dairy Products: 2009 Summary](#) (2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Farms, Land in Farms, and Livestock Operations, 2009 Summary](#) (2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Milk Production, Disposition, and Income, 2009 Summary](#) (April 29, 2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Farmers by Age](#) (September 11, 2009).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [New England Statistics](#) (2011).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Farms, Land in Farms, and Livestock Operations, 2009 Summary](#) (February 12, 2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Milk Production](#) (July 19, 2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). 2007 Census Publications, [Ag Atlas Maps, Livestock and Animals](#) (2010), especially [Milk Cows Inventory](#) (Map 07-140), [Cattle and Calves - Inventory: 2007](#) (Map 07-M134) and [Cattle and Calves - Change in Inventory: 2002 to 2007](#) (Map 01-M135).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [U.S. Dairy Herd Structure](#) (September 26, 2002).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Milk Production: U.S. Milk Cows and Milk per Cow, Quarterly, 2004-2007](#) (July 14, 2005).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Overview of the United States Dairy Industry](#) (September 2010)
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [Prices Received by Farmers, All Milk](#) (2010).
- U.S. Department of Agriculture, National Agricultural Statistics Service (USDA / NASS). [A Compilation of Current Dairy Marketing Research](#), *Researcher*, Issue 7 (Market Administrator's Office, Lenexa, Kansas, 2001-2002).

- U.S. Department of Agriculture, National Agriculture Statistical Service (USDA / NASS). [Milk Disposition and Income Final Estimates, 2003-2007](#), Statistical Bulletin 2017 (May, 2009).
- U.S. Department of Agriculture, Office of Communications. [Agriculture Secretary Vilsack Announces Immediate Relief for Struggling Dairy Producers: Obama Administration to Raise Dairy Support Prices, Will Increase Dairy Farmers' Revenue by \\$243 Million](#), Press Release No. 0355.09 (July 31, 2009).
- U.S. Department of Agriculture, Office of Communications. [Agriculture Secretary Vilsack Announces Cheese Purchase of \\$60 Million to Assist Struggling Dairy Producers, Aid Nation's Food Banks](#), Press Release No. 0624.09 (Dec.18, 2009).
- U.S. Department of Health and Human Services, Public Health Services, and Food and Drug Administration (USPHS/FDA). [Grade "A" Pasteurized Milk Ordinance \[PMO\]](#) (2009 Revision).
- U.S. General Accounting Office (GAO). [Dairy Industry: Information on Milk Prices and Changing Market Structure](#), GAO-05-50 (December 29, 2004).
- University of New Hampshire Cooperative Extension. *The History and Economics of the New Hampshire Dairy Industry*. Durham: UNH Cooperative Extension Publications, 2007.
- [Vermont Attorney General Sorrell Announces Antitrust Settlement With Dairy Giant Suiza](#), *Agriview* 65:13 (July 1, 2001), pp. 1-2.
- Vermont Attorney General's Office, Sarah London and Diane E. Zamos, Principal Authors. [Vermont Attorney General's Report: The Capper-Volstead Act and the Northeast Dairy Fluid Milk Market Pursuant to Sec. 5 of Act 48 of the Acts of the 2009 Legislature](#) (January 2010).
- Wacker, Tim. "[Struggling Under the Dairy Grind: Co-op Proposes Premium on Milk to Aid Local Farms](#)," *Boston Globe* (September 21, 2006).
- Wadsworth, James J. and Boris E. Bravo-Ureta. "Financial Performance of New England Dairy Farms," *Agribusiness* 8:1 (January 1992), pp. 47-56.
- Winsten, Jonathan R., C. D. Kerchner, A. Richardson, A. Lichau, and J. M. Hyman. "Trends in the Northeast Dairy Industry: Large-Scale Modern Confinement Feeding and Management-Intensive Grazing," *Journal of Dairy Science* 93:4 (April 2010), pp. 1759-69.