An Examination of the Connecticut Dairy Inspection Program

by
Gary V. Johnson

Food Marketing Policy Center
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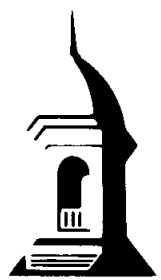

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Department of Agricultural Economics
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Executive Summary

Background

Connecticut currently inspects all dairy farms that ship milk to handlers who import either bulk or processed fluid milk into Connecticut. In the past two years this inspection practice has been called into question by two sources. The first source, the state of New York, has challenged the timeliness of Connecticut inspection and intimated that the slow inspection of farms associated with new handlers wishing to enter the Connecticut market is a form of restraint of trade. The New York State Agriculture Commissioner and others have called for Connecticut to eliminate the problem by accepting full reciprocity regarding inspection. This suggestion has broader implications than a shift of authority from one state to another. Dairy farm inspection in the State of New York is not carried out entirely by state inspectors. Certified industry milk inspectors (CIMIs), who are employees of the milk handlers, perform the bulk of the inspections. The only time that New York Sate milk inspectors examine individual dairy farms is when farmers switch handlers, when rating producers and processors for the Interstate Milk Shippers Program, or when undertaking the annual recertification of CIMIs. (During recertification New York State Inspectors accompany the CIMIs on a typical day of farm inspections.)

The second source questioning Connecticut's dairy farm inspection program is Connecticut's Agricultural Commissioner. This is, to some extent, a reaction to New York but also reflects other conditions. Connecticut is currently revising their dairy regulations. The revision process, coupled with tight budgetary conditions, has led to the need to assess the performance of the current inspection program to determine the need for resource allocation and regulatory changes.

The purpose of this report is to evaluate the current Connecticut milk inspection program and to examine several alternatives to current dairy inspection regulations.

Current Regulatory Environment

The first part of this report is an analysis of the current regulatory environment in which Connecticut operates. While the

federal government has no direct role in regulation it sets the environment through the Pasteurized Milk Ordinance (PMO) and the Interstate Milk Shippers (IMS) Program. The latter organization oversees the interstate shipment of milk. Furthermore, in order to participate in interstate milk markets, states cannot have less strict requirements than the PMO.

When comparing Connecticut's dairy regulations with the PMO and those of Massachusetts, New York, and Wisconsin, one finds that the Connecticut regulations vary only in two areas. First, Connecticut has a less stringent standard for pasteurized bacteria count. This is not as important as it seems since the state has been enforcing the PMO standard for pasteurized bacteria count on a *de facto* basis. Second, Connecticut uses state inspectors for on-farm dairy inspections while New York, and to some extent, Wisconsin are using Certified Industry Milk Inspectors (CIMIs).

A Comparison of Performance of Connecticut's Dairy Program with that of Other States

According to federal IMS program check-rating data Connecticut's dairy plant inspection program is one of the best in New England. However, using the same data for farm inspections, Connecticut's program seems to be one of the poorest when compared to other New England states and the state of New York.

A more detailed evaluation of the farm inspection program uses a matched data set of New York farms that ship into order one with CIMIs inspection reports, Connecticut State inspection reports, and laboratory reports of performance of the farms relative to the standards of performance. The conclusions from this analysis are as follows:

- in terms of number of inspections failed and number of farms failing them, Connecticut's inspections appears tougher than those of the CIMIs,

- in terms of number of farms that repeatedly failed inspection, both Connecticut and the CIMIs are identical,

- while the number of farms that repeatedly failed inspections are the same for the two sets of inspectors, the actual farms within that number are different,

- at least some of that difference is attributable to a different motivation when doing inspections, and

- the initiation of inspections for CIMIs and the focus of that inspection are much more tied to performance standard violations.

With regard to the barrier to trade issue, a barrier to trade could take one of three forms: higher health standards, selective enforcement of those standards to exclude potential entrants into the Connecticut milkshed, and a lack of timely inspection of potential entrants. This research provides no support for the existence of the first two types of barriers and does not address the issue of timeliness. However, recent actions of the Connecticut Commissioner of Agriculture regarding to requests for inspection by two major New York processors suggests that timeliness is not a barrier. The commissioner waived the permit requirement on the farms supplying these processors allowing them to ship milk immediately. In effect, he gave the farms temporary permits until normal inspection could be carried out by Connecticut inspectors.

Examination of Options to the Current Dairy Regulations

As explained above, the only areas that can differ in dairy regulations from the PMO are the issues of reciprocity and who should undertake the farm inspections. Given this fact, three options that differ from the current program are outlined, all three differ from the existing regulations regarding reciprocity. The last two of these allow partial reciprocity, while the first allows total reciprocity. The first two options further differ from current practice by employing CIMIs instead of state inspectors. Since the findings of the analytical section of this report can be used to support any of these options, none is suggested as superior to the others. The budgetary consequences of the options are also presented.

Three recommendations are made in this section of the report that are supported by the empirical analysis. First, the state

should attempt to limit the number of farms that an individual inspector visits. This would allow inspectors to react in a more timely fashion to such things as violations of performance standards. Second, the state inspection program should initiate inspections on a timely basis when performance standards are violated. The analysis demonstrated that this would lead to identification of different problem farms than those currently identified by state inspectors. Finally, there is a real need to computerize the inspection staff to allow better management for the inspection program.

1. Background

Connecticut currently inspects all dairy farms that ship milk to handlers who import either bulk or processed fluid milk into Connecticut. In the past two years this inspection practice has been called into question by two sources. The first source, the state of New York, has challanged the timeliness of Connecticut inspection and intimated that the slow inspection of farms associated with new handlers wishing to enter the Connecticut market is a form of restraint of trade. The New York State Agriculture Commissioner and others have called for Connecticut to eliminate the problem by accepting full reciprocity regarding inspection. This suggestion has broader implications than a shift of authority from one state to another. Dairy farm inspection in the State of New York is not carried out entirely by state inspectors. Certified industry milk inspectors (CIMIs), who are employees of the milk handlers, perform the bulk of the inspections. The only time that New York State milk inspectors examine individual dairy farms is when farmers switch handlers, when rating producers and processors for the Interstate Milk Shippers Program, or when undertaking the annual recertification of CIMIs. (During recertification New York State Inspectors accompany the CIMIs on a typical day of farm inspections.)

The second source questioning Connecticut's dairy farm inspection program is Connecticut's Agricultural Commissioner. This is, to some extent, a reaction to New York, but also reflects other conditions. Connecticut is currently revising their dairy regulations. The revision process, coupled with tight budgetary conditions, has led to the need to assess the performance of the current inspection program to determine the need for resource allocation and regulatory changes.

The purpose of this report is to evaluate the current Connecticut milk inspection program and to examine several alternatives to current dairy inspection regulations. The report is divided into several sections. The first one is devoted to a description of the current regulatory environment for plant and farm level milk inspections. In assessing the state level regulatory environment, Connecticut's regulations and inspection regime will be compared with that of several other states (Massachusetts, New York, and Wisconsin). The second section will be a comparison of actual farm level inspections by Connecticut inspectors to those by inspectors in other New England states and the state of New

York and by Certified Industry Milk Inspectors in New York State. The final section of the report will contain three broad farm level inspection regulatory alternatives for the state of Connecticut and evaluate the performance of each, given the empirical analysis of the second section and their budgetary consequences.

2. Regulatory Environment for Dairy Farms and Milk Plants

This section of the Milk Study focuses on the nature and enforcement of sanitary regulations of the operations of both dairy farms and dairy processing plants. The main issue to be considered is how, if at all, should the State of Connecticut's sanitary regulations and their enforcement policy be changed. To address this issue we will explore the current regulatory environment in which Connecticut's regulations and policies act. The first part of this section will look at the regulatory environment at the federal level, and the second part at the state level, regarding sanitation on dairy farms and in dairy plants for Connecticut, Massachusetts, New York, and Wisconsin.

2.1 The Federal Level

The main regulatory body that is involved with the sanitation of milk production, transportation, and processing is the Public Health Service (PHS), Food and Drug Administration (FDA), U.S. Department of Health and Human Services (USDHH). The main involvement of the PHS/FDA has been confined to two main activities—the development of the Grade A Pasteurized Milk Ordinance (PMO), and oversight of the Cooperative Federal-State Program for the Certification of Interstate Milk Shippers (IMS) Program. Both activities are unique in their cooperative interaction with the appropriate state regulatory agency and their voluntary nature. Federal regulatory power in this area rests upon participation of the states.

The PMO, acts as a model set of regulations, which must be adopted in whole or in part by the participating state in order for them to have any effect. Similarly, the statutory adoption by a state of the procedures for the certification of interstate milk

shippers is required for involvement of the state in the certification program. The IMS program appears to be much the same; however, once adopted, these procedures lead to an expanded federal role. Even with this latter exception, the role of the PHS/FDA can be viewed as one of supplying information, coordinating regulatory activities, and ensuring the quality of state inspection personnel.

Before discussing the impact of the federal role in the sanitary regulation of dairy farms and dairy processing plants, it is important to look in more detail at the PMO and IMS programs.

2.1.1 The Grade A Pasteurized Milk Ordinance (PMO)

The PMO was first published in 1924 and grew out of the recognition of the dietary importance of milk as well as the realization of milk's potential as a carrier of disease associated with major disease outbreaks. At the time of the PMO's inception, the problem of sanitation on dairy farms and dairy processing plants was preponderantly a state and local problem, given the intrastate nature of milk markets. This led to the voluntary nature of this PHS/FDA activity. The main purpose of the PMO was to provide guidance and information to local regulatory officials and to promote a uniformly high standard for milk products throughout the country. An indication of the success of this activity is the precipitous drop in disease outbreaks associated with milk from 25% of all major outbreaks in 1938 to 1% recently (PHS/FDA, 1985).

The PMO has been continually revised and updated, the 1985 Revision being the latest. The updating of the PMO is done in conjunction with National Conference on Interstate Milk Shipments, a voluntary group made up of state and federal officials, and industry representatives. The PMO is organized into two main parts—the ordinance, and the ordinance and administrative procedures—and a number of appendices. It will be useful to give a brief description of the various sections of the PMO.

Section 1 identifies and defines the products, processes, and individuals that are covered by the ordinance. Section 2 prohibits the production, provision, and sale of adulterated milk. Section 3 delineates the permits necessary for the production, transporting, hauling, processing, and selling of milk and milk products covered by the statute. Section 4 deals with the labeling

of the products covered. Sections 5 and 6 deal with inspection of dairy farms and milk plants, and the examination (sampling and testing) of milk and milk products. Section 7 delineates standards for milk and milk products, including the sanitation requirements for Grade A raw milk for pasteurization, ultra pasteurization, or aseptic processing. Section 8 deals with animal health. Section 9 defines the milk and milk products that may be sold under the ordinance. Section 10 deals with transfer, delivery container, and cooling of milk and milk products. Section 11 deals with milk and milk products originating outside the limits of routine inspection of the jurisdiction adopting the ordinance. Section 12 states requirements to submit plans for future construction of new dairy farms or new facilities at existing dairy farms and new dairy plants. Section 13 prohibits the employment of an individual with a communicable disease where said individual could come in contact with milk and milk products during their production, transportation, or processing. Section 14 delineates the procedure for dealing with infection of milk or milk products by an individual with a communicable disease. Section 15 indicates responsibility for enforcement of the ordinance. Section 16 describes the penalties for violating the ordinance. Finally, sections 17 and 18 deal with repeal, effective date, and separability of the clauses within the ordinance.

Part II of the PMO restates the ordinance and provides administrative procedures for its implementation, the intent being to promote uniform interpretation. There are 13 appendices to the PMO containing details regarding various aspects of milk sanitation technology and administrative procedures. These appendices are part of the ordinance when they are specifically cited in the ordinance and, like Part II, are meant to promote uniform interpretation of the ordinance. There is also an appendix (K) that contains an adoption by reference form for the ordinance.

There are two general types of regulation—process based and performance based; the PMO utilizes both. Process regulation stipulates adherence to the use of various materials and methods for undertaking a particular task. Originally, the PMO was based solely on this type of regulation. Process regulation is found in the current version of the PMO in Sections 5 and 7 (items 1r through 22p), which specifies the inspection of dairy farms and dairy plants for the use of items such as concrete floors, types of pasteurization devices, cleanliness of the grounds surrounding a

milk plant, etc. The underlying argument for the use of process regulation is that specification of aspects of the process for producing milk will impact the healthfulness of the resulting product. The advantage of process regulation is that it is generally easy to ascertain if the provisions are being met by the regulated entity. The disadvantage is that they may or may not result in a healthier product.[1]

The second type of regulation, used in sections 6 and 7 of the PMO, is based on performance, which requires specification of characteristics of the product of a process. Maximum bacterial counts and somatic cell counts required at both the dairy farm level and the milk plant level are specified in these sections along with a specification of the number of times these cell counts must be taken and how often they can be exceeded. The advantage of performance based regulation is that it specifies a particular characteristic or level of a characteristic that the final product should have. One disadvantage, however, is that it may be difficult to define and measure product characteristics. A second disadvantage is that the link between what is measured and the desirable characteristic may not be relevant, as exemplified by unpasteurized bacteria counts in raw milk.

The strength of the PMO lies in its use of both process and performance types of regulation, since they overlap. The performance standards for milk cover some but not all possible aspects of milk safety and quality. By using process inspection an attempt is made to deal with overlooked aspects. Because the relationship between process inspection and performance standards is not well known, one would expect some overlap between between them to be enforced.

An important issue when assessing a model regulation like the PMO is whether it will withstand testing in the courts. The two most important of the numerous court cases are *Billings et al. versus City of Hutchinson et al.*[2] and *Dean Milk Company versus City of Madison.*[3] In the first the court refused to enjoin the enforce-

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[1]Recent doubts concerning the effectiveness of process based regulations have led in part to a proposal to reduce meat inspections by USDA (Executive Office of the President, 1988).

[2]May 1, 1934 District Court, Reno County, Kansas.

[3]US Supreme Court No. 258—October term, 1950.

ment of the Hutchinson ordinance (based upon the then current PMO). The plaintiffs based their case on the grounds that the ordinance was unreasonable, conflicted with state statutes, license fees provided in the ordinance were in excess of expenses, and the milk inspector was vested with arbitrary powers. The broad nature of the plaintiffs grounds for injunction are what makes this case important.

The case of *Dean Milk Company versus the City of Madison* was important because the court struck down an imposed 5-mile limit on the location of pasteurization plants selling milk in Madison. The court pointed out that Madison consumers would be adequately protected under Section 11 of the PMO, which requires that milk entering a market from outside the jurisdiction of local inspection meet the PMO standards. Therefore, this prohibits the establishment of unwarranted trade barriers against the acceptance of high quality milk from other milksheds on the basis of Public Health needs.

2.1.2 The Cooperative Federal-State Program for Certification of Interstate Milk Shippers

The second activity at the federal level by PHS/FDA is the IMS program. While this program is not federal in the conventional sense of that term, it has a large federal component to it and, therefore, will be discussed here. The IMS program came about after World War II because of the recognition by the milk industry, state and federal departments of agriculture, and state and federal health regulators that there needed to be assurances regarding the sanitary conditions of milk shipped interstate. This recognition was also an acknowledgement that milk markets were becoming more interstate than intrastate in nature, as was the case when the PMO was first proposed.

The IMS program is a cooperative effort by state and federal governments and the milk industry to provide assurances of the quality of milk shipped interstate. The body formulating the necessary guidelines for the PHS/FDA is the National Conference on Interstate Milk Shipment (NCIMS). Although this body is composed of state and federal officials and industry representatives, it is controlled by the states.

The IMS program, while voluntary, has 48 member states, Connecticut and Massachusetts being the only nonmembers. Member states are required to recognize the PMO as the basic

standard for making compliance ratings of interstate milk shippers. Milk and milk products from beyond the jurisdiction of member states is acceptable under the principle of reciprocity for sale in the member states, provided it has been produced and pasteurized in compliance with the PMO and been awarded an acceptable compliance and enforcement rating by a state milk sanitation rating officer certified by the PHS/FDA. It is important that no action or requirement can be made by a member state accepting the milk or milk products in excess of those specified by the PMO.

The *Procedures Governing the Cooperative State-Public Health Service/Food and Drug Administration Program for Certification of Interstate Milk Shippers* (PHS/FDA, 1987) lays out the requirements for standards, supervision, rating and certification, uniformity of bills of lading and sealing of shipments, responsibilities of participating state agencies, responsibilities of the PHS/FDA, and the application of conference agreements. Beyond the requirement of accepting the PMO or equivalent regulation as the standard for milk production and processing, the IMS program clearly indicates the state and federal role in maintaining those standards. The state regulatory agencies are responsible for the rating of milk supplies following procedures outlined in the PMO. The federal government through the PHS/FDA is responsible for:

1. standardizing the performance ratings of state rating officers, state milk laboratory evaluation officers, and state sampling surveillance officers;

2. publishing a list of those officers that are competent;

3. publishing the compliance and enforcement ratings of interstate milk shippers;

4. training of state regulatory personnel;

5. check rating the compliance status of listed interstate shippers;

6. providing interpretations of the PMO; and

7. acting as a clearing house for complaints from receiving and shipping states and municipalities.

One of the most important features of the PHS/FDA role is the check rating of compliance status of interstate shippers. This is done not only for milk plants but also for individual dairy farms whose milk is shipped interstate in raw form or who ship to a milk plant that ships processed milk interstate. Plants, bulk tank units in a state, and the farms within the selected bulk tank units are all randomly selected for check-rating. The specific details on check-ratings are contained in the *Methods of Making Sanitation Ratings of Milk Supplies* (PHS/FDA, 1987). If the PHS/FDA rating is below the 90 % compliance rating, then the PHS/FDA can ask the pertinent state agency for a new rating; and if the check rating is sufficiently low, the PHS/FDA can ask that state for withdrawal of current certification and notification of all receiving states. If the state indicates an inability to make arrangements for the PHS/FDA to make a check-rating or to perform a new rating if so required, the PHS/FDA shall indicate those states in the next IMS list. Other IMS states will then refuse to accept milk from the listed state. This feature gives the PHS/FDA *de facto* regulatory powers.

Delisting of interstate milk shippers or the listing of a state that is unable to comply has occurred three times in New England in the recent past. Milk processing plants in the state of Rhode Island lost their certification in 1986 through the inability of the state regulatory agency to carry out adequate compliance ratings, West Lynn Creamery was delisted in November of 1988 due to low check ratings, and in 1988 Connecticut Bulk Tank Unit No. 2 was delisted because of sufficiently low compliance rating.[4]

2.1.3 An Assessment of the Federal Role in Dairy Farm and Dairy Plant Sanitary Regulation

From the above discussion of the PMO and IMS program, it is clear that, while voluntary in nature, the federal role in dairy

[4]Note that this bulk tank unit was shipping milk out of state for processing in Massachusetts. Although both Connecticut and Massachusetts are not members of the IMS program, they voluntarily complied with the program in this instance. This case will receive further discussion in the part of this section dealing with state regulatory environment.

farm and dairy plant sanitary regulation is an important one. The role of the PMO is larger than its model ordinance status because of the reasonableness of the ordinance and because of the IMS program. While voluntary, the high level of participation in the IMS program results in a major role for PHS/FDA in assuring uniformity of sanitation standards for dairy farms and dairy plants and in uniformity of administration of those standards. In some sense this expanded federal role is a reflection of the overwhelmingly interstate nature of milk markets in the U.S.

2.2 The State Level

In this part we will review state sanitary regulations for dairy farms and plants and their enforcement. While our main interest is in Connecticut, we will look at three other states as well—New York, Massachusetts, and Wisconsin. These states were chosen using two criteria—the importance of the state to the Connecticut milkshed and a history of innovation in sanitary regulations for dairy farms and plants. Two of the four states examined, New York and Wisconsin, are in the cooperative IMS program, while the other two states, Connecticut and Massachusetts, are not. Because of the importance of the PMO and IMS program, our discussion will compare and contrast state sanitary regulation and its enforcement with that proposed in these federal entities.

The PMO is the basis for the bulk of the dairy farm and dairy plant sanitary regulations in all these states. Thus, the more interesting features of these states regulations are their differences with the PMO, which appear in three broad categories—bacterial performance standards for milk and their administrative procedures for implementation, the rating score required at the farm level, and who is empowered to undertake farm level inspections. We will first turn to the differences in standards.

2.2.1 Differences in Performance Standards

The performance standards stated in Section 7 of the PMO for bacterial and somatic cell counts are shown in Table I below. Sampling for these standards is described in Section 6 of the

Table I. DIFFERENCES IN THE PERFORMANCE STANDARDS BETWEEN THE PMO, MASSACHUSETTS, CONNECTICUT, NEW YORK, AND WISCONSIN.

		Standard			
Product	Item	PMO & NY	CT	MA	Wisconsin
Grade A Raw Milk	Bacterial Counts*	100,000/ml	100,000/ml	50,000/ml	100,000/ml
	Somatic Cell Counts	1,000,000/ml	1,000,000/ml	1,000,000/ml	750,000/ml
Grade A Pasteurized Milk	Bacterial Counts	20,000/ml	25,000/ml	25,000/ml	20,000/ml

*Prior to comingling.

PMO and requires 4 samples to be taken at the farm level during each six month period. Furthermore, if the standards for bacterial and somatic cell counts are exceeded in two of the last four samples, a written notification will be sent to the farm and inspection of the farm will be necessary to identify the problem. If the standards for bacterial and somatic cell counts are exceeded three of the last five samples, the suspension of permit and/or immediate court action shall occur.

As can be seen in Table I, New York, in the main, follows the PMO regarding the standards and procedures for dealing with their violation. New York, however, differs in that samples of milk must be taken and recorded every month. Connecticut, Massachusetts, and the new proposed regulations for the state of Wisconsin implement different quality standards for the bacterial counts, pasteurized bacterial counts, or the somatic cell counts than those in the PMO and, like New York, requires monthly testing and reporting. Massachusetts' standards are interesting because they require a lower bacterial count for raw milk but a higher bacterial count in pasteurized milk. While Connecticut has the same requirement for the raw bacterial count as the PMO, it, like Massachusetts, has a higher pasteurized bacterial count standard. Connecticut also differs from the PMO in applying the pasteurized bacterial count to a laboratory pasteurized test for individual producers. Wisconsin's proposed new regulations differ from the PMO by requiring a lower somatic cell count.

The standards for these states appear to be at odds with the IMS program as described above, but since Connecticut and Massachusetts are not in the IMS program, this is not a problem. Wisconsin, however, is in the program but is an exporter of milk. Wisconsin regulators have made assurances that this export nature of its milk industry removes the conflict.[5] It is important to note that, except for Massachusetts' difference in bacterial counts for pasteurized milk, all four states have essentially the same requirements for dairy plant inspection.

[5]Information given orally to Gary V. Johnson during an interview with Tom Leitzke, Food Division, Wisconsin Department of Agriculture.

2.2.2 Other Differences Between State Programs

Further differences among the states and with the PMO occur regarding the necessary rating of farm sanitary conditions for receipt or continuation of a Grade A milk permit. A 90% score using the standardized inspection sheet is sufficient in Connecticut and New York. Such is not the case in Massachusetts and Wisconsin, where farms can pass inspection with scores marginally below 90% and fail with scores above 90%.[6] This reflects dissatisfaction with the mandatory point deductions for specific categories required by the standard farm inspection sheet. The feeling is that these point deductions do not allow for differentiation between minor and major infractions in a given portion of the inspection sheet.

The final differences between the four states involves who is allowed to carry out dairy farm inspections. For the inspection of dairy plants there is no difference since all states inspect dairy plants with state personnel. However, at the dairy farm level of inspection the states fall into two rough groupings. Connecticut and Massachusetts inspection of both in-state dairy farms and out-of-state dairy farms is conducted by state personnel. Massachusetts does differ from Connecticut in that state personnel are only required to make the first inspection of a dairy farm applying for a grade A permit. The State Commissioner of Agriculture can accept inspection by out-of-state inspectors if that is deemed desirable, and, in fact, Massachusetts used inspection by out-of-state inspectors prior to the 1980s. These inspectors were responsible for one of the two required farm inspections per year. The practice was changed due to the New York *listeria* outbreak that occurred in 1979.

Alternatively, New York and Wisconsin allow Certified Industry Milk Inspectors (CIMIs) to perform official inspections, as allowed in the PMO (Part II and Appendix B). Wisconsin provides for the use of CIMIs for one of the two required farm inspections per year. There are only a small number of CIMIs in the state. (See Table II). On the other hand, New York

[6]Information given orally to Gary V. Johnson during interviews with Tom Leitzke, Food Division, Wisconsin Department of Agriculture and David Sheldon, Director of the Division of Dairying and Animal Husbandry, of the Massachusetts Department of Agriculture.

Table II. WORK LOAD FOR FARM INSPECTORS.

State	Number of Farms	Number of State Inspectors	Number of CIMIs	Other Tasks Performed by Inspectors
CT	3,918	10	NA	Plant inspection
MA	6,070*	10	NA	Plant inspection
NY	14,000	55	190	Inspection of milk plants, laboratories, cheese plants, and frozen desert plants
WI	24,000**	65	15	Inspection of milk plants, cheese plants, confectioners, supermarkets

* Only inspecting farms in the state of New York once a year.

** 13,000 of these are grade B milk producers with only one required visit per year.

requires milk handlers and processors to employ CIMIs for farm level inspections. These CIMIs are responsible for all farm inspections except the initial inspection when a producer first applies for a New York Grade A permit, check rating a supplier for the IMS program, or when a producer changes handlers. As members of the IMS program neither Wisconsin nor New York make farm level inspections outside of their respective state jurisdictions. Both states make at least one inspection per year of processing plants shipping to their state but located outside their state.

Part of the reason for the employment of CIMIs by Wisconsin and New York can be seen in Table II. The right hand column of this table indicates what inspections, in addition to farm inspections, are made. It can be seen that both Wisconsin and New York have a heavier inspection load outside of farm inspections than do Connecticut and Massachusetts.

The above comparisons between the states raise questions regarding whether the actual inspection performance differs between Connecticut and Massachusetts, where both states use public inspectors, and Connecticut and New York, which use industry inspectors. This issue is addressed in the next section of the report.

3. A Comparison of Dairy Inspection Between Connecticut and Several Other States

In this section of the report we will compare the Connecticut dairy inspection with that of other New England states and with New York. The first part of this section focuses on a comparison with other New England states and New York using federal check-rating data. The second part examines the inspection of the same farms by both Connecticut inspectors and CIMIs for the state of New York. The final part of this section draws some general conclusions regarding the current dairy inspection by the state of Connecticut.

3.1 A Comparison of Inspection Between New England States and New York Using Federal Check-Rating Data

As part of the IMS program described above in section 2.1.2, federal inspectors check rate milk supplies in states belonging to the program. While Connecticut and Massachusetts do not belong to the program, they participate in the check rating of both plants and farms in order to allow their milk plants to participate in interstate markets. Data from these check ratings can be used to compare inspection by the state rating officers within the New England milkshed and the state rating officers for New York.[7] This federal check rating data allows a valid comparison of state inspection programs since the state rating officer is certified by the federal inspector and his or her ratings reflect general sanitation level on a group of farms in an area. If the scores for a group of farms by the state rating officer were significantly lower than those of the normal inspector, corrective action must be taken.

The federal inspector's check ratings are on samples of plants and farms within a state. The drawing of these samples is specified in the *Methods of Making Sanitation Ratings of Milk Supplies* (PHS/FDA, 1987). The number of plants check rated will depend on the number within the state, and they are drawn from a random sample. The number of farms check rated is somewhat more complicated. A random choice of bulk tank units to be check rated is made. Again, as in the case of plants, the number of bulk tank units in the sample depends on the number within the state. Farms are randomly chosen for check rating from the sample of bulk tank units. The number of farms chosen in a bulk tank unit depends on the total number of farms within that unit. The fewer the farms the higher the percentage of farms in the bulk tank unit that are sampled.

The actual check rating is a comparison of the inspection score by the federal inspector with that for the same plant or farm by the most recent state rating inspection. Comparison with inspection by other states or industry field personnel is not made. As explained above, generally in section 2.1.2 and specifically in the *Procedures Governing the Cooperative State-Public Health Service/ Food and Drug Administration Program for the Certification of*

[7]It is important to note that the state sanitation certification officer is a state employee not a CIMI.

Interstate Milk Shippers (1987), adverse actions are taken if the federal inspector's score differs within certain tolerance ranges from those of the state inspection and falls below the 90% level. If the federal inspector's score is more than 5 points below the state score and below 90%, then the state must reinspect and rate the plant or farm. If the federal inspector's score is below the state score by more than 10 points and below 85%, then the state is required to remove the plant or farm's certification.

Regarding plant check ratings the state of Connecticut has performed well. Between 1985 and the 1988 Connecticut has had the lowest percentage of adverse actions of any of the New England states, as shown in Table III. The federal government's confidence in Connecticut's plant inspection is reflected in the request for Connecticut inspectors to do plant inspections for the State of Rhode Island when that state's inspection program lost its inspection certification in 1986.

Table III. PLANT CHECK RATINGS ACTION SUMMARY FOR THE NEW ENGLAND STATES: 1985 TO 1988.

State	Total Check-Rated	Passed	Adverse Actions: New Rating Required	Adverse Actions: Immediate Withdrawal Required	Total Adverse Actions
Maine	14	9 (64%)	3 (22%)	2 (14%)	5 (36%)
New Hampshire	5	2 (40%)	1 (20%)	2 (40%)	3 (60%)
Massachusetts	31	15 (48%)	13 (42%)	3 (10%)	16 (52%)
Vermont	19	12 (63%)	5 (26%)	2 (11%)	7 (37%)
Rhode Island	12	7 (58%)	1 (9%)	4 (33%)	5 (42%)
(Since program revitalization 2 years ago.)	5	5 (100%)	0 (0%)	0 (0%)	0 (0%)
Connecticut	15	10 (67%)	4 (26%)	1 (7%)	5 (33%)

Note: Information supplied by Steven Sims, Senior Regional Milk Specialist, PHS/FDA.

Unfortunately, Connecticut's farm inspections have not done as well in the check ratings, as shown in Table IV. The data in the table is in terms of bulk tank units. Whether a bulk tank unit passes or is subject to an adverse action is based on a weighted average of the individual farm scores within the unit. The weights are based on the amount of milk from the farm as a percentage of the total milk in the bulk tank unit. Under this system a single farm can have a very large impact. For example, the immediate withdrawal required of Connecticut shown in Table IV was the result of a single very large farm that made up a large proportion of the bulk tank unit. The check rating on this farm was so low that certification was withdrawn for the bulk tank unit as a whole, i.e., all farms could not ship milk. As can be seen in the table the percentage of total adverse actions taken by the federal government is highest for the Connecticut of all the New England States and New York. Also, Connecticut is the only state with less than 50% of its bulk tank units passing the check rating. The general conclusions that can be drawn from the data in Table IV is that farm level milk inspection by Connecticut within Connecticut appears to be poorer than that of other New England states or New York state.

One might think that this conclusion should be modified because New York state farms have more than just CIMIs making inspection and this would lead to higher sanitary conditions on New York farms. Both the state of Connecticut and the state of Massachusetts use state inspectors to inspect farms in New York. However, considering that less than 10% of New York's milk production enters the New England milkshed, this argument does not have much force. If anything the argument should hold for Connecticut dairy farms. Nearly all of Connecticut's dairy farms are inspected for sanitary conditions by industry field personnel, Connecticut state inspectors, and Massachusetts' state inspectors. Finally, it should be noted that if limited inspection resources exist for the state of Connecticut then you would hope that the state would put more effort into inspection of dairy plants than into farm inspections. This emphasis on plants stems from the need to protect consumers. It would appear that if Connecticut has followed such an allocation of scarce resources.

Table IV. FARM CHECK-RATING ACTION SUMMARY FOR THE NEW ENGLAND STATES AND NEW YORK: 1985 TO 1988.

State	Total Check-Rated	Passed	Adverse Actions: New Rating Required	Adverse Actions: Immediate Withdrawal Required	Total Adverse Actions
Maine	14	12 (86%)	2 (14%)	0 (0%)	2 (14%)
New Hampshire	15	11 (73%)	4 (27%)	0 (0%)	4 (27%)
Massachusetts	19	13 (68%)	5 (26%)	1 (5%)	6 (32%)
Vermont	14	9 (64%)	4 (29%)	1 (7%)	5 (36%)
Rhode Island	7	4 (57%)	3 (43%)	0 (0%)	3 (43%)
Connecticut	10	2 (20%)	7 (70%)	1 (10%)	8 (80%)
New York	36	30 (83%)	5 (14%)	1 (3%)	6 (17%)

Note: Numbers are number of bulk tank units. Check ratings for the New England States are made by a single federal inspector except for 1 bulk tank unit in Vermont. That single bulk tank unit passed. Check Ratings for New York were made by a different single federal inspector. Information for New England supplied by Steven Sims and for New York by Terry Musson both are Senior Regional Milk Specialists, PHS/FDA.

3.2 *A Comparison of Farm Level Inspection by Connecticut State Inspectors and New York CIMIs*

The purpose of comparing Connecticut State Inspectors with CIMIs in the state of New York is to address two issues. The first issue is whether Connecticut State Milk Inspectors are more strict, as strict, or less strict than CIMIs, and the second is the relationship between process inspection and performance standards.

3.2.1 The Data

Two types of data were gathered for this examination of state versus industry inspection—farm inspection reports from the state of Connecticut and CIMIs for two New England milk handlers and laboratory reports on milk standards testing. Data was requested from several New England and New York handlers, some of whom do not ship into the New England milkshed but are potential entrants. Only two New England handlers provided data.

The contents of farm inspection reports for both state and industry inspection are dictated by the Federal Pasteurized Milk Order (PMO), which breaks down the process inspection into 10 broad areas, as follows:

cows;
milking barn, stable, or parlor;
milk house or room;
toilet and water supply;
utensils and equipment;
milking;
transfer and protection of milk;
personnel;
cooling;
vehicles; and
insects and rodents.

Each of these categories are further broken down into subcategories with mandatory point reductions for a violation of a subcategory. Within an inspection report the number of points lost are totaled and subtracted from 100. A score of 90 is considered passing. In general, any score below 90 requires reinspection of the farm.[8] If upon reinspection the farmer has not corrected

[8]The 90 score requirement is not universally followed as noted above in section 2.2.2. Massachusetts' milk inspectors do not use 90 but their own judgement. Thus, depending on the severity of the violation in a specific category, a score at or above 90 will not necessarily prevent reinspection nor will a score below 90 necessarily require reinspection. Massachusetts' inspectors do not give a total score on their inspections, just a pass or a fail.

the deficiencies noted in the regular inspection, his/her grade A permit can be revoked for some specified period of time. Such revocation requires a hearing in addition to the reinspection. The data in farm inspection reports are those from process regulation.

The second type of data is the results from laboratory test reports required of all handlers. Laboratory tests are for the following items:

raw bacteria count (required);
pasteurized bacteria count;
preliminary incubation count;
somatic cell count (required);
cryoscope range [added water] (required); and
presence of antibiotics (required).

Those marked with required, in parentheses, are part of Connecticut's regulatory standards. Limited tests are run on samples for each farm for each day of milk pickup by the handler. One full test of a sample per month is required by the state milk inspection programs. If the laboratory finds that the statutory limit for bacteria count is violated, i.e., 2 bacterial counts greater than the standard in the last four counts, then the handler must inform the state and retest. If upon retesting the sample still exceeds the limit, acceptance of milk from that producer is stopped and a reinspection required. Similarly, if the somatic cell count is exceeded in two of the last four samples tested, the handler must retest the milk. If the requirement is still exceeded, reinspection will take place and the delivery of milk may be stopped. The type of data from the laboratory reports is associated with performance regulation.

Both types of data were collected for a set of farms in the state of New York that delivered milk into the New England milkshed for the years 1987 and 1988. For each farm in the data set there is a complete set of laboratory reports and field inspection reports by both Connecticut and industry inspectors. The total number of farms in the data set for 1987 was 87 and for 1988 was 118. These farm numbers reflect 7% and 10% of the approximately 1200 New York farms whose milk enters Connecticut.

3.2.2 Analysis of the Farm Inspection Data

Table V provides the data from the farm inspection reports for 1987 and 1988, and we see that industry inspectors visit the farms much more often than state inspectors. This is due to several factors, the foremost being the number of farms that are the responsibility of the two groups and the nature of each inspector's job. The typical CIMI is responsible for between 150 to 200 farms while performing other jobs (e.g., the recruiting of new producers). The state inspector, on the other hand, has 350 to 400 farms that must be inspected in a given year and may also have responsibility for plant inspections as well.

Looking at Table V, it appears that, even with fewer farm visits, the state of Connecticut inspection is tougher than that by the CIMIs. This appearance stems from the higher failure rate (54 over the two years for the state inspectors versus 34 for industry) and the larger number of farms that failed (43 for the state inspectors versus 26 for industry). This may be somewhat deceptive since sanitary conditions on farms can change on a daily basis and being out of compliance may be a somewhat random event.

A better measure of strictness of inspection might be the number of farms that fail inspection more than once in a year. Using this measure we see that both state and industry inspectors each failed 8 farms repeatedly over the two year period. Since we might construe the farms with multiple failures as problem farms, this latter measure would seem to indicate an equal ability on the part of industry and state inspectors to identify problem farms. Table VI indicates that even this conclusion might be wrong.

Table VI looks at the overlap of those farms that failed at least one inspection in a given year by either industry or state inspectors. For example in 1987 a total of 21 farms failed state inspection and of these 21 farms 5 failed more than once. 18 of the 21 farms were only failed by state inspectors while 3 of the 21 were also failed by CIMIs. With regard to the 5 farms that repeatedly failed, 4 were failed only by state inspectors and only one farm was also failed by CIMIs. As can be seen from this table there is very little overlap of those farms that failed the industry inspection and those that failed the state inspection. This is also true of farms that had repeated failures. This still may be merely a problem of timing, i.e., if an industry (state) inspector visits a farm failed by a state (industry) inspector after

Table V: SUMMARY OF FARM PROCESS INSPECTION DATA FOR NEW YORK FARMS INSPECTED BY BOTH THE STATE OF CONNECTICUT AND NEW YORK CIMIS.

Inspector	Farms	Inspections	Failures	Farms That Failed	Farms That Failed Repeatedly
		1987			
State	87	175	28	21	5
CIMIs	87	263	16	14	2
		1988			
State	118	204	26	22	3
CIMIs	118	347	18	12	6

a significant passage of time, then the problems leading up to the failure may have been corrected.

For the farms in the 1987 data in Table VI the timing issue appears to be important. On the two occasions both state and industry inspectors failed a farm that they visited on the same date. However, the reasons for failure were not identical. For all other failed farms in 1987, neither the state nor industry inspector visited within a month either side of the date of failure. The 1988 data in Table VI differ somewhat from the 1987 data. In two cases an Industry inspector passed a farm that was failed within the last two days by a state inspector and in one case the reverse was true. In all three cases the scores for all three farms were within at least two points of a 90 score.

In conclusion state and industry inspectors don not seem to completely agree on the sanitary conditions of farms at a given time. Why is this so? One possible answer to this question may lie with the relationship between process inspection and performance standards.

Table VI. THE OVERLAP OF THE GROUPS OF FARMS THAT WERE FAILED BY CONNECTICUT STATE INSPECTORS AND/OR NEW YORK CIMIS.

Inspector	Total	Only in Own Group	In Both Groups
	1987		
State	21 (5)	18 (4)	3 (1)
CIMIs	14 (2)	11 (1)	3 (1)
	1988		
State	22 (3)	18 (3)	4 (0)
CIMIs	12 (6)	8 (5)	4 (1)

Note: Figures in parentheses are repeat offenders.

3.2.3 Analysis of the Relationship Between Performance Standards and Process Information

The monitoring of farms for violation of performance standards is an activity of industry. However, enforcement of violations of performance standards is a state activity. This split of the monitoring and enforcement activities may be optimal under current regulation, since industry would be monitoring the milk for quality control anyway. Looking at the laboratory data for the firms discussed in the previous section we see that in 1987 no firms were excluded for violations of performance standards. The laboratory data for 1988 show only a single firm that was excluded and that was for antibiotics in the milk.

Given these findings, the interesting aspect of performance standards is their interrelation with process inspection and whether the interrelationship differs for state and industry inspectors. The interrelationship between performance standards and process inspection may take on several forms. First, violation of performance standards may trigger process inspec-

tion. Second, violation of performance standards may be related to the failing of a process inspection. Finally, violation of performance standards may be related to loss of points within specific areas of the process inspection.

However, before we explore these possible relationships, we need to understand that industry has different performance standards than the state. This is shown in Table VII. Industry standards shown in the table are stricter than the state standards except in the case of somatic cell count. This makes sense if we think of the PMO or state standards being a minimum to assure milk safety and quality. Furthermore, industry can trigger action based on a single violation of standards, whereas state action does not occur until two out of the last four laboratory tests for a standard show a failure. Finally, industry has an additional performance standard—preincubation bacteria count (PI).[9] The PI test is a test for the bacteria that live at the cold temperatures that fluid milk is stored at. This test is thought to reflect on milk spoilage and bacterial diseases such as *listeria*. The third column in Table VII shows another use of performance standards by industry as the basis for paying a premium for higher quality milk. Given the differences between industry and state performance standards, we are now ready to begin exploration of the relationship between performance standards and process inspection.

3.2.3.1 Performance Standards as Initiators of Process Inspection. One potential use of performance standard violations is as initiators of process inspection. On some of both the state's and some of the CIMI's inspection forms, violations of performance standards were explicitly noted as the cause for the inspection. These notations where much more common on CIMI's inspection forms than those of the state. In order to explore this more carefully, violations of performance standards prior to process inspection were carefully matched for both the 1987 and 1988 farms in the matched data set. It is important to note that the matching was different for state and industry inspection.

[9]Both firms that participated in this study use a PI standard. This standard is not universal among industry firms.

Table VII. DIFFERENCES IN THE PERFORMANCE STANDARDS BETWEEN THE STATE AND INDUSTRY.

		Standard		
Product	Item	State	Industry	Agrimark Premium
Grade A Raw Milk	Bacterial Counts*	100,000/ml	50,000/ml	10,000/ml
	Preliminary Incubation	NA	100,000/ml	50,000/ml
	Somatic Cell Counts	1,000,000/ml	1,000,000/ml	500,000/ml
Grade A Pasteurized Milk	Bacterial Counts	25,000/ml	1,000/ml	300/ml

*Prior to comingling.

For inspections by CIMIs, matches were made between inspection dates and violations that took place in the previous 30 days. A single violation of an industry performance standard was considered adequate, although record was kept of two of four violations for raw bacteria and somatic cell counts. For inspections by the state, matches were made between inspection dates and violations that took place in the previous 60 days. As was the case for industry a single violation was considered adequate with records kept of two of four violations for raw bacteria and somatic cell counts. The reason that 60 days were chosen for the state inspections was to take into account potentially less timely reporting of laboratory tests to the state. While even 30 days may seem to be extremely long between performance violation and process inspection, it must be remembered that both industry and state inspectors have other duties beside farm inspection.

The analysis of the resulting data sets are shown in Table VIII. Inspection visits in this table are separated out on a basis of what potentially initiated the visit. As shown in the table, industry is much more responsive to performance standard

Table VIII. SUMMARY OF CAUSES FOR INITIATING A PROCESS INSPECTION.

		Reason for Inspection			
Inspector	Total Inspections	None	Reinspection	Violated Only Industry Standards	Violated State Standards
			1987		
State	175	132	28	0	15
CIMIs	263	141	16	60	46
			1988		
State	204	160	26	0	18
CIMIs	347	185	18	79	65

violations than is the state. From notations on the inspection reports this seems to be the case. This sensitivity may also reflect the lower number of farms that industry has to inspect.

This result is further strengthened in Table IX where there is a breakdown of the nature of the violation of standards. For example, in the column marked Own Raw Bacteria Standard, we see that 11 of the 15 inspections initiated in 1987 by the state because of standards violations in Table VIII were initiated by a violation of the state's standard raw bacteria standard in 1987. Similarly, of the 60 inspections initiated in 1987 by CIMIs for industry standard violations, 50 involved the violation of the industry raw bacteria standard; and of the 46 inspections initiated by the CIMIs in that year for violations of state performance standards, 35 involved the state's raw bacteria standard. Therefore, the table illustrates that the most common violations initiating state process inspection are those of the raw bacteria count. Although industry figures also reflect this as an important initiator but violation of the PI standard is the one most cited. This table, again, stresses that the state is less responsive in initiating process inspections from performance standard violations than is industry. This conclusion is especially dramatic given the 1988 figures where state inspectors only visited farms that violated the two of the last four criteria for either raw bacteria or somatic cell count one-fourth as many times as industry inspectors.

The results from comparing state and industry figures for Table VIII and IX would seem to indicate that the state inspection program is less performance standard oriented than that of industry. To examine the extent that this explains the differences in the farms that fail state and industry process inspection we turn to an analysis of the relationship between performance standards and process inspection failure.

3.2.3.2 <u>Performance Standard Violation as an Indicator of Process Inspection Performance</u>. In order to analyze the relationship between performance standard violation and process inspection performance the data in the matched farm data set need to be changed. Given that performance standard violations may reflect transient conditions on the farm, the time period that passes between violation and process inspection should be shorter. To reflect this shortening in both the industry and state

Table IX. A Breakdown of Type of Performance Violation in Table VIII.

Inspector	Own Raw Bact. Std.	Own Past. Std.	Own PI Std.	Own Somatic Cell Std.	2 of 4 Raw Bact. Std.	2 of 4 Somatic Cell Std.
			1987			
State	11	1	NA	3	3	0
CIMIs	50 (35)	10 (1)	70	13 (13)	8	1
			1988			
State	15	0	NA	3	3	1
CIMIs	81 (54)	25 (0)	90	11 (11)	12	1

Figures in parentheses are number of state standard violations.

portions of the data set, performance standard violations were only included if they occurred 30 days or less before the process inspection. While even this time may appear excessively long, given the paucity of state inspections initiated by performance standard violations, it is necessary to ensure performance standard violations appearing in both portions of the data set.

Variables for performance standard violations were expressed as 1 if one or more performance standards were violated or 0 indicating no violation of performance standards. Each of the individual performance standards were also 1-0 variables with 1 indicating a violation of a particular standard and 0 indicating no violation. The passed process inspection variable was assigned a value of 1 if the farm passed or 0 if the farm failed. Variables for sections of the process inspection took on values between 0 and the maximum point reduction for that section. A point count greater than zero for a section indicated a marking down of the farm for items included in that section. Note that not all sections of the process inspection are included in the analysis. Those sections not included did not appear as deductions in the process inspections under analysis.

The analysis of the data will be done by calculating simple statistical correlations between whether a farm passes the inspection and performance standard violations and various sections of the process inspection. These correlations can range between 1 and -1 with the extreme values indicating that a particular variable is positively or negatively correlated with another. For example if violation of the raw bacteria standard and milk house conditions were perfectly positively (negatively) correlated, a bacterial standard violation would always (never) indicate poor milk house conditions. A correlation of 0 would indicate that there is no correlation between variables. In our analysis we would anticipate that all the performance standard violations and sections of the process inspection would be negatively correlated or uncorrelated with passage of the process inspection. Conversely, we would anticipate that all correlations between performance standard violations and sections of the process inspection would be positive or 0.

The results of the correlation analysis for state inspections for the two year period is shown in Table X. Looking first at state inspections, we see that with regard to passing the process inspection the performance standard variable measures overall performance. This variable is negatively correlated with the passed inspection variable, as hypothesized, and it is statistically

Table X. CORRELATIONS BETWEEN PASSING OR FAILING THE PROCESS INSPECTION, CATEGORIES WITHIN THE PROCESS INSPECTION, AND PERFORMANCE STANDARDS FOR STATE INSPECTIONS.

	Passed Inspection	Performance Standards	Raw Bacteria	Pasteurized Bacteria	Somatic Cell Count	2/4 Raw Bacteria	2/4 Somatic Cell Count
Performance Standards	*-0.068* *(-1.331)*	1.000					
Raw Bacteria	-0.047 (-0.908)	*0.871* *(34.456)*	1.000				
Pasteurized Bacteria	0.021 (0.412)	0.172 *(3.396)*	-0.013 (-0.260)	1.000			
Somatic Cell Count	*-0.068* *(-1.319)*	*0.425* *(9.114)*	-0.033 (-0.641)	-0.007 (-0.126)	1.000		
2/4 Raw Bacteria	-0.054 (-1.054)	*0.175* *(3.457)*	*0.205* *(4.065)*	-0.005 (-0.101)	-0.013 (-0.250)	1.000	
2/4 Somatic Cell Count	-0.019 (-0.377)	0.040 (0.777)	-0.017 (-0.328)	-0.003 (-0.064)	*0.122* *(2.391)*	*0.828* *(28.616)*	1.000
Barn	*-0.266* *(-5.353)*	-0.026 (-0.509)	-0.036 (-0.707)	*-0.080* *(-1.554)*	0.046 (0.902)	-0.021 (-0.398)	*-0.070* *(-1.359)*
Milk House	*-0.264* *(-5.308)*	0.038 (0.734)	0.026 (0.505)	0.027 (0.522)	0.021 (0.412)	-0.025 (-0.489)	-0.044 (-0.861)
Toilet & Water Supply	-0.044 (-0.849)	0.023 (0.451)	0.037 (0.723)	-0.008 (-0.146)	-0.019 (-0.361)	-0.015 (-0.289)	-0.010 (-0.186)
Utensils & Equipment	*-0.632* *(-15.851)*	*0.084* *(1.633)*	0.037 (0.719)	-0.022 (-0.427)	*0.121* *(2.361)*	-0.003 (-0.054)	0.031 (0.596)
Milking & Milk	*-0.149* *(-2.932)*	0.059 (1.146)	-0.005 (-0.103)	-0.022 (-0.418)	*0.149* *(2.916)*	-0.010 (-0.196)	0.019 (0.377)
Insects & Rodents	*-0.120* *(-2.347)*	0.011 (0.214)	0.006 (0.124)	0.054 (1.040)	-0.010 (-0.198)	0.001 (0.025)	-0.001 (-0.014)

Note: Figures in parentheses are the conditional t-statistic for the test that the correlation is equal to zero. The t-statistics for 90% and 95% significance level are 1.282 and 1.645 respectively for 377 degrees of freedom. This table is based on a total of 379 inspections.

significant at the 90% level.[10] The only single performance standard variable that is significantly correlated with the passed inspection variable is somatic cell count. As anticipated, Somatic Cell Count is negatively correlated with passing the process inspection. All other performance standard variables can be thought of as having a zero correlation in a statistical sense. Furthermore, with the exception of the Toilet and Water supply variable, all the included sections of the process inspection were statistically significant, negatively correlated with passing the process inspection, and at least twice as large (in an absolute value sense) as that of the Somatic Cell Count. It should also be noted that Somatic Cell Count had a statistically significant positive correlation with both the Utensil and Equipment and the Milking and Milk sections of the process inspection.

The results of the correlation analysis of the industry portion of the data set are shown in Table XI. Here we see that with the exceptions of the Somatic Cell Count variables for both the industry and state standards and the 2/4 Somatic Cell Count variable, all performance standard and process inspection section variables have a statistically significant negative correlation with passing the process inspection. Furthermore, both the Utensil and Equipment and Milking and Milk sections of the process inspection have significant positive correlations with the failure of state Raw Bacteria Standards, and industry Preincubation Standard. The Utensil and Equipment section also has significant positive correlations with industry Raw Bacteria Standard and violation of the 2/4 Raw Bacterial Count Standard. Milking and Milk has significant positive correlations with industry and state Somatic Cell Count Standard, and with the 2/4 Somatic Cell Count Standard. The Barn and Insects and Rodents sections of the process inspection have significant positive correlations with the failure of the industry Pasteurized Bacteria standard. The only odd results in Table XI are the significant negative correlations between the Toilet and Water Supply and Insects and Rodents sections of the process inspection and violation of several of the performance standards. In all cases these correlations are less than 0.1 and suggest that, given a violation of the relevant

[10]What is meant by statistical significance at the 90% level is that the correlation between two variables is different from zero with a 90% level of confidence. Figures in italics in Tables X and XI are statistically significant.

performance standard, there is less likely to be a mark down of the relevant process inspection section. This result is counter intuitive and, while it occurs in the data set, it is probably spurious. It indicates that these categories are more likely to be marked down when industry inspectors are inspecting a farm where no recent performance standard violation has taken place.

If we compare the correlations between performance standards and process inspection sections and passing the process inspection in Tables X and XI, we see some interesting contrasts between state and industry inspections. Just as our analysis of the previous section suggested that the state is less responsive to violations of the performance standards than industry, we see lack of significance or lower significant correlations between performance standard violations and the passing of state process inspections than we do for industry process inspections. This would seem to indicate that the CIMIs are looking for different things in the process inspection than the state inspectors. By looking more closely at those farms that violate performance standards, the CIMIs might be doing a better job of identifying those farms that pose the highest health risk, i.e., those farms that both violate performance standards and fail process inspections.[11]

3.3 Conclusions from the Data Analysis

There are a number of conclusions that can be drawn from the above analysis. These conclusions are given below.

1. The state dairy inspection program at the farm level appears to be less stringent than that for other New England states or the state of New York.

2. If we use the number of farm process inspections that end in failing of that inspection or the total number of

[11]Steven Sims, in a telephone conversation, indicated that the general feeling is that farms that violate performance standards and fail process inspection pose the highest potential health threat.

Table XI. CORRELATIONS BETWEEN PASSING OR FAILING THE PROCESS INSPECTION, CATEGORIES WITHIN THE PROCESS INSPECTION, AND PERFORMANCE STANDARDS FOR INDUSTRY INSPECTION.

		Industry Standards				
	Passed Inspection	Performance Standards	Raw Bacteria	Pasteurized Bacteria	Preincubation	Somatic Cell Count
Industry						
Performance	-0.146	1.000				
Standards	(-3.636)					
Raw	-0.169	0.627	1.000			
Bacteria	(-4.214)	(19.845)				
Pasteurized	-0.063	0.296	0.111	1.000		
Bacteria	(-1.553)	(7.632)	(2.754)			
Preincubation	-0.082	0.700	0.296	0.045	1.000	
	(-2.033)	(24.163)	(7.632)	(1.110)		
Somatic	0.047	0.232	0.091	-0.048	-0.036	1.000
Cell Count	(1.161)	(5.876)	(2.261)	(-1.179)	(-0.878)	
State						
Performance	-0.182	0.566	0.747	0.048	0.288	0.410
Standards	(-4.550)	(16.906)	(27.649)	(1.181)	(7.421)	(11.078)
Raw	-0.223	0.496	0.790	0.058	0.313	-0.005
Bacteria	(-5.644)	(14.066)	(31.778)	(1.421)	(8.114)	(-0.132)
State						
Pasteurized	0.010	0.049	0.078	0.164	0.068	-0.008
Bacteria	(0.244)	(1.199)	(1.915)	(4.101)	(1.677)	(-0.195)
Somatic	0.049	0.243	0.079	-0.050	-0.025	1.000
Cell Count	(0.216)	(6.164)	(1.947)	(-1.233)	(-0.616)	
2/4 Raw	-0.156	0.221	0.352	0.034	0.141	-0.036
Bacteria	(-3.886)	(5.578)	(9.265)	(0.831)	(3.514)	(-0.880)
2/4 Somatic	0.015	0.073	0.057	0.143	0.047	0.119
Cell Count	(0.367)	(1.811)	(1.414)	(3.551)	(1.157)	(2.963)
Barn	-0.150	0.026	-0.021	0.092	0.033	0.028
	(-3.725)	(0.646)	(-0.515)	(2.276)	(0.823)	(0.685)
Milk House	-0.070	0.024	-0.035	0.035	0.038	0.042
	(-1.739)	(0.582)	(-0.868)	(0.870)	(0.925)	(1.026)
Toilet &	-0.172	-0.067	-0.087	-0.087	-0.079	-0.051
Water Supply	(-4.304)	(-1.647)	(-2.159)	(-2.157)	(-1.952)	(-1.246)
Utensils &	-0.580	0.161	0.213	0.039	0.100	-0.041
Equipment	(-17.528)	(4.014)	(5.368)	(0.949)	(2.464)	(-0.999)
Milking &	-0.071	0.071	0.051	-0.026	0.063	0.169
Milk	(-1.749)	(1.756)	(1.248)	(-0.638)	(1.565)	(4.227)
Insects &	-0.123	-0.011	0.021	0.082	-0.018	-0.061
Rodents	(-3.064)	(-0.264)	(0.505)	(2.020)	(-0.434)	(-1.513)

Note: Figures in parentheses are the conditional t-statistic for the test that the correlation is equal to zero. The t-statistics for 90% and 95% significance level are 1.282 and 1.645 respectively for 607 degrees of freedom. This table is based on a total of 609 inspections.

Table XI. TABLE XI CONTINUED.

	Violated State						
	Passed Inspection	Performance Standards	Raw Bacteria	Pasteurized Bacteria	Somatic Cell Count	2/4 Raw Bacteria	2/4 Somatic Cell Count
State							
Performance	*-0.182*	1.000					
Standards	*(-4.550)*						
Raw	*-0.223*	*0.876*	1.000				
Bacteria	*(-5.644)*	*(44.814)*					
Pasteurized	0.010	*0.086*	-0.017	1.000			
Bacteria	(0.244)	*(2.124)*	(-0.414)				
Somatic	0.049	*0.429*	-0.012	-0.008	1.000		
Cell Count	(0.216)	*(11.701)*	(-0.298)	(-0.202)			
2/4 Raw	*-0.156*	*0.367*	*0.419*	-0.008	-0.096	1.000	
Bacteria	*(-3.886)*	*(9.705)*	*(11.379)*	(-0.188)	(-0.880)		
2/4 Somatic	0.015	*0.130*	*0.079*	-0.005	*0.119*	*0.195*	1.000
Cell Count	(0.367)	*(3.220)*	*(1.943)*	(-0.062)	*(2.963)*	*(4.893)*	
Barn	*-0.150*	0.017	-0.024	0.006	0.028	0.033	0.050
	(-3.725)	(0.412)	(-0.601)	(0.143)	(0.685)	(0.804)	(1.224)
Milk House	*-0.070*	0.018	0.000	0.026	0.042	-0.019	0.039
	(-1.739)	(0.456)	(0.005)	(0.628)	(1.026)	(-0.458)	(0.952)
Toilet &	*-0.172*	*-0.071*	-0.051	-0.011	-0.051	-0.048	-0.016
Water Supply	*(-4.304)*	*(-1.746)*	(-1.248)	(-0.261)	(-1.246)	(-1.186)	(-0.394)
Utensils &	*-0.580*	*0.194*	*0.240*	-0.016	-0.041	*0.208*	-0.025
Equipment	*(-17.528)*	*(4.867)*	*(6.086)*	(-0.404)	(-0.999)	*(5.234)*	(-0.611)
Milking &	*-0.071*	*0.124*	*0.065*	-0.009	*0.169*	-0.004	*0.085*
Milk	*(-1.749)*	*(3.071)*	*(1.592)*	(-0.219)	*(4.227)*	(-0.086)	*(2.092)*
Insects &	*-0.123*	-0.021	0.010	-0.025	*-0.061*	-0.002	-0.035
Rodents	*(-3.064)*	(-0.513)	(0.239)	(-0.574)	*(-1.513)*	(-0.037)	(-0.865)

Note: Figures in parentheses are the conditional t-statistic for the test that the correlation is equal to zero. The t-statistics for 90% and 95% significance level are 1.282 and 1.645 respectively for 607 degrees of freedom. This table is based on a total of 609 inspections.

farms that fail this type of inspection, the state inspectors appear stricter than CIMIs when inspections of the same farms are compared.

3. If we use the number of farms that are found to repeatedly fail process inspections, it appears that state inspectors and CIMIs are equally strict when looking at inspections of the same farms. However, the two groups of inspectors find different groups of farms with repeat failures.

4. If we examine the initiation of process inspections or the correlations between passing process inspections, violation of performance standards, and sections of the process inspection, CIMIs process inspections are much more performance standard oriented. If performance standards and process inspection are measuring the same thing than this would point to better performance by CIMIs. However, if the two types of regulation partially measure different things the results are less important.

5. In the case of both CIMIs and state inspectors the correlation between performance standard violation and process inspection are very low even where they are statistically significant. The reason for this may be the lack of timely inspections after violation of performance standards. Given the more timely nature of CIMIs inspections and the higher correlations for this group between violation of performance standard and failing of the process inspection, it appears that attempts should be made to initiate process inspections quickly after standard violations.

At the beginning of this report we noted that one of the reasons that this investigation was initiated was because of potential restraint of trade by Connecticut exercised through the inspection process. From our comparison of regulations in other states, it was determined that the regulations regarding process inspection are the same in New York as Connecticut (basically those set out in the PMO) and those regarding performance standards are the same or less stringent in Connecticut than New York. Furthermore, there has been no evidence presented in the data analysis that Connecticut is biased against New York

farmers. The only potential for a barrier to trade that could exist is timeliness of inspections. Given the offer of a waiver of permit requirements for farms associated with Crowely and Dairy Lea plants entering the Connecticut market by Connecticut's Commissioner of Agriculture, even the issue of timeliness seems moot. If barriers to entry into the Connecticut market exist, they must be associated with something other than the dairy inspection program. (For further analysis of the barriers to trade issue and the Connecticut milk market see Cotterill and Pinkerton, September 1989).

We now turn to an evaluation of changes to the current regulations and dairy inspection to ensure top performance into the future.

4. An Examination of Alternatives to the Current Dairy Inspection Program

The state of Connecticut's choices regarding changes of the dairy inspection program are limited by the interstate nature of milk market and budgetary considerations. As discussed in Section 2.1.2, the IMS program requires the adoption of the PMO or equivalent regulations. It further prohibits states from making requirements that are beyond the PMO. Connecticut needs to revise its dairy regulations in the area of performance standards to be at least as strict as those in the PMO. This would mean changing the Pasteurized Bacteria Count standard to 20,000 per ml. Since the state is already *de facto* enforcing this standard, it is not much of a change. The only other changes in the dairy inspection program regarding regulations that are open to the state without jeopardizing the interstate milk market for its plants and farmers are concerned with who undertakes the process inspection, how that inspection is initiated, and the issue of reciprocity with other states. The impact of these changes are best explored by looking at a limited number of scenarios.

Three alternative changes to the dairy inspection program along with the current program are shown in Table XII. The estimates of farm visits in this table were established by using the historical record for new entrants into the Connecticut milkshed, the fact that one half of all Connecticut farms must be rated each year for the IMS program, the percentage for farms changing

Table XII. REGULATORY OPTIONS

Option	Who is inspected by CT State Inspectors	No. of farms	Comments
Full Reciprocity with CIMIs	Check rating of All farms in CT, all CT farms that change milk handlers, oversight of CIMIs in CT, and all CT processing plants and MA processing plants shipping into CT	330	This could be accomplished by adopting the PMO by reference and becoming a member of the IMS program. Major regulatory change would be the CIMIs program and the UHT milk.*
Partial Reciprocity with CIMIs	Rating of all farms in CT, inspection of all new entrants, inspection of farms in CT changing handlers, and all processing plants shipping into CT	1,470	This could be accomplished by adopting all portions of the PMO except those dealing with reciprocity and maintaining the current status regarding the IMS program.
Partial Reciprocity with State Inspectors	Inspection and rating of all CT farms, all new entrants, all farms in the milkshed that change milk handlers, except those in New York, and all milk processing	2,280	This could be accomplished by adopting all portions of the PMO except those dealing with reciprocity and CIMIs, and maintaining the current status regarding the IMS program.
Current Program	Inspection and check rating of all farms in the CT milkshed, and all processing plants shipping into CT	3,918	No reciprocity.

*UHT milk is specifically mentioned in the PMO. If you adopt the PMO by reference you automatically accept UHT milk.

handlers from the New York statistics for 1987,[12] and the percentage for farms violating performance standards in a given year. Inclusion of this latter figure stems from our findings in the previous section, which point to increased quality of the milk supply from a health standpoint when the process inspection is initiated in a timely fashion after violation of performance standards because of the identification of a new set of problem farms.

The first two regulatory options involve employment of CIMIs in Connecticut. Our previous analysis has shown that doing so results in a focus on a different set of problem farms. If it is felt that by having both industry field personnel and state inspectors looking at sanitation on dairy farms affords a better coverage of problem farms, then this is a drawback of the first two options. If this is of no concern, then both options would allow a manpower reduction from the currently authorized 12 inspectors to a lower number. The use of CIMIs would also be a benefit to Connecticut farmers in that it would cut down on the number of inspectors they would have to deal with.

Given that the matched data set showed slightly under two visits per farm for state inspectors, it is strongly recommended that inspectors be limited to between 150 and 200 farms each. This limitation will allow a more timely and frequent inspection. At 150 farms per inspector, the first scenario requires at least two inspectors. An additional inspector would be required to perform plant inspections and IMS ratings for a total of three inspectors. The second option would require 8 inspectors for farm inspection plus 2 additional inspectors for IMS ratings and plant inspections, for a total of 10 inspectors. The final regulatory option would require 11 inspectors for farm visits and 2 inspectors for IMS ratings and plant inspections, for a total of 13 inspectors.

Rather than demand reciprocity as is the case in the PMO and regulatory option one, options two and three would write a reciprocity clause into the state regulations that would allow partial as well as full reciprocity. This clause could allow the Commissioner of Agriculture, with the approval of the Milk Regulation Board, to negotiate reciprocal agreements. By allowing for either partial or full reciprocity the new regulation

[12]Supplied by A.R. Place, Director, Division of Milk Control, Department of Agriculture and Markets, State of New York.

would provide the state with flexibility to achieve the goal of healthy milk being sold to consumers while facing differing budgetary conditions.

Finally, it is a strong recommendation that the state of Connecticut computerize its dairy inspection program. This is already being done for record keeping but our recommendation is at the inspector level. What is being suggested is a portable microcomputer, modem, and printer for each inspector. This would have a number of advantages for the inspection program. First, it would eliminate the need for inspectors to send in inspection sheets that would have to be then entered into the computer. Second, it would provide inspectors with increased access to performance standard information and results of previous inspections. Third, it would minimize math errors by inspectors. The inspector could enter his inspection work sheet on the portable computer or it could be entered from a paper inspection work sheet in the inspector's car and the inspector could print out an electronic copy for the farmer. The former type of entry is used extensively by the U.S. Forest Service. Finally, computerization, in general, would give managers of the inspection program potential for locating problem farms and giving them the opportunity for undertaking targeted action, such as more frequent inspection. For this system to work properly, regulatory options one and two would require either the input of CIMIs inspection records into Connecticut's data base b;y state personnel or the CIMIs to furnish the appropriate electronic record.

The budgetary impact of the three regulatory options are shown in Table XIII. Note that while the first two options save personnel money, the third requires increased expenditures. Any of the three options would not be achieved immediately, so the monetary savings or expense for personnel would be achieved only with full implementation.

Table XIII. THE BUDGETARY IMPLICATIONS OF THE REGULATORY OPTIONS

Regulatory Option	Personnel Budget Impact	Computer Expense
Option 1	Savings of $252,000/yr	$15,000
Option 2	Savings of $56,000/yr	$50,000
Option 3	Expense of $28,000/yr	$65,000

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