This topic was suggested by recent statements made privately by sanitarians in regulatory work and by quality control or fieldmen in the dairy industry. If we had enough sanitarians to inspect farms and plants the quality of the milk would be excellent, according to the men enforcing milk sanitation regulations. On the other hand, stated industry men, milk could be tested to assure its high quality without the expense and inconvenience of repetitious, contradictory, and needless farm inspection regulations. Now there is merit and fallacy in both assumptions. It is my objective to discuss this question and to propose more logic and facts as the basis of future policies.

Let us define high-quality milk and differentiate between public health and other commercial qualities of milk. "The attributes of quality in pasteurized milk are absence of pathogenic bacteria and toxic substances, cleanliness, low bacterial count, good flavor, satisfactory keeping quality, and high nutritive value (p 112—See footnote). All of these attributes are essential to high-quality milk, yet only the first three are of public health significance on the basis of strict interpretation. The last three quality factors might be termed commercial qualities.

The important consideration is the contributions that inspecting farms and testing milk make toward a high-quality milk supply. In some instances data are meager or completely lacking. Some interesting data and conclusions have been presented in the reference mentioned above (Nat'l. Res. Council Publ. 250). For example, "As all of the pasteurized milk was safe and wholesome and generally complied with all standards, there was no opportunity to obtain data to show the value of each regulation." (p 124). However, some correlations in the variations in attributes of quality and regulations could be established.

"There was a slight correlation of little practical significance between the number of inspections of farms by the sanitarians of the health department and the sanitary quality of the milk. These visits by sanitarians of the city health departments varied from an average of none to 10.6 per farm per year." (p 107). In the city with no dairy farm sanitation inspections the state department of agriculture planned on one inspection of each farm per year. Data were not obtained on the number of farm visits by fieldmen of milk processors of milk marketing cooperatives but, "There was a small degree of direct correlation between the average number of farms per [industry] fieldman and the average bacterial counts of the raw milk for the eight cities [in the study]." (p 107). "This correlation between average bacterial counts and the average number of farms per fieldman was much better than the correlation between the average bacterial counts and the average number of farms per sanitarian in the health department." (p 47). The explanations given for this situation were "The fieldmen had much more information on the bacterial counts of the milk supplies available to them than did the milk sanitarians so that the fieldmen could concentrate their efforts on the producers whose milk was not in compliance with standards. Furthermore, much time of the sanitarians in all cities was occupied with routine farm inspections to determine compliance with regulations rather than on specific producers to lower bacterial counts." (p 47). Thus, it is clear that it is difficult to associate the number of farm inspections with lower bacterial counts.

"A study of the scores reveals that the raw milk with the very lowest bacterial numbers was produced by cows that received the highest scores for cleanliness and that were housed in barns and milked in barns that were rated cleanest by the sanitarian. In such dairies the milk houses were clean." (p 106). "Farmers with the cleaner utensils had milk with lower bacterial counts. Furthermore, the data also showed that cleaner barns, cows, and milk houses were found generally on the farms with cleaner utensils." (p 106). "It is possible to produce clean milk of low bacterial count in dirty surroundings, but it is generally not done." (p 107). Obviously, the virtues of cleanliness cannot be overemphasized.

"The bacterial counts of the milk decreased as the number of samples of milk tested yearly per producer [by industry] for bacteria increased. There was no significant relationship between the bacterial
counts of the milk and the number of tests made by the health departments." (p 123). "When the samples of milk of individual producers were tested at least twice a month, sufficient information was obtained on milk quality to enable the fieldman of the milk companies and farm cooperatives and sanitarians of the health departments to work intelligently with dairymen to assure reasonable compliance of the milk with bacterial standards." (p 123).

These general relationships of industry inspection and milk testing are not as useful in quality milk production as one would wish because "The sanitary conditions of milk production on the farm were related to the bacterial counts of the raw and of the fresh pasteurized milk, but they were not related to the initial flavor and the keeping quality of the pasteurized milk." (p 123).

So the issue is clear that the problem is not one of whether to test milk or to inspect farms, but it is one of coordinating the work to attain the best quality milk supply with the least effort and expense. Health departments recognize that the public health aspects of milk sanitation are no longer urgent problems and industry knows that milk quality is generally satisfactory, but workers in both areas realize the situation could change rapidly through neglect. Budgets of health departments are apt to be assigned to more popular and urgent subjects; profits in the milk industry are low so the situation is difficult.

**Farm Inspections**

Certain desirable sanitation conditions on the farm can be assured only by proper regulations enforced by a government agency. The history of the dairy industry substantiates this statement. For example, there was a time and there were areas in which milk produced for cheese making was very much better in quality than milk produced for fluid consumption. Efforts to protect the public health on a local level eventually gave consumers high-quality grade A milk in spite of the lethargy of the dairy industry in some areas.

The principal objectives of dairy farm inspection by the regulatory agency are to be sure that each milk producer has the facilities required by the ordinance and that these facilities must be in good condition in proper buildings. The American Dairy Science Association Dairy Farm Sanitation Report provides that these facilities involve (a) health of cows, (b) milking area, (c) milk house or room, (d) utensils and equipment, (e) cooling facilities, (f) water supply, and (g) toilet and sewage disposal. No dairy farm should be approved for producing grade A milk until these required facilities are available. Acceptance of the milk must be the responsibility of the local or state regulatory agency; however, the dairy farms inspection forms ought to be developed at the state or federal level.

This initial inspection assures adequate farm facilities to produce high-quality grade A milk; however, it does not guarantee milk of such quality. Also, so far as possible, it should provide housing and equipment of good useful design for the producer. This reduces the chance of contamination of the milk supply with disease-producing bacteria but the total bacterial counts standards are sufficiently low to avoid the presence of bacterial toxins in milk. The consumer should be pleased with the conditions under which the milk is produced, a fact which should not be overlooked by personnel of the dairy industry and by regulatory officials.

How often should farms be reinspected? To that question there can be no answer based upon research data. Routine farm inspections should be made twice yearly by a sanitarian of the health or agricultural department or by a fieldman approved by the proper regulatory agency. The regulatory department sanitarian should inspect at least bi-yearly, in fact, semi-yearly if the budget permits. There is no need for more frequent official inspections as milk quality will not be improved thereby.

Under present conditions it seems obvious that the responsible state agency, if it has not already done so, must develop educational and experience requirements for sanitarians and fieldmen. A list of approved sanitarians may be available in each state. It should be compulsory to employ persons from this list assuming the list is ample to give some choice. Such a policy gives prestige and reliability to the inspection service as well as assisting in salary increases to sanitarians, which are so necessary in most states.

Responsibility at a local level is in the city or county health department. At the state level authority is divided about equally between the health departments or in the departments of agriculture and markets. In states where a department is in charge that has little interest in enforcing and improving laws and lacks an adequate staff to promote this field of activity it would be well for the dairy industry and others to study the situation. Possibly the proper solution is to transfer grade A milk sanitation to another state department, or it may be that expressed and continued interest by industry will redevelop activity by the responsible agency. In any event, providing a high-quality, safe milk supply for consumers is a very broad problem affecting many people and work on it must not lag even under reduced financing. The dairy industry is too important in the economy and the nutrition of this nation to permit it to stagnate through inferior quality products due to lax regulations and enforcement.
INDUSTRY INSPECTIONS AND MILK EXAMINATIONS

“The bacterial counts of the milk decreased as the number of samples of milk tested yearly per producer for bacteria increased.” (p 123). This statement applies only to industry testing of milk. “The routine semi-monthly tests of the raw milk should include temperature, sediment, total bacterial count, and thermoduric count, the last especially when the total bacterial count was not reduced sufficiently by pasteurization.” (p 123). Obviously, odor must be checked daily along with visual observation of conditions. The number of tests should be specified but need not be held constant forever under all situations. It could be varied according to conditions and the quality of the milk.

As the number of farm inspections by fieldmen did have a relationship to milk quality, it should be emphasized that these fieldmen usually visit farms which are experiencing trouble in meeting quality standards. If the approved fieldmen make official farm inspections for regulatory officials there is no necessity for requiring additional inspections of all farms by them; however, it may be necessary to make several closely spaced visits to farms producing milk of unsatisfactory quality. It should be the duty of the sanitarian in regulatory work to be intimately acquainted with the reasons for degrading or rejecting a producer’s milk supply by the fieldman or to do so himself.

To give consumers pasteurized milk of satisfactory quality, the keeping quality, as measured by flavor and bacterial counts after a reasonable storage period, must be very good. “The sanitary conditions of milk production on the farm were related to the bacterial counts of the raw and of the fresh pasteurized milk, but [unfortunately] they were not related to the initial flavor and the keeping quality of the pasteurized milk.” (p 125). It may be that sometimes we misinterpret the values of farm inspection for even though the farm conditions and the bacterial counts on the raw milk are excellent, the pasteurized milk may not be satisfactory. Hence, official farm inspections cannot replace examination of the milk. “Therefore, keeping quality tests on pasteurized milk [as packaged in the processing plant] should be made each week for flavor and for psychrophilic and coliform bacteria as an aid in improving this important characteristic of milk.” (p 125).

INDUSTRY AND REGULATORY RESPONSIBILITIES

In view of the facts herein presented, the responsibilities of men in industry and in regulatory work may be more clearly defined.

Official inspections of farms determine the degree of compliance with laws and ordinances; hence, it must be the responsibility of regulatory agencies. Although such inspections usually are directed through local municipal or county health departments, the work is handled also by state regulatory agencies. In either instance, the original inspection to qualify a new producer ought to be made by a regulatory sanitarian; however, thereafter much of the official inspection work may be done by approved industry fieldmen. The official inspection assures facilities and methods to ease the effort to produce a safe, high-quality milk supply in satisfactory surroundings.

The major protection to the public health by regulatory agencies lies in systematic inspection of processing plants and key procedures, such as pasteurization, distribution, and retailing facilities, and examination of the packaged pasteurized milk. There is much divergence of opinion on the frequency with which this work should be done but, except where conditions prove otherwise, I favor a weekly examination of the pasteurized milk and inspection of vital processes. Excellent plant control work, particularly in respect to pasteurization, does not mean that the raw milk supply need not be protected against contamination with harmful bacteria. This refers particularly to approved health of cows, acceptable water supplies, and proper sewage disposal. It is something like disregarding precautions in using a gun during hunting because the safety is on except when shooting.

It is the responsibility of the milk industry to produce, process, and deliver pasteurized milk of fine initial quality and good storage characteristics under conditions and with facilities which would be approved by consumers as well as by regulatory sanitarians. The basis for conditions on farms being satisfactory to consumers usually is determined by official regulations. The milk industry should never delegate its responsibility to any regulatory agency by paying it a fee to do this work. The milk industry is in the best position to control the quality of its own products by virtue of its experience, its contact with all details of the processing and handling, and its association with the men doing the actual work from production to sale. If industry should fail to produce high-quality milk for any reason, including failure of regulatory agencies to do a good job, such failure may be fatal in the competition for the consumers’ food dollar.

Nearly every conceivable means has been tried by the milk industry and by regulatory agencies to improve milk quality. Great progress has been made during this century in the production of safe, nutritious, good-tasting milk. Today some local conditions have stopped or reversed this trend, and in
some areas there has been accelerated improvement in quality. A situation inducive to possible retrogression is the unfortunate forced connection in some markets between pricing and health regulations as shown in one municipality where “the health department could not accept additional milk irrespective of its good sanitary quality.” (p 25). An example of the possibilities of material improvement in quality without excessive costs is a quality control laboratory which handled milk testing and quality control for milk producers, milk companies, and the regulatory agencies, with all parties participating in the management.

Finally, the recent agitation about contamination of milk with antibiotics, pesticides, and radioactive fallout emphasizes the possibilities of new methods by which foods, including milk, may become a public health hazard. The national scope of the problem and the need for federal standards and action is obvious. There has been considerable success in reducing or eliminating contamination of milk with antibiotics. There is urgent need for extended research in this area for all foods. The combined efforts of regulatory agencies at all levels and of the milk industry are necessary to keep the contamination of milk at a minimum.

SPECIAL FEATURE

INFORMATION ON C. I. P. CLEANING

Dairy Industry Committee
Washington, D. C.

Automation is in its first generation and succeeding generations will perfect automation beyond anything we can imagine at this time. Many changes will come in the next few years and management should keep itself informed. When they feel that the progress made meets their problems they should consider installing automation. In many cases reality of these installations are years off and the purpose of this report is to help in planning for future needs.

Buying an automated system without proper planning can be very expensive and very costly to correct. A proper plan for a dairy plant should not become fixed. It should be flexible and geared for changing conditions. Certain decisions however, have to be made and the following steps suggest means of putting a master plan in operation.

1. A floor plan of the entire plant should be made to scale and filed with a regulatory agency.
2. Templates should be used for best positions in relation to over-all picture.
3. Future equipment needs should be projected as closely as possible.
4. After equipment is arranged on theoretical basis, it should be measured with cost and a realistic plan formulated.
5. Processing lines now and for future expansion should be drawn in.
6. After processing lines have been laid out, return lines should be drawn so that everything can be cleaned with C.I.P. system.
7. After all C.I.P. circuits and return lines have been put in, work toward having all lines starting and ending at a central point. This point becomes an ideal place for an automation unit.

Equipment Considerations—

There are several things although small in themselves, which can prevent an automation unit from preforming as expected.

1. Storage Tanks

Before storage tanks or processors can be cleaned, there are conditions to be met.

a. The tank must be properly pitched for prompt free draining. Many spray ball installations have failed because of mixing of pre-rinse and cleaning solutions. This dilution of concentrations of cleaning solutions results in unsatisfactory washing.

b. Outlet should be of adequate size; 2½ to 3 inch outlet preferred.

c. The tank must be high enough off the floor to allow the solution return pump to operate in full flooded suction. Tanks too close to the floor will cause return pump to cavitate and fail to recover suction causing solution to build up in the tank and seriously affecting the dependability of the timing mechanism.

d. Proper location of spray equipment in storage tanks. Additional spray equipment may be necessary to thoroughly cover all areas behind baffles and agitator shafts.

2. Pipe Lines

Pipe lines should have proper pitch about 1/8 of an inch per foot. Pipes should be anchored to prevent sagging and puddling of cleaning and sanitizing solutions in the line.

Valves, especially air operated valves, should be