

Is It Desirable to Simplify and Unify Our Milk Quality Program?

FROM THE VIEWPOINT OF THE HEALTH OFFICER

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IN the light of our present knowledge in dairy science, it is well to ask why our known and accepted control measures have not been more universally applied.

To answer this question satisfactorily, it is necessary to consider some of the limiting factors for a proper control of milk supplies. Among these may be mentioned the economic, the esthetic, and quality aspects of the problem; certain long established ordinance features; and a shortage in manpower due to the war effort.

LIMITING FACTORS FOR CONTROL

The economics involved is always a limiting factor in connection with control work as evidenced by the fact that present effective control programs presuppose that from ten to twenty cents per capita per year will be available for carrying out the work.

When we remember that the majority of smaller municipalities and counties now provide practically nothing for milk supervision and that the average provision among cities is about five cents per capita, the seriousness of this economic angle is better appreciated.

ESTHETIC ASPECT

As to the esthetic aspect, all students of milk problems are in accord with the excellent conditions under which certified milk is produced and handled. We should be pleased to have the same attractive conditions surround the pro-

duction of ordinary milk as exist in connection with certified milk production.

However, when we remember that these very attractive conditions entail an increase of approximately three to five cents per quart in the retail price of milk, we understand why our esthetic desires cannot have full sway in milk production. In other words, our esthetic desires are in fairly constant conflict with the economics of the situation.

MILK QUALITY

The third aspect of control work is that concerning the quality of milk as produced. It is agreed that too many health officials are striving to improve the quality of milk by measures which are directed mainly toward the esthetics of the situation, in the hope that this will solve the problem of quality.

Under such conditions, it is not surprising that our milk control efforts are not producing the results desired.

ORDINANCE CONSIDERATIONS

Fourth, practically all municipal ordinances, including the Public Health Service Standard Ordinance, favor the use of the bacterial plate count as one of the criteria for judging milk, which perhaps does not offer the dependable quality picture originally anticipated.

For instance, it is now apparently believed by many laboratory workers that standard plate counts contribute little or nothing to controlling a milk supply, and indeed at times actually

detract from milk control because of the illogical absurdities encountered in the attempt to enforce bacterial standards. As a matter of fact, the agar plate method entails too much work for the results attained.

FEDERAL ORDINANCE COMMENT

As to milk control under the provisions of the Standard Milk Ordinance, which now has been with us for practically twenty years, this ordinance apparently comes no nearer to unifying milk control than at the start, because of the many cities and states which do not deem it advisable to adopt this code. Perhaps it is significant that three of the largest milk producing states—New York, Michigan, and Wisconsin—have not urged its adoption.

Further, in our own state of Illinois, outside of the Chicago and St. Louis milk markets, only four cities—Elgin, Decatur, Champaign and Waukegan—were able this last year to attain a ninety percent or better rating by the U. S. Public Health Service. This scoring unfortunately is interpreted by the public as being a standard for judging the safety of milk.

DECREASED MANPOWER

Lastly, experience shows that we are still continuing to control milk production by our old systems, which must be changed or modified to conserve manpower. Vigorous farm inspection service will have to be curtailed. Quicker methods of attaining the same results must be substituted.

MILK QUALITY YARD STICK

Health authorities seem agreed that the quality of milk is made up of five essentials: richness or food value; safety or freedom from pathogenic organisms; cleanliness or freedom from physical dirt; sweetness or keeping quality; and flavor or palatability.

The value of this classification is much increased by the fact that indices are available for each of these conditions, and these indices may be used in the control of milk supplies.

CERTAIN SIMPLE TESTS CAN BE APPLIED

For instance, richness is indicated by the Babcock test; safety is indicated by the phosphatase test; cleanliness is indicated by the sediment test; and keeping quality and flavor are indicated by physical observations and the methylene blue reductase test of the raw milk. When laboratory facilities are available, the direct microscopic examination can be used in place of, or in conjunction with, the reductase test. Experience in many places over a long period indicates that it gives a great deal of information regarding the causes of poor quality milk, not only raw, but also pasteurized milk.

DOCK TESTING

With these apparently reliable tests at hand, an increasing number of health departments are experimenting to see whether these rather simple tests can be applied at the points where milk is received into the city, for the purpose of rejecting such milk as does not meet these tests.

In other words, following an initial inspection of the farm, the point of observation and determination of milk is shifted from the farm to the receiving dock or city plants.

The attempt to control the milk largely by stipulating the environment under which it is produced has given place to an attempt to measure in the milk itself the qualities which make it attractive and safe to the consumer.

4-POINT TEST SYSTEM

In the light of this situation, it appears reasonable to give serious consideration to the possibility of stream-

lining milk control by utilizing certain accepted platform and plant tests which can be used to assure safe milk and milk products for the armed forces and civilians.

Such an attempt is schematically outlined in Chart 1, which shows a 4-point test system for judging the quality of milk by utilizing (1) the Sediment, (2) the Direct Microscopic (or Reductase Test), (3) the phosphatase, and (4) the Swab Test, together with certain other simple observations applied at the receiving plant and in the processing plant.

In this plan, farm inspections by field men are restricted to the small number of non-compliance milk producers, and if desired the milk can be rejected *on the spot*. This affords the city inspector more time for cooperating with plant men in the proper processing of milk, and so permits quicker and more effective control of the quality of the raw milk to be processed.

CHART 1

DOCK AND PLANT INSPECTION PROGRAM

A. Incoming RAW MILK Can Be Judged by Noting

Daily by Weighman

1. Its Appearance: (1) Off Color, (2) Flaky, (3) Stringy, (4) Bloody.
2. Odor: (1) Sour, (2) Barn, (3) Feed, (4) Chemical, (5) Silage.
3. Temperature: Milk over 65° F. is not desirable.

Weekly

4. Sediment Test: (1) Clean, (2) Acceptably Clean, (3) Slightly Dirty, (4) Dirty.
5. Methylene Blue Reductase Test: (When no laboratory is available).

Milk not decolorizing in 6 or more hours is good milk.

Every Four Weeks (A very helpful test to the field men).

6. Direct Microscopic Examination: Shows (1) Excessive Count, (2) Udder Trouble, (3) Dirty Utensils, (4) Poor Cooling.

Twice or Once a Year (With decreased manpower rely on direct microscopic examination).

7. Routine Farm Inspections: Essential to use written recommendations with field cards.

As Indicated

8. Disposition of Producers in Trouble:

- a. Give Notice: (1) Through hauler, (2) by phone, (3) by can tag, (4) by mail.
- b. Submit Samples to City Laboratory: (1) For 3 successive days, (2) conferences.
- c. Farm Visit: To check (1) cooling, (2) milking machine, (3) utensils, (4) herd disease.
- d. Rejection on the Spot: As a last resort only.

B. PASTEURIZED MILK Can Be Judged by Noting

Daily

1. Charts and Staffs: If below or not checked, suggest repasteurization.
2. Plant Technic: Check (1) Washing, (2) Sterilization, (3) Storage.
3. Phosphatase Test: Preferably of each vat; if positive, repasteurize.

Daily (This test can replace bacterial plate counts).

4. Direct microscopic examination of finished pasteurized milk:
 - a. Count should not be over 60,000.
 - b. There should be no evidence of mastitis.
 - c. Free from heat-resistant bacteria from raw milk or plant equipment.

Monthly or Oftener

5. Swab Test of Equipment Parts:
 - a. To note improper cleaning and sterilization.

Monthly or Oftener

6. Butter Fat Test: Perhaps should be at least 3.25 percent.

Explanatory Note: It is to be noted that laboratory testing is limited essentially to the 4-Point Test System, that is, to (1) the sediment, (2) the direct microscopic, (3) the phosphatase, and (4) the swab test. With no laboratory the (1) sediment and (2) the methylene blue reductase tests are very useful adjuncts.

APPLICATION OF PLAN AT ROCKFORD

Reference is made to the March 24, 1943, issue of the *Bulletin of The Dairy Research Bureau*, Detroit, giving results obtained with one type of dock and plant control used in the Rockford milkshed for twelve years.

Since January first an attempt has been made to replace the methylene blue reductase test for keeping quality and the coliform test when used to check sterility of plant equipment, with the direct microscopic and swab tests.

(For results of the present program, see Chart 2.)

The cost of supervising this plan is 0.155 cent per gallon, which is approximately one-third the cost estimated by Fuchs in operating the Standard Milk Ordinance for cities the size of Rockford.

ARE PRESENT QUALITY STANDARDS SATISFACTORY?

With this picture in mind, let us now ask whether our present milk quality standards are satisfactory. In the case of milk consumed in the raw state, the answer of course is "no" because of the continued number of epidemics still reported in the use of raw milk.

However, in communities where milk is still sold in the raw state, the direct microscopic examination perhaps comes nearer to showing the quality of milk than any other means available thus far. Indeed, instant rejection of inferior milk *on the spot* is far superior to costly, time-consuming routine farm inspections, supported by bacterial plate counts, which are more or less quantitative and do not distinguish types of bacteria present. Scarlet fever and septic sore throat are spread more generally than is realized through udder infection with human strains of streptococci. The direct microscopic test will detect a high percentage of such infected udders. Special tests will determine whether human or animal strains cause the infection.

The second question as to whether it is desirable to employ dock inspection more and farm inspection less can perhaps at this writing be answered in the affirmative, based on experience, especially in the East and to some extent in Illinois.

Results obtained with the 4-point test system discussed apparently speak for themselves, compared to expensive, time-consuming routine farm inspections, coupled with bacterial plate counts of the finished product.

As to uniform standards for all mar-

kets, it perhaps can be said that in terms of dock and plant control—with the direct microscopic examination (or methylene blue test), sediment test, the phosphatase test, and the swab test, the answer is "yes" because, after all, these criteria meet the economic, esthetic, and quality aspects of the problem. In other words, no matter the market, these criteria can, in the face of a man-power shortage, be utilized at small cost.

Finally, the question of whether we want a single standard for all milk regardless of its utilization: It appears that rejections of fluid milk, cheese, cream, butter, ice cream, evaporated and powdered milk by governmental agencies passing on the use of these dairy products for the armed forces and for lend-lease shipment seem to present satisfactory evidence that the answer to this question is "yes."

OVER-ALL PICTURE SPEAKS FOR SIMPLIFICATION

The over-all picture then is one in which it appears desirable to simplify and unify our milk quality program in terms of data presented, not perhaps in the next year, but in a shorter time than has been our experience with the standards used during the last quarter of a century. Under the Standard Milk Ordinance, it was presumed that a greater degree of satisfactory compliance could have been expected.

Simplification under a 4-point test system, with abolition of the bacterial plate count, plus selective farm inspections and rejection *on the spot*, apparently offers possibilities.

From data presented it perhaps may be in keeping to suggest that a National Allied Dairy Products Council be formed for the purpose of formulating specific recommendations that will simplify and unify the many varied milk control procedures applied to fluid milk, cheese, cream, butter, ice cream, evaporated and powdered milk, similar to what was done with the State of Michigan Fluid Milk Code.

CHART 2
PRELIMINARY RESULTS OF DOCK AND PLANT
INSPECTION AT ROCKFORD, ILLINOIS

A. Incoming RAW MILK

Daily by Weighman

1. Appearance: 2,150 lbs. of milk held out for retesting.
2. Odor: 2,200 lbs. rejected.
3. Excessive Temperature: 650 lbs. returned to producers.

Weekly by Weighman

4. **The Sediment Test:**
(Class 1, 0 mgm.; 2, 25 mgm.; 3, 100 mgm.; 4, 125 mgm.)

| Month | Tests | Class 1 & 2 | Class 3 | Class 4 |
|-------|-------|-------------|---------|---------|
| Jan. | 1,085 | 86.3% | 13.1 | 0.6% |
| Feb. | 1,236 | 89.7 | 9.9 | 0.3 |
| Mar. | 1,649 | 88.9 | 10.5 | 0.4 |
| Apr. | 1,329 | 82.8 | 16.8 | 0.4 |
| May | 1,304 | 87.9 | 11.9 | 0.2 |

5. **Methylene Blue Reductase Test:**
(Class 1, 6 hrs. and over; 2, 6 hrs.; 3, 3 hrs.; 4, 2 hrs.)

| Month | Tests | Class 1 | Class 2 | Class 3 | Class 4 |
|-------|-------|---------|---------|---------|---------|
| Jan. | 1,210 | 90.0 | 7.1 | 1.1 | 0.8 |
| Feb. | 1,179 | 86.6 | 12.1 | 1.1 | 0.0 |
| Mar. | 1,657 | 93.7 | 5.4 | 0.7 | 0.1 |
| Apr. | 1,161 | 94.7 | 4.9 | 0.3 | 0.1 |
| May | 1,100 | 92.8 | 5.5 | 0.7 | 1.0 |

Every Four Weeks (This test replaces bacterial plate counts.)

6. **The Direct Microscopic Test:**

| Month | Tests | Below 200,000 | 200,000 to 480,000 | 500,000 to 1,000,000 | Over 1,000,000 |
|-------|-------|---------------|--------------------|----------------------|----------------|
| Jan. | 383 | 76.7% | 8.5% | 5.2% | 9.4% |
| Feb. | 339 | 83.9 | 9.1 | 4.1 | 2.6 |
| Mar. | 385 | 85.1 | 8.3 | 3.9 | 3.8 |
| Apr. | 386 | 88.8 | 5.9 | 2.3 | 2.8 |
| May | 383 | 83.0 | 10.5 | 3.1 | 3.1 |

Apparent cause of high direct microscopic counts (More than one cause may apply to each farm in trouble.)

| Month | Tests | Dirty Utensils | Poor Cooling | Insanitary All Respects | Udder Trouble |
|-------|-------|----------------|--------------|-------------------------|---------------|
| Jan. | 76 | 15.0% | 4.4% | 0.6% | 13.3% |
| Feb. | 64 | 15.4 | 2.2 | 0.2 | 11.0 |
| Mar. | 44 | 8.5 | 1.6 | 0.0 | 5.5 |
| Apr. | 40 | 5.3 | 0.7 | 0.5 | 6.1 |
| May | 101 | 10.0 | 4.2 | 0.3 | 8.9 |

Twice a year (Less than once a year soon—loss of personnel.)

7. **Routine Farm Inspections:**
(Write Rockford Health Department for Details.)

As Indicated

8. **Disposition of Producers in Trouble:**
a. Given Notices: 1,709 in first 5 months of 1943.

- b. Submitted 3 Successive Samples to City Laboratory: 9 producers.
- c. Farm Follow-up: 167 required to be visited.
- d. Milk Rejected at the Dock: 12,030 lbs. in 1943.

B. PASTEURIZED MILK

Daily

1. Pasteurized Charts and Staff Temperatures: 5 corrected.
2. Plant Technic: 5 showed poor washing, sterilization, or storage.
3. **The Phosphatase Test:** (As indicated so far in 1943).

| Month | Samples | Negative |
|-------|---------|----------|
| Jan. | 44 | 100.0% |
| Feb. | 47 | 98.8 |
| Mar. | 45 | 100.0 |
| Apr. | 54 | 100.0 |
| May | 48 | 98.8 |

Daily (Mickle of Connecticut advocates greater use of this test.)

4. **Direct microscopic examination of the finished pasteurized milk:**
a. Over 60,000: Jan., 64%; Feb., 60%; Mar., 28%; Apr., 28%; May 2%.
b. Evidence of Mastitis: Four percent.
c. Heat-resistant Bacteria: 19 percent.

Monthly or Oftener

5. **Swab Test of Equipment and Parts:**

| Month | Plants Checked | Number Tests | Improperly Cleaned and Sterilized |
|-------|----------------|--------------|-----------------------------------|
| Jan. | 3 | 80 | 3 |
| Feb. | 6 | 199 | 5 |
| Mar. | 11 | 188 | 2 |
| Apr. | 0 | 0 | 0 |
| May | 6 | 62 | 1 |

Monthly

6. **Butter Fat Test:** 4 percent of samples were below 3.25 percent.

Some Advantages of Dock and Plant Testing

1. It is one method of unifying milk control procedures.
2. Plan quickly locates apparent source of poor milk.
3. It is a means of culling out low production mastitis cows.
4. Minimizes time-consuming routine farm inspection.
5. Plan emphasizes safety, quality, and flavor of milk—not esthetic scoring of milk control.
6. Is apparently applicable to not only fluid milk, but to cream, butter, cheese, evaporated and dried milk quality control procedures.
7. Plan conserves manpower so essential in the war effort.

Each of the following organizations could be invited to select one representative to serve on this national council:

International Association of Milk Sanitarians
 Association of Bacteriologists
 Milk Producers Association
 International Association of Milk Dealers
 American Dairy Science Association
 Association of Agricultural Colleges
 Dairy Industries Supply Association
 Association of State Health Officers
 Institute of Food Technologists
 Municipal Health Officers Association
 American Veterinary Medical Association

Working collectively, this council no doubt could be instrumental in devising a quality program of merit in terms of advanced knowledge in the field of dairy science.

CONCLUSION

From data presented, it appears that our present milk control procedures should be critically re-examined, with the object of eliminating what have become, with the passage of time, irrelevancies.

LISTING SALVAGABLE EQUIPMENT

WAR PRODUCTION BOARD

To determine whether a piece of material or equipment should be used in its present form or put into war production in the form of scrap, the Special Projects Salvage Branch of the Salvage Division, WPB, is publishing, bi-monthly, "Available Used Material and Equipment Bulletin."

This publication, providing a ready guide for scrap determination, is distributed to approximately 3,000 government procurement officers and contractors, including the services and other war agencies such as Lend-Lease, Board of Economic Warfare, etc., covering most of the market for war uses. If any material or equipment listed in this bulletin can be put to use by these agencies, they contact the owner for purchase, and the listing is terminated. If the material or equipment has not been sold within a stipulated period (usually 60 days) after listing, the Regional Office of the War Production Board takes every possible step to move the material as scrap.

One of the most puzzling problems in the national salvage program has been the determination of whether a piece of equipment can be put to immediate war use or whether it should be melted down as scrap. A great deal of equipment is "borderline"; that is, no one can, for certainty, decide if it can be put to use "as is." The owner is usually anxious to have some guide as to the value of his property, and failure on the part of 3,000 war agency purchasers to ask for the equipment is a good indication that it cannot be used in the war effort.

Listing of materials in the "Available Used Materials and Equipment Bulletin" is possible only after investigation by the Regional Office of the WPB and routine reporting of the project has been made. As a direct result of the publication, thousands of tons of metal have been moved as scrap, and thousands of pieces of idle equipment have been bought by agencies for war work.