

Journal of

MILK and FOOD TECHNOLOGY.

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August 14, 15, 16, 17, 1967
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(RESERVATION BLANK PAGE V)

Official Publication

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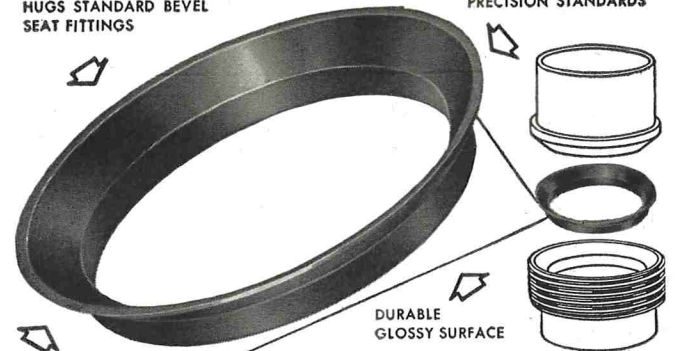
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July, 1967

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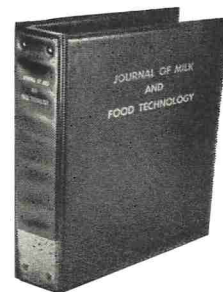
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IAMFES, Inc., P.O. Box 437, Shelbyville, Ind.

A SIMPLE QUANTITATIVE CATALASE PROCEDURE FOR ABNORMAL MILK¹

J. J. JANZEN AND W. C. COOK

Department of Dairy Science
Clemson University, Clemson, S. Carolina 29631

(Received for publication April 17, 1967)

SUMMARY

A simple, quantitative catalase test for detecting abnormal milk has been described. This procedure utilizes a 10 ml. B-D Yale glass syringe with a 23 ga 1/2 inch Luer-Lok needle. The needle tip is plugged by inserting into a No. 00 rubber stopper. Five ml. of milk and 0.5 ml. of 3% H₂O₂ solution are measured into the syringe barrel. The plunger is inserted, syringe inverted, and stopper loosened to allow the discharge of all entrapped air from the syringe. The syringe is then re-closed, set upright, and incubated at 72 F for 3 hours. The volume of O₂ released is measured as ml. O₂ (directly on the scale) and converted to % O₂ by multiplying the reading by 20.

This test provides a simple, efficient, and reproducible procedure for reporting catalase activity on the basis of percent oxygen evolved during a standardized test period. A comparison of the Clemson and Wisconsin Catalase test procedures indicated consistently lower values for the latter. Possible reasons for this variation are mentioned.

The catalase test has been used for many years as a measure of the leucocyte content of milk. This test is based on the decomposition of hydrogen peroxide by the enzyme catalase which is present in milk.

Milk normally contains some catalase, however, udder infections increase the catalase activity of milk. This increase is due largely to leucocytes, body cells, blood and bacteria, especially staphylococci and aerobic spore formers.

Fermentation tubes of various types have been used to measure the amount of oxygen liberated by the catalase present in the milk (5). Inverted tubes with standardized orifices in the cap have also been used (6). Similar techniques using centrifuge tubes fitted with stoppers and glass tubes also have been used (4). All of these procedures, while varying in simplicity, have certain drawbacks. Many do not measure all the oxygen liberated.

Garrison and Patrick (3) described a quantitative technique which permitted the measurement of total volume of liberated oxygen. This procedure required the use of a glass test-tube and a special agar plug. Willits and Babel (7) have described a disc flotation technique which is simple, rapid, accurate and requires very little equipment. Nageswararao, et al. (4) report a close relationship between the inverted

tube method and the Warburg procedure, on samples ranging from 18 to 50% oxygen.

Most catalase tests that have been proposed are relatively simple. They all propose to measure the amount of oxygen released by the action of the enzyme catalase on a standard hydrogen peroxide solution. The temperature and time of incubation also must be specified. All proposed tests require rigid standardization, but the results are not always reported in units that can be readily converted to a standard base, such as percent oxygen. This paper will describe a simple test for measuring the total oxygen liberated from the hydrogen peroxide by the enzyme catalase in the sample of milk being tested.

EXPERIMENTAL PROCEDURE

Materials.

This procedure utilized 10-cc B-D Yale Locking syringes with 23-gauge 1/2-inch Luer-Lok needles. The needle tips were plugged by insertion into rubber stoppers No. 0 or No. 00. A test-tube rack was used to store the syringes during the performance of the test. Mohr pipettes, graduated to 0.1 ml, were used for measuring the 3% H₂O₂ solution and the milk samples. A 3% H₂O₂ solution was prepared from a 30% stock supply. One incubator set at 72 F, and a time clock were used. Figure 1 displays the component parts of this catalase test. Figure 2 presents the completed test following incubation.

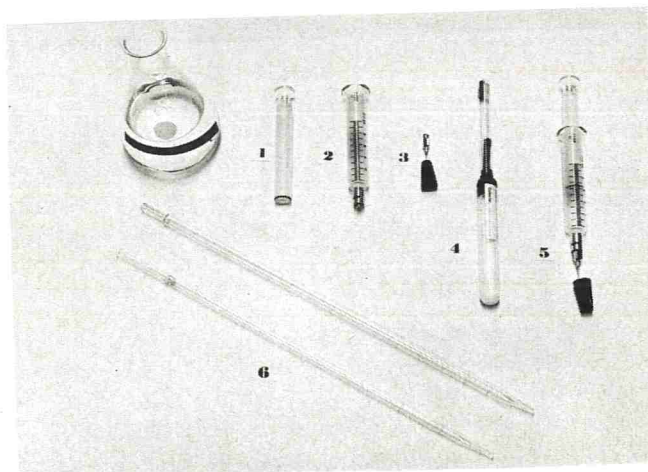


Figure 1. The component parts of the Clemson catalase test: flask with 3% H₂O₂, (1) plunger, (2) syringe barrel, (3) Luer-Lok needle plus stopper, (4) Jeb tube milk sample, (5) assembled syringe, (6) mohr pipettes graduated in 0.1-ml increments.

¹Technical Contribution No. 651, South Carolina Agricultural Experiment Station. Published by permission of the director.

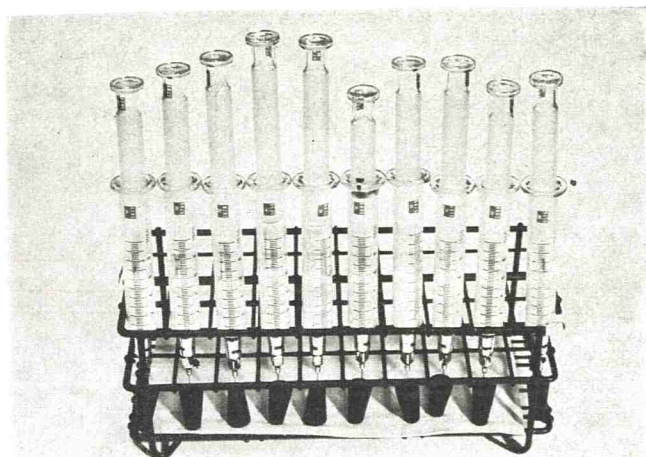


Figure 2. Clemson catalase test showing syringes, in rack, following incubation at 72 F for 3 hours and ready for reading.

Procedure.

Be sure the glassware is clean, and the plunger and barrel of each syringe properly matched (both barrel and plunger have matching numbers). Attach the needle to the syringe tip and insert the needle into the rubber stopper. Introduce 5.0 ml of well-mixed milk into the syringe barrel. Add 0.5 ml of 3% H_2O_2 solution with a mohr pipette. Insert syringe plunger into the barrel, invert the syringe assembly, loosen the needle seal with a gentle half-twist, and slowly push up the plunger to evacuate all the air within the syringe. Reclose the needle seal. Return the syringe to an upright position, and set it in the test-tube rack and incubate it at 72 F for 3 hours. The released O_2 will collect at the top of the milk, displacing the plunger. Measure the volume of O_2 released by subtracting the milk level reading from the base-of-plunger reading. Calculate the % O_2 by multiplying the ml of O_2 by 20. (Convert the ml O_2 reading to a basis of 10 ml of milk and multiply by 10 to obtain percent).

RESULTS AND DISCUSSION

This procedure has been used over a period of one year and has been found to be practical, easy to perform and replicable. Replicability results are presented in Table 1.

The results reported in Table 1 were obtained using 10-ml syringes. These syringes were calibrated in 0.2-ml increments. The use of 30-ml syringes also has been investigated and is presently being used on another research project. This larger syringe permits the use of a 10-ml sample of milk plus 1 ml hydrogen peroxide. The 30-ml syringe has the advantage of allowing the measurement of volumes of O_2 well over 100%. This may occur in some samples high in leucocytes and/or bacteria. The major disadvantage of using a 30-ml syringe is the lack of accuracy in reading the scale, since the smallest graduations are in 1-ml increments.

Disposable 12-cc Roehr² monoject plastic syringes have been tried in lieu of glass syringes. The repli-

cability of this test was poor when the plastic syringes were used. The rubber-tipped plungers offered considerable and varying resistance to movement within the syringe barrel. The resistance appeared to be the major cause for the variable results.

Comparisons were made between the Wisconsin Catalase Test (1) and the Clemson Catalase test described in this paper. The Wisconsin procedure used the 12-cc Roehr plastic syringe, 9-ml milk, and 1 ml 3% H_2O_2 . The 12-cc. Roehr plastic syringe represents an improvement over the earlier screw-top tube method as used by Corbett (2). The incubation temperature and time was the same for both procedures (72 F for 3 hrs). It should be noted that the Wisconsin procedure allows for the milk-peroxide mixture to drip from the tip as O_2 is generated within the syringe. This allows for varying volumes of milk to be expelled, depending on the catalase activity within the sample. In the case of the Clemson procedure,

TABLE 1. REPLICABILITY OF THE CLEMSON CATALASE TEST

	Raw milk samples tested							
	A	B	C	D	E	F	G	H
% O_2	44	32	72	44	36	44	28	24
Total replications	10	5	10	5	20	10	10	5
No. agreeing	9	5	9	5	20	8	8	5
No. disagreeing	1	0	1	0	0	2	2	0
Maximum variation (% O_2) ^a	+4	0	+4	0	0	+4	+4	0

^aPlus (+) indicates the varying test was higher than the accepted % O_2 level for the respective sample.

TABLE 2. COMPARISON OF CLEMSON AND WISCONSIN CATALASE TESTS

Range of variations ^a between the 2 procedures	Milk samples tested	
	(No.)	(%)
(% O_2)		
0.0	24	8.99
2.0 - 4.0	85	31.83
6.0 - 10.0	80	29.96
12.0 - 20.0	51	19.10
22.0 - 30.0	16	5.99
32.0 and over	11	4.12
Total milk samples tested	267	

^aThe Wisconsin test reading, where different, were always lower than the Clemson test readings.

²Roehr Products Co. Inc., Deland, Florida.

none of the milk is lost and all the O₂ is retained within the syringe.

The results of both tests performed on identical milk samples are summarized in Table 2. The data in Table 2 indicate considerable variation between these two tests. It must be recognized, however, that the test data are not directly comparable because of the inherent error in expressing the Wisconsin test results as percent.

CONCLUSION

The catalase test described appears to provide a simple, efficient and reproducible procedure that allows for reporting of results on a percentage basis. Reporting results on the basis of "% O₂ evolved" under a standard set of conditions provides for easy comparison of results between laboratories.

ACKNOWLEDGMENTS

Appreciation is expressed to Mrs. Florence Crawford for

her untiring efforts in the performance of these tests and collection of the data.

REFERENCES

1. Burch, C. W. 1966. Catalase Test Procedure. Personal communication received Sept 5, via Dr. H. S. Powell, Clemson Livestock Laboratory, Columbia, S. C.
2. Corbett, W. J. 1963. Catalase Test for Detection of Abnormal Milk. Convention Proceedings, MIF, Laboratory Section. 56th Annual Convention, Dallas, Texas, November 6-8.
3. Garrison, E. R. and Patrick, T. E. 1966. A Simple Quantitative Test for Catalase in Milk. *J. Dairy Sci.* 49:442.
4. Nageswararao, G., Blobel, H. and Derbyshire, J. B. 1965. Catalase Test for Abnormal Milk. I. Techniques and Factors Affecting the Test. *J. Dairy Sci.* 48:1290-1294.
5. Sommer, H. H. 1952. Market Milk and Related Products. Published by the Author, 1952. Madison, Wisconsin.
6. U. S. Department of Health, Education, and Welfare. 1965. Screening Tests for the Detection of Abnormal Milk. Public Health Service Publication No. 1306. Washington, D. C.
7. Willits, R. E. and Babel, F. J. 1965. Disc Flotation Test for Measurement of Catalase Activity in Milk. *J. Dairy Sci.* 48:1287-89.

CERTIFIED RAW MILK, WHAT IS IT?¹

L. D. SEARING

*Seattle-King County Health Department
Seattle, Washington*

Certified Raw Milk was sold in the Seattle and King County area many years ago. It disappeared over twenty-five years ago, at the beginning of World War II because of difficulty in obtaining adequate qualified help.

Now, with the adoption of the new King County Milk Sanitation Resolution, Certified Raw Milk is again permitted. Some of the dairies have shown interest in qualifying for the sale of this product.

The definition of "Certified Raw Milk" in the King County Resolution is as follows:—"Certified Raw Milk which conforms with requirements of the American Association of Medical Milk Commissions, Inc., in force at the time of production and is produced under the supervision of a Medical Milk Commission, recognized and approved by the American Association of Medical Milk Commissions, Inc., reporting monthly to the Director." (of Public Health).

Standards for Certified Raw Milk are higher than for Grade A Raw Milk. Weekly samples of all Certified Milk and milk products are required for butterfat and total solids tests and bacteria and coliform analysis. Certified Milk shall have a bacterial count of not more than 10,000 colonies per ml and a coliform count of not more than 10 per ml. Monthly veterinary inspection of the milking herd must be made. All milking animals must be tested for tuberculosis annually and for brucellosis semi-annually. Monthly medical examination of dairy workers is required and sanitary inspections are required at least once per month.

A certified milk program requires the organization of a Medical Milk Commission. A Medical Milk Commission may be appointed by the Medical Society, by public health officials, or by the Council of the American Association of Medi-

cal Milk Commissions. The Medical Milk Commission elects its own officers and appoints a Physician, a Veterinarian, a Laboratory Director, and a Sanitarian to enforce the Methods and Standards.

In contrast to the above requirements for Certified Milk, Grade A raw milk standards require only four samples of milk and milk products each six months for butterfat, total solids, and bacterial analysis. No coliform analysis is required. The bacterial standard is 20,000 per ml or twice as lenient as for Certified Milk. No Veterinary inspection of the herd is required. No medical examination of the dairy worker is required, merely a chest X-ray every two years. Sanitary inspection is required only once in six months. Annual tuberculosis and brucellosis tests are required.

The question might be asked—"after twenty-five years without Certified Milk in this area, with the development of a fine Grade A pasteurized milk supply, with the development of excellent pasteurization equipment and controls, with ninety-eight per cent of the milk sold being pasteurized, why is Certified Raw Milk necessary?" Certified Raw Milk represents a compromise in the Health Department's efforts to do away with Raw Milk entirely. A small segment of our population sincerely believes that raw milk is more nutritious and believes it is their constitutional right to buy it. Certified Raw Milk preserves this right but assures a safer product. With the necessary higher costs of producing Certified Raw Milk it is anticipated that the sale will drop appreciably and that eventually only pasteurized milk will be available.

¹Reprinted from the Washington Milk Sanitarian's Association Quarterly News Bulletin, May 26, 1967.

ELEVENTH NATIONAL CONFERENCE ON INTERSTATE MILK SHIPMENTS

DEAUVILLE HOTEL—MIAMI BEACH, APRIL 2-6, 1967

EXECUTIVE BOARD MEETING

April 3, 1967

The Executive Board meeting was convened by Chairman Howard K. Johnston at 9:30 A.M. The Secretary's report covering the interim board meeting held at the O'Hare Ramada Inn, Chicago, Illinois, March 8, 1966 was accepted as read. The Treasurer's report indicating a balance of \$641.72 as of April 1, 1967 was accepted.

Sam Noles, Chairman of the Local Arrangements Committee, and Don Race, Chairman of the Program Committee, reported on the current status of their activities. Both reports were unanimously accepted.

Chairman Johnston announced the appointment of a Nominating Committee consisting of: Wendell Carr, Marion Causey, Brace Rowley, Kenneth Carl, George Parker and Enos Huffer, Chairman. Chairman Johnston also announced the appointment of the Resolutions Committee consisting of Harold Barnum, Ted Blakeley, Evert Wallenfeldt, Chairman. There being no new business, the meeting adjourned at 10:45 A.M.

FIRST GENERAL SESSION

The first general session of the Conference convened at 1:30 P.M. on Monday, April 3. The Reverend H. Floyd Folsom, Miami Shores Baptist Church, gave the invocation. This was followed by a most interesting address of welcome by Doyle Conner, Assistant Commissioner of Agriculture, State of Florida. The keynote address was given by Richard A. Prindle, M.D., Director of the Bureau of Disease Prevention and Environmental Control, U. S. Public Health Service, Washington, D. C. Dr. K. G. Wecel, University of Wisconsin, presented an excellent discussion on "Review and Accomplishments of the National Conference on Interstate Milk Shipments."

The biennial report of the Public Health Service to the Conference was presented by R. D. Vaughan, Chief, Environmental Sanitation Program, National Center for Urban and Industrial Health, Bureau of Disease Prevention and Environmental Control. The report was prepared jointly by Mr. Vaughan and R. A. Belknap, staff officer, Milk Sanitation Section, Milk and Food Branch, Environmental Sanitation Program. O. M. Osten, Assistant Director, Food In-

spection Division, Minnesota Department of Agriculture, presented "Rules of the Road." This presentation enabled individuals who had not attended previous Conferences to understand the mechanism of the task force operations and the voting procedures.

The first general session closed with the presentation by Chairman Johnston of charges to both the Resolutions Committee and the Nominating Committee.

SECOND GENERAL SESSION

The second general session was convened by Chairman Johnston at 8:40 A.M. on Tuesday, April 4. The following committee reports were presented at this session.

A. "Single Service Containers" by Dr. Richard M. Parry of the Connecticut Department of Agriculture and Natural Resources.

B. "Cooling Temperatures and Permit Suspension" by Dr. Henry V. Atherton, University of Vermont.

C. "Over-The-Road Tankers" by Luther Hortman, Louisiana State Board of Health.

D. "Reporting" by H. H. Vaux of the Indiana State Board of Health.

E. "Standards For Nonfat Solids in Consumer Packages" by Clarence Luchterhand, Wisconsin Board of Health.

F. "Reciprocity" by Rudolph Schneider of Albert Lea Coop. Creamery Association.

G. "Abnormal Milk" by Dr. C. W. Burch, University of Wisconsin.

The Conference Chairman Dr. Johnston and Program Chairman Don H. Race concluded this general session by outlining the plan of operation for the various task forces and assigning meeting rooms. It was announced that Tuesday afternoon and Wednesday morning would be devoted to task force deliberations.

THIRD GENERAL SESSION

The third general session was convened by Chairman Johnston at 11:10 A.M. on Wednesday, April 5.

The chairman of each task force reported on the deliberations and the results of voting on the various problems. Dr. Johnston mentioned at the conclusion of this session, which was adjourned at 12:20, that all task force reports would be available at the registration desk by 6 P.M. for Conference members who

might wish to study them in preparation for the Thursday morning general session.

FINAL GENERAL SESSION

The final general session convened at 8:45 A.M., Thursday April 6, with Dr. Howard K. Johnston presiding. The roll call of states and delegates authorized to vote on Conference agreements showed that 42 states were represented, 11 represented by both departments of health and agriculture, 8 represented by departments of agriculture and 23 by departments of health. The minutes of the previous Conference were accepted as mailed to those who had been in attendance in Louisville in 1965. The treasurer's report showing a balance of \$641.72 as of April 1, 1967 was accepted as read.

Mr. E. G. Huffer reported the Nominating Committee's selections for Executive Board members from Region III. The selections were: Carl Henderson, New Mexico State Department of Health; J. M. McIntire, The Carnation Company; Vergil Simmons, Oregon Department of Agriculture; David Monk, Wichita-Frederick County Health Department; Floyd Fenton, U. S. Department of Agriculture.

Brace Rowley moved, seconded by Earle Borman that the nominations be closed and the Secretary be instructed to cast a unanimous ballot for the slate presented. Motion passed.

RESOLUTIONS

The Resolutions Committee presented the following resolutions, all of which were accepted by the Conference.

1. The Conference approves Board action toward the implementation of Conference agreements in the interim between the previous general meetings and the 1967 meeting.

2. The Conference directs the Executive Board to implement the 1967 agreements and to transact such business as is necessary to further the declared objectives of the Conference in the interim between general meetings.

3. The Conference acknowledges and endorses the important role of the PHS in the work of the Conference since its inception and expresses its appreciation to the P.H.S. for its help and participation. The Conference emphasizes the need for a more active role by the P.H.S. in assisting the states to achieve uniformity.

4. The present system of reciprocal inspection developed by the NCIMS has resulted in the free flow of milk in many states without costly duplication of milk inspections where the suppliers have been certified by the Milk and Food Branch of the P.H.S. Now a reorganization of the Public Health Service has resulted in the loss of identity of the Milk and Food Branch. This loss of identity may seriously jeopardize the prestige and acceptance of the Public Health Service role in the reciprocal inspection program and may tend to cause a return toward duplication of inspection by the regulatory authorities in some areas instead of acceptance of the inspection already made by the authorities in the producing

states. Because of the impact which this is likely to have on the economic welfare of the dairy industry, we urge that the Secretary of the Department of HEW clearly restore the identity of the Milk and Food Branch in the organizational structure of the PHS so that it can effectively continue to fulfill its role in our program. We respectfully request that the Secretary of the HEW instruct the Surgeon General to provide the necessary directives, funds and personnel to give effective PHS support for discharging its responsibilities incurred in "Procedures Governing the Cooperative State-Public Health Service Program for Certification of Interstate Milk Shippers."

5. It is recommended that persons submitting questions on problems should be present or submit a statement of clarification for the appropriate Task Force session.

6. The 11th National Conference on Interstate Milk Shipments expresses its sincere appreciation and a vote of thanks to the Local Arrangements Committee, Sam Noles, Chairman, for the very excellent way in which Conference needs were handled.

7. The Conference expresses its appreciation and thanks to the Program Committee, Don H. Race, Chairman, for planning and carrying out such an excellent program.

8. The Conference gives a vote of thanks and commendation to the Deauville Hotel management for the fine help given in providing for the many needs of the Conference.

9. The Conference expresses appreciation to the speakers and all the other participants in the Conference program.

10. The Conference expresses its appreciation and commendation to Dr. Howard Johnston, Chairman and the other officers and directors, the committee and task force chairmen for their outstanding leadership and service to the organization.

11. The Conference expresses its deep appreciation to Dr. Luther Black for his dedicated efforts and direction in improving laboratory procedures and technology. We wish him the very best in his retirement.

12. The Conference recommends that any unfinished action on committee recommendations be referred to the Executive Board for further consideration.

13. The Conference urges that all interested individuals and/or organizations forward suggestions and comments to the Executive Board for consideration and action where necessary.

14. The Conference suggests that greater effort be made in acquainting the entire milk industry with the activities and purposes of this Conference and urges greater participation by the industry in our common goals: To promote the best possible milk for all the people.

15. The Conference expresses deep sympathy to the family of the late Milton Fisher who was one of the charter members of the Conference and devotedly contributed much of his time and effort to this organization.

16. The Conference requests that our Conference chairman convey these resolutions to the appropriate persons.

TASK FORCE REPORTS

Chairman Johnston next called for reports of the various task forces. Complete Task Force reports are in the Secretary's file. However, only the changes in or additions to procedures are included in this report.

Task Force On Standards

This task force was given 10 problems. The first four problems were discussed and voted affirmatively as a group since they were merely editorial changes in the "Procedures Governing Cooperative State-Public Health Service Program for Certification of Interstate Milk Shippers." Problem 5 suggested that the present Section C entitled "Laboratory Procedures" be changed to Section D and that a new Section C and new Section E be added. The new Section C will be entitled "Sampling Procedures." Sampling procedures used to collect milk and milk products of interstate milk shippers as well as pasteurized milk and milk product containers and closures shall conform substantially to the procedures in the latest edition of Standard Methods for the Examination of Dairy Products published by the American Public Health Association.

The new Section "E" will be entitled "Laboratory Evaluation Procedures." The procedures outlined in the PHS "Evaluation of Milk Laboratories" shall be used in determining compliance with the laboratory provisions and enforcement procedures mentioned in the applicable standards specified.

Problem 6 involved a study of the report submitted by the Committee on Standards for Single Service Containers and Closures. The task force recommended the acceptance of this committee report as guidelines for certification in listing of single service container and closure manufacturers in the IMS quarterly publication. The task committee recommended that the effective date for publication of the listing be July 1, 1969. However, after considerable discussion, the assembled delegates voted to amend the date to January 1, 1969.

The task committee recommended also that the PHS train and certify their own representatives and those of state milk control agencies to conduct inspections of single service container and closure plants and that the single service container and closure committee be kept active to work with the PHS in developing a point score system for inspections. These recommendations were approved.

Problems 7, 8, 9 and 10 were tabled by the task committee.

The Conference delegates adopted a motion that the Conference go on record as requesting the Public Health Service to develop and publish a Grade A Condensed and Dry Milk Sanitation Ordinance.

Task Force On Supervision

This task force was presented with 8 problems. Three of these problems were tabled by the task force and so voted by the delegates. A fourth problem involved only editorial changes in the Procedures.

The task force recommended and it was so voted by the delegates "that the National Conference on Interstate Milk Shipments go on record as favoring the California proposal to FDA on residue tolerances for DDT and its analogues in milk and milk products and that this Conference forward the letter to FDA by April 13 stating the endorsement of the California proposal and urging FDA to reconsider the recent tolerances allotted to DDT and its analogues in milk and milk products and give favorable consideration to the California proposal."

The task force recommended changing Subsection A.3 to read: "Sampling procedures and laboratory examinations are a fundamental and basic component of supervision. The surveillance of sample collection procedures shall be conducted as prescribed in the PHS booklet entitled "Evaluation of Milk Laboratories." The voting delegates accepted this recommendation.

The revised edition of the report of the "Abnormal Milk Program" committee which was scheduled to be presented by the task force chairman was not presented since Luther Hortman obtained the permission of Chairman Johnston and the assembled delegates to present a revision of the revised edition instead. The revision as amended and approved by the voting delegates, is presented below. New material which was not present in either the original report or task force revision is italicized.

ABNORMAL MILK PROGRAM

All segments of the dairy industry should adopt and support a uniform program for the control of abnormal milk. The dairy industry and the milk regulatory authority are jointly responsible and should use all available resources and techniques to eliminate abnormal milk from their milk supply.

Indicator tests for the detection of excessive number of leucocytes in milk are recommended as an adjunct to already existing tests to provide the consumer with a safe, high quality product consistent with the production of wholesome dairy products. Uniform screening programs for the detection of leucocytes are needed.

The Grade "A" Pasteurized Milk Ordinance—1965 Recommendations of the United States Public Health Service emphasizes the use of screening tests to determine the presence of abnormal milk in Section 7, Item 1r.

"Current Concepts of Bovine Mastitis", published by the "National Mastitis Council, Inc.", states on page 18 that ". . . presence of more than 500,000 leucocytes per ml of mixed herd milk strongly suggests a significant incidence of mastitis in a given herd." Colostrum milk, mastitis, udder injury, stripper milk, and diseased cows are some of the common causes of high leucocyte counts. The committee recognizes that current knowledge cannot be expected to either eradicate or completely control bovine mastitis, but is of the opinion that the standard or not more than 1,500,000 leucocytes per ml on herd milk is attainable by the application of known control procedures which will effectively exclude from supplies that milk produced under conditions which disregard prevention and control procedures.

Although several areas have operational programs, a comprehensive program for the control of abnormal milk will be new in many areas. People must be trained to properly fulfill their roles and budgets must be adjusted. For this reason, the committee feels that a program for the control of abnormal milk should be implemented by successive steps.

PHASE I—Effective July 1, 1967. The agreements of the National Conference on Interstate Milk Shipments state in Section II. A. 5 that "Effective July 1, 1967, laboratory examinations or screening procedures for the presence of unwholesome, altered mammary secretions, whether of an inflammatory, infectious physiological or environmental origin, in raw milk for pasteurization shall be made at the same frequency as specified for bacteriological tests in the milk sanitation standard specified in Section I. A. 2." *The milk producer shall be notified of all test results.* The official indicator tests shall be conducted by an approved laboratory utilizing the official indicating tests for the detection of abnormal milk published by the USPHS and subjected to the State Laboratory Certification Program.

PHASE II—Effective July 1, 1968. After July 1, 1968, only those interstate milk shippers that are certified to be following an indicating test program shall be listed in the

quarterly publication, "Sanitary Compliance and Enforcement Ratings of Interstate Milk Shippers." It is recommended that the U. S. Public Health Service adopt official laboratory indicating test(s) for the detection of abnormal milk and that such test(s) be published by the U. S. Public Health Service and subjected to the State Laboratory Certification Program. After this date, when a herd milk sample tested by an *approved* laboratory indicates the presence of 1,500,000 or more leucocytes per ml, the following procedure shall be followed:

- a. A warning letter shall be sent to the producer notifying him of the high leucocyte count. The letter shall also list the principal causes of excess/leucocytes count.
- b. Following the second consecutive indicating test indicating a raw milk count of 1,500,000 or more leucocytes per ml, an inspection shall be made by an official sanitarian or a person designated by him.
- c. A third herd milk sample shall be taken. If this sample also indicates a leucocyte count of 1,500,000 or more per ml, the milk regulatory authority shall, if he deems it necessary, require the producer to:
 1. Have milking equipment analyzed by a milk equipment serviceman.
 2. Have individual animals examined by a veterinarian, Cows producing abnormal milk shall be milked separately and the milk shall be withheld from the milk supply.

PHASE III—Effective July 1, 1970. A penalty clause shall be added for non-compliance with leucocyte standards. Milk supplies having 1,500,000 or more leucocytes per ml on three out of five of the last tests and continued violations of applicable items of sanitation (1r and/ or 14r) shall have their permit suspended and/or court action shall be taken in accordance with Section 3 and/or 6 of the Grade "A" Pasteurized Milk Ordinance—1965 Recommendations of the U. S. Public Health Service: provided that leucocyte counts of 1,500,000 or more per ml shall not have been officially recorded nor penalty applied unless corroborated by the direct microscopic leucocyte count or the equivalent as published by the USPHS and subjected to the State Laboratory Certification Program.

The NCIMS chairman shall, with the advise and consent of the Executive Board, appoint an AdHoc Committee on Abnormal Milk Control whose responsibility it shall be to coordinate the efforts of this Conference with those of other official and unofficial groups developing methods and conducting studies on abnormal milk control, which Committee shall report to the 1969 NCIMS with recommendations for action at that time.

Task Force On Rating And Certification

Eleven questions were submitted to this task force. All questions were discussed in detail by the task force which voted "no action" on 9 of them.

The task force recommended the following new Subsection D to the Agreements: Milk laboratory evaluation shall be made by qualified state milk laboratory survey officers who have been standardized by the P.H.S. as state milk laboratory survey officers and hold a currently valid certificate or provisional endorsement of qualification. This recommendation was accepted by the delegates. The task force considered the question which recommended that "... consideration be given to listing all shippers over 90% across the board as 90 or higher. List shippers below 90% to the nearest whole number." The task force moved that no action be taken on the first sentence, but that the second sentence be changed

to read "report and list all shippers to the nearest whole number." This recommendation was approved by the delegates.

Task Force On Uniform Bill Of Lading And Seals

This task force had seven problems submitted to it, some of which were combined before the submission of the report to the Conference and three of which were tabled. The task force recommended changing A.I. to read as follows: "All interstate shipments of milk must be accompanied by copies of a uniform bill of lading which includes the following information:

- a. shipper's name, address and permit number
- b. permit number of hauler, if not employee of shipper
- c. point of origin of shipments
- d. tanker identity number
- e. weight of product
- f. grade of product
- g. temperature of product
- h. date of shipment
- i. name of supervising health authority and point of origin
- j. whether the contents are raw, pasteurized or otherwise heat treated
- k. seal number on inlet and outlet

The task force handled the question to recommend that the receiving area official supervising agency return a copy of the bill of lading to the supervising agency of the shipper with required information noted thereon in the following way: Upon request, the local authority or state authority shall return to the official supervising agency the following information:

- a. date and time of arrival of product
- b. temperature of product
- c. bacterial count and butterfat test of product on individual shipment
- d. adequacy of seals
- e. other pertinent information

Task Force On Responsibilities Of Participating State Agencies

This task force received seven problems for consideration. Their report combines many of these problems.

The task force recommended that a committee be appointed to study the implementation of a uniform report form for volume control similar to the uniform bill of lading. It recommended that state rating officers more closely check volume control forms. These recommendations were approved by the delegates.

The task force recommended that all state milk sanitation rating agencies make IMS surveys in strict adherence to PHS Milk Ordinance and not by state milk regulations. This was approved by the delegates. The task force recommended that the title of Subsection C be changed to read "Sampling and laboratory control." It also recommended the addition of a new item 1. to Section V, C. This new Item 1 would read "Sample collectors who collect samples of milk and milk products of rated interstate shippers shall be approved by a state milk laboratory or rating agency in accordance with the sample collection procedures specified in the Public Health Service booklet entitled "Evaluation of Milk Laboratories." Current Items 1, 2, and 3 would then become new Items 2, 3, and 4.

Task Force On The Responsibilities Of The Public Health Service

This task force was given 11 problems, five of which were reported by the committee as recommending no action. Three problems recommended editorial changes in the Agreements

and were so approved by the task force and accepted by the delegates.

The task force recommended that the PHS take steps to develop its facilities and manpower toward the end that it is able to effectively carry out its responsibilities incurred under "Procedures Governing The Cooperative State-Public Health Service Program for Certification of Interstate Milk Shippers." This recommendation was accepted by the delegates. The task force recommended that the Conference reaffirm the need for continued effort by the PHS for the standardization and recertification of the survey officers and the improvement of uniformity between state rating agencies.

The committee recommended also that the Public Health Service list transfer station by symbol in the IMS quarterly publication. These recommendations were accepted by the delegates.

Task Force On Procedures For Handling Complaints And Challenges Of Validity Of Ratings

This task force received only two charges, both of which were unanimously accepted by the delegates. These accepted charges are listed below:

1. The recommendation that the investigation of complaints or challenges of validity of ratings be made by the PHIS instead of the state rating agency.
2. Consider revising the penalty to industry when the rating agency cannot make proper investigations called for in Section VIII, A, 5.

Task Force On The Application Of Conference Agreements And Special Problems

The task force received 12 problems, six of which were recommended to be tabled. The delegates approved of the recommendations. The recommendation of the task force that the USDA and industry representatives be memorialized to study the feasibility of adopting the USDA now published Frozen Dessert Ordinance was voted down by the delegates.

The task force recommended that the Conference strongly request the PHS to administratively reconsider that portion of the 1965 Pasteurized Milk Ordinance that concerns itself with existing water systems to the end that the 1953 provisions be made applicable. This was approved by the delegates. The task force recommended that a new committee be formed to further study the problem of reciprocity. The recommendation was approved by the delegates.

The recommendation of the task force that the Conference recommend to the PHS that amendments and revisions of the ordinance be governed by the rule-making procedures under the Federal Administrative Procedure Act was voted down. The task force recommended that the report of the committee on "Over-The Road Tankers" be accepted and that the committee be continued in order to further study the problem. The recommendation was accepted by the delegates.

The official general session of the 11th meeting of the National Conference on Interstate Milk Shipments adjourned at 12:23 P.M., Thursday, April 6, 1967.

EXECUTIVE BOARD MEETING

April 6, 1967

The Executive Board was convened by Chairman Johnston at 1:40 P.M., Thursday, April 6. The Chairman called for the election of new officers as the first order of business. Shelby Johnson, Kentucky State Board of Health, was unanimously elected chairman. J. C. McCaffrey, Illinois Department of Public Health, was unanimously re-elected to the office of Secretary-Treasurer.

The Secretary then presented a group of invitations from various organizations inviting the Conference for the 1969 or 1971 meeting. The Board voted to hold the 1969 meeting at the New Albany Hotel, Denver, Colorado, May 25-29. The 1971 meeting will be held at the Edgewater Beach Hotel, Chicago, May 23-27. Both hotels have guaranteed a single room rate of \$10 and twin-bedded room rate of \$16 per room.

The Chairman was instructed to appoint a publicity committee containing one member each from agriculture, health, industry and the Public Health Service with the Conference officers as ex-officio members.

The Board discussed possible changes in the organization of task forces. Each Board member is to convey his ideas in writing to the Secretary-Treasurer who will then assemble them and send them to all members of the Executive Board. The Board voted also to continue the publication of the Newsletter and to again authorize the mimeographing of task force reports to be made available to persons attending the Conference, prior to the final business session. It was voted also to pay any secretarial help that might be needed to expedite the printing of the task force reports.

There being no further business, the meeting adjourned at 2:55 P.M.

Respectfully submitted by
J. C. McCaffrey, *Secretary-Treasurer*

NATURE AND GROWTH RESPONSE OF THE MICROFLORA OF PASTEURIZED, PACKAGED MILK¹

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SUMMARY

The microflora of freshly pasteurized, packaged milk is heterogeneous, and the numbers are generally low. While it is commonly assumed all bacteria are included in assays of numbers with plate count agar and standard methods, under normal conditions few are able to grow and contribute significantly to spoilage. Post-pasteurization contamination, which contributes insignificantly to the total count on freshly pasteurized, packaged milk, contributes most of the bacteria that are capable of growth to cause spoilage during subsequent storage. Though there is a delay after pasteurization before significant bacterial growth takes place, the same group of bacteria is responsible at either 5 C or 32 C.

The growth response of these bacteria was measured with a selective medium of nutrient agar containing alkyl aryl sulfonate. Data obtained by the use of the selective medium indicated a potentially useful approach to quality control.

The microflora of pasteurized milk is important as a potential health hazard and as a potential spoilage agent during storage. Since pasteurization destroys pathogenic bacteria and common heat sensitive non-pathogenic bacteria, a major alteration in the microflora is thereby obtained. Post-pasteurization contamination therefore may be distinct and significant to the quality of the product.

Early observations on the microorganisms surviving pasteurization, post-pasteurization contamination, and shelf life of the finished product gave results quite different from those expected today. For example, Dahlberg (6) found the average plate count to be more than 13,000 in pasteurized milk. The limited kill might logically have been expected due to the mild heat treatment being applied for pasteurization at that time, because the heat treatment was limited to protect the creaming properties. These counts would have been even higher with presently recommended plate count media and procedures (2, 16, 20). A contemporary publication indicated Dahlberg (7) used 37 C for the incubation temperature. The lack of inclusion of psychrophilic bacteria is more apparent in view of his data (7) showing no increase in the total count during storage at 35-40 F (1.7-4.4 C) for 4 days.

Atherton et al. (2) showed later that bacteria surviving even the mild pasteurization treatment of 62.8 C (145 F) for 30 min were not able to grow at 4.4 or 7.2 C (40 or 45 F). Thus post-pasteurization contamination, even though small in original numbers, accounted for most, if not all, of the subsequent growth during refrigerated storage. Their work led to the realization that the control of psychrophilic bacteria entering as post-pasteurization contamination was a necessity for long shelf life of the finished products.

Year to year improvements in processing, cleaning, and operating techniques have increased the shelf life of milk apparently through a reduction in post-pasteurization contamination with psychrophilic bacteria. Simply counting the presence of psychrophiles has not provided an exact measure of the expected subsequent shelf life of the product. The value in making psychrophilic plate counts is limited as exemplified by Broitman et al. (4) concluding that psychrophilic counts could not be used to predict keeping quality, except that milks with populations of 10 or less per ml had long shelf lives. Furthermore, psychrophilic growth must reach 5 to 20 million per ml before a flavor or physical change is observable (17).

The microflora of pasteurized milk, exclusive of post-pasteurization contamination, includes a broad spectrum of bacteria reflecting the history of the product. Workers such as Egdell and Bird (8) have shown that it is not possible to determine the degree of post-pasteurization contamination by taking counts at various stages in a commercial operation. The traditional study of this microflora was therefore based on determining the heat resistance of bacteria known to occur commonly in milk or to have special significance, e.g., the coliform group, the micrococci, and the lactobacilli. The common time-temperature combination was 61.8 C (143 F) for 30 min, survivors of which were assumed to appear in pasteurized milk.

More recently, however, modern processes and practices involve a much more severe heat treatment. The process of 76 C (168.8 F) for 16 sec allows approximately 4 times the holding period required to effect an equivalent heat treatment of 61.8 C

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(143 F) for 30 min (11). Thus the microflora in pasteurized milk from modern processes might be quite different than expected by traditional means of predicting the survivors.

Egdell and Bird (9) found a rather diverse flora in commercially pasteurized milk. The extent of the heat treatment, however, was not reported and the milk prior to pasteurization had a geometric mean count of 257,000 (8) with a plate count incubation temperature of 37 C. Dependent on the exclusion of post-pasteurization contamination they found a marked difference in outgrowth of the microflora when subsequently incubated at 18 C. In more recent work Thomas et al. (20) found a more limited flora in laboratory pasteurized samples (62.5 C (144.5 F) for 30 min). Micrococci and microbacteria accounted for 75% or more of the isolates when the plate incubation temperature was 28 or 32 C. Post-pasteurization contaminants were excluded. Observations in our laboratory also showed a broad spectrum of bacteria from CIP equipment and packages of milk from the same commercial equipment (13). A greater proportion of bacilli was found than was found by the previously mentioned workers.

Observations on the microflora of pasteurized milk are further complicated due to the heat injury of the microorganisms. Injury from shock of temperature change alters the subsequent growth response (12, 20). It is therefore difficult to differentiate between the kill during pasteurization, thermal injury with delayed death or slow recovery, and subsequent multiplication.

Commercial interest with economic justifications directs efforts to prolong shelf life, which involves primarily low temperatures. The ultimate handler of milk, e.g., the housewife, cares for milk only to prevent obvious spoilage, with little regard to intermediate levels of bacterial growth. Carelessness grows with continued experience of lack of obvious defects, e.g., not keeping the milk under refrigeration. The common practice therefore may allow warm conditions for growth.

Studies of the growth response of the microflora of pasteurized, packaged milk during cold storage have been essentially limited to observations on the psychrophiles and to indicators of public health interest (coliforms). Few observations on the growth response at warm temperatures have been reported. Dahlberg (7) allowed quarts of milk to remain at room temperature for 6 hr and found relatively little growth occurred. He used glass bottles with indefinite conditions in which the temperature did not reach normal room temperature within the 6 hr exposure period. Courtney (5) allowed samples to stand at room temperature for 4 hr after which the average temperature was 81 F (27.2 C). Changes in the

standard plate count were small and indefinite in direction. There was, however, an increase in the coliform count. Warming apparently produced a greater response in coliform growth than in the remainder of the flora.

The nature and growth response of the microflora determine the type and degree of spoilage as well as the extent and type of the health hazards. To obtain more information on these phenomena, work was undertaken to determine which bacteria or groups of bacteria are involved. Identification of those bacteria growing most rapidly in pasteurized milk should contribute to a better understanding of the protection of the quality of the milk.

METHODS

Grade "A" milk from the University Dairy Plant and from a large, local commercial plant was used. Samples represented a period of 7 months and included both the warm and cold seasons. The pasteurization treatment was at 167 F (75.0 C) for 17-18 sec. Cartons were taken from the fillers to include post-pasteurization contamination and provide individual units for each test. Less than an hour elapsed, with precautions to prevent warming, before samples were set for the experiment to be performed. Total numbers were determined according to Standard Methods for the Examination of Dairy Products (1) with plate count agar (Difco) at 32 C. Shelf life observations were made by storage at 5 C (41 F).

Platings of the pasteurized milk were made in duplicate, and three colonies were picked from each plate of the appropriate countable dilution. While this technique limited the number of isolates from each sample, it avoided the common error of over weighting of samples involving unusual growth situations. Inoculations from each picked colony were made into litmus milk followed by streaking onto plate count agar with added skim milk. Further subcultures were then made as appropriate to classify the isolates following the procedures given in Manual of Microbiological Methods (18). The scheme for classification of the bacteria was based on the reaction in litmus milk, nature of surface growth, Gram stain, proteolysis on milk agar, catalase production, gas formation in brilliant green lactose bile broth, and spore formation (staining characteristics and resistance to 80 C for 10 min).

Preliminary observations indicated that certain gram-negative bacteria accounted for the major growth response of the microflora of pasteurized milk. To study this group, a selective medium was developed based on previous observations of inhibitory activity (15) and platings with various concentrations of the ingredients to determine inhibitory activity. The accepted medium consisted of 2.3% nutrient agar (Difco) plus 0.045% alkyl aryl sulfonate. The source of alkyl aryl sulfonate was the active ingredient of Nacconol (Allied Chemical Corp.) or Ultrawet (Atlantic Refining Co.). The plates were incubated at 32 C for 48 hr. This medium inhibited completely *Streptococcus lactis*, *Streptococcus faecalis* var. *liquefaciens*, *Bacillus cereus*, *Bacillus licheniformis*, *Staphylococcus aureus*, and *Brevibacterium linens*. There was no detectable reduction in the counts with *Escherichia coli*, *Pseudomonas fluorescens*, *Achromobacter lipolyticum*, or *Alcaligenes viscolactis*. When dilutions of milk were plated using

TABLE 1. FREQUENCY OF OCCURRENCE WITHIN CATEGORIES OF BACTERIA ISOLATED FROM 42 SAMPLES OF FRESHLY PASTEURIZED, PACKAGED MILK

Category	Number of isolates	Percent of total
Gram-positive nonsporeforming rods	99	40
Micrococci	80	32
Bacilli	53	22
Streptococci	12	5
Coliform	2	1
Other gram-negative rods	0	0
Total	246	100

the selective medium and isolates made therefrom, over 90% of the isolates were common gram-negative rods.

The above observations on inhibition applied only when the samples to be plated contained no more than 0.1 ml of milk. When greater concentrations of milk were present, the milk solids interfered with the selective action of the alkyl aryl sulfonate (14) thereby permitting the growth of the gram-positive bacteria. The following observations, therefore, were limited to counts where the dilutions were 1 to 10 or more.

RESULTS

Microorganisms in freshly pasteurized, packaged milk.

The standard plate counts of the packages of milk from both the University Dairy Plant and the commercial plant were commonly in the range of 500-1,500 per ml. The shelf life was 14 days or more at 5 C. There was no indication of a seasonal influence in the count or in the shelf life.

From 42 samples and 84 plates, 246 isolates were studied. The general nature of the microflora of the pasteurized, packaged milk is shown in Table 1, which presents a grouping of the isolates with related physiological characteristics of importance to the dairy industry. The relative distribution within the various groups was in general agreement with the work of others (9, 20) but with a slightly higher frequency of sporeforming bacilli. The largest single group was the gram-positive nonsporeforming rods, which were characteristic of the genera *Brevibacterium*, *Corynebacterium*, and *Microbacterium* (3). Approximately one-third were micrococci, and slightly less than one-fourth were sporeforming bacilli. The streptococci accounted for approximately 5%. These observations indicate that near 99% of the bacteria contributing to the total plate count in pasteurized,

packaged milk are of minor significance in spoilage as compared to the gram-negative rods of post-pasteurization contamination.

Growth response of the microflora in pasteurized, packaged milk.

Most studies on the growth response (increase in numbers through multiplication or recovery from physiological shock) of the microflora of pasteurized milk have been based on temperatures and conditions of normal, proper handling of milk. Some studies have involved slight mistreatments through warming the packaged milk (5, 7). Mistreatment at a temperature at which most bacteria could grow, however, has not been studied. A temperature of 32 C was therefore chosen to observe the growth response as an extreme of warm exposure. Precautions were taken to obtain this temperature within 5 min and to maintain it by the use of a thermostatically controlled water bath.

The pattern of growth from the average results on four samples is shown in Figure 1. With the freshly pasteurized milk there was little growth for 6 hr. Some samples showed little growth until after 10 hr. When samples from the same process lot were pre-incubated at 5 C for 2 days, the growth response on subsequent incubation at 32 C was some-

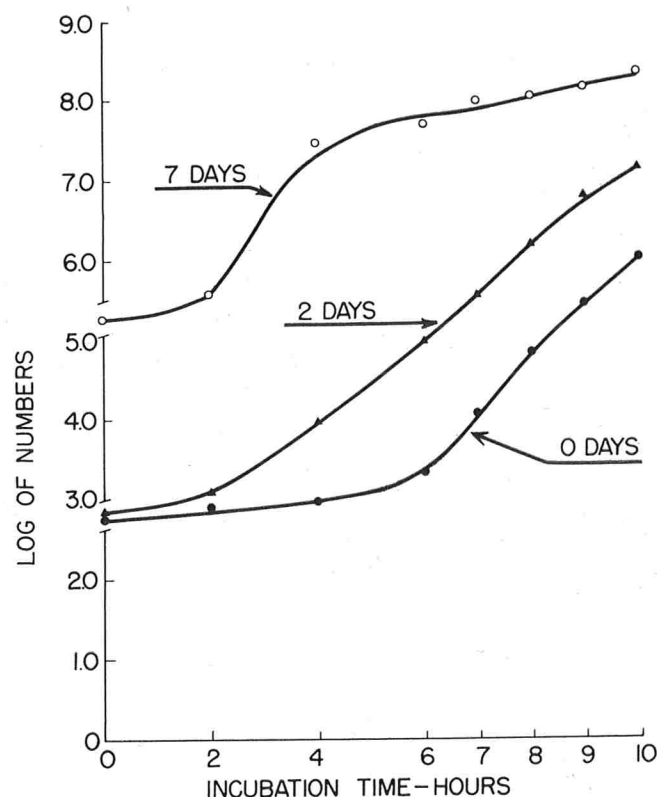


Figure 1. The effect of storage at 5 C on the total bacterial growth in pasteurized, packaged milk during subsequent incubation at 32 C.

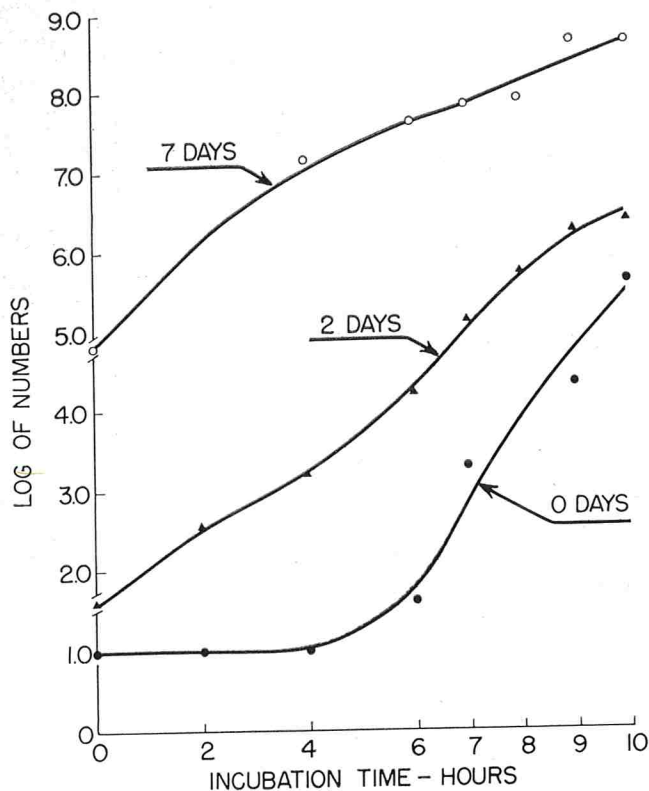


Figure 2. The effect of storage at 5 C and subsequent incubation for various times at 32 C on Nacconol resistant bacteria in pasteurized, packaged milk.

what greater. The growth response on samples pre-incubated for 7 days was much greater still. Samples pre-incubated for 14 days commonly spoiled by coagulation within 4-6 hr, giving data too erratic to be included in Figure 1. These observations indicated changes occur during pre-incubation at 5 C that contributed greatly to the growth response and spoilage during subsequent incubation at 32 C. Thus it is apparent that older milk is much more susceptible to spoilage through mishandling.

The growth response of selected bacteria.

The gram-negative bacteria in pasteurized, packaged milk are limited to post-pasteurization contamination. Since these bacteria include the psychrophilic and coliform groups, they represent a major problem in quality control. The growth response of these bacteria relative to the growth response of the total microflora was therefore studied by the use of a selective medium as described in the section on methods.

Observations were made on freshly pasteurized samples and similar samples that were pre-incubated at 5 C for up to 14 days. Data representing the averages of 7 trials are given in Figure 2. The growth response of those bacteria enumerated with the selective medium was similar to the pattern shown in

Figure 1, which represented the total standard plate count. The count on the selective medium was much lower than commonly found by total counts on freshly pasteurized samples. When conditions permitted growth within the pasteurized milk, however, the counts on the selective medium exceeded 90% of that found for total counts. Thus, the bacteria capable of growing on the selective medium apparently accounted for the growth during pre-incubation at 5 C as well as most of the growth response at 32 C.

Relative growth response at 5 C.

Since growth response at 5 C is an important factor in the quality of pasteurized, packaged milk, observations on the growth response without including the relatively inert thermophilic bacteria should be helpful. The previous data indicated that much of the growth response in pasteurized, packaged milk held at 5 C was reflected by the counts on the selec-

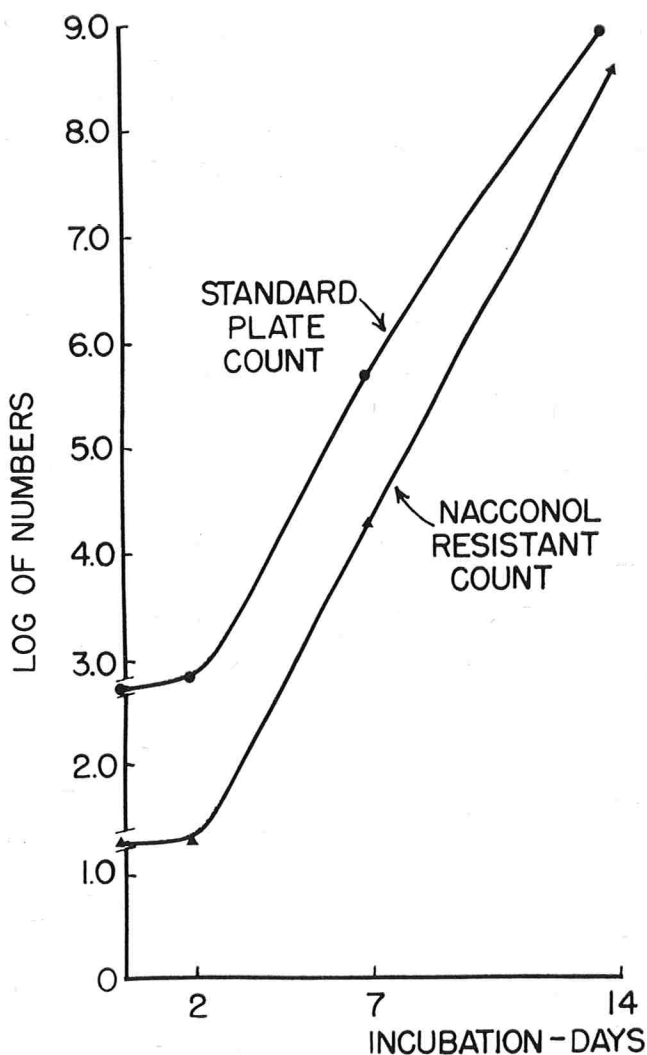


Figure 3. The relative growth response of Nacconol resistant bacteria and the total microflora when pasteurized, packaged milk was incubated at 5 C.

tive medium. Further observations were made on this phenomenon. Samples of freshly pasteurized, packaged milk were pre-incubated at 5 C, and comparative counts with the selective medium and with standard plate count agar were made after 0, 2, 7, and 14 days. The average results of five trials with duplicate plates are given in Figure 3. The two methods showed similar patterns of growth. In actual numbers, however, the counts with the selective medium were approximately 3% of the total at the beginning of the incubation period, but accounted for an increasing percentage as the test period progressed. Thus the selective medium appeared to be a more sensitive indicator of growth response than the total count.

Relative growth response at 32 C.

Earlier data indicated that most of the bacteria in freshly pasteurized, packaged milk did not grow on the selective medium. Similar observations, however, indicated that an exposure of the sample to 32 C allowed considerable growth, most of which could be accounted for by plating on the selective medium. Additional observations were therefore made. Samples of freshly pasteurized milk—two of which were poor in that they contained considerable post-pasteurization contamination—were pre-incubated at 32 C for up to 10 hr. Periodic counts were made with standard plate count agar and with the selective medium. The average results of five trials with duplicate plates are given in Figure 4. It is apparent that growth response at 32 C could be accounted for by using the selective medium. An increasing percent-

age of the bacteria grew on the selective medium as the test period progressed.

DISCUSSION

Modern commercial methods of processing market milk provide a finished product with a very low total count. And, most of the bacteria remaining grow slowly, if at all, except in extreme circumstances of long storage or gross mistreatment of the milk. It is the occasional troublesome contaminant that is the limiting factor in shelf life.

All the bacteria in milk are presumed to contribute to the total count with plate count agar and standard methods. The inherent variation in the method, however, is greater than the numbers of common spoilage bacteria. Thus, with the present level of refinement in processing equipment and sanitation, reliance on total count represents an unrewarding approach to quality control and protection of public health. The apparent limitation in value of the plate count in quality evaluation is in agreement with the conclusions of Elliker et al. (10).

The results of the observations on the microflora are in general agreement with other workers (8, 9, 20). The comparatively infrequent occurrence of troublesome contaminants in freshly pasteurized, packaged milk was apparent in our data. With 246 isolates there was not a gram-negative proteolytic rod, which is generally considered a constant potential trouble source. Similarly, there was only one sample with microorganisms considered as coliform indicators and these accounted for less than 1% of the 246 isolates. The infrequent occurrence of gram-negative rods is in harmony with the general understanding that the total coliform and psychrophilic count is less than 10 per ml in a properly pasteurized, packaged milk supply.

The group of bacteria capable of growth on the selective medium represents the primary problem either at low temperature storage of 5 C or at extreme mistreatment conditions of 32 C. There is every reason to expect, if the results are true for the extreme temperatures, the intermediate temperatures or combinations thereof would be included. These bacteria occur in pasteurized, packaged milk as post-pasteurization contaminants. A selective medium to reflect growth response of post-pasteurization contamination therefore seems warranted.

While the value of plating with the selective medium is limited to measuring growth response of selected bacteria, recognition of the general importance of this group of bacteria may lead to tests of further practical applications. A quick test for quality evaluation would be most helpful, and work along these lines is now underway in our laboratory.

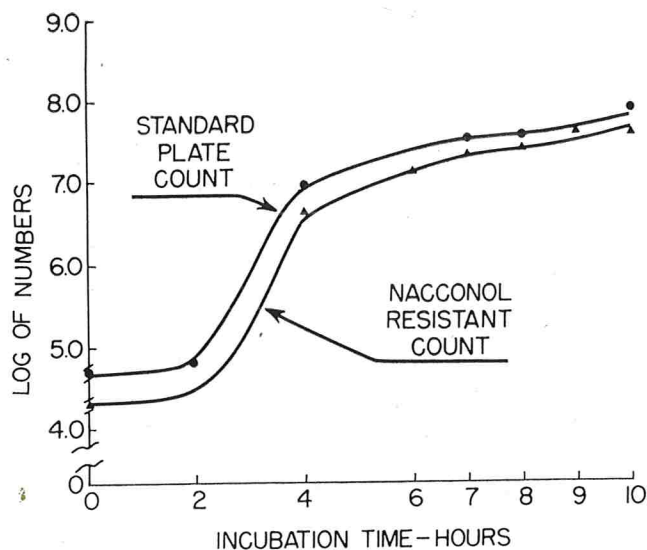


Figure 4. The relative growth response of Nacconol resistant bacteria and the total microflora when pasteurized, packaged milk was incubated at 32 C.

ACKNOWLEDGMENT

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Sincere appreciation is due Mr. H. M. Barnhart, Jr. for his technical assistance on this work.

REFERENCES

1. American Public Health Association. 1960. Standard Methods for the Examination of Dairy Products. 11th ed. Am. Public Health Assoc., Inc. New York, N. Y.
2. Atherton, H. F., Doan, F. J., and Watrous, G. H., Jr. 1954. Changes in Bacterial Population and Characteristics of Bottled Market Milk During Refrigerated Holding. Penna. Expt. Station Bull. 575.
3. Breed, R. S., Murray, E. C. D., and Smith, N. R. 1957. Bergey's Manual of Determinative Bacteriology. The Williams and Wilkins Company, Baltimore, Md.
4. Broitman, S., Mallmann, W. L., and Trout, G. M. 1958. A Simple Test for Detecting Quality for Milk. J. Milk and Food Technol. 21:280.
5. Courtney, J. L. 1963. The Effect on Bacterial Counts of the Gradual Warming of Milk Samples. J. Milk and Food Technol. 26:389.
6. Dahlberg, A. C. 1946. The Relationship of the Growth of All Bacteria and Coliform Bacteria in Pasteurized Milk Held at Refrigeration Temperatures. J. Dairy Sci. 29:651.
7. Dahlberg, A. C. 1946. The Keeping Quality of Pasteurized Milk. Cornell Univ. Ag. Expt. Sta. Bull. 838.
8. Egdell, J. W. and Bird, E. R. 1949. Some Aspects of the Bacteriological Quality of Pasteurized and Heat Treated Milk in the West of England. J. Soc. of Dairy Technol. 2:144.
9. Egdell, J. W. and Bird, E. R. 1950. Types of Organisms Present in Commercially Pasteurized Milk. J. Soc. of Dairy Technol. 3:171.
10. Elliker, P. R., Sing, E. L., Christensen, L. J., and Sandine, W. E. 1964. Psychrophilic Bacteria and Keeping Quality of Pasteurized Dairy Products. J. Milk and Food Technol. 27:69.
11. Farrall, A. W. 1963. Engineering for Dairy and Food Products. John Wiley and Sons, Inc., New York, N. Y.
12. Hegarty, C. P. and Weeks, O. B. 1940. Sensitivity of *Escherichia coli* to Cold-Shock During the Logarithmic Growth Phase. J. Bacteriol. 39:475.
13. Maxcy, R. B. 1964. Potential Microbial Contaminants from Dairy Equipment with Automated Circulation Cleaning. J. Milk and Food Technol. 27:135.
14. Maxcy, R. B. 1964. Influence of Surface Active Agents on Some Lactic Streptococci. J. Dairy Sci. 47:1285.
15. Maxcy, R. B. 1966. Some Relative Effects of Surface Active Agents and Dissolved Substances on Microorganisms of Importance in Sanitation. J. Environmental Health 29:121.
16. Nelson, F. E., and Baker, M. P. 1954. The Influence of Time and Temperature of Plate Incubation Upon Bacterial Counts of Market Milk and Related Products, Particularly After Holding Under Refrigeration. J. Milk and Food Technol. 17:95.
17. Punch, J. D., Olson, J. C. Jr., and Thomas, E. L. 1965. Psychrophilic Bacteria. III. Population Levels Associated with Flavor or Physical Change in Milk. J. Dairy Sci. 48:1179.
18. Society of American Bacteriologists. 1957. Manual of Microbiological Methods. McGraw-Hill Book Co., Inc. New York, N. Y.
19. Thomas, S. B., Druce, R. G., and King, Kay P. 1964. The Microflora of Steam Sterilized Milking Equipment. J. Applied Bacteriol. 27:7.
20. Thomas, W. R., Reinbold, G. W., and Nelson, F. E. 1963. The Effect of Temperature and Time of Plate Incubation on the Enumeration of Pasteurization-Resistant Bacteria in Milk. J. Milk and Food Technol. 26:357.

FDA REDUCES TOLERANCE ON ALDRIN AND DIELDRIN

The Federal Food and Drug Administration has reduced tolerances for the insecticides aldrin and dieldrin on some raw agricultural commodities and has withdrawn entirely the tolerance on others. The maximum tolerance now permitted for either pesticide in or on any food will be 0.1 part per million. This is a reduction from the levels formerly permitted, 0.75 and 0.25 part per million.

An interim tolerance for citrus and grains was included in the new order to remain in effect pending review by an advisory committee requested by a petitioner for the tolerances.

The possible transmission to meat or milk of aldrin or dieldrin residues (in both cases as dieldrin) from grain or citrus pulp fed to animals is the primary

issue in establishing tolerances for these commodities. The tolerances established today reflect the recommendations of FDA's first advisory committee on aldrin and dieldrin tolerances. The committee was established to explore the safety of these pesticides, as recommended by the President's Science Advisory Committee on Use of Pesticides.

Aldrin tolerances for total residues are established at 0.1 part per million for 29 fruits and vegetables; zero on 46 raw agricultural commodities, including fruits, vegetables, and animal feeds.

Dieldrin tolerances are established at 0.1 part per million for 34 fruits and vegetables, and zero for 29 vegetable and feed crops.

BACTERIOLOGICAL EXAMINATION OF GRADE A DRY MILK POWDER

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SUMMARY

A total of 223 samples of bulk Grade A dry milk powder from 39 dryers was examined for bacterial count, coliform count, and the presence of salmonellae; direct microscopic counts (DMC) also were made on 211 of these samples. No salmonellae were detected. Bacterial counts ranged from 260 to 1,300,000 per g; but only 15.2% of the samples exceeded the 30,000-per-g limit recommended by the Public Health Service. Coliform counts ranged from 0 (none detected) to 120 per g, but only 0.9% of the samples exceeded the 90-per-g limit. About 20% of the samples yielded excessively high DMC.

Early in 1966, a relatively rare serotype among the salmonellae, *Salmonella new-brunswick* was being isolated at a much higher rate than the previous years' experiences indicated as normal. In 1963, six isolations had been made and in 1964, four. Between October 1965 and February of 1966, however, 13 isolations were made—a sixfold increase over previous years; furthermore, eight of these isolations were from individuals 1 year of age or under (a marked shift toward the lower age group), and ten of the patients had a positive history of exposure to instant non-fat dry milk (5).

Since early 1966, a great many samples of dry milk powder have been examined, and isolations of at least 11 serotypes of salmonella have been made by federal and state agencies from dry milk powder from more than 20 drying plants in 11 states (6). These findings stimulated our interest in the sanitary quality of non-fat dry milk being produced in drying plants that operate under the provisions of the "Grade A" Pasteurized, Condensed and Dry Milk Products Sanitation Ordinance recommended by the U. S. Public Health Service (3, 4). Arrangements were therefore made early in May of 1966 for the collection of samples of "Grade A" dry milk powder from plants located in all parts of the United States. Upon arrival in Cincinnati, Ohio, they were examined for the presence of salmonella, viable bacterial count, coliform count, and direct microscopic count, to get a clearer picture of the quality of the milk being used

and the product being produced. This paper describes the results of this study as they reflect the quality of the raw milk and the dried product.

EXPERIMENTAL PROCEDURES

Specimens

The samples of dry milk powder were collected in plastic specimen containers at intervals during the drying process or from lots of dry milk in storage at the drying plant. Although samples in excess of 100 grams were requested, in some instances smaller samples were received. When this occurred, samples of the same "run" or "lot" number were combined and examined as a single sample. Samples were mailed to the Cincinnati laboratory either directly from the drying plant area or from the nearest Public Health Service Regional Office. The samples were tested shortly after receipt, usually within 1 week after collection.

Methods

The samples were examined for the presence of salmonellae by the following method agreed upon jointly by the Communicable Disease Center, the Food and Drug Administration, and the Division of Environmental Engineering and Food Protection as follows:

One hundred grams of dry milk powder were reconstituted in 1,000 ml of sterile distilled water in a 2-liter flask. To this was added 20 ml of a 0.1% aqueous solution of brilliant-green dye (Bacto[®] Brilliant-Green, control number 433358). The flasks were incubated at 37 C for 18 to 24 hr. A loopful of material from each flask was streaked onto brilliant-green agar (Difco control number 439158) containing sodium sulfadiazine (80 mg per liter of agar). At the same time, 10 ml of the material from each flask was added to 100 ml of tetrathionate broth (Difco control number 436980) containing brilliant-green dye (10 ml of a 0.1% solution per liter). The plates and tetrathionate were incubated at 37 C for 18 to 24 hr and a loopful of the tetrathionate broth was streaked on a brilliant-green sulfadiazine (BGS) agar plate and incubated for 18 to 24 hr. The BGS plates were examined for colonies typical of Salmonella after 24 hr at 37 C and again after a 24-hr incubation at room temperature. The only exception to the method agreed upon was the use of a 35 C incubation temperature after trials indicated it was equally satisfactory.

^aMention of commercial products does not imply endorsement by the Public Health Service.

The bacterial plate counts, the coliform plate counts, and the direct microscopic counts were determined as directed in the 11th edition of Standard Methods for the Examination

of Dairy Products (1). Isolates of coliform organisms from the violet-red bile agar plates were examined for their ability to produce indole from tryptophane, and acetyl methyl carbinol from glucose; their ability to utilize citrate as a sole source of carbon; and the final pH in glucose broth by the methyl red reaction. The isolates were classified as types of *E. coli*, *A. aerogenes*, intermediates, or atypical coliform organisms on the basis of the IMViC patterns obtained (2).

RESULTS AND DISCUSSIONS

A total of 287 samples was received. This included 275 samples from 39 dryers, and 12 samples from the Cincinnati Laboratory of the Food and Drug Administration that had been previously tested by them. Samples containing less than 100 grams were combined; therefore, only 223 samples were examined for salmonellae, bacterial plate count, and coliform plate count. Of these, 211 were examined for direct microscopic count; the samples from the FDA were not so examined.

Bacterial Plate Count

The bacterial plate counts ranged from 260 to 1,300,000 per g with a mean of 28,000 per g and a median count of 2,000 per g. Of the 223 samples, 34 (15.2%) exceeded the 30,000-per-g limit for Grade A dry milk products, (3) and 41 (18.3%) exceeded the 20,000-limit (4).

Of the 39 dryers from whom samples were received, 12 (30.8%) submitted one or more samples that had counts over the 30,000-per-g limit, and 13 (33.3%), samples with counts over the 20,000-per-g limit.

The bacterial plate counts were read after incubation at 32 C for 72 hr as required by Standard Methods (1). They were also read at 48 hr, and the levels obtained at the two incubation times were compared. The same person, counting the same plates, might obtain differences in colony count as great as $\pm 5\%$ between the two counts (1); therefore, differences of $\pm 5\%$ or less in the 48- and 72-hr counts were considered as similar counts. An examination of the counts at 48 and 72 hr showed that 64 (28.7%) of the samples had similar counts; 25 (11.2%) had lower counts at 72 hr than at 48 hr; and 132 (60.1%) had higher counts at 72 hr than at 48 hr. The average percent of decrease in those samples that gave lower counts at 72 hr was 28.5%. Many of these lower counts resulted from the presence of spreaders that made accurate counting more difficult at 72 hr. The average increase in colony count in those samples that had higher counts at 72 hr was 53.2%. The percentage increase ranged from 6 to 755% with a median of 25%. For counts falling in the range of 100 to 1,000 organisms per g, the median

was 27%; in the range of 1,100 to 10,000, the median was 16%; in the range of 11,000 to 100,000, 41%; and in the range of 110,000 to 1,000,000, 41%.

In spite of the fact that over half of the counts increased with the longer incubation period and that, in some instances, this increase was very great, the number of samples that were above the limit at 72 hours but not at 48 hr was very small. On the basis of the 30,000-per-g limit (3) only two samples were over-limit at 72 hr that were acceptable at 48 hr, and on the basis of 20,000 per g, (4) only four.

The results with this relatively small number of samples indicate that the proposed change in Standard Methods for the Examination of Dairy Products from a reading time of 72 hours to 48 hours in the examination of dry milk powder would not significantly affect the number of samples rejected, because of high bacterial plate counts. The fact that nearly one-third of the dryers had one or more specimens in a drying "run" that had bacterial plate counts above the recommended limits indicates a need for some improvement in the general sanitation of the drying plants, in the pasteurization process and its controls, or in the quality of milk being used.

Coliform Counts

Of the 223 samples examined, 19 (8.5%) contained coliform organisms as indicated by the appearance of one or more colonies on the violet-red bile agar plates, which were verified as coliform organisms by producing gas in brilliant-green lactose bile broth (BGLB) in 24 to 48 hr. Only 2 (0.9%) of the samples contained coliform organisms at levels in excess of the 90-per-g limit, (3) and only 6 (2.7%) exceeded the 10-per-g limit (4). Although 13 (33.3%) of the dryers had one or more samples that contained coliform organisms, only 2 (5.1%) had samples that exceeded the 90-per-g limit, (3) and 5 (12.9%), that exceeded the 10-per-g limit (4).

In addition to verification in BGLB, isolates of the coliform organisms were made and tested for their IMViC patterns. Twenty strains were isolated and tested: three were *E. coli*, six were intermediate types, five were *A. aerogenes*, and six gave atypical reactions. The range of coliform counts were from 0 (none detected) to 120 per g, with a median count of 0 (none detected) per g and a mean of 1.5 per g. One isolation of *E. coli* was associated with a specimen that had an excessive bacterial plate count (1,000,000 per g), and two were from the samples with the highest coliform counts (50 and 120 per g). The other coliform isolates were not associated with either high bacterial plate counts or excessive coliform counts; in fact, 9 of 10 coliform isolates were made from single colonies on groups of three plates containing 10 ml of the reconstituted milk.

These results indicate a gratifying degree of freedom from contamination by fecal coliform organisms and a relatively low level of contamination by any type of these organisms.

Salmonellae

No isolations of salmonellae were made from any of the samples from the 39 dryers. The 12 samples from the Food and Drug Administration (FDA) laboratory were used as a control on the salmonellae method. The FDA had found 11 of the 12 samples positive for salmonellae, but indicated that the contamination was not uniform throughout these samples and that sub-samples tested by different laboratories were not always positive. In this study, 8 of the 12 samples were positive when tests were done on 100-g portions. Furthermore, when known levels of salmonellae were added to dry milk powder before testing, positive results were obtained with the addition of about 8 salmonellae per 100 g of dry milk powder, but not with 0.8 organism per 100 grams. The method used in this study should have been capable of detecting salmonellae had they been present at levels above the sensitivity of the testing procedure.

Direct Microscopic Counts

Direct microscopic counts (DMC) were made to obtain information on the quality of the milk used in the preparation of dry milk powder. Inasmuch as most of the 39 dryers are listed in the Department of Health, Education, and Welfare Sanitary Compliance and Enforcement Ratings of Interstate Milk Shippers as producing bulk non-fat dry milk powder from Grade A milk, it is assumed that the raw milk should meet the standard of no more than 400,000 clumps per ml, which is equivalent to 4,000,000 clumps per g of powdered milk made from such milk (3).

The DMC ranged from 200,000 to 630,000,000 clumps per g with a mean of 11,000,000 and a median of 3,000,000 clumps per g. Of the 211 samples on which DMC were made, 95 (45.2%) were above the 4,000,000-per-g level. Of the 39 dryers from whom samples were received, 30 (76.9%) had one or more samples with counts over this level. Although in some instances only one or two samples from a dryer were tested, the average number of samples per dryer was six; the range was one to 15. The counts of all the samples of nine dryers (23.1%), over half the samples of eight (20.5%), and only one sample of seven (17.9%) were above the 4,000,000 clumps-

per-g limit. Because of the relatively large conversion factor (300,000) used in the DMC, minor differences in counts have little real meaning. For example, DMC of 3,000,000 and 6,000,000 indicate a difference between one clump and two clumps per microscopic field; the latter count, however, places the samples above the acceptable level, whereas the former is within the acceptable range.

The results were further evaluated in relation to the individual dryers by computing the mean DMC for each dryer. Seventeen (43.6%) had average DMC below the 4,000,000 clumps-per-g limit, 14 (35.9%) had average DMC in the range of 4,000,000 to 8,000,000 clumps per g, but 8 (20.5%) had average DMC of over 10,000,000 clumps per g.

The results of these studies suggest several possibilities in relation to the drying operation and the milk being used. Assuming a reasonable degree of sanitation in the plants, the eight dryers all of whose specimens yielded DMC of over 10,000,000 per g could not have been using milk meeting the Grade A Standards (3). Those other dryers who had one or more samples with DMC over the 4,000,000 per g limit may have been using Grade A Milk but, if so, somewhere in the process a build-up of organisms was occurring so that some of the samples of dry product were heavily contaminated. The fact that 76.9% of the dryers had one or more samples with DMC above the acceptable limit suggests that more careful attention should be given to plant sanitation or the quality of the milk being used, or both.

REFERENCES

1. Am. Public Health Assoc. 1960. Standard Methods for Examination of Dairy Products. 11th Ed. New York, N. Y.
2. Am. Public Health Assoc. 1965. Standard Methods for Examination of Water and Waste Water. 12 Ed. New York, N. Y.
3. U. S. Dept. of Health, Education, and Welfare. Grade A Dry Milk Products. Supplemental to the Milk Ordinance and Code—1953 Recommendations of the Public Health Service. 1959. Washington, D. C.
4. U. S. Dept. of Health, Education, and Welfare. Grade "A" Pasteurized, Condensed and Dry Milk Products Sanitation Ordinance-1967 Recommendations of the Public Health Service. Washington, D. C.
5. U. S. Dept. of Health, Education, and Welfare. 1966. Salmonella Surveillance Report No. 47, March 30. Public Health Service, Communicable Disease Center, Atlanta, Ga.
6. U. S. Dept. of Health, Education, and Welfare. 1966. Salmonella Surveillance, Report No. 49, June 1, 1966. Public Health Service, Communicable Disease Center, Atlanta, Ga.

WATER USE AND CONSERVATION IN FOOD PROCESSING PLANTS¹

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The first question to be asked on water usage in processing plants should be: "Are you using enough water?" The primary consideration in the use of water is to accomplish the task for which the water is being used. In addition to product conveyance, such as in flumes, two of the more important uses are in washing the raw product and cooling of the finished product. These primary purposes must be accomplished without any sacrifices as to the amount of water being used. There are a few trends in the food industry, as a matter of fact, that suggest an increase in water usage.

Research on spoilage probabilities has shown that microbial counts for foods in the final container are influenced by the sanitation condition of the plant and the quality of water in which the product has been handled and conveyed. Due to increased emphasis on quality and more rigid definitions of clean food, it has been estimated that approximately twice as much water is now used per case than 20 years ago. The increased interest shown by regulatory agencies and government buying agencies on the sanitation of the plant and the wholesomeness of the final product suggests even a further increase in the amount of water used per case of product.

In this era of mechanical harvesting even a further increase in water may become necessary for field cooling, water hauling, and removal of excess soil and debris which appears to be characteristic of mechanical harvesting as compared to hand picking. Increase use of water conveyance systems has also greatly increased water usage.

WATER CONSERVATION

Regardless if enough water is being used or not or if more water will be required to accomplish certain tasks in the future, there is always room for water conservation in most plants due to (a) new processing procedures; (b) more efficient equipment; (c) avoiding unnecessary use or waste of water; and (d) reuse or recirculation of water.

It must be remembered that all water released in the plant, regardless of how small the amount, has to be disposed of in some manner or another, resulting in an additional load on the waste disposal system. In addition each of us has a responsibility to conserve

the quantity and preserve the quality of the waters of our state and nation. Thus, the second question to be asked is: "How can the total load (water) on the waste disposal system be reduced?"

At a recent National Canners Association convention, Mr. Blair Bowers reported on a survey he had conducted for NCA which showed several interesting facts. As the operating rate increases the use of water per unit product decreases. Thus any factors which increase the flow of product through the plant is a step in the direction of more efficient use of water. Along this same trend, factors which improved case yield/per ton of product decreased the waste load per unit of raw product being processed.

According to Mr. Bowers, new and improved equipment is having a tremendous impact on water utilization. Continuous cookers and hydrostatic sterilizers have resulted in significant decreases in groww water used per unit of product in contrast to still retorting. Improved and more efficient fillers which have less spillage will conserve water and also reduce the bio-oxygen demand (BOD) load of the waste.

In general it appears that some of the more advanced and automated equipment coupled with better methods of handling water and waste, such as better spray washing systems, improved cooling systems, automatic-monitoring and control of water flows, separation of concentrated from dilute waste, improved clean-up operations and recirculation of water can contribute significantly to the efficient utilization of water.

UNNECESSARY USE OR WASTE OF WATER

The following suggests certain areas where the processor should pay particular attention:

1. All water hoses should have automatic shut-off valves to prevent waste of water when hoses are not in use. A running hose can discharge up to 300-400 gallons of water per hour.
2. Use low-volume high-pressure nozzles rather than low-pressure sprays for clean-up. The high-pressure system uses less water and will do a more efficient job of cleaning.
3. Avoid unnecessary water overflow from equipment, especially when not in use.
4. Avoid using water to flume the product or solid waste when the material can be moved just as effectively in a dry-state by conveyors.
5. Avoid using water in excess of the amount needed to accomplish the job, such as reducing cooling water flow to the minimum needed to accomplish the necessary temperature drop.

¹From the Maryland Processors Report, December, 1966.

6. Rain water run-off from buildings should be diverted away from the factory and not allowed to inadvertently be collected in the waste disposal system.

7. Certain water used in the plant, especially can-cooling water, which is not reused and which meets the purity requirements of the Maryland Department of Water Resources, may be discharged directly into streams without prior treatment through a waste disposal system. In some cases this may amount to over 50 percent of the total water used.

REUSE OF WATER

Indiscriminate reuse of water in the processing plant can result in costly spoilage losses. However, reuse of water under recommended practices can greatly reduce total water consumption. In general, the reuse of water in certain operations is permissible if certain water quality factors are met and certain guidelines followed:

Only fresh water should be used where prepared or partially prepared products, such as blanched peas, beans, asparagus, dried fruit, peeled tomatoes, etc., should only come in contact with water. Also, only fresh water should be used in blanchers or in final flumes and product washers.

Reuse of water is permissible and advisable in certain operations. By using the counterflow principle of water usage the cleanest or final water may be reused within a given operation, such as in a sequence of washers or flumes, if it is counter-flowed to the direction of movement of the product. For example, where a raw, unprepared product is given two successive cold-water immersion washings, the water from the second washing may be used as make-up water for the first washing, if it is not heavily contaminated with organic matter and insects. The same principle would apply to flumes used for conveying and washing raw unprepared produce.

The water from can coolers, in general, is fairly

uncontaminated and may be reused as make-up water in can cooling as well as at numerous other locations within the plant.

PRECAUTIONS IN THE REUSE OF WATER

Recirculation of washer and flume water (using the counter-flow system) must be carefully controlled to prevent excessive accumulation of soil and organic debris. Reclaimed water for washers and flumes should be effectively chlorinated if the temperature is not held at 80 F or below.

All water for reuse should first be screened. If used for cooling cans, it must be chlorinated, and chlorination is recommended for all reused water. (A chlorine residual of 0.5 to 1 ppm increased to 4-5 ppm for a short time about every two weeks).

Water must not be reused for any purpose other than cooling cans if it has been treated with dichromate or other corrosion inhibitors. If cooling water is reused in other equipment than can coolers, a separate piping and pumping system is required, with no cross connections to the potable water supply.

A copy of a "Water-Economy Check Table" useful as a guide on the reuse of water is available from the author.

REFERENCES

1. Bower, Blair. 1966. Water Utilization in Canning. NCA Info. Letter, Convention Issue No. 2054.
2. Mercer, W. A., and C. T. Townsend. 1954. Water Reuse in Canneries. NCA Bulletin 31L.
3. Mercer, W. A. and G. K. York. 1953. Reuse of Water in Canning. NCA Info. Letter Convention Issue No. 1426.
4. Mercer, W. A., W. W. Rose, C. E. Butler, and M. M. Appleman. 1958. More Effective Product Washing with Less Water. NCA Info. Letter Convention Issue No. 1666.
5. Townsend, C. T., and I. I. Somers. 1949. How to Save Water in Canneries. Food Industries. Vol. 21, pp. 11-12.

NITRATES IN PRIVATE WATER SUPPLIES IN MORGAN COUNTY, MISSOURI

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A survey of private water supplies in Morgan County, Missouri, made by representatives of the Missouri Division of Health, was begun early in 1965 and carried on into 1966. It was prompted by numerous communications received from residents of the county requesting assistance and information. Professional consultants suggested nitrate in the water could be a contributing factor to some of the problems farmers had experienced with their livestock. The medical profession suspected contamination of the water used by some of their patients. Members of local 4-H Clubs stimulated interest through the health phase of their club activity.

GEOLOGICAL CONDITION

Morgan County is generally considered to be in the Ozark Mountains region, although the gently rolling plains of the northern part could be excluded. A pronounced escarpment separates the plains in the northern part from the highly dissected area of the south. The upland in the north is underlaid with a dolomite of the Jefferson City formation while in the highly dissected areas the Roubidoux and Gunter formations produce massive rock ledges.

The oolitic dolomite of the Jefferson City formation and the sandy dolomite of the Roubidoux have contributed to the formation of mammoth caves. One cave receives a heavy flow of surface water following a rain but extensive exploring has not revealed the surface opening through which the water enters. A number of caves have been explored while others have not. Probably some caves exist that have never been located.

A variety of minerals are known to be present in practically every township in the county. Many of the mineral deposits are located in circles and sinks and are described as pocket deposits. Numerous prospect holes and mine shafts have penetrated the Roubidoux formation and some have pierced the Gunter. Mine shafts, prospect holes, and caves provide direct openings into the water bearing formation and probably contribute to the nitrate contamination.

RESULTS OF THE TESTS FOR NITRATES

Samples have been collected from a total of 157 wells. At the time of sampling, a data sheet was

filled out supplying available information about the wells. Lack of information or reluctance of the owner to give this information reduced the number of wells on which complete data was obtained. All samples were submitted to the Missouri Division of Health Laboratory in Jefferson City for analysis.

A laboratory report was returned on 157 samples. The following nitrate levels were reported in parts per million:

40 samples contained no nitrate.
27 contained less than 1 ppm.
44 contained 1 ppm or more but less than 20 ppm.
23 contained 20 ppm or more but less than 45 ppm.
23 reports indicated contamination in excess of 45 ppm, the level considered as the maximum acceptable for a public water supply.

To date, the highest nitrate contamination found in this study is 220 ppm. Two wells have 110 ppm and one has 100 ppm. Three of these wells are in one township, but the fourth is located on the opposite side of the county, at least twenty miles away. Eight townships have one or more well with the nitrate levels above 45 ppm. These eight townships are located in the chief farming area in the northern part of the county.

WELL CONSTRUCTION OBSERVED

The surface construction of sixty-four wells was deemed to have met the recommended standards of the Missouri Division of Health. Seventy nine did not have satisfactory protection. Of the wells that did not meet the standards, 82% showed nitrate contamination. However, nearly 80% of the wells that did meet the standards were also contaminated. This slight variation may have no significance, but it may also indicate that the surface water in the immediate area of the well is not the source of the nitrate.

One third of the wells with solid casings are free of nitrate, while only one seventh of the wells with non-solid casings showed no nitrate. Since only 13 wells are cased to a depth of 100 feet or more and only four of these are free of nitrate, it would seem most likely the source of contamination is a water bearing strata below the average casing depth. Several of the old wells have been replaced with new ones since this study began.

SIGNIFICANCE OF NITRATES IN WATER SUPPLIES

Chemists describe nitrates as salts of nitric acid that contain the NO_3 radical, while nitrites are the salts of nitrous acid that contain the NO_2 radical. These chemicals are produced in nature and are the results of the breakdown of proteins. It is generally considered that if nitrites are found in water it indicates pollution and signifies active bacterial action and the presence of organic matter. Nitrates in water, without nitrites, are an indication of and an index to past pollution.

Many authorities recognize nitrates in the water as a contributing factor in animal health or rather lack of good health. Diagnosis of nitrate poisoning in animals probably dates back to the 1890's. Then it was usually called stalk field poison. Trouble in the herd began about the time of the year that cattle were permitted to graze fields of corn stalks after the ears had been harvested. Stockmen soon became aware that some seasons the stalks were more toxic than others. Researchers in animal nutrition found through investigations that the variations of nitrate level in the plants were directly associated with the growing season.

With a season conducive for the plants to store nitrates as such rather than as plant proteins and the drinking water containing a high level of nitrates, it is easy to see that an oversupply of nitrates could be available for the stock. The onset of nitrate poison may be rapid and the results may be fatal. However, with lower concentration, the animals may develop an unthrifty condition. Varying degrees of infertility, pre-mature birth, and poor viability of the newborn are some of the obvious results of nitrate ingestion.

Research in human nutrition and the evaluation of the injection of nitrates has lagged behind experimentation in animal nutrition. Methemoglobinemia, in which nitrates have been considered a contributing factor, has been recognized as a disease of the very young since about 1948. It is only recently that doctors have begun to consider nitrate injection in adults as contributing to chronic illness.

In October, 1966, a federal grant was made to the University of Missouri to be used in the study of the occurrence of nitrates in Missouri water supplies. The study is being conducted by George E. Smith, Director, Water Resources Research Center, University of Missouri. It is understood that the study is directed to ground water supplies primarily, with attention to amounts of nitrates and probable sources. Consideration is also being given the wide use of soil fertilizers. No doubt much valuable information will be available from this study of some 5000 wells.

CONCLUSION

It is obvious that the survey of the 157 private water supplies in Morgan County, Missouri has not contributed any significant knowledge in the solution of the evergrowing problem. However, it is hoped that because of this study a higher percentage of the new wells drilled for private use will be cased deep enough and adequately sealed so that only nitrate free water can be pumped from the well. Wells that are pressure grouted well below the stratified rock formations are at this time nitrate free. Maybe one answer to the problem is a reliance on public water systems developed through the formation of more water districts.

DANGERS IN ACID TREATMENT OF WELLS

The following communication has been sent to all local health officers, state and local sanitarians in Indiana by Frank E. Fisher, Director, Division of Food and Drugs, Indiana State Board of Health.

"It has been a common practice in Indiana for well drillers to acidize wells in order to dissolve incrusting minerals from the screen or formation and restore efficient operation. A number of strong acid preparations have been used and a few are offered for retail sale to the home owner for a do-it-yourself job.

"An informed well driller would realize that, following sufficient reaction time, the well should be pumped 'to waste'

until the water had returned to normal. The acid solution should never be pumped through the plumbing system in a home, especially plumbing of copper pipe. An acid solution standing in the plumbing could dissolve enough metal from brass or bronze fittings and copper pipe to cause serious injury and illness in persons who drink even small amounts of this water.

"All public health officers and sanitarians should be alerted to the dangers involved in acid treatment of a well. Wells so treated should be pumped 'to waste' where partially spent acid and salts will cause no damage. Acid must never be pumped into a house plumbing system."

FOOD AND MODERN TIMES¹

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One of the best comedy films ever made in this country was probably a film called *Modern Times*, with Charlie Chaplin. Mr. Chaplin was an assembly worker on a constantly accelerating assembly line, and the faster he worked, the more ludicrous he became. *Modern Times* was one of the first films ever to comment on the new, complex, modern technological environment.

As you are aware, we are now living in *Modern Times*, and the assembly line on which we work *is* constantly accelerating—in terms of population, production, and complexity. Today it is my privilege to be speaking to a group which has long worked to meet the challenge of these speeded-up factors. You have worked with an industry which has carved a market out of the growing population, which has met the need for great productivity, and which has produced profits not only for the industry but also for the consumer in terms of better products. The fluid milk industry, and you who are responsible for the safety of its products, are at the very least keeping pace with the mounting complexities of our *Modern Times*.

One reason this has been possible is that the milk industry has by and large faced its problems squarely. It is no secret that milk—an almost perfect food nutritionally—can carry diseases such as tuberculosis, brucellosis, typhoid fever, scarlet fever, diphtheria, and many others. To keep it safe, milk must come from healthy animals and must be handled under highly sanitary conditions. But rather than debate these statements, the milk industry has joined government in a program that insures the safety of the Nation's milk and milk products. The industry has cooperated to insure that our milk does, in fact, come from cows free of tuberculosis and brucellosis, that it is indeed handled in the most hygienic way possible, and that it will not cause disease.

Our State, local, and Federal Governments have recognized their obligation to protect the public health in respect to milk-borne hazards. At all levels, the need for protecting the public was identified, the

resources were mobilized, and a pure milk supply was achieved.

Less than 20 years ago industry and government joined in the cooperative milk certification program. Where 17 states participated in this program in 1951, 47 states are now participating. The program encompasses 155,000 dairy farms and more than 1,500 shippers. More than 12 billion pounds of milk a year are shipped in interstate commerce under this program. Both as a health official and as a consumer, I can say I'm greatly pleased with this record of efficient cooperation and health consciousness.

The food industry in general—and especially the milk industry—I know, is deeply conscious of its responsibility to protect the health of the public. Indeed, the general good health of the Nation is in part due to the excellence and efficiency of the food industry—from farm production to retailing. As a public official I can vouch for the concern of the Government in this field and for the quality and diligence of the programs for protecting the public health. No one knows better than yourselves the effectiveness of the programs which you operate. The fact that American families can be confident as to the purity and safety of the some 12 billion pounds of milk shipped each year under this program is testimony to your efforts.

But there's always a danger in looking back on a successful record. The often-quoted baseball pitcher, Satchel Paige, phrased it quite well. "My philosophy is this," Paige is supposed to have said, "don't ever look back; somebody may be gaining on you." However, I don't think it really hurts to look back now and then, especially when you have a good record. We might be able to learn something from it. But I think it's even more important not to stop running. In these *Modern Times* we have to run pretty fast just to stand still. The year 1967 is not the time to rest on our laurels—not for the milk certification program, not for the milk industry, and not for the food industry.

Our assembly line is now moving faster than ever before. And unlike in the Charlie Chaplin movie, inability to keep pace could have grim results. I am speaking now of food in general and of the growing and clamorous population, of the need for further increased production, of new production techniques which can make a quandary of the simplest health

¹Presented at the National Conference on Interstate Milk Shipments, Miami Beach, Florida, April 3, 1967.

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question, and of the new products which challenge the curiosity of the scientific mind as much as they tempt the public palate. Food is not only the happy world of Snap, Crackle, and Pop, and the Jolly Green Giant. Like it or not, food can also be the world of salmonellosis, staphylococcal food poisoning, botulism, pesticides, radiation, quackery, fadism, malnutrition, obesity, sickness, and death.

A very basic question is facing the State and local government agencies, the Federal Government, the milk industry, and the food industry. It is this: If we are all so conscientious, so concerned, and so efficient, how can we explain the fact that thousands of cases of foodborne illness were reported in this country last year? How can we explain that the incidence of salmonellosis, for example, has increased by over 3,000 percent in just the past 15 years? And the figures we have do not present a complete picture. Forty percent of the States do not report outbreaks, and another forty percent report only one or two outbreaks a year, far less, we are sure, than actually occur. In 1964 about 20,000 cases of salmonellosis were reported, and at that time we estimated that these represented probably only one out of 100 actual cases. This would mean that something on the order of 2 million cases occurred in that year.

Just last month the Wall Street Journal reported that the Chunky Corporation was recalling all its chocolate candy bars because salmonellae were found in some of them. Last November salmonellae were found in Starlac, the Borden Company's non-fat dry milk product. Borden's took the products off the market. But even without these dramatic examples, foodborne illness occurs frequently enough and is severe enough to constitute an important public health problem. These illnesses have especially severe effects on infants and among the elderly.

Staphylococcal food poisoning, while possibly less common than salmonellosis, is also prevalent enough to qualify as a major health problem. At least one estimate indicates that the incidence of staphylococcal intoxication may be as high as the incidence of salmonellosis.

In 1963 botulism became a household word when canned tuna fish and smoked fish from the Great Lakes were found to be carrying this often fatal illness. And in the last five years about a quarter of a million cases of infectious hepatitis have been reported. The transmission of this disease through contaminated shellfish is well established, and it is highly probable that many other viruses are foodborne. That's too bad, you may say, but what does this mean to the National Conference on Interstate Milk Shipments? The answer to that is simple: It means you have your work cut out for you.

We must face the fact that milk is but one part of the broad food protection problem. We must recognize that food protection is indeed a real and potentially a very serious problem in this country. And we must recognize that we have an obligation to contribute toward the solution of this problem.

I think one of our obligations is to speak up about the problem. We must inform the public and we must inform our legislatures that there are important health considerations involving food which require immediate attention. We must translate the accomplishments of our fluid milk program into an effort to make other food products equally safe. Dry milk and egg products should be as free of salmonellae as is our fluid milk. It is apparent from the events of the past 12 months that the processing of dry milk needs to be improved to reflect the same concern for health protection that gave rise to the pasteurization process itself. Careful surveillance of dry milk processing should be designed to provide early identification of pathogens or toxins in the final product and to permit prompt application of decisive corrective measures.

Methods must also be developed to insure that there is no chance of botulism occurring in fish products. Our new food processing methods—irradiation and freeze drying, for example—must be evaluated in terms of their health aspects. We must develop new ways of doing our present jobs more efficiently in order to release the manpower necessary for our new and expanded responsibility.

At the Federal level this intensified effort to combat food hazards will involve strengthening current programs by providing greater technical assistance and support to States. Our research efforts will be expanded to identify and assess food hazards, to determine the causes and mechanisms of food related illnesses, and to determine effective methods of treatment and prevention. Food hazard control activities will be intensified aboard interstate carriers and in related facilities. We also hope to initiate a food service protection program for Federal installations both to provide protection for those using these facilities and to serve as demonstrations of effective programs for State and local agencies. These efforts are aimed at strict control of the microbiological food hazards in our environment by the end of the next decade.

The large and complex task of controlling microbiological food hazards is just one part of what is becoming a growing national food problem. I will mention some of the other aspects to give you an idea of the scope of the overall problem.

In addition to the microbiological hazards there is also the hazard posed by toxic contaminants which

are added inadvertently or sometimes purposely to our foods. Modern Times have brought new preservatives, nutritional supplements, fertilizers, pesticides, growth stimulants, therapeutic agents, stabilizers, flavor enhancers, and synthetic packaging materials. The short-term effects and the effects of heavy doses of these materials are generally known, but the effects of their interactions with other materials and the effects of long-term low dosage urgently demand further investigation. Pesticides, for example, while undeniably of great value, are hazardous in large doses. Their long-term cumulative effects are not yet understood. The interaction of pesticides with other compounds such as drugs and alcohol requires further study. We *do* know that synergists added to pesticides may potentiate their action as much as ten-fold. And we also know that man obtains most of his pesticide burden from food. A certain food stabilizer has been found to produce undesirable reactions in rats. Certain other additives have been found to disturb seriously the weight of rodents. Treatment of fish with sodium nitrite may lead to the formation of nitrosamines—a group of very powerful cancer-producing agents.

The need here is quite clear: the health effects of these substances must be determined as soon as possible, and until then, we must continue treating these additives with caution.

The rapidly advancing technology of the food industry is not without dangers. With our new processes, methods and techniques we can produce the quantity of goods demanded by our population and we can produce the new products dreamed up by our ingenuity and called for by our insatiable tastes. But with it we can also compound the most minor health hazards into the death of a human being. In these modern times a company rarely serves just one neighborhood, one city, or one state. Today's big food companies serve the entire nation and the world.

Only a few weeks ago, 248,000 pounds of canned salmon were called off the market because the Food and Drug Administration found that some of the cans were contaminated. The salmon was canned in Clam Gulch, Alaska. It was distributed from Seattle, Washington to 39 companies which then distributed the food nationally. By the time the recall began, the salmon had been shipped to Memphis, New York City, Denver, and Montgomery, Alabama as well as throughout New England. Fortunately, no illnesses were attributed to the contaminated food, but the incident illustrates the tremendous importance of maintaining the safest possible practices in food processing. Fail-safe, zero tolerance, and perfection should be watchwords of the food industry. For

where it is possible for one case of illness or one death to occur, it is possible for many to occur.

Another aspect of this emerging national food problem involves nutrition. Many of the major nutrition deficiencies—pellagra, rickets, goiter, and ariboflavinosis—have been virtually eliminated in this country for more than 25 years. But other nutritional problems such as anemia, B complex deficiencies, and general physical debilitation continue. In addition, we have been finding that nutrition plays a more important role than had been suspected with certain diseases and conditions. For example, research findings strongly suggest that improper nutrition among pregnant women produces irreversible physical and mental damage in their infants. Another nutritional problem is the large percentage of American adults who are overweight to some degree and are proportionately higher risks for several diseases, including coronary heart disease, stroke, hypertension, and diabetes. Many very basic questions in this field are unanswered. We need to know more about how dietary requirements vary among groups and about the interactions of various nutrients. We need to know how nutritional needs change in stress conditions, during disease, and in cold or heat. We need to find out how to make the most efficient use of nutrition information to better treat disease, to prevent disease, and to enhance as well as to protect our health.

The extent of our knowledge on these topics is pitifully small in comparison to what it could and should be. Yet the importance of this information is evident. Nearly every one of the health programs which Congress has embarked upon within recent years has at least some nutrition overtones. Atherosclerosis, diabetes, and arthritis are but a few of the major diseases in which nutrition can be a factor in either prevention or treatment or both. But we are just beginning to tap the potential that the nutrition field can supply to our programs.

As you can see, the subject of food and health has gigantic dimensions, and it is impossible for a single group to cope with all the problems that the field contains. But I hope it is not too much to expect the various components already at work in this field to intensify their efforts and to apply their knowledge and experience wherever it can be of value.

The present programs and efforts of both Government and industry certainly have merit. But we cannot deny that there are new problems which are not being met and that there are old problems which are still unsolved. Unless some adjustments are made, yesterday's programs and yesterday's methods cannot be expected to cope with the problems of today.

Existing standards and methods for assuring the

safety and wholesomeness of various foods must continue to be reassessed periodically to determine whether they need to be *tightened* in order to reduce hazards to man or, on the other hand, whether they can be *relaxed* measurably without risking the health of the consumer. The Public Health Service is actively seeking improved ways to provide aggressive health protection to Americans without imposing on any sector of our society more of an economic burden than man's health requires and our expanding knowledge permits.

The steps which I have already mentioned which the Public Health Service is taking to eliminate microbiological food hazards are part of a broad effort to improve the Nation's health by safeguarding the food on our tables and for improving the nutrition of our citizens.

Various aspects of the Government's food protection activities are now scattered among no less than five Federal Departments. These include the Department of Agriculture, the Department of the Interior, the Department of Commerce, and—within the Department of Health, Education, and Welfare—both the Public Health Service, and the Food and Drug Administration. This fragmented attack on the Nation's food problems has come about for some very good and understandable reasons. But what is needed at the very least is some cohesion and direction for these efforts. Therefore, as the Federal Agency charged with the broad overall responsibility for protecting the Nation's health, the Public Health Service is taking the initiative in establishing an interagency coordinating group to organize and help direct an effective attack on food hazards. One of the most important tasks of this group will be to insure that the data, the findings, and the research obtained or performed by one agency are made available or are translated into action as soon as possible by the other agencies concerned. The coordinating group will also be able to determine where gaps in knowledge or unnecessary duplication exist, and can insure more efficient and effective operations.

Fully realizing the immensity of the task, we propose to obtain the necessary data on which judgments can be made as to the safety of various food additives, nutritional supplements, growth stimulants, and a host of various other compounds which are finding their way into our diet. We also propose to investigate thoroughly the interaction of these compounds with the other materials and situations encountered by the consumer in a modern environment. We will, of course, make this data available promptly to other agencies such as the Department of Agriculture and the Food and Drug Administration for use in their

programs, we will keep State agencies informed, and we will share this information with industry.

I should emphasize at this point that this stepped up program for protecting the public is not intended to be a crackdown on the food industry. In fact, the Public Health Service cannot conduct such a crackdown but can only advise other agencies as to the safety of food and food products. Instead, I hope this move forward in public health will be interpreted for what it is: a major effort, first, to apply our already existing knowledge in stamping out the needless and alarming amount of foodborne illness in this country, and second, to develop the information and data needed for a rational appraisal of the new food products, compounds, and processes which are being developed almost daily.

We will also undertake a nutrition program to gather and develop the data now lacking on the nutritional state of various sectors of the population, on the nutritional requirements of various age groups, on the information and misinformation which the public now possesses on nutrition and diet, and on a series of now unanswered questions in this field. We will also develop practical information concerning the prevention of various diseases through nutritional practices, and we will work with the health professions, educators, and others to instill in the general public a genuine understanding of what constitutes proper nutrition.

We hope that the cooperative program which has worked so well for ensuring the safety of our milk will serve as a model for action to the rest of the food industry. The confidence which the public can have in today's milk supply is a tribute to the industry and to Federal-State-local industry cooperation. In the history of health agency and milk industry relations, problems have been faced, disputes have been resolved, dictatorship has been avoided, and health has been protected and enhanced. We hope to match this record with other components of the food industry and we hope to improve our record in the milk field. We intend to see not only that milk remains as safe as it is today, but that we learn to accomplish this job more efficiently.

Never before have men been as interdependent as they are today. Urban man is virtually entirely dependent on the commercial food industry for his sustenance. And supermarket boycotts notwithstanding, urban man is willing to pay well to fill this basic need. There is no reason why the public should not be sure that the food it buys is safe from contamination. We have shown this is possible in the fluid milk industry. We must make it possible in the dry milk industry. And we must make it pos-

sible for every other food product available to the consumer.

The nation that hopes to put an astronaut on the moon should hope that he doesn't get there with salmonellosis. And there is no reason why his family on earth shouldn't also be fully protected from food-borne illness.

The milk industry can take pride in its accomplishments to date, and official agencies should take encouragement from their dealings with the industry. But all of us must move ahead. We must do more than just keep pace. We must improve the health of Modern Times.

ASSOCIATION AFFAIRS

IOWA ASSOCIATION CELEBRATES SILVER ANNIVERSARY

Thirty four men with responsibilities for safeguarding the milk supplies in the state of Iowa met in 1942 and formed the Iowa Association of Milk Sanitarians and subsequently established affiliation with the International Association. On March 29, 1967, the present membership held its 25th Annual Meeting and at its banquet awarded special certificates honoring the eleven charter members who returned for the occasion.

Dr. M. P. Baker of Iowa State University was elected first president of the newly formed group and continues as an active member. In his honor the Iowa Association annually presents to an Iowa sanitarian the M. P. Baker Award for "meritorious contribution in the field of milk and food sanitation."

The 1967 Award, together with a \$50 Defense Bond, went to James H. Burkett of Sioux City. Jim graduated from Iowa State and subsequently joined the staff of the Sioux City Health Department. In 1957 he was responsible for the formation of the Northwest Iowa Milk Sanitation Unit.

The unit performs quality supervision of a number of milk handlers in the area and under Jim's Administration the farms and plants consistently have maintained commendable ratings. The Award Certificate stated that Burkett "has been a Sanitarian of high principles and has had the courage to stand by them; and as a result the industry and the state have profited from his efforts."

The 1942 records further show that the first vice-president elected was Milton P. Held. Milt is now Regional Milk and Food Consultant, in the USPHS regional office in San Francisco, California, and is well-known to IAMFES members as our present Second Vice-President. Milt was master of ceremonies at the Iowa Silver Anniversary banquet and presented certificates to the returning charter members.

Officers for the coming year for the Iowa Association are: Charles Yeager, President; Art Roth, Jr., President-Elect; Duane Hagedon, 1st Vice-President, and Don Jaeger, 2nd Vice-President. H. E. Hansen continues as Secretary-Treasurer.



James H. Burkett (right) receives from Charles Yeager Iowa's M. P. Baker Award for Outstanding Sanitarian for 1967. Dr. M. P. Baker looks on.



Charter members of the Iowa Association of Milk Sanitarians who returned for the silver anniversary meeting on March 29, 1967. Back row (l. to r.): Maurice Strait, R. J. Schliekelman, F. R. Pfeiffer, Joe Shaner, Lee Swanson and W. F. Schlenker. Front row, (l. to r.): M. E. Held, Dr. M. P. Baker, C. A. Hooven, F. W. Kreamer and E. R. Armil.

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of papers presented may be available through the Secretary of the respective Affiliate Association.

KENTUCKY ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS

Conference of Fieldmen
and Sanitarians
Lexington, Kentucky
February 21-22, 1967

(Sponsored jointly with the Dept. of Animal Sciences, Univ. of Kentucky and the Dairy Products Assoc. of Kentucky)
(Secretary, Leon Townsend, 2205 Brent Drive, Madisonville, Ky.)

A Practical Working Abnormal Milk Control Program—
William Lovell

Vacuum Storage for Silage—*Phil Douglass*

Trends in the Dairy Industry—*W. J. Dorn*

Factors Affecting Spray and Circulation Cleaning on the
Farm—*G. A. Smith*

What About Raw Milk Quality Problems?—*W. J. Harper*

U. S. Public Health Concepts of the Dairy Industry—*Robert
A. Stevens*

Salmonellae—Detection and Control—*H. J. Buyens*

Sanitation Problems and Control—Today and Tomorrow—
W. J. Harper

MICHIGAN ASSOCIATION OF SANITARIANS

Conference on Environmental
Sanitation
Gull Lake, Michigan
March 28-29, 1967

(Sponsored jointly with Michigan State University)
(Secretary, T. J. Kilmer, 1200 N. Telegraph Rd., Pontiac,
Mich., 48053)

Progress and Problems in Vending—*D. E. Hartley*

Professionalism in Environmental Health—*Sam Stephenson*

Michigan's Registration Program—*Carl Gregory*

Hospital Needs in Environmental Health—*R. J. Weatherby*

Public Health Aspects of Frozen Foods—*Georg Borgstrom*

Medical Applications of Chemical Disinfectant Agents in
Patient Care Facilities—*R. J. Weatherby*

What We Know—What We Don't Know—What We Should
Know in Some Areas of Environmental Health—*W. L. Mall-
mann*

Today's Use of Lagoons for Waste Water Treatment—*Donald
Pierce*

The Michigan Department of Agriculture Salmonella Program
—*Richard Swanson*

Solving the Sanitation Problems of a Wally Byam Airstream
Trailer Caravan "Round-Up"—*Jack Cinco*

MISSOURI ASSOCIATION OF MILK AND FOOD SANITARIANS

35th Annual Milk and Food
Sanitation Conference
Columbia, Missouri
April 10-12, 1967

(Sponsored jointly with the Dept. of Dairy Husbandry and
Extension Division of Univ. of Missouri)

(Secretary, Erwin P. Gadd, Mo. Division of Health, State

Office Bldg., Jefferson City, Mo.)

The Salmonella Problem—*Jeanette Burchard* and *J. E. Ed-
mondson*

Solid Waste Disposal—*Don Townley*

Rodent Control on Dairy Farms—*E. B. Horahan*

Housing and Housing Programs—*M. F. Brewer*

Current Status of Encephalitis—*Jack Hayes*

Illinois Sanitarians Registration Law—*James Barringer*

Things to Come in Agriculture Research—*J. E. Edmondson*

Status of 1965 Milk Ordinance and State Dairy Law—*Erwin
Gadd*

Alcoholism as a Health Problem—*R. E. Murphy*

Roach Control Problems in St. Louis—*John Dwyer* and *John
Sadowski*

1965 Milk Sanitation Survey Procedures—*Erwin Gadd*

Food Service Sociological Epidemiologic—*J. N. Wallace*

How to Write "Easy to Read" Reports—*L. G. Fligor*

Proposed Meat and Poultry Inspection—*George Stiles*

Comparison of Mastitis Tests—*Paul Spencer* and *R. T. Marshal*

CONNECTICUT ASSOCIATION OF DAIRY AND FOOD SANITARIANS

Spring Meeting
Glastonbury, Conn.
May 17, 1967

(Secretary, Richard M. Parry, Dept. of Agriculture and Natur-
al Resources, State Office Bldg., Hartford, Conn.)

Polytrip Plastic Milk Containers—*Richard Orsage*

Causes of High Leucocyte Counts in Milk—*Roger Natzke*

Symposium on Packaging and Packaging Materials—Moderator,
Kenneth Crane

Scientific Aspects—*Joseph Levitzky*

Industry's Point of View—*R. H. Daley*

Consumers Point of View—*Fred Waddell*

Symposium on Pollution—Moderator, *William Ullman*

Connecticut Looks at Pollution—Clean Water Task Force
John Curry

A Specific Aspect—The Bantam Lake Project—*Charles
Frink*

Air Pollution—Sources, Detection, and Control—*G. F.
Collins*

MARTIN DONOVAN RECEIVES CITATION

Martin C. Donovan, Sanitarian with the Dade County (Florida) Health Department has been honored by the Regional Director's Citation from the Region IV office of the Public Health Service at Atlanta for his excellent work in sanitation at the Miami International Airport.

The citation awarded on April 28, 1967, read as follows: "In recognition of original achievements in areas of environmental sanitation control at the Miami International Airport; for pioneering and conducting the project with professional competence and creative dedication that distinguishes it as a unique accomplishment in the record of public health affairs."

Martin was the recipient of the IAMFES "Sanitarian of the Year" award at its 1961 meeting. It is good to note that he has not rested on his laurels and that he is continuing to be a credit to his profession.

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NEWS AND EVENTS

FUTURE OF NEW SUBSTITUTE FOOD PRODUCTS DISCUSSED AT CORNELL MEETING

New food products as substitutes for or alternatives to the natural foods are being developed rapidly but the overall impact of new products is unlikely to be very dramatic in near future. New foods using plant or other sources will continue to advance, but agriculture as a whole will remain unshaken for a long time to come. In fact, new products will help improve natural food items.

These are some of the conclusions and predictions made at the two-day conference on foods, flavors, and analogs at Cornell University, April 24-25, 1967. The event, sponsored by the N. Y. State College of Agriculture, was the first of its kind held at Cornell

to examine changing concepts of foods and their sources.

The program was focused on what science has done, is doing, and can do in developing new foods. Topics discussed ranged from chemical food sources and substitutes for dairy products, meats, and other products to artificial flavors and political and economic implications.

Projecting the impact in years immediately ahead, one speaker said that the new developments will have greater effects on certain farm commodities than on others. Commodities that are most vulnerable to new products in the future will be fibers (cotton and wool), sugar, and butterfat, he cited. Other items such as protein supplements for livestock, fruit juices, and possibly coffee will face less competition.

Fruits, vegetables, meat, fluid milk, and eggs will remain relatively free from any serious threat from substitutes.

For example, substitute meat made of soybean protein is growing at the rate of 10 per cent a year. But even if this rate is maintained during the next decade or so, the total amount of meat displaced by these products in 1975 would still amount to less than one per cent of the combined current production of beef, pork, and poultry meat. Persistency of food habits and rigidity of the existing laws or regulations in accommodating new foods are among major factors that will limit the impact of new foods.

Looking further ahead, another speaker stated that substitutes for the existing food products will make up a major market. Potentially important areas include the creation of completely new food products, blending and extending the natural products, and the development of nutritional supplements.

New foods using non-animal protein and other sources may help alleviate the problem of malnutrition around the world. But, the speaker said, no one really knows exactly how much protein deficiency exists in each country. "Malnutrition means poverty. Even if new foods are available, those in poverty-stricken nations, cannot afford to buy them. It is not only a nutritional problem, but also a political and economic problem, and we must find out the total picture country by country."

Discussing meat-like products from plant sources, the conference was told that the new food products derived from vegetable protein will ultimately become an important segment of the American food supply in the future. The development of new foods using non-animal proteins, the vast array of new concepts, the expanding technical feasibilities, and the current medical interest all offer a promising future for plant protein foods.

The impact of synthetic flavors on agriculture was reviewed and greater use of artificial flavors both in agricultural products and new food items was predicted. Citing advantages over natural flavors, the speaker said the quality of artificial flavors can be controlled at will as opposed to unstable natural flavors.

Research and development in the field of synthetic fibers will have a large impact on agribusiness. The synthetic fiber business grew 24 per cent a year during the last five years, while the market for other fibers gained only four per cent per year another speaker pointed out. "The availability of newer fibers has stimulated growth in the total use of fibers, but the basic reason for a six-fold rate of growth for synthetic fibers is our ability to tailor fiber products to the requirements of particular markets and unmet needs." To this end, DuPont is spending \$80

million this year on research and development, he added.

At the conference banquet the five-course dinner featured a variety of new food products. The main dish was ham made of soybean protein. Other items included vegetable fat lime sherbet, substitute sour cream, canned sterile cream, synthetic cream de cacao, and others. Hors d'oeuvres consisted of a variety of substitute food products made of wheat protein, soybeans, yeast extracts, and hydrolyzed vegetable protein. Participants numbering more than 130 persons were not informed of what they were eating until after the dinner was over.

Charles E. Palm, dean of the College of Agriculture, kicked off the two-day conference with a talk on the changing concepts of foods. Recognizing the importance of high-quality proteins from plant and other sources for human consumption, Palm said: "The rise in basic research in the sciences that underpin the technology in modern agriculture has gone forward so rapidly over the past decade, that one hardly knows the limit of its impact on what we often consider as agriculture's traditional role in providing the food supply."

Despite opposition—physiological, legislative, economic, and other—substitutes for natural or established products have increased in numbers and importance, he pointed out. "The food industry is deeply and increasingly involved in this competition. Agriculture likewise has high stakes in keeping its competitive situation."

TO STUDY DISPOSAL OF SOLID WASTES BY RAIL

The Public Health Service through its Solid Wastes Program has awarded a grant for a project to investigate the feasibility and cost benefits of transportation of refuse and other solid wastes by rail from cities to abandoned strip mines and other land in need of reclamation.

The award of \$178,200 to the American Public Works Association, Chicago, Illinois, was to cover part of the first-year cost of the project. The project is expected to run for three years at a total cost of \$468,800. The New York Central System, as well as cities throughout the country acting through the Association's Research Foundation, will share in the cost of the project.

The study of the potential of railroads for mass transportation of solid wastes will consider, among other questions, the use of unit trains loaded exclusively with wastes. These would be similar to unit trains used for mass movement of coal and other bulk materials. The study will determine what type of cars and other equipment might be most suitable

for solid wastes and whether unit trains can operate from cities on regular schedules to land reclamation sites or refuse reduction centers which may be many miles from urban communities.

Investigation also will be made during the project of the use of transfer stations in assembling trainloads of wastes, the desirability of containerizing solid wastes, and the adaptation of pressure loading and other new material handling techniques not yet employed for solid wastes.

"Success in this project will provide breakthrough results for cities throughout the country which are running out of sites for waste disposal and must find means for mass movement of wastes away from metropolitan areas," Leo Weaver, Chief of the Solid Wastes Program, said. "Reduction in urban area pollution and more efficient night-time use of rapid transit and railroad trackage in many cities also could result from the project."

The submarginal character of the land that could be reclaimed through waste disposal could make site costs relatively low. Problems which may be encountered in obtaining sites will be studied.

At one stage of the project, a prototype plan for rail haul of solid wastes will be carried out in cooperation with several cities selected as representative of many U. S. municipalities in terms of size and volume of wastes generated.

DOCTORATE DEGREES IN SOLID WASTES MANAGEMENT TRAINING

A \$38,050 Public Health Service grant has been awarded the University of Kansas at Lawrence to establish the Nation's first program for training students working toward doctorate degrees in techniques of pollution-free disposal of refuse and other solid wastes.

The grant was made by the Solid Wastes Program in the Public Health Service's National Center for Urban and Industrial Health. The Program is seeking to end shortages of personnel technically qualified to carry on a national attack on pollution-spreading solid waste disposal practices.

Six institutions of higher education already offer solid wastes management training at the masters degree level under programs supported by Public Health Service grants. The University of Kansas program will be the first to provide solid wastes training at doctoral as well as masters levels. Students working on master degrees will be trained in careers in solid wastes management for public agencies and industry. Work for doctoral candidates will be oriented toward solid wastes teaching and research.

The University of Kansas program will be directed by Dr. Ross E. McKinney, Chairman of the Department of Civil Engineering. The program will be interdisciplinary in character with participation by the departments of mechanical, industrial, and chemical as well as civil engineering and from such fields as political science, business administration, and economics.

Solid waste training programs are now being conducted under Public Health Service grants at the Drexel Institute of Technology, Philadelphia, Pennsylvania; the University of Florida, Gainesville; the Georgia Institute of Technology, Atlanta; the University of Michigan, Ann Arbor; the University of Texas, Austin; and the University of West Virginia, Morgantown. More than \$418,000 has been awarded in training grants.

DRAFT OF LABELING GUIDELINES SENT TO STATE DAIRY OFFICIALS

State regulatory officials and state dairy associations are being asked to review and comment on a draft of the Model Labeling Regulations for Fluid Milk and Fluid Milk Products.

The National Labeling Committee, in its continuing effort to foster uniform labeling regulations, has sent the Model to regulatory and industry representatives in all states. Because some states are now considering changes in existing regulations, the Committee has requested comments on the draft be provided them by July 1st.

The draft was reviewed last March by a committee of regulatory and industry officials. The NLC urged states to study the document "not as to whether it is at variance with existing laws, but in the context of 'would this regulation as now proposed be an acceptable labeling regulation for this state?'"

In a letter from the National Labeling Committee secretary transmitting the Model Regulations, the need for uniformity in labeling regulations was stressed. It was pointed out that many states are now planning to revise their labeling regulations, and that, additionally, regulation implementing the Fair Packaging and Labeling Act are scheduled for publication around July 1st.

When finalized, the model state regulation will represent the views of both the dairy industry and regulatory officials. In addition to providing labeling standards, it is designed to eliminate the need for a milk processor to use several cartons for the same product, in order for the company to satisfy regulations of various political jurisdictions.

PESTICIDES MONITORING JOURNAL

A new Federal publication, the *Pesticides Monitoring Journal*, makes its initial appearance with the June, 1967, issue. It is to be published quarterly under the auspices of the Federal Committee on Pest Control through its Subcommittee on Pesticide Monitoring composed of representatives of U. S. Departments of Agriculture, Defense, the Interior and Health, Education and Welfare.

Responsibility for publishing has been accepted by the Pesticides Program of the Public Health Service under an Editorial Manager with offices at the National Communicable Disease Center at Atlanta, Georgia 30333.

Pesticide monitoring activities of the Federal Government are expected to be principle sources of data and interpretive articles. However, pertinent data in summarized form are invited from both Federal and non-Federal sources, including those associated with State and community monitoring programs, universities, hospitals and non-government research institutions. Results of studies in which monitoring data play a major or minor role or serve as support for research investigation are also welcome; however, the Journal is not intended as a primary medium for the publication of basic research.

NEW AVMA BOOKLET ON RABIES CONTROL

While it is true that in the United States today rabies seldom is a cause of death in man, the dread disease remains a potentially dangerous public health problem. This warning is made by the American Veterinary Medical Association in a just-off-the-press booklet "What You Should Know About Rabies" now being distributed by the Association.

The majority of animal rabies cases in the United States, the booklet explains, is found in wildlife, particularly in skunks, foxes, and bats, and in domestic farm animals. Among domestic pets, the Association adds, dogs and cats are the most commonly infected species.

Meant for circulation by veterinarians among their clients, the booklet lists five things the individual pet owner should do to help prevent rabies in his community. First and foremost, it is imperative to have one's pet vaccinated against rabies. Safe and effective vaccines that give maximum protection against the disease are readily available.

Strict adherence to leash and licensing regulations is important as is the attaching of license and rabies inoculation tags to the pet's collar. Reporting the presence of stray or homeless dogs to the police or

local pound is another preventive measure. Also, children should be taught to avoid wild animals and not to become playful with pets they do not know.

In the event one is bitten by an animal, it is imperative, the AVMA says, that the wound be washed carefully with soap and water and immediately reported to a physician. The local board of health or police department should be notified also. If possible, the animal inflicting the wound should be captured and confined so it may be observed for signs of rabies.

Constant vigilance is necessary, the booklet says, since some 30,000 persons are required to submit to vaccination against the always fatal disease each year. In addition, the United States Department of Agriculture reported 3,689 confirmed cases of animal rabies in 1966.

Offices of the American Veterinary Medical Association are located at 600 South Michigan Ave., Chicago, Ill. 60605.

THE QUESTION OF DATE-MARKING OF CANNED FOODS¹

¹From an article "The Achievement of Shelf Life" in *Tin and Its Uses*, the Quarterly Journal of the Tin Research Institute, No. 72, 1966.

In most countries where canned foods are consumed on any considerable scale, there are occasions when the age of a can of food is called in question. This sometimes leads newspapers and consumer organizations to propose that the public authorities should make a regulation that foods in cans should bear the date of their manufacture with the object of limiting the time they may be kept in store before being sold. The implication is that the "shelf life" of canned foods is strictly limited by natural causes and that there may be risk in eating food that has been contained in a can for more than some specifiable period. Precisely what is believed to have happened to the food in a can that has been kept for longer than since the last season is seldom made clear and it seems to be assumed that the "shelf life" is the same for all canned foods.

SHELF LIFE IS ESSENTIAL

In case any justification is felt to be necessary for using the term "shelf life" with its implication of a limit to the duration of freshness it is useful to reflect that fresh foods—raw fruits, vegetables, fish, eggs, milk, meats—have no shelf life worth mentioning. They are from the outset the prey of microorganisms and their deterioration is rapid. It is the purpose of canning to give their freshness a shelf life for as long as possible to meet the predictable requirements of consumers. This was the origin of the invention of canned foods: to preserve fresh foods indefinitely. It was achieved then, and still is, by heating the foods after they have been sealed in the can. This kills the living organisms of decay which are already on all foods and the airtight can excludes any others and also shuts out the air which would cause the foods to be spoiled by drying and oxidation.

THE EFFECTS OF STORAGE

The first question that arises is whether changes occurring in canned foods as a result of bacterial action fix a limit to the time during which canned foods may safely be kept in a sealed can. Many examples of canned foods being in good condition after very long periods provide ample proof that the mere lapse of time does not result in food in cans becoming spoiled by organisms.

The second question is whether during storage in the can, chemical interactions between the can and the food have any deleterious effects on the food. The answer to this is, firstly, that many foods do not react appreciably with the can. Secondly, some other foods do react but only very slowly so that the food is in first rate condition even after some years have elapsed. Thirdly, some foods are indeed potentially aggressive towards the can. For such foods, therefore specially resistant types of can are made for them because ordinary cans would not have an adequate shelf life. Finally, it is well known that there are some foods which are altogether too aggressive to be packed in cans and, as it would be a waste of materials, no commercial canner attempts to pack them.

One of the best safeguards in practice for all parties—canners, wholesalers, retailers and consumers—is that people never invest money in larger stocks of foods than are sufficient for their foreseeable needs. Canners do not suddenly decide to pack double or treble quantities of a food merely because there unexpectedly happens to be a glut of it. Canning is not done on this basis: everything is contracted for well in advance of the cropping season. The decision is made before the time of sowing as to how big a crop of any particular fruit or vegetable is required and the contracts are placed with the farmers accordingly. Surpluses of raw produce may find their way to the raw food markets but they do not have a big influence on the amount the canner packs.

THE CASE FOR CODED DATING

The date-marking of cans of foods was quite fully discussed at a meeting of the Comité International Permanent de la Conserve in Parma, Italy, in September, 1965. A preliminary questionnaire had established that the date of manufacture was required by law to appear on packed foods on sale in only four countries (France, Morocco, Portugal, and Spain.) In most countries it was customary for the manufacturers to date-mark in code and to divulge their code to authorities upon request in case of suspicion of a can of food and a desire to identify cans of the same batch.

The argument against the actual date-marking of canned foods was based on the premise that if the can was marked with the date of manufacture in clear, the consumer might well assume that a pack which had been canned one month ago when bought was in better condition than one which was, say, three months old or nine months old. In fact, of course, if the older product had been kept well and the younger product had been kept badly, the older product would be the more likely to be the better quality product."

The official viewpoint of canners in the U.S.A. was expressed by Mr. Milan D. Smith, of the National Canners Association, Washington, D. C. in these words:

"We fear that dating of any food will give the consumer a false and unjustified sense of security, and that it would be unwise for a consumer to rely on a date and simultaneously ignore organoleptic factors such as appearance, odor and taste. We fear also that if canned foods were dated shop-

pers would choose the foods carrying the most recent date, and the older packs would back up on the retailer and the distributor and eventually on the canner. It is possible that some of the dated food products could not be sold even though they were perfectly wholesome and acceptable except for their date."

SHORT COURSE ON COMPUTER USE IN THE FOOD INDUSTRY

A three-day short course on the use of computers in the food industry is scheduled for September 18-21, 1967, at the University of Florida, Gainesville. Food research and development applications of computers, computer process control and management functions are some of the areas to be covered in the discussions.

The meeting is sponsored by the Florida Section of the Institute of Food Technologists and the Florida Agricultural Extension Service. Information on the course may be obtained from Dr. R. F. Matthews, Dept. of Food Science, University of Florida, Gainesville, Fla. 32601.

FARM BULK TANKS INCREASED IN 1966

The twelfth annual Farm Milk Tank Survey, conducted by the Bulk Tank Market Action Committee of Dairy and Food Industries Supply Association, shows 222,667 farm tanks installed and in use in the United States as of January 1, 1967. The U. S. figure represents an increase of 3,422 over the 219,245 which were installed as of the same date 1966.

Although dairy farms have decreased approximately 74 per cent since the Farm Milk Tank Survey began in January 1957, the use of farm milk tanks has increased 645 per cent. The increase in use of tanks over last year reflects a change in sizes. The increase of milk production per farm has resulted in farmers exchanging smaller tanks for larger ones. Also reflected in the current figures—despite a decrease in Grade A producers—is the use of bulk tanks by farms producing milk for manufacturing purposes.

The entire report which includes a size breakdown on tanks installed and in use as of January 1, 1967 and 1966, may be obtained by writing the Marketing Department, Dairy and Food Industries Supply Association, 1145 19th Street, N. W., Washington, D. C. 20036. Conducted annually, the Farm Milk Tank Survey is a service to the community and to the industry.

H. E. RANDOLPH LEAVES KENTUCKY FOR TEXAS A & M



Dr. Henry E. Randolph was honored at a dinner given at Lexington, Kentucky, April 19, 1967, by the dairy industry, in recognition of Dr. Randolph's outstanding contribution to the dairy industry of Kentucky in the field of dairy technology. Dr. Randolph has been Assistant Extension Professor of Dairy Technology at the University of Kentucky for the past four and one-half years.

The dairy industry of Kentucky was represented through the Dairy Products Association of Kentucky, dairy technology societies, Kentucky Association of Milk, Food and Environmental Sanitarians, American Dairy Association of Kentucky, dairy cooperatives and dairy suppliers. Representatives of these dairy groups came from Kentucky, West Virginia, Ohio, and Indiana, to express their thanks and to wish Dr. Randolph the best of luck when he joins the staff of the Department of Animal Science, Texas A & M University, as Associate Professor.

ADVISORY COUNCIL TO PAPER CONTAINER INDUSTRY HOLDS MEETING

The Public Health Advisory Council to the Syracuse University Research Corporation met on June 1, 1967, at Syracuse, N. Y. The Council serves as an advisory body to SURC's Microbiology and Biochemistry Center on food protection programs.

A research and service program to serve the needs of the paper mill and paper converting industry has been located in Syracuse University for over 20 years. Originating in the Department of Plant Sciences in 1946, it became a part of the Microbiology and Biochemistry Center in 1958.

The main topic of the meeting was sanitation and toxicological aspects of food packaging materials. The council, chaired by Dr. Richard Parry, Chief of the Dairy Division, Connecticut Department of Agriculture and Natural Resources, recommended that the M-B Center continue to expand the program of single service container sanitation, and pursue additional research relating to the packaging and quality of food products.

The council members, in addition to Dr. Parry, are: Robert Carson, Milk Sanitation Section, USPHS, Washington, D. C.; Clarence Luchterhand, Wisconsin Division of Milk Certification, Madison; Charles Senn, Los Angeles County Health Department, Los Angeles; Ralph Bernstein, State Department of Agriculture and Markets, New York City; Shelby Johnson, Food and Drug Program, Kentucky State Department of Health, Frankfort; Allen Retzlaff, Food and Drug Administration, Buffalo; and Clifton Van Devender, Mississippi State Board of Health, Jackson.

INFORMATION FROM INDUSTRY

Editorial Note: Following are items of information on products, equipment, process and literature based on current news releases from industry. When writing for detailed information, mention the Journal.

TRI-CLOVER OFFERS NEW CLAMP-ON PRESSURE GAUGE.

A new sanitary type, clamp-on pressure gauge, manufactured by Ladish Co., Tri-Clover Division, can be installed in minutes on any 2 inch tee or cross. It is of sanitary and weathertight stainless steel construction and features a teflon coated diaphragm to provide for easy cleaning and to prevent build up of tacky materials.

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For Bulletin PG 10-67 write Ladish Co. Tri-Clover Division, Kenosha, Wisconsin 53140.

KENDALL SUPER SOCK WITHSTANDS EXTREME PRESSURES

The Kendall Company is now producing a "Super Sock" scientifically designed to withstand the extreme pressures of pipeline systems with high pressure centrifugal pumps. The new non-gauze sock is guaranteed against breaking and the company also claims the "Super Sock" has extra retention qualities that give dairymen superior sediment protection.

Kendall's new "Super Sock" is 2-3/16 inches by 24 inches in size. Like all Kendall non-gauze socks, it is completely lintfree to eliminate flannel washout constructed with exclusive "Sealtype" bonded seams and capable of handling large volumes of milk. Non-gauze "Super Socks" are made for

single service. For further information write to The Kendall Company, Walpole, Massachusetts 02081.

S/P 1967 GLASSWARE CATALOG

Quality glassware for laboratory use is presented in an attractively illustrated catalog by Scientific Products. Among items featured are pipets, microscope slides, staining dishes, capillary tubes, test tubes, cover glasses, syringes.

For free copy, write for SP9303, Scientific Products, Literature Service Department, 1210 Leon Place, Evanston, Illinois 60201.

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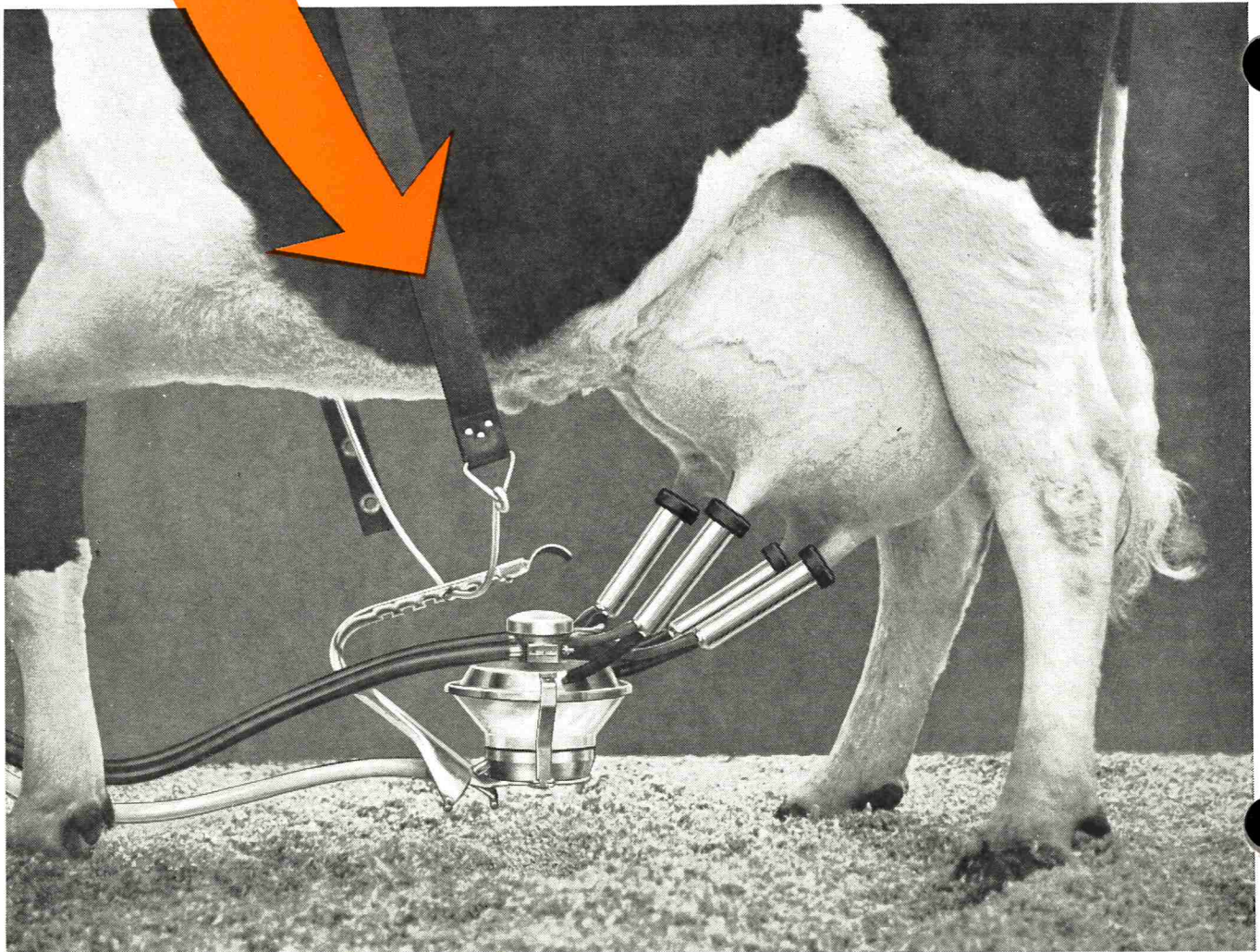
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