

for him and in this as in his greater responsibilities, he attained considerable prominence.

Doctor Brooks has written a large number of articles on a variety of health subjects which have appeared in department publications and in medical and scientific journals. The best known probably are those written, several years ago on Milkborne Communicable Diseases. Quotations from these have appeared in well known text books.

One of Doctor Brooks' chief characteristics has been his broad understanding of public health practice and his almost intuitive grasp of the problems and viewpoint of the medical practitioner. This and his ready insight into the everyday problems of those about him, have endeared him to his friends and associates everywhere.

The retirement of "Doctor Jones" may give Doctor Brooks more time to do the things he has wanted to do,—we hope that he will include a bit of writing for the *Weekly Bulletin*.

Ever since the *Journal of Milk and Food Technology* was born, Dr. Brooks has been one of our dependable and valued contributors and a long-time Associate Editor. But to the Association, he has been a veritable god-father.

He was our President at our Silver Anniversary meeting at Atlantic City. Again, when we had no one to hold the Association together during the confused days after the death of Ivan C. Weld (our first

secretary and inspiring genius) Dr. Brooks took over and helped us get straightened away. His influence on the direct health aspects of our work has been greater than that of any one member, and nearly that of all combined. Particularly outstanding was his work on the epidemiology of milk-borne disease.

Old-timers will recall their startled dismay at many of our annual meetings when "Paul" Brooks and "Bill" Palmer would let fly at each other—no holds barred. Gradually we would recognize that these hot forensics were really harmless—but certainly stimulating, and no one slept during them!

He has been one of the stalwarts of the Association. He was one of the few M.D.'s who have taken an active interest in this field of ours. He has always been practical and down-to-earth in his work, penetrating in his insights, and forceful in his utterance. We'll miss what "Dr. Jones Says" but shall likewise be glad to realize that he is enjoying a well-earned rest. With Dr. Hilleboe, we hope to hear from him whenever he feels the spirit moving him.

J. H. SHRADER

*New York State Department of Health, News Release of September 6.

THE USE OF RADIOACTIVE PHOSPHORUS TO MEASURE THE AMOUNTS OF MILKSTONE DEPOSITED ON RUBBER, PYREX GLASS, AND TYGON TUBINGS

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The problem of milkstone formation together with its contribution to high bacterial counts is being attacked by a study of physical as well as chemical factors. The condition of the surface of milk equipment would be expected to influence the rate at which milkstone is deposited. The results obtained show that the relatively rough and porous surface of rubber takes on twice as much milkstone as glass, and that little or none is deposited on tygon during the given time exposure.

INTRODUCTION

The purpose of this study was to obtain information regarding the amounts of milkstone deposited on rubber, pyrex glass, and tygon tubing.

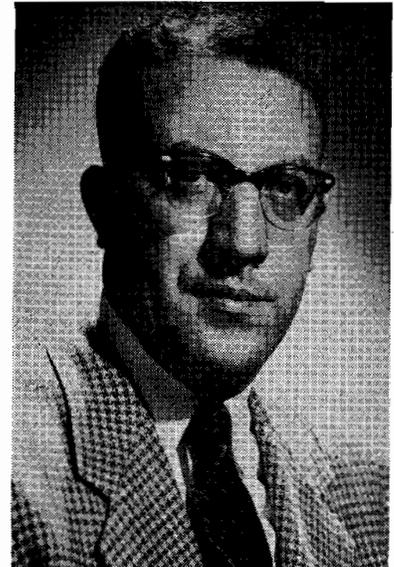
Milkstone is generally regarded as scale resulting from the precipitation of calcium and magnesium salts on a surface. These salts may be of an inorganic nature such as phosphates and carbonates, and of an organic nature such as lactates and proteinate.

*MILK PLANT SPECIALTIES CORPORATION, 770 Exchange Street, Rochester 8, New York.

since calcium phosphate would be expected to be present in significant quantities in milkstone, it was decided to use radioactive phosphorus in the form of phosphate as a tracer.

In an attempt to simulate the formation of milkstone from the rinsings of a milk pipeline, a solution of 1 percent aqueous whole milk containing radioactive phosphorus was used. This milk solution did not lend itself to the formation of a detectable precipitate after an exposure period of one day. The experiment was then repeated using whole milk to which radioactive phosphorus was added. Again, no detectable precipitate formed after an exposure of one day.

At this point it was decided to simulate the condition of rapid formation of milkstone resulting from a combination of high calcium concentration from milk and a high phosphate concentration as present in some common detergent solutions. This combination gave not only a precipitate but also a significantly measurable amount of radioactivity.



Myron W. Cucci obtained his A. B., 1937, at the University of Rochester; M. S., 1939, Cornell University; 1939-1941, Research Chemist, Lehmkuhl Laboratory, Rochester, New York; 1941-1943, Civilian Inspector of U. S. Army Ordnance Material, New York State Area; 1943-1946, Seventh Medical Laboratory, 3rd U. S. Army European Theater; 1946-1950, Atomic Energy Commission, University of Rochester, Research Associate; 1950-1954, Milk Plant Specialties Corporation, Rochester, New York, Research and Development.

RESULTS

	Counts per 5 min per ml	Counts per min per ml	Counts per min above back- ground per ml
Tygon	97	19.4	-0.6
Glass	143	28.6	8.6
Rubber	171	34.2	14.2
Background	100	20.0*

*Distilled Water - Blank

PROCEDURE

0.1 ml of radioactive phosphorus (P32) in the form of phosphate was added to a solution of 255 ml of homogenized milk and 45 ml 10 percent trisodium phosphate dodecahydrate.

A 1-ml aliquot was counted on a "Berkeley" Geiger-Mueller thin end window counter and found to have an activity of 2,500 counts per minute per ml.

100 ml of this "tagged" milk was placed into tubing of rubber ($\frac{1}{2}$ inch I.D. x 24 inches long x 1 inch O.D.), pyrex glass ($\frac{1}{2}$ inch I.D. x 24 inches long x $\frac{3}{8}$ inch O.D.), and tygon ($\frac{1}{2}$ inch I.D. x 24 inches long x $\frac{3}{8}$ inch O.D.). Each tubing was clamped in a vertical position and plugged with No. 1 size rubber stoppers. At the end of 24 hours, the "tagged" milk was poured off and the tubings allowed to drain in a vertical position for 15 minutes.

The material retained on the inner wall was rinsed three times with 10 ml quantities of distilled water, then eluted once with 15 ml of concentrated HCl, and twice with 20 ml (1:1) HCl. The rinsings and elutions were transferred to 100-ml volumetric flasks, diluted to 100 ml with distilled water, and shaken thoroughly.

1-ml aliquots were taken from each flask and counted on the above described instrument for five minutes.

CALCULATIONS

1. The original tagged milk + trisodium phosphate contained 2,500 counts per minute per ml or a total count of $2,500 \times 100 = 250,000$ counts per minute.

2. Counts obtained by elution of inner wall of tubing:

Tygon = none

Pyrex Glass = 8.6 counts per minutes per ml x 100 = 860 counts

per min.

Rubber = 14.2 counts per minutes per ml x 100 = 1420 counts per min.

3. Percentage retained on inner surface of tubing:

$$\text{Tygon: } \frac{0}{250,000} (100) = \text{Zero}$$

$$\text{Pyrex Glass: } \frac{860}{250,000} (100) = 0.34\%$$

$$\text{Rubber: } \frac{1420}{250,000} (100) = 0.57\%$$

DISCUSSION

The use of homogenized milk and trisodium phosphate was made because two previous runs with 1 percent aqueous whole milk and with regular whole milk gave no evidence of retention. The failure of calcium phosphate to precipitate in the first two instances indicated that the pH was not high enough, even though it has been shown by other workers that calcium phosphate can begin to precipitate at pH 3 to 4. Also, since some detergents contain trisodium phosphate, its presence in milk lines is not foreign, and its use in the experiment to form a precipitate is not out of order.

Since this study was exploratory and made under limited conditions, the interpretation of results is not intended to be decisive. However, the evidence is sufficient to indicate that twice as much milkstone in the form of calcium phosphate is deposited on rubber than on Pyrex glass during a one day exposure, and that no detectable amount is deposited on Tygon during the same interval.

It is recognized that the conclusion is based on data from a relatively short time exposure with very small pieces of representative equipment and under static conditions.

For those interested persons who may wish to experiment under dynamic conditions, it is suggested that the same materials be tested in

closed pipeline circuits with continuously circulating milk. It is believed that such an experiment may also afford an opportunity to determine whether surface electrical charges developed by the passage of fluid through a pipeline have any influence on milkstone deposition.

ACKNOWLEDGEMENT

This work was conducted in collaboration with Dr. Philip S. Chen, Jr.¹ and Dr. John Weikel² of the Atomic Energy Project of the University of Rochester, and with the kind permission of Professor William F. Neuman of the Department of Biochemistry of the Medical School at Strong Memorial Hospital.

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OREGON MILK SANITARIANS
SHORT COURSE

The annual Oregon fluid milk sanitarians short course will be held November 29 and 30 and December 1 this year with sessions in both Salem and Corvallis. The tentative program has just been announced by Kenneth E. Carl of the division of foods and dairies of the state department of agriculture.

Features the first and second days, when the meeting will be held in the state capitol at Salem, will include a talk on Role of Oregon Dairy Industry in milk legislation, views on milk sanitation by a consumer and dairyman and a number of field trips.

On December 1 the sessions will move to Withycombe Hall on the Oregon State College campus in Corvallis, where sanitation and milk quality will be the main topics under consideration. This annual short course is sponsored by the department of agriculture and the state college and is for all state milk inspectors working in Oregon. Attendance of inspectors is required under the Oregon Fluid Milk Act. The course is held annually to improve techniques and to make uniform both the state and city milk inspection service. During the three-day meeting the Association of Milk Sanitarians will hold their annual dinner meeting.