VOLUME 17 NO. 10
OCTOBER, 1954

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

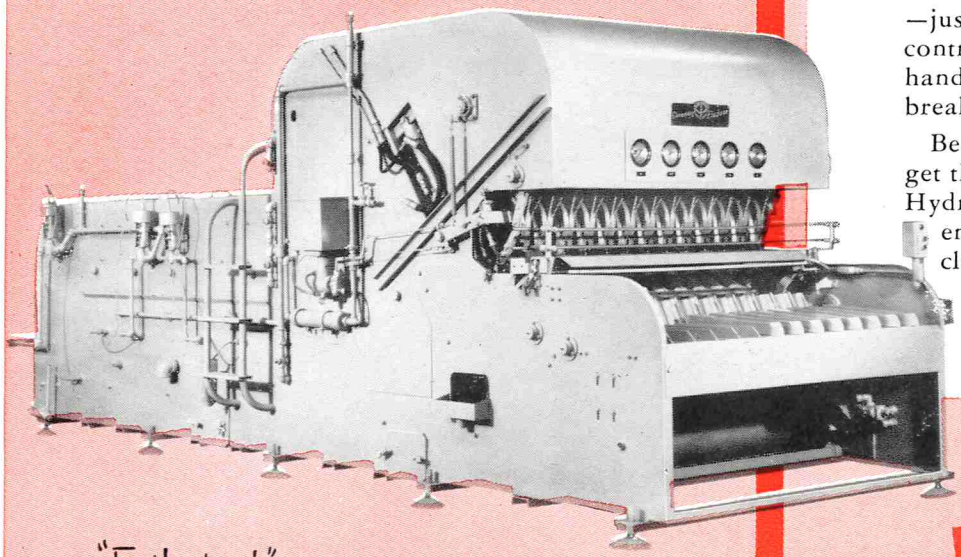
International Association of Milk and Food Sanitarians, Inc.

You'll Save on MAINTENANCE and BOTTLES!

with the

Hydraulically Powered

MODEL "H" SOAKER
BOTTLE WASHER!



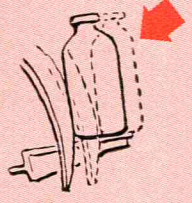
Less Parts Mean Less Maintenance!

Here is a soaker bottle washer so simple that just 3 hydraulic cylinders and a small amount of tubing comprise the drive mechanism. Gone completely are all internal shafts, drive cams, gears and drive levers. This oil hydraulic drive is actually as simple—and dependable—as the hydraulic brakes on your car!

But that's only part of what makes the CP Model "H" different. In addition to the simplicity and dependability of hydraulic drive, there are many other major features—just a few shown here—that contribute to smoother bottle handling and reduced bottle breakage.

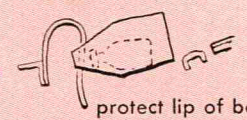
Before you buy any bottle washer, get the facts on the CP Model "H" Hydraulic—the bottle washer that's engineered to turn out sparkling clean bottles—and cut your maintenance and breakage costs. See your CP Representative TODAY!

"Feathertouch" GRAVITY DISCHARGE

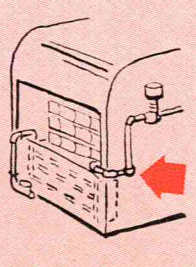


gives better bottle support. No knock-out fingers—no need to synchronize discharge and infeed.

Stainless Steel Impact Absorbers



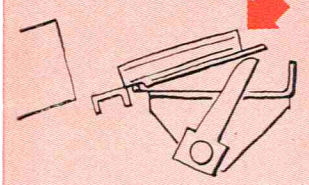
protect lip of bottles loaded into pockets!



Single, Compact Heating Coil

eliminates packing glands and welded connections. Easily removed for scale removal. Gives more square feet of heating surface than ever before!

Load Table



is hinged and swings up to line up with pocket. Bottle slides in smoothly by gravity without jar, wobble or bounce.

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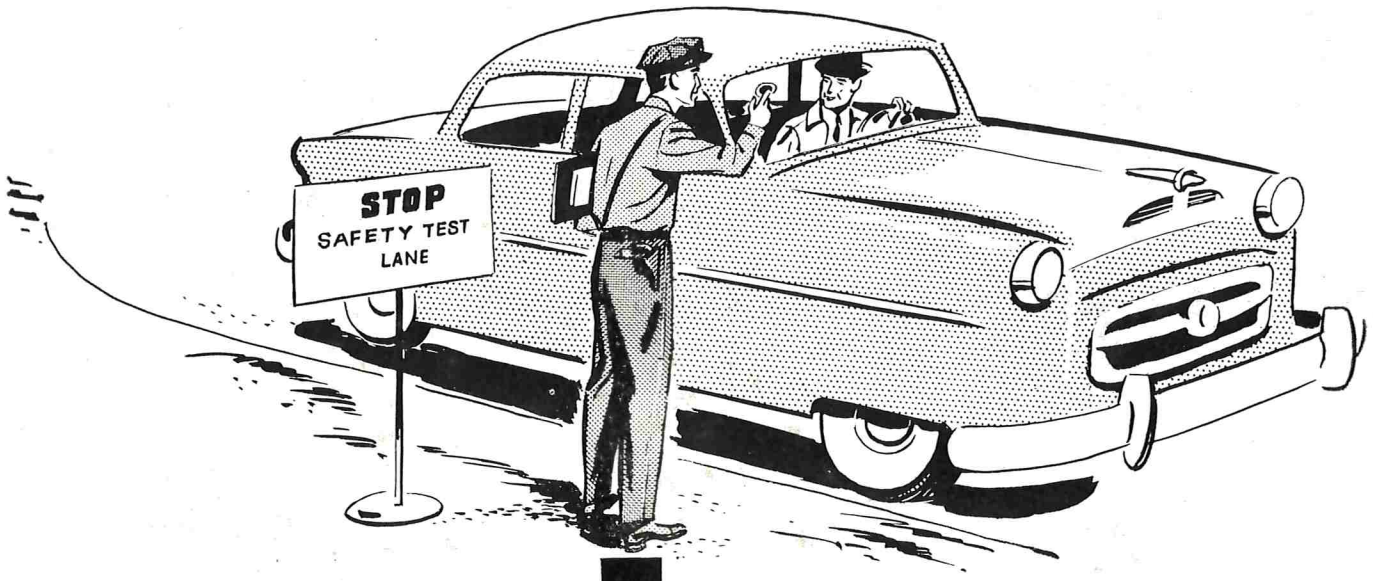
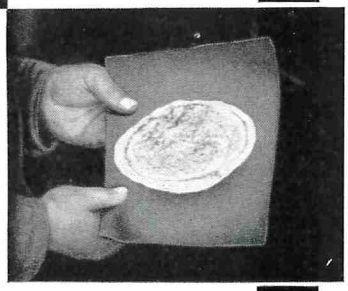


There's a Safety Check for Milk, Too

***The Rapid-Flo Farm Sediment Check-Up**

1. After filtering each can of milk (10 gallons or less), the producer should carefully remove the used **Rapid-Flo** Filter Disk from the strainer and place on a cardboard to dry.



2. When the **Rapid-Flo** disk is dry, it should be examined closely. The producer then has the facts. He can identify the sediment or extraneous matter to determine its origin, and take precautions to prevent its recurrence.

3. When conditions causing sediment are corrected and the **Rapid-Flo** Filter Disk, following filtration, is clean then you have the PROOF of clean milk production that you want.

In the interest of highway safety all of us are glad to comply with the regular automobile safety check-ups required by most cities and states.

In like manner all of us should encourage milk and cream producers to use the safety check-up for milk quality...the Rapid-Flo Farm Sediment Check-Up.* Here a clean used Rapid-Flo Filter Disk following filtration is the sign that the dairyman has kept his milk or cream clean and of high quality.

In the further interest of safety always recommend genuine Johnson & Johnson Rapid-Flo Filter Disks. They're *fibre-bonded for extra protection...* engineered for maximum retention and SAFE milk filtration...and at no extra cost you get the safety check-up for quality milk, the Rapid-Flo Farm Sediment Check-Up.*

FILTER PRODUCTS DIVISION

Johnson & Johnson

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Grand

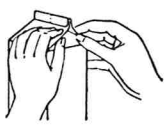
that's what people are saying

REALLY SANITARY...

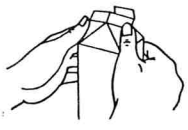
that's why consumers, dairymen and health authorities appreciate Pure-Pak's protected pouring spout. It gives you an interesting new consumer benefit to point to... and it can't flip open in cases or in grocery stores!

COMPARE ...

this feature with other milk containers and you will share the confidence of Pure-Pak users who know that Pure-Pak's seal has never been broken until opened personally by them. Pure-Pak protects your family's health!

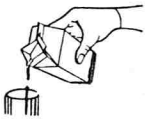


You are the first to break Pure-Pak's tamperproof seal.



Spread spout wings all the way back.

Just squeeze spout wings together and, spout pops open.



Empties to the very last drop... no milk wasted.

Re-closes tightly. Simply push spout back in.

Opening!

about Pure-Pak's Tamper-Proof seal

POURING?...

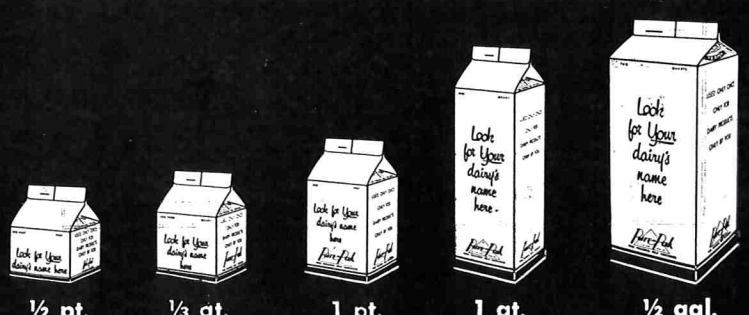
Everybody who has ever poured a drop of milk from this new Pure-Pak container instantly knows "IT POURS LIKE A PITCHER" . . . better than any other milk container ever used by dairymen and their customers!

All this...and it pours like a pitcher!

© Pure-Pak

® EX-CELL-O CORP., DETROIT, MICH.

YOUR PERSONAL MILK CONTAINER



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5 Minutes, Please?

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3 Minutes to jot down their names and addresses.

1 Minute to mail.

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Editorial Notes

CONFORMITY: ITS COST AND OUR REMEDY

It is common knowledge that the development of our highly sanitary practices in the milk industry grew like Topsy. Ever since the City of New York, about the year 1912 or so, set the municipal sanitation control pace, so to speak, one community after another caught the vision of a clean milk supply and formulated a code of what its local authorities considered to be essential requirements for production and handling. One by one over the country these rules and regulations went into effect. With no clear leadership of a body of factual knowledge, these codes were built up on the basis of the opinions of well meaning and often meagerly informed officialdom. Discordant heterogeneity in regulatory practice resulted. The whole country became spotted with self sufficient, legally insulated, milk sheds, often overlapping in contradictory requirements. Industry encountered mounting difficulties in developing supplies for consumption and the whole enterprise of milk sanitation control was thrown more and more on the defensive. Such contradictions as to what were the important basic factors that must be met to secure a reasonably sanitary supply showed plainly that knowledge was befogged by opinion.

When the situation became bad enough, steps were taken to remedy it. At first, states tried to systematize the practices within their respective domains. Then groups of states or communities tried to work out area agreements. Then came the national government with its standard practice in an attempt to achieve uniformity among all by mutual agreement. The basis of this agreement was mostly expert opinion.

Finally, the National Research Council[1] made possible a scientific study of the conditions of milk production and handling which factually affected sanitary quality. The array of evidence collected showed conclusively that a few important practices were all that really counted. Most of the requirements above these principles were "frills" that reflected personal ideas that were not supported by facts.

The result has been a great advance in conformity of our industrial milk control practices. The published findings of the scientific study have served to unlock the log jam, so to speak, that has heretofore hindered the free flow in commerce of these essential foods. Nowadays, rules and regulations that are scientifically based, and analytical control practices that facilitate instead of impede commerce, are receiving due recognition and application.

But with this growing conformity in practice, we seem to be sacrificing individuality and initiative in securing more knowledge about milk. When every community was more or less on its own, its enforcement personnel had an incentive to substantiate their practices. Laudable ambition stimulated efforts to keep improving the supply. A sort of competition of enforcement excellence grew apace. So the practices of milk sanitation control have been moving from the situation where milk-is-milk to the present era where scientifically attested control procedure has produced the cleanest food known.

The above presentations are theoretical and interpretative regarding the birth, adolescence, and maturity of milk control. We now face the hazard of senility. From time immemorial mankind has undergone in government, art, religion, philosophy, education, and other expressions of his culture, a rise to excellence, followed by a sort of plateau period of standardization and formulation of practices, and then leading into a long, slow period when attention is directed to details, a polishing of various facets of application, an emphasis on meticulous hair-splitting interpretations, a loss of creative inspiration. The perspective of a desire to understand becomes cramped into a narrow field of over-specialization. Originality becomes smothered by regimentation—conformity.

Does milk technology want to fall into this condition? No, a thousand times, NO! Then what shall we do about it? Can we reverse the trend of human nature? No, but we can introduce new ideas. This latter revolves around the need for introducing some new blood into our investigative programs. Two aspects are evident: in the first place, we might take a leaf from the practices that have shown themselves to be effective in the physical sciences, namely, cooperative research among a team of investigators drawn from several related fields; and in the second place, we might tap the immense reservoir of the intelligence, initiative, and enthusiasm of youth. In our March issue (page 75) we editorially discussed the need for more facts in building our sanitary practices, and suggested that our universities could very advantageously have their advanced students engage in various re-check and other investigations under competent faculty supervision. The very act of re-checking analytical procedures brings to light many an obscure phenomenon that constitutes the basis for new insights. Many schools do not require an original piece of work for their graduating seniors for the bachelor degree. They well might.

Since writing the above suggestions, we note with interest that Mr. L. V. Strasburger[2] points out that the relative complexity, certainly the inordinate time consumption that is involved in determinations of the insoluble extraneous material in foods, needs simplification to enhance their greater utility.

And now the American Chemical Society has published[3] their National Cooperative Undergraduate Chemical Research Program (NaCUR). "The major premise is that usable chemical information can be obtained from duplicating work done by two or more undergraduate students in different schools, independent and unknown to each other." Furthermore, this project, going now for five years, has stimulated interest in teachers of small schools who have felt handicapped by limited facilities. Yet again, they cite the case of a project sponsored by an

industrial chemist for the second year. Twenty projects for student participation have been organized by the Committee. A Certificate of Acceptance is awarded to each student who submits a report acceptable to the Project Director. Some of this kind of work has already been published in the current literature.

Here is a venture that our Association may well consider. The sponsoring of such an investigative stimulus and the unearthing of new knowledge is a worthy development of our program of raising the professional status of our personnel and certainly of obtaining new knowledge. Since others have done this, why can't we!

J. H. SHRADER

1. National Research Council: Sanitary Milk Control and Its Relation to the Sanitary, Nutritive and Other Qualities of Milk. Publication 250 (1953).

2. Strasburger and Seigel, Inc., Consulting Chemists, Baltimore, Md.

3. Cortelyou, E., and Cortelyou, W. P.: National Cooperative Undergraduate Chemical Research Program. *J. Chem. Education* 31, 267 (1954).

NEW BOOKS OF INTEREST TO FOOD SANITARIANS

Laboratory Instruments: Their Design and Application, by A. Elliott and J. H. Dickson. Published by The Chemical Publishing Co., 212 Fifth Ave., New York, N.Y. 414 pages. $7.50.

Chapters are given on machining operations, materials, drawings, constrained motion, magnification, sensitivity, damping, tests of straightness, flatness, etc., glass properties and working, lenses and mirrors, optical instruments, and photography.

Industrial Wastes: Their Disposal and Treatment, Edited by Willem Rudolphs with 17 contributors. Published by Reinhold Publishing Corpn., 330 West 42nd St., New York 36, N.Y. 1953, 501 pages, profusely illustrated, $9.50.

Under the editorship of Professor Willem Rudolfs, Department of Sanitation, Rutgers University, the chapter headings run:

The Problem
Stream Pollution and Self-Purification
Milk Products Waste
Canning, Freezing, and Dehydration
Slaughterhouse and Meat Packing Wastes
The Fermentation Industries
Corn Starch Processes
Wastes from Tanning, Fat Processing, and Laundry Soap Industries
Textile Dyeing and Finishing
Pulp, Paper, and Paperboard
Acid and Explosives Wastes
Steel Pickling
Plating Wastes
Waste Disposal Problems in Mining, Preparation, and Carbonization of Coal
Petroleum Industry
Liquid Radioactive Wastes
Miscellaneous Wastes

The Vitamins; Chemistry, Physiology, Pathology. Vol. I. Edited by W. H. Sebrell, Jr. and R. S. Harris. Published by Academic Press, Inc., New York. 1954, 676 pages, $16.50.

This is the first volume of a planned set of three. Twenty-one authors have written from their particular competency, overlapping to some degree. This gives coherence and strengthens the coverage which emphasizes the chemistry and the physiology of the vitamins. These are arranged alphabetically, and deal with vitamin A and carotenes, ascorbic acid, vitamin B_{12}, and Biotin. Old, present, and chemical names are given, and an extensive bibliography, all of which give the treatise an excellent reference value.

Man's Foods: Nutrition and Environments in Food Gathering Times and Food Producing Times, by L. B. Jensen. Published by The Garrard Press, Champaign, Ill. 1953, 278 pages.

Here is an interestingly written book which traces the development of man's search for and treatment of foods, clear through from archeological man down to the present. "The history of man perhaps could be written in terms of diet and the fulfilled promises of nutrition. The work outlined here does not accomplish that intricate and delicate task, but does point up as others have done the need for close group research in the several disciplines." There is but little technical material, but the book is rich in information on the food practices of developing man throughout history. "The stream of civilization followed the spread of food production slowly and sometimes rapidly." It is rewarding and entertaining reading for those who like to read of man's quest for food and its effect on his development.

Industrial Fermentations, edited by L. A. Underkofler and R. J. Hickey. Vol. I. Published by The Chemical Publishing Co., 212 Fifth Ave., New York, N.Y. 1954, 565 pages, $12.00.

The field of industrial fermentations is so large and the technical information so generally unavailable that the co-operation of many technically competent workers in the various fields of applied fermentation technology has been secured. The first volume deals with alcoholic fermentation, the production of yeast, the butanol acetone fermentations, and the fermentative production of organic acids. Bibliography, trade statistics, yields, and other such practical information are presented clearly and succinctly.

Dairy Cattle Feeding and Management, 4th edition, by H. O. Henderson and P. M. Reaves. Published by John Wiley & Sons, Inc., New York. 1954, 614 pages, $6.50.

This new edition (fourth) is based on the original work by Larson and Putney. Designed to cover completely the feeding and management of dairy cattle, it contains new chapters on minerals MILK BOOK ....Aug. Sept. .....84 and vitamins, milking, establishing a herd, artificial breeding, maintaining herd efficiency, the purebred cattle business, programs of breed associations, and marketing.

Foodstuffs: Their Plasticity, Fluidity, and Consistency, edited by G. W. S. Blair. Published by North-Holland Publishing Co., Amsterdam, and Interscience Publishers, Inc., New York. 1953, 264 pages, $7.25.

The physical properties of foodstuffs are dealt with as they affect keeping quality, palatability, and processing. Measuring techniques, theoretical presentations, instrumental interpretations of data, and much other data in the physicochemical area of starch, cereals, dairy products, and honey, jellies, chocolate are discussed. A chapter on psycho-rheology discusses the assessment of human reactions to the rheological (flow or plastic properties) behaviour of materials —as for example, in the "spreadability" of butter, margarine, and related products. An extensive bibliography of over five hundred titles supports this chapter.

Food Service: A Master Plan, by K. G. Vester. Published by the Pageant Press, 130 W. 42nd St., New York, 36, N.Y. 152 pages, $3.00.

Personnel, sanitation, publicity, decoration, "atmosphere," the problem of management replacement, price range, hospitality, and the undeveloped eating-out market are discussed for large and small restaurants, in large and small places. The emphasis is on hospitality and consumer appeal. It is not technical but suggestive to restaurateurs.

Food Science: A Symposium on Quality & Preservation of Foods, edited by E. C. Bate-Smith and T. N. Morris. Published by The Cambridge University Press, 32 East 57th St., New York 22, N.Y. 1952, 319 pages, $8.00.

"The science and practice of storing, preserving, and transporting foods between production and consumption is a new science . . . This is the first English book to deal with it comprehensively." It is an outgrowth of a course in Food Science arranged by the Board of Extra-mural Studies of the University of Cambridge. Tables, charts, curves, electronmicrographs of food texture, rich bibliographies, chemical structural formulae of constituents, are contributed by twenty-six authorities. It is an excellent elementary treatise, done with typical English literary and typographical quality.

Chemistry of Food and Nutrition, by H. C. Sherman. 8th edition. Published by the Macmillan Co., New York. 1952, 721 pages, $6.00.

"In order thoroughly to incorporate the recent advances into this new edition, every chapter has been revised, several of them re-written, a new chapter on folic acid, vitamin B_{12}, and the citrovorum factor has been inserted, and the last chapter has been replaced by two new chapters dealing respectively with trends of food consumption and improvement of already normal nutrition." The excellence of the previous editions of this classic text has been maintained in readability, authoritativeness, and format. Here are the fundamentals of nutrition for maintenance of the "steady state" of the healthy body.

Biochemistry and Physiology of Nutrition, edited by G. H. Bourne and G. W. Kidder. 2 volumes. Published by Academic Press, Inc., 125 East 23rd St., New York 10, N.Y. 1953, Vol. I, 569 pages, $13.00; Vol. II, 641 pages, $15.00.

Twenty-eight contributors have co-operated in this up-to-date appraisal of our state of knowledge of the basic aspects of nutrition—a century of nutritional progress embracing metabolism as well. Enzymic function is emphasized. The chapter headings run as follows:

Vol. I

Early Developments of the Science of Nutrition
The History of Vitamins
Water and Electrolyte Metabolism
Carbohydrate Metabolism
Amino Acids
The Biosynthesis of Proteins
Lipid Metabolism
The Fat-Soluble Vitamins (With Special Reference to the Requirements of Different Animals)
The Vitamin B Complex
Vitamins and Hematopoiesis
Vitamin C

Vol. II

Structural Changes in Vitamin Deficiency
Microbiology of Digestion
The Nutrition of Invertebrate Animals
Energetics and Metabolic Function
Hydrolytic and Phospholytic Enzymes
The Respiratory Enzymes
Coenzymes
Iron Metabolism
Calcium and Phosphorus Metabolism
Trace Elements
Applications to Human Nutrition

The arrangement of contents, typography, and binding are excellent.

Elements of Food Engineering, Vol. I, by M. E. Parker. Published by Reinhold Publishing Corporation, 330 West 42nd St., New York 36, N.Y. 1952, 386 pages, $8.75.

The author has produced an elementary text on food technology (the application of science to food processing). A large amount of practical information, industrial perspective, statistical data of impressive emphasis on the size and relative importance of the food industry as an industry, and food unit processes and operations have been collected and conveniently organized into a good textbook basis for a course in food technology. Possibly the succeeding volumes will give more of the engineering data usually comprised under that heading.

Engineering in Public Health, by H. E. Babbitt. Published by McGraw-Hill Book Co., 330 West 42nd St., New York. 1952, 582 pages, $8.00.

Workers in the field of public health generally and sanitarians in particular will find much useful information in this book. The mathematics is elementary to those with basic training in mathematics and the sciences. The chapter headings:

Engineering in Public Health
Values and Costs in Public Health
Public Health Administration
Disease and Immunity
Epidemiology of Communicable Disease
Biostatistics
Diseases Transmitted by Insects, the Lower Animals, and Birds
Disinfection
Pesticides, Poisons, and Fumigants
Food Sanitation
Milk
Water and Public Health
Housing
Plumbing
Ventilation and Heating
Light, Sound and Odor
Sanitation of Hospitals
Sanitation of City Air
The City Streets
The Collection and Disposal of Municipal Refuse
Industrial Hygiene
Swimming Pools and Bathing Places
Sewage and Industrial Wastes Treatment
Pollution of Surface Waters
Rural and Camp Sanitation
Sanitary Engineering in Disasters

This book is excellently descriptive of sanitary technology.

Techniques of Dairy Plant Testing, by E. F. Gross. Published by The Iowa State College Press, Ames, Iowa. 1953, 350 pages, $5.00.

This is a good practical manual for teaching students "how" to make the important tests on dairy products. Detailed descriptions, illustrations, and problem-solving are within the comprehension of the average student, even an intelligent high-schooler.

The Mechanical Properties of Cheese and Butter, by Margaret Baron. Published by Dairy Industries, Ltd., 24 Bride Lane, London, E.C.4, 1952, 106 pages, 15/s.

Experimental work is presented on the researches conducted at the National Institute for Research in Dairying (England) to develop instruments and measuring techniques for determining the proper physical properties of cheese and butter. Much progress is reported but the work needs additional research to correlate better the subjective tests of the experienced cheesemaker with the instrumental record.

Cheese Varieties and Descriptions, by George P. Sanders. U. S. Department of Agriculture, Agr. Handbook No. 54. 1953, 151 pages.

This is a revision of and supersedes Department Bulletin 608 "Varieties of Cheese: Descriptions and Analyses."

Developments in the Law: The Federal Food, Drug, and Cosmetic Act. Distributed by The Food Law Institute, Inc., Reprinted from *Harvard Law Review* 67, 632-722 (1954).

The Federal Food and Drug Act is discussed from the standpoint of its historical background and article coverage, infractions, definition and standardization, enforcement practices, both administrative and judicial.

THE FOOD AND DRUG LAWS AND THE CITRUS INDUSTRY* **

DONALD R. THOMPSON
Manager, Products Department Sunkist Growers, Ontario, California

Sunkist Growers has an interesting history going back to 1893 when, believe it or not, there was over-production—a familiar word in agriculture today—in oranges and lemons. During these 61 years it has been regarded as the outstanding example of a grower-owned cooperative marketing organization and the name Sunkist has come to be the best-known trademark in the fruit and produce business. Some 14,500 citrus growers of California and Arizona have spent $75 million since 1908 to advertise Sunkist oranges, lemons, and grapefruit and, more recently, Sunkist frozen and canned juice products. In 1953, Sunkist sold $172 million worth of these fruits and juices in the United States and throughout the world. Of this total, 76% were derived from the sale of fresh fruit. The spirit and policy of innovation both in product and marketing have been vital factors in the Sunkist Story. For example, the idea of drinking the juice of several oranges each day to provide the necessary amount of Vitamin C for good health and to furnish other food values as well as refreshment and enjoyment was originated by Sunkist in 1916.

PRODUCTS

The Products Department of Sunkist Growers was established as the sales organization for products produced from the surplus oranges, lemons, and grapefruit of its grower-members some 25 years ago. The products are produced by two affiliated corporations, The Exchange Orange Products Company and Exchange Lemon Products Company, and are classified in two general groups, industrial products and consumer products. The industrial products include concentrated juices, bottlers' soft-drink concentrates, essential oils, pectin, citric acid, dried pulp for cattle feeding, and some very interesting pharmaceutical products. All of us are familiar with Du Pont's slogan "Better Things for Better Living through Chemistry." That statement is particularly applicable also to the Sunkist citrus products business because our processing involves careful and oftentimes intricate chemical procedures with the consumer constantly in mind, that is, his health and his economic interest in being able to buy citrus fruit products at reasonable prices and packaged and labeled in such a way that he is not misled.

In the consumer goods category there are at present twelve Sunkist frozen, canned, and bottled juices which are sold through the 376,000 food stores of the nation. All are processed to precise specifications established by Sunkist which in some instances are more rigid and exacting than the accepted grade standards of the industry. From a dollar volume of sales standpoint, industrial and consumer products are about of equal importance at the present time in Sunkist's citrus products activities. As producers both of food products and ingredients for food products sold to manufacturers we have always advocated a strong food and drug law soundly administered and adequately enforced both for the protection of the consumer and for the maintenance of high standards of quality in the industry. The Federal Food and Drug Act of 1906, the Federal Food, Drug, and Cosmetic Act of 1938, and the food laws of the states have had a most beneficial and valuable influence on the development of the citrus business both at the local and national level. Furthermore, the industry has a moral and practical interest in promoting and safeguarding the health and welfare of the consumer, realizing that when the food laws are uniform and properly enforced there is a good measure of protection from unfair competition resulting from the distribution of debased or fraudulent products.

As indicated previously, the

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distribution and sale of fresh oranges, lemons, and grapefruit are the principal Sunkist activities. These citrus fruits are natural products of agriculture which are moved unaltered and unchanged from the groves to the consumer. Paul S. Armstrong, General Manager of Sunkist Growers, has stated very appropriately the importance of the food and drug laws to our business: "Both as citizens and as producers and distributors of a major fruit crop, Sunkist Growers applaud the high purpose of Food and Drug laws and regulations. We shall support in every way the fair administration of these laws."

If all foods were supplied to the ultimate consumer in the form of the raw agricultural commodity, the regulations and their enforcement would be difficult enough. In that instance we in the citrus business would be spared many of the problems of the deciduous fruit grower and the vegetable producer because the durable protective skin of citrus fruits is never eaten in the raw state and affords ample protection to the edible part of the fruit itself. However, with all the many variations of form and kinds of preparation, compounding, and blending that the consuming public desires and demands, the problems of manufacturing, advertising and selling are multiplied many times. To even a great degree this is true of the problems of food law enforcement for the protection of the public. Certainly, the producers of the crops which are starting materials for the production of all foods will and should be ever thankful for the basic principles being constantly applied and enforced by the food law enforcement agencies, both federal and state.

Cooperation Between Officials and Industry

Sunkist recognizes the importance of this necessary alliance of the agricultural producer, those who promulgate food law legislation, and food law enforcement agencies for the long range mutual good of producers and consumers. We realize also the continuing need of standardization and improvement of methods along the course from farm or orchard to factory, to warehouses, to food stores, and of the importance of food law enforcement at each particular stage of this distribution process. We have been very much aware of the complexities of these problems because of our extensive marketing activities in many of the related sub-divisions of the food industries such as the flavoring and extract groups, jam and jelly manufacturers, confectionery, the bakery trade, dairies and ice-cream producers, soft-drink bottlers, pharmaceutical manufacturers, other grocery manufacturing groups, and the stock feed business. While some of the many products derived from citrus fruit have uses in other fields, it will be evident that practically all of them enter into products of the food industries. As a consequence we have been close to the problems encountered in the conversion from the raw agricultural commodity to intermediate and finished prepared foods so in this respect we are talking not about some small part of the citrus business, but speaking of the national production of all areas, of about one-half of the citrus crop which is purchased as processed products.

Suggestions for the improvement of the prompt evaluation and the solution of food problems will come from no one source exclusively, whether it be the grower, the manufacturer, the distributor, the food law enforcement agency, or the consumer. We should hope that the experiences of all these groups will constantly bring forth valuable suggestions and therefore we are not at all reticent in speaking briefly about one of our own suggestions, which, I believe, will serve to illustrate a need concerned with certain basic principles common to the food business in the channels of conversion and distribution.

Tolerances

The agricultural chemical industry in cooperation with state and federal experiment stations all over the country, Departments of Agriculture, growers' organizations, trade associations, chemical manufacturers and others, have made great progress in the use of agricultural chemicals such as pesticides. There is only one purpose motivating these commendable efforts and that is to effect improvement of quality and quantity of crops, thereby enhancing the economic situation for all concerned, and the consuming public. Incidental to this gratifying progress is the necessity of carefully selecting and controlling these chemicals, and their use and subsequent removal, so that the inevitable residues of these pesticides on or in food are such as to involve no hazard because of their toxicity. As is well known, past and future plans in such instances call for the establishment at safe levels of tolerances for the pesticide residues unavoidably present. Such tolerances have been expressed as parts per million or as grains of the residual chemical per pound of fresh weight of the raw agricultural commodity.

This manner of expressing tolerances has been generally satisfactory in the past when the natural form of the commodity was the form most commonly used by the consuming public, but times have changed in the food business as we in the citrus industry well know. In these days when there is so much emphasis on convenience afforded by prepared foods, concentrated citrus juices are sold in ever-increasing volume; diluted juices in the form of ready-to-drink beverages such as orangeade and lemonade are increasing greatly in popularity and consumer acceptance; and liquid pectins and powdered pectins, flavoring oils, extracts and emulsions are in wide use, to mention only a few types of products or derivatives of the original agricultural commodity. Careful examination of the basic principles of nutrition, of food technology and of eating habits has convinced us and many others that no alteration of the inherent safety of a given product accrues from the addition or subtraction of water by the manufacturer of the food product. This is a fundamental concept which can be and has been well supported with actual examples. It is our proposal, therefore, that once a safe tolerance for pesticide residue has been established for the raw agricultural commodity, that this tolerance be converted and expressed as parts per million of the particular pesticide involved based on the nonaqueous or dry matter content of the commodity. We propose further that this tolerance, when so expressed, becomes the tolerance applicable to the commodity and to its deriva-

tives, such as the products made from citrus fruits as mentioned previously.

The proposal permits of a minimum of legislation to control safely by far the greater porportion of food processing of the country. It permits in regulatory and enforcement work much less effort to accomplish much greater benefits. It would eliminate much confusion and uncertainty which the conscientious food processor new experiences. It would prevent irresponsible processors from avoiding the underlying purpose of tolerances which is to afford the consuming public economy, quality, and safety of its food supply.

Modern rapid and precise methods of determination of moisture content make this proposal simple of technical accomplishment. Furthermore, the technical-legal significance of samples for official testing would be enhanced greatly because moisture losses would not affect the conclusions.

Our philosophy in connection with matters of this kind is best illustrated by paraphrasing a statement attributed to Abraham Lincoln — he has the right to suggest and to propose who has the heart to help.

We of Sunkist regard highly the advantages afforded the food industry of informal discussions with representatives of the Food and Drug Administration whose cooperation we have always appreciated and whose opinions we have always respected, as contrasted with strictly legal hearings. The recent enactment of the Hale Bill, in our opinion, is a significant accomplishment in the right direction by omitting the need for exhaustive and often costly hearings governing the establishment of food standards at least in connection with non-controversial matters.

FUNDAMENTAL RESEARCH

So often in public statements we hear richly deserved praise of the American way of life expressed in terms of physical comforts such as central heating, sanitary facilities, telephones, or motor cars, but there are other ingredients contributing to the higher levels of living standards which are far more dimensional. Without attempting to enumerate all of them, let us think of just one and then briefly discuss its meaning in the sense of human welfare. The one to which I refer is nutrition in all of its social and economical manifestations. We are blessed with a productive land, but so are many peoples. From the most primitive techniques we have advanced to a most efficient plane of agricultural production. We are a well-fed nation—some would say, too well fed.

Sunkist and the citrus industry owes its present vitality to modern nutrition concepts and traces the beginning of its commercial progress to nutrition research. Were it not for nutrition awareness on the part of scientists and the public interest it has aroused, citrus would still be considered a luxury as it was in the decade or so after the turn of the century. Because our growers realized that nutrition benefits were the only means by which citrus would be established as a part of the regular dietary, they made their first grant to a university in 1921. Sunkist thus became one of the very earliest commercial enterprises to support scientific nutrition research. Since then Sunkist has supported scores of projects, large and small, by grants of money, fellowships, and other assistance. These have revealed important facts which, when directed to the public in advertising and exactingly prepared literature, have stimulated the consumption of citrus fruits and products through public enlightenment. Of greater importance than the work Sunkist has directly supported have been the investigations conducted independently by qualified individuals at renowned institutions.

It should be made clear that at first the objective was the identification of the components of citrus. After that came their evaluation as elements in human nutrition. Other American enterprises had the same interests and followed the same procedures with the result that the work of one complemented the other. A modestly publicized example of the interest and support the American food industry has taken in nutrition development is the Nutrition Foundation founded in 1941. Its objective is fundamental nutrition research and the development of the public's interest in nutrition. Members have no voice in the selection of projects to be sponsored by the foundation funds. Those decisions lie in the hands of eminent scientists. The roster of membership includes the nation's leading food producers and processors, of which Sunkist is pleased to be listed as a member.

Today the consumer is better informed on the subject of nutrition than ever before, thanks to the teamwork of food officials, medical doctors, nutritionists, food editors, and the agricultural industries. The minimum daily requirement of certain of these important vitamins established by the Food and Drug Administration has done much to acquaint the consumer with his continuing needs for the maintenance of good health. All of this work has contributed to the improved general health of our 160 million population. Of course, there remains in this relatively new field some standardization yet to be accomplished. For example, Food and Drug regulations specify that the minimum daily requirements of Vitamin C (ascorbic acid) is 30 milligrams while the National Research Council Food and Nutrition Board maintains that 75 milligrams are necessary for good health and well-being. We recognize that these two recommendations serve somewhat different purposes—the one for labeling requirements and the other as a guide to nutritionists—but in this instance of Vitamin C, the difference is so great that it has caused confusion.

CONFLICTING LAWS

The national distribution of food products frequently has to contend with vexing problems that originate as a result of the variations of the state laws and regulations as between the states and the Federal Act of 1938. For example, some states have defined certain food products in conflict with definitions promulgated in other states. Others have sought to enforce dictionary definitions that neither are practicable nor in the best interest of consumers. Some permit the addition of certain chemical preservatives with specified tolerances, while others do not. Some require label declarations that are different from the federal requirements and from other states. National distributors of food products find these situations confusing and expensive to resolve, and frequently consumers in one state are deprived of the advantages of convenient,

economical, wholesome, and nutritional products that may be available to consumers in other states.

Several years after the adoption of the Federal Act of 1938, the Association of Food and Drug Officials of the United States approved and endorsed a model Act known as the Uniform State Food, Drug, and Cosmetic Bill. At present some 29 states have seen fit to adopt it in whole or in part and most of these have followed the federal regulations in many particulars. That is very helpful! The reasons for the apparent apathy in some of the remaining states in adopting this Uniform Code are not entirely clear, but it is suspected that it may be due largely to a lack of active and informed public interest. In spite of these problems where uniformity would be helpful, we acknowledge that food products available to us as consumers in the United States and processed and distributed in accordance with present federal and state food laws are unequaled in quality anywhere in the world.

State regulation of fresh fruits and fruit products has been an important adjunct to the Federal Food and Drug Laws and conflicts have been minimized by cooperation between the state and federal groups. We in the citrus business would advocate more uniformity between state and federal laws, realizing that complete uniformity probably can never be achieved. Our industry in California stands ready at all times to cooperate fully with federal and state food officials in promulgating standards for citrus fruits and citrus fruit products in the interests of the consumer and the grower.

Sunkist sells and ships citrus fruits and citrus products to some fifty-five foreign countries and we have to deal constantly with the food and drug laws of those countries where policies and attitudes often are much different from those in the United States. Sometimes interpretations of officials are perfunctory and decisions can have obvious political implications, but we have observed recently a trend toward better international understanding relative to food and drug regulations accentuated, I am sure, by the leadership of the United States as a producer of more food than we can consume and the world-wide distribution given to those substantial surpluses. Our food and drug laws are, and must continue to be, worthy of emulation. That obligation puts upon all of us the responsibility of being progressive in food law legislation and alert to changes which are sound and beneficial to all concerned.

In conclusion, I want to thank Mr. Dunn and The Food Law Institute for the opportunity of discussing with you this afternoon these problems of mutual interest; also Dean Kingsley, Dean of the School of Law, University of Southern California, for the gracious hospitality extended by him and his associates. Working together all of us can continue to accomplish much for the common good in food and drug legislation consistent always with the maintenance of the spirit of our free enterprise system.

TWO PENN STATE ICE CREAM SHORT COURSES

Two short courses in ice cream making will be given by the Dairy Science Department of the Pennsylvania State University this coming winter. One is designed for ice cream supply and equipment men and will be of one week's duration, from December 6 to December 11, 1954.

The second course will be held January 10 to 22, 1955 for plant men. The two courses are given because of the demand during the past years. If the demand does not warrant the two courses, they will be combined in the two weeks course. The two weeks course is limited to 60.

Material covered in the two courses is quite similar but naturally the two weeks course for plant men goes into considerably more detail and includes a few more subjects and more time is spent on mix calculations.

SUPPLY MEN'S COURSE
DECEMBER 6-11, 1954

Topics covered in the Supply Men's Course will include, mainly, composition of ice cream, ingredients used, standardization of acidity, calculation, processing, flavoring, freezing, overrun, and hardening of ice cream, ices, and sherbets. A certain amount of testing will also be included. A discussion of soft ice cream is given along with demonstrations.

PLANT MEN'S COURSE
JANUARY 10-22, 1955

Subjects covered in the two weeks course for plant men follow: composition of ice cream; ingredients used in ice cream – sugars, sugar alternates, etc.; testing ice cream (Mojonnier and Modified Babcock); calculation of mixes; restandardization of off-batches; processing mixes; standardizing acidity; manufacture of sherbets and ices using various sugars, stabilizers, etc.; use of stabilizers for ice cream, sherbets, and ices; freezing of mixes, sherbets and ices (batch and continuous freezers); defects in ice cream, sherbets, and ices; cocoa and chocolate flavored ice cream; flavors used in frozen desserts; scoring of ice cream; ingredients used in ice cream; washing compounds used; making mixes in vacuum pan; and making soft ice cream.

For further information, bulletin, and application of either of these courses, please write to D. R. McClay, Director of Short Courses, College of Agriculture, The Pennsylvania State University, State College, Pennsylvania.

ICE CREAM CONFERENCE

At the conclusion of the two weeks course the usual Penn State Ice Cream Conference will be held at the Nittany Lion Inn. Outstanding speakers will be on hand for an interesting and instructive program. The conference date is Friday, January 21, 1955. The Banquet, at which time the usual awards are made, will be held the same evening at the Nittany Lion Inn.

HYDROLYTIC RANCIDITY INDUCED BY PIPELINE MILKERS

L. A. KELLEY AND W. L. DUNKLEY
Department of Dairy Industry, University of California, Davis, California

Rancidity induced in milk by activation treatments in pipeline milkers has been encountered on a number of ranches. Methods of reducing such activation have been demonstrated by laboratory experiments Among the major contributors to induced rancidity are admission of air to the milk line, low milk flow-rate, inclusion in the vacuum section of the milk line of a filter, numerous fittings, or vertical pipes in which air bubbles through milk, and continous operation of a starved centrifugal pump. Variations in the susceptibility of milk to induced rancidity appear to be important in determining whether milk will go rancid after passage through a pipeline milker.
(Received for publication, June 20, 1954)

Little opportunity is provided for the activation of lipolysis (either from agitation or temperature fluctuation) when bucket-type milking machines, surface coolers, and 10-gallon cans are used — especially in combination with daily delivery and processing. This may not be the case with more modern production equipment, such as cold-wall farm tanks and pipeline milkers, and with every-other-day pick-up and processing.

An increased incidence of hydrolytic rancidity has been encountered in milk produced in California in recent years. Activation treatments of the milk by some pipeline milkers and farm tanks appear to be at least partially responsible for the defect.

In 1950 N. P. Tarassuk and W. L. Dunkley conducted some experiments at a ranch where a pipeline milker, in use for eight years, had a record of rancidity in its milk over the entire period. Milk produced with bucket-type milking units did not develop rancidity but many samples taken from the pipeline milker did. It was established that the rancidity was induced by the treatment the milk received in the pipeline milker. Attempts were made to study the activating effect of individual parts of the equipment during normal milk production, but there were so many variable conditions that this approach was abandoned. This paper reports a more recent study of factors influencing activation of lipolysis in pipeline milkers conducted at the University of California under conditions permitting more rigid control of variables.

Most of the literature dealing with rancidity has been reviewed elsewhere[5, 11]. Rancidity can be induced in most raw milks by activation treatments such as agitation of warm milk[9], including homogenization[2]; or temperature fluctuation treatments, involving cooling milk, warming it to about 86°F, and cooling it again[8]. The effects of such activation treatments appear to be dependent upon changes in the milk fat globule. When the protective material adsorbed to the surface of the fat globules is either disrupted or displaced by activation treatment, the lipase normally present in milk is able partially to hydrolyze the fat, liberating fatty acids responsible for the rancid flavor. Different acids vary in their flavor characteristics, and the predominant sensation from rancid milk may therefore range from a sharp, irritating taste and "goaty" odor to a pronounced bitter or soapy taste. In some cases the conditions favoring rancidity may result in an unclean flavor[6].

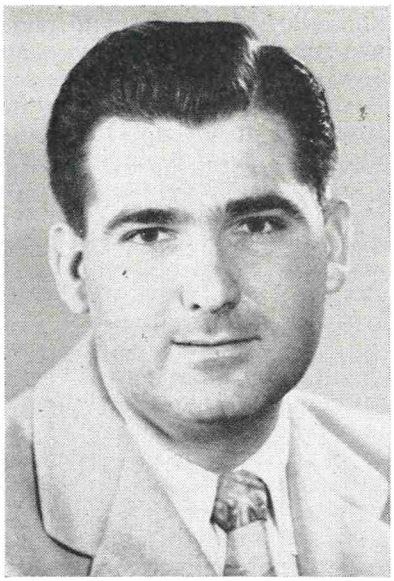
Numerous factors — such as characteristics of the cow, stage of lactation, and feed—are known to influence the susceptibility of milk to rancidity. Although most investigations have been concerned primarily with spontaneous rancidity, induced rancidity is probably also influenced by such factors[4].

The decrease in surface tension accompanying lipolysis has been used as a convenient measure of the intensity of rancid flavor[3, 12].

METHODS

The experimental procedure involved passing milk several times through individual sections of a pipeline milker under controlled conditions. The intensity of rancidity that developed in samples taken after each pass was used as a criterion of the activating effect under the conditions studied.

The equipment used was designed so that the vacuum, milk temperature, milk flow-rate, and air flow-rate could be varied and carefully controlled. Milk, drawn from a supply pail suspended on a scale, was passed through a 9/16 in. diameter milk hose, constricted to regulate the flow-rate, and admitted to the pipeline assembly through a "T". Air was introduced into the same T through a 9/16 in. milk hose. The air flow rate was measured either directly, by a rotameter, or by use of calibrated orifices. From the T the milk and air were drawn through the section of the pipeline being tested and into a receiver. For all experiments (except those involving pumps) the milk was removed from vacuum by a Surge Siphon releaser and discharged into a second pail, suspended in a water bath that maintained the milk temperature between 95



Dr. Leon A. Kelley was born in Madison, Wisconsin, June 28, 1923. During World War II he attended Amherst College and Yale University prior to being commissioned as a communications officer. After returning from the South Pacific, he obtained B.S. (1948), M.S. (1949), and Ph.D. (1951) degrees in Dairy Industry from the University of Wisconsin. In 1951 the services of Capt. Kelley were required in the Korean War where he served as Deputy Commandant and instructor at the Far East Air Forces Medical Technology Training School in Nagoya, Japan. Dr. Kelley joined the staff of the Department of Dairy Industry, University of California, Davis, in 1953.

TABLE 1

Influence of Operating Conditions on Rancidity Induced in Milk on Repeated Passage through a 5-Ft. Riser (Results are averages of 2 experiments)

No.	Experiments	Air Flow-rate cfm	Milk Flow-rate lb./min.	Vacuum in. Hg	Milk Temperature °F	Number of passes for average flavor score ≤ 1	2	3	Number of passes for average decrease in surface tension (dynes/cm.) ≤ 1	2	3
1	A & B	0	8	15	103°	>10	>10	>10	>10	>10	>10
2	"	1.8	"	"	"	4	5	9[a]	3	5	7[a]
3	"	3.6	"	"	"	2	3	6	3	5[a]	7[a]
4	"	6.5	"	"	"	2	3	6	3	4	7[a]
5	"	0	24	"	"	>10	>10	>10	>10	>10	>10
6	"	1.8	"	"	"	7	9	>10	5	>10	>10
7	"	3.6	"	"	"	3	7	>10	4	7	10
8	"	6.5	"	"	"	3	5	9[a]	4	7[a]	10
9	C & D	3.6	8	12	"	2	4	9	2	4	6
10	"	"	"	15	"	2	4	8	2	4	6
11	"	"	"	18	"	2	5	9	2	4	6
12	E & F	"	"	15	50[b]	9	>10	>10	4	8	>10
13	"	"	"	"	50[c]	8	>10	>10	5	8	>10
14	"	"	"	"	68[b]	8	>10	>10	6[a]	>10	>10
15	"	"	"	"	68[c]	>10	>10	>10	>10	>10	>10
16	"	"	"	"	86[b]	1	4	>10	0	1	6
17	"	"	"	"	86[c]	4	8	>10	3	7	>10
18	"	"	"	"	103[b]	3	6	10	4	7	9
19	"	"	"	"	120[b]	6	8	>10	5	8	>10
20	G & H	"	"	"	103	3	4	7	3	4	7
21	"	"	"	"	103[d]	2	3	5	0	0	2

[a] - Interpolated
[b] - Milk temperature adjusted by heating from approximately 40°F.
[c] - Milk temperature adjusted by cooling from 103°F.
[d] - After specified number of passes through riser, milk was cooled to 40°F., held 2 hr., rewarmed to 86°F. and again cooled.

and 103°F. Unless specified otherwise, 1½ in. sanitary tubing and fittings were used in assembling the various sections of the equipment being tested.

All experiments reported here were conducted with previously cooled milk, produced by the University herd. No differences were observed in experiments that involved comparisons of freshly-drawn milk and cooled milk that was rewarmed to 103°F. A trial with a "riser" (vertical section in which milk is elevated under vacuum with air bubbling through it) was included in each experiment, to permit a comparison of the susceptibility of the milk to induced rancidity.

At the beginning of each trial the assembled equipment was first flushed with warm water, to permit adjustment of milk and air flow-rates and determination of the weight of milk retained in the system at the end of a pass. Then the appropriate amount of milk was weighed into a supply pail, heated with gentle agitation to 103°F, and the pail suspended on a scale. A clamp, which simultaneously controlled the milk and air flows, was released until all the milk was drawn from the supply pail, through the pipeline and releaser, and into the receiving pail, from which a 2-oz. sample was removed. The two pails were interchanged and the procedure repeated until the milk had been passed through the system the required number of times, usually 10.

Most of the experiments were conducted using a milk flow-rate of 8 lb. per min. and an air flow-rate of 3.6 cfm (cubic feet per minute). Such an average milk flow-rate is within the normal range for ranches using three milking units, but the flow in practice would be extremely variable. The relatively high air flow-rate of 3.6 cfm was adopted to produce a marked activating effect, not to be representative of normal operating conditions.

The amounts of milk were varied from 8 to 40 lb., according to the milk-retaining characteristics of the equipment, using smaller quantities with hoses that retained little milk at the end of a pass. Most trials were conducted with 20 lb. of milk. When the equipment retained a relatively large amount of milk, the proportionate decrease in the number of passes incurred by part of the milk required some manner of compensation: In some trials the weight of milk used was increased, to reduce the proportion of error; in other trials the number of passes was increased, so that the milk would receive an average of 10 passes through the system. Results are reported in terms of effective passes.

The milk samples that were taken after each pass were cooled in a water bath, held over night at 35-40°F, and the rancidity assessed organoleptically and through surface tension measurement. Coded samples were scored by two judges on the following basis: 0 — not rancid; 1—very slightly rancid (not consistently detectable); 2—slightly rancid (readily detectable but probably not objectionable to most consumers); 3—rancid (objectionable); and 4—very rancid (very objectionable). Surface tension determinations, made at 20°C with a Cenco DuNouy Tensiometer, were expressed as decreases in dynes per cm. from the control sample for the experiment. All experiments were conducted at least twice, and data from duplicate experiments were averaged. The

results are presented in tables specifying the number of passes that were required to give flavor scores and surface tension reductions equal to or greater than 1, 2, and 3 under the various conditions studied. When flavor scores or surface tension determinations were omitted for part of the samples (as occurred in some trials), missing data were estimated by interpolation.

RESULTS

Activating Effect Under Varied Operating Conditions. The riser was found to be one of the components of a pipeline milker that especially promotes rancidity. Therefore, a riser was studied alone to determine its contribution to rancidity under the influence of variables other than equipment changes.

The effects of variations in air flow-rate, milk flow-rate, vacuum level, and milk temperature on rancidity induced in milk passed 10 times through a 5-ft. riser are shown in Table 1. The importance of air flow-rate to the activating effect is evident in no. 1 to 8: No rancidity developed following 10 passes through the riser in the absence of air (no. 1 and 5), whereas the activating effect appeared when air was admitted to the milk line, and generally increased with air flow-rate. Increasing the milk flow-rate decreased the activating effect while air flow-rate remained constant (compare no. 2 and 6, or 4 and 8). Varying the vacuum level in the milk line between 12 and 18 in. of mercury did not influence the rate of activation of lipolysis or the intensity of rancidity (cf. no. 9, 10, and 11).

The relation between temperature treatments of the milk and the activating effect of the 5-ft. riser was investigated in experiments E, F, G, and H. In experiments E and F milk was both heated to and cooled to the temperature at which it was passed through the riser. Consequently, no. 16 and, to a lesser extent, no. 14 were given a temperature activation treatment along with the agitation activation they received in the riser. In experiments G and H, the samples taken in no. 21 were subjected to temperature activation after passing through the riser. In both cases, the effects of the activation treatments were cumulative. Part of the difference between pairs of trials, such as between no. 16 and 17, might be attributable to a difference in physical state of the fat that was unrelated to the temperature activation.

The trials in which the milk was heated above 103°F or cooled from 103°F to the temperature at which it was passed through the riser illustrate the influence on activating effect of the temperature of agitation without the complicating influence of temperature activation. In these trials rancidity developed most rapidly in milk agitated at 103°F. Churning occurred most rapidly at 86°F (about two passes), and was not proportionate to intensity of rancidity. Of the temperatures studied, maximum resistance to agitation activation of lipolysis was observed at 68°F. The same result was also obtained in experiments in which air at atmospheric pressure was bubbled through milk maintained at desired temperatures.

Activating Effect of Individual Parts of a Pipeline Milker. The activating effects of various parts of a pipeline milker are illustrated by the results summarized in Table 2.

At a milk flow-rate of 24 lb. per min. no induced rancidity was observed in milk passed 10 times through 40 ft. of pipe, moving nearly horizontally—either up or down a slope of 0.1 in. per ft. (no. 22, 23). At a flow-rate of 8 lb. per min. a slight rancidity was induced in upward flowing milk (no. 30) but not in downward flowing milk (no. 29). The activating effect of risers was approximately proportionate to the lift (cf. no. 24, 25, and 26). Use of a sloped pipe to lift the milk 5 ft. did not decrease the activating effect (cf. no. 26 and 27, and no. 31 and 32). Three short risers that accomplished a total lift of 5 ft. induced rancidity more rapidly than a single 5-ft. pipe, presumably because of increased agitation at the elbows (no. 26 and 28).

No. 33, 34, and 36 compare risers of 1½ in., 1 in., and 2 in. diameters, respectively, at the same air and milk flow-rates, and no. 33, 35, and 37 compare the same risers at air and milk flow-rates proportionate to their cross-section areas. The results indicate that at the flow-rates studied, there was little difference between the activating effects of 1-in. and 1½-in. risers, but the 2-in riser induced rancidity more rapidly.

Experiments O and P compare the effect on induced rancidity of a milk hose and a vertical pipe. An average milk flow-rate of 8 lb. per min. may be considered representative of the rates encountered in a pipeline milker with three milking units. A comparison of 5-ft. vertical 1½-in. pipe (no. 38) with 5-ft. vertical 9/16-in. hose (no. 40) indicated similar activation when air and milk flow-rates in the hose were 1/3 those in the pipe (see also no. 42 and 43). In both hose and pipe, rancidity developed with fewer passes at lower milk flow-rates (cf. no. 39, 40, and 41).

Possible differences in the activating effects of representative milking units (exclusive of the inflations) were investigated in experiments Q and R. Milk hose connections for two inflations were plugged, and the remaining two were joined by rubber tubing to a T, through which milk was introduced at 2.7 lb. per min. Air, if any, was admitted as in normal use of the unit. A DeLaval claw was tested both with a solid plug that admitted no air (no. 44) and with a plug that contained a valve admitting air continuously at 0.1 cfm (no. 45). The Surge Surcingle milking unit tested admitted air intermittently, 48 times per minute, so that the flow-rate (measured at the receiver) fluctuated from 0 to about 1.2 cfm. No rancidity was induced by the unit that did not admit air, and only very slight (questionable) rancidity was produced by the two units that admitted air. This experiment was conducted four times because the first trials showed less satisfactory agreement in results than did studies of any of the other equipment, but the same trend was evident in each experiment.

The results obtained in experiments S and T demonstrate that fittings in horizontal sections of pipe have slight activating effects. In this as in other experiments, when air was withheld rancidity did not develop (cf. no. 51 and 52).

Either a plate—or bag—type filter

TABLE 2

Influence of Various Parts of a Pipeline Milker on Rancidity Induced in Milk
(Milk temperature 103°F; vacuum 15 in. mercury. Results are averages of 2 experiments)

Experiments	No.	Equipment tested	Air flow-rate cfm	Milk flow-rate lb./min.	Number of passes for average flavor score ≥ 1	2	3	Number of passes for average reduction in surface tension (dynes/cm) ≥ 1	2	3
I & J	22	40 ft. "horizontal" 1-1/2 in. pipe sloped down 0.1 in./ft.	3.6	24	>10	>10	>10	>10	>10	>10
	23	40 ft. "horizontal" 1-1/2 in. pipe sloped up 0.1 in./ft.	"	"	>10	>10	>10	>10	>10	>10
	24	1 ft. vertical 1-1/2 in. pipe	"	"	9	>10	>10	9	>10	>10
	25	3 ft. vertical 1-1/2 in. pipe	"	"	5	8	>10	5	8	10
	26	5 ft. vertical 1-1/2 in. pipe	"	"	4	6	9[a]	5	8	10
	27	5 ft. lift through 17 ft. 1-1/2 in. pipe sloped up at 17° angle	"	"	4	6	10	3	7	10
	28	5 ft. lift through 3 vertical sections, 4 elbows, 2 horizontal sections	"	"	3	4	6	3	4	6
K & L	29	40 ft. "horizontal" 1-1/2 in. pipe sloped down 0.1 in./ft.	3.6	8	>10	>10	>10	>10	>10	>10
	30	40 ft. "horizontal" 1-1/2 in. pipe sloped up 0.1 in./ft.	"	"	8	>10	>10	9	>10	>10
	31	5 ft. vertical 1-1/2 in. pipe	"	"	2	4	7	2	3	5
	32	5 ft. lift through 17 ft. 1-1/2 in. pipe sloped up at 17° angle	"	"	1	3	6	2	3	5
M & N	33	5 ft. vertical 1-1/2 in. pipe	3.6	8	3	5	8	3	5	8
	34	5 ft. vertical 1 in. pipe	3.6	8	2	4	8	3[a]	6	8
	35	5 ft. vertical 1 in. pipe	1.5	3.3	2	5	8	3[a]	5	8
	36	5 ft. vertical 2 in. pipe	3.6	8	2	4	5	2	3	4
	37	5 ft. vertical 2 in. pipe	6.4	14.2	2	3	5	2	4	5
O & P	38	5 ft. vertical 1-1/2 in. pipe	3.6	8	2	4	8	2	4	6
	39	5 ft. vertical 9/16 in. I.D. rubber hose	1.2	1	2	3	5[a]	1	3	5
	40	5 ft. vertical 9/16 in. I.D. rubber hose	1.2	2.7	2	3	6	1	4	6
	41	5 ft. vertical 9/16 in. I.D. rubber hose	1.2	4	3	4	9	3	5	7
Q & R	42	5 ft. vertical 1-1/2 in. pipe	3.6	8	2	3	8	3	5	7
	43	5 ft. vertical 9/16 in. I.D. rubber hose	1.2	2.7	1	5	9	2	4	7
	44	DeLaval milking unit without air valve plus 5 ft. vertical hose	0	"	>10	>10	>10	>10	>10	>10
	45	DeLaval milking unit with air valve plus 5 ft. vertical hose	0.1	"	7	>10	>10	>10	>10	>10
	46	Surge Surcingle milking unit with intermittent injection of air by pulsator plus 5 ft. vertical hose	0-1.2	"	6	>10	>10	>10	>10	>10
S & T	47	5 ft. vertical 1-1/2 in. pipe	3.6	8	3	5	9	3	5	8
	48	9 ft. horizontal 1-1/2 in. pipe	"	"	>10	>10	>10	>10	>10	>10
	49	9 ft. total horizontal flow divided at T, through 2 elbows, joined at T	"	"	7	>10	>10	10	>10	>10
	50	9 ft. total horizontal flow including 4 elbows	"	"	9	>10	>10	9	>10	>10
	51	9 ft. total horizontal flow including 4 capped T's	"	"	6	>10	>10	10	>10	>10
	52	9 ft. total horizontal flow including 4 capped T's	0	"	>10	>10	>10	>10	>10	>10
U & V	53	3 ft. vertical 1-1/2 in. pipe	3.6	8	4	6	9	4	6	>10
	54	Plate-type filter in 3 ft. vertical section	"	"	3	4	6	3	4	6
	55	Plate-type filter horizontally plus 3 ft. vertical 1-1/2 in. pipe	"	"	3	4	9	3	5[a]	7[a]
	56	Bag-type filter in 3 ft. vertical section	"	"	3	4	6	3	3	5
	57	Bag-type filter horizontally plus 3 ft. vertical 1-1/2 in. pipe	"	"	3	4	7	3	4	7
	58	Diaphragm pump with 3 ft. vertical discharge pipe	b	"	>10	>10	>10	>10	>10	>10
	59	Diaphragm pump with plate-type filter in 3 ft. vertical discharge section	b	"	>10	>10	>10	>10	>10	>10
	60	Diaphragm pump with bag-type filter in 3 ft. vertical discharge section	b	"	>10	>10	>10	>10	>10	>10

TABLE 2 (Continued)

Experiments	No.	Equipment tested	Air flow - rate cfm	Milk flow - rate lb./min.	Number of passes for average flavor score[a] 1	2	3	Number of passes for average reduction in surface tension (dynes/cm)[a] 1	2	3
W & X	61	5 ft. vertical 1-1/2 in. pipe and releaser	3.6	24	4	6	>10	4	9	>10
	62	Releaser only	0	"	>10	>10	>10	10	>10	>10
	63	3500 r.p.m. centrifugal pump operating continuously with 8 ft. vertical discharge pipe	b	"	1	2	3	1	2	3
	64	3500 r.p.m. centrifugal pump operating continuously with 1 ft. vertical discharge pipe	b	"	1	2	2	1	2	3
	65	3500 r.p.m. centrifugal pump operating intermittently with 8 ft. vertical discharge pipe	0	"	8	>10	>10	>10	>10	>10
	66	3500 r.p.m. centrifugal pump operating intermittently with 1 ft. vertical discharge pipe	0	"	9	>10	>10	10	>10	>10
	67	Diaphragm pump operated continuously with 8 ft. vertical discharge pipe	b	"	10	>10	>10	9	>10	>10
	68	Diaphragm pump operated continuously with 1 ft. vertical discharge pipe	b	"	>10	>10	>10	>10	>10	>10
	69	Diaphragm pump operated intermittently with 8 ft. vertical discharge pipe	0	"	>10	>10	>10	>10	>10	>10
	70	Diaphragm pump operated intermittently with 1 ft. vertical discharge pipe	0	"	>10	>10	>10	>10	>10	>10
Y & Z	71	5 ft. vertical 1-1/2 in. pipe and releaser	3.6	24	5	7	>10	5	7	>10
	72	3500 r.p.m. centrifugal pump operating continuously, starved	b	"	1	1	3	1	1	2
	73	3500 r.p.m. centrifugal pump operating intermittently	0	"	>10	>10	>10	>10	>10	>10
	74	3500 r.p.m. centrifugal pump operating continuously throttled	0	"	7	>10	>10	10	>10	>10
	75	1725 r.p.m. centrifugal pump operating continuously	0	"	>10	>10	>10	>10	>10	>10

a - Interpolated

b - Not measured. Pump removed some air along with milk

c - Vacuum 13 in. mercury instead of 15 in.

mounted in a 3-ft. vertical section in the vacuum line caused more activation than a 3-ft. riser alone (no. 53, 54, and 56). Mounting the filters horizontally, in an attempt to channel air and milk through them separately, effected only slight improvement (cf. no. 54, 55, and 56 and 57). However, when the filters were installed in the discharge line of a diaphragm pump used to withdraw milk from the receiver, rancidity did not develop after 10 passes through the equipment (no. 59 and 60). Furthermore, in another experiment, for which data are not reported, the bag-type filter, mounted horizontally in the vacuum line without a riser, did not induce rancidity in 10 passes.

Experiments W, X, Y, and Z were designed to determine the activating effect of different methods of removing the milk from vacuum. The releaser alone did not induce rancidity (no. 62). A 3500 rpm centrifugal pump (Surge milk pump No. 27001) induced rancidity rapidly when operated continuously at a flow-rate much below its capacity (no. 63, 64, and 72), but had only a slight activating effect when operated intermittently to keep the pump flooded (no. 65 and 66). In experiments W and X the milk was discharged from the pump into a can without satisfactory precautions to reduce agitation at the outlet. In experiments Y and Z the milk was discharged into the can tangentially through plastic tubing, to reduce agitation at the outlet. Under these conditions no rancidity was induced by the 3500 rpm centrifugal pump operated intermittently (no. 73). Operation of the 3500 rpm centrifugal pump continuously, but throttled to keep it flooded, reduced the activating effect markedly, but not as effectively as intermittent operation (cf. no. 72, 73, and 74). In a test on a 1725 rpm centrifugal pump operating continuously (no. 75) it was necessary to reduce the vacuum to 13 in. mercury to keep the pump primed. Under these conditions the pump was constantly flooded and did not induce rancidity in 10 passes. The diaphragm pump studied (DeLaval No. 04565) induced very slight rancidity when operated continuously at a flow-rate below its capacity and with an 8-ft. vertical discharge pipe (no. 67), but not under the other conditions studied (no. 59, 60, 68, 69, and 70).

DISCUSSION

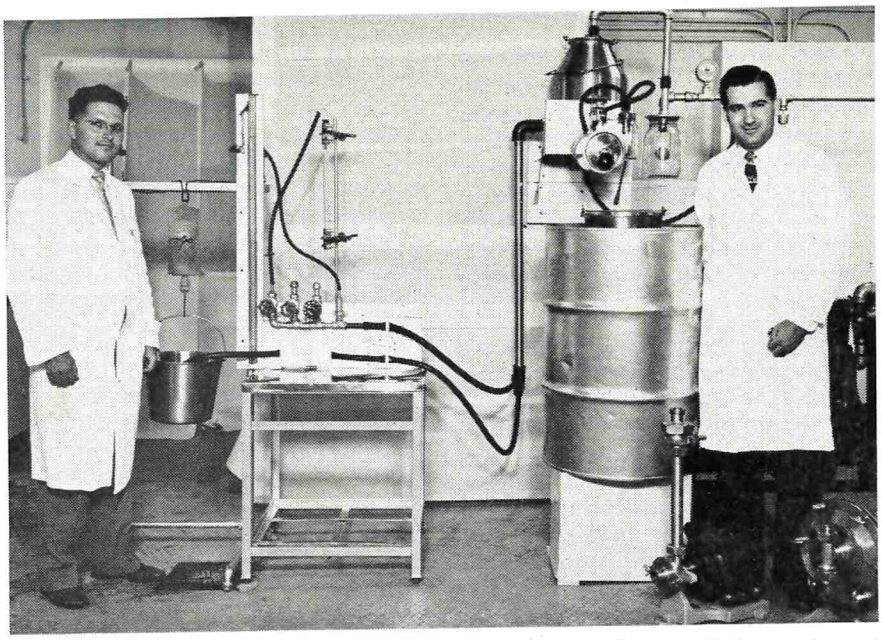
The effect of agitation on induced rancidity has been attributed to an alteration in the surface characteristics of the fat globules that creates a condition more favorable for lipolysis[9], and also to an increase in the contact area between the fat and serum, through subdivision of the fat globules[7]. The violent

agitation that milk receives in pipeline milkers under some conditions probably would cause some subdivision of the fat globules. In addition, conditions in the pipeline milker could alter the nature of the surface of the fat globules without increasing the fat surface area. Much of the material adsorbed to the fat globules is surface-active and might concentrate also at milk-air interfaces. The increase in milk-air interface created by air bubbling through warm milk could cause a partial transfer of surface-active material from the fat globules to the milk-air interface, thereby creating conditions more favorable for lipolysis.

The probability that intensity of agitation is not the only factor determining the activating effect of a pipeline milker is suggested by two results reported above. It is improbable that the marked difference in activating effect between starved operation of the 3500 rpm centrifugal pump and throttled operation, to keep it flooded, could be entirely accounted for by the difference in agitation. In trials with risers, and also with horizontal pipe sections including fittings, activation was observed only when air was admitted. These results indicate that alteration of the surface characteristics of the globules by desorption of surface active materials might be a more important factor in the effect of air on rancidity induced in a pipeline milker than is the influence of air on the violence of the agitation.

The temperature treatments the milk received in these experiments required careful consideration. Inasmuch as previously cooled raw milk was used, it was necessary to reheat the milk to at least 98.6°F[8]. The temperature 103°F was adopted because it is in the normal range of body temperature for the cow. Milk was maintained at approximately this temperature during the trials, to prevent churning and to produce a maximum activating effect.

The results showed that of the temperatures studied, 68°F gave the least activation. Previous reports dealing with agitation activation have shown that low temperatures cause less activation than



Dr. Walter L. Dunkley and Dr. Leon A. Kelley with part of the equipment used to study the activating effect of individual parts of a pipeline milker.

temperatures at which the fat is liquid, but do not indicate minimum activation at an intermediate temperature[9, 10].

In the experiments in which milk was subjected to both temperature and agitation activation, the effects were found to be cumulative. This result may be of importance in practical control of rancidity when the activation is at least partially attributable to treatment the milk receives in the farm tank.

The activation treatment influenced the relation between results obtained with the two methods used to evaluate degree of lipolysis. The decrease in surface tension at which rancidity was detected organoleptically was less for milk activated by agitation than for milk activated by temperature fluctuation. In most experiments involving agitation activation there was, by coincidence, relatively close agreement between the number of passes necessary to produce corresponding changes in flavor scores and surface tension reductions. This was not true of milk activated by temperature fluctuation. This observation indicates a possible difference in the products of the hydrolysis reactions related to the method of activation.

In a number of trials the milk developed an unclean flavor rather than the characteristic rancid flavor. The unclean flavor appeared to be definitely attributable to the treatment the milk received, increasing in intensity with the number of passes, in the same manner as the typical rancid flavor. In some of the trials, some treatments produced a typical rancid flavor whereas different treatments of milk from the same can produced an unclean flavor. Careful examination of the data did not provide an explanation for the difference in the flavor defects developed in these experiments. An increase in intensity of unclean flavor was accompanied by a decrease in surface tension, in the same manner as observed with the typical rancid flavor.

Conditions in the use of pipeline milkers, other than equipment changes, that may be modified to reduce activation to a minimum are evident from the results reported in Table 1. Complete elimination of air would prevent most of the activation, but this is impractical. However, attention should be given to reducing, as much as possible, the amount of air entering the system. The reduction in activating effect observed at a higher milk flow-rate may be explained on the basis of the shorter average time of agitation in the riser. Increasing the vacuum might be expected to increase the activating effect, by increasing both the amount of air entering the system and its volume, but the

experimental results indicate that normal variations in the vacuum level probably would not be an important factor. Cooling the milk would reduce lipolysis, but practical control by that method is limited by the probable acceleration of churning and the necessity for cooling prior to passage through milking equipment that would induce rancidity.

The experimental results indicate that minimum activation would be expected when the milking operation is conducted at a high milk flow-rate and a low air flow-rate. Both may vary markedly during milking. Shortly after the milking unit is started, the milk flow-rate reaches its maximum, subsequently decreasing[1]. Air leaking past the inflations apparently increases as milking approaches completion. A high air-rate and low milk-rate occur during machine stripping. Variations in teats influence the amount of air leaking into the teat cup. Milkers differ markedly in the amount of air they admit to the system during change of units from one cow to another.

The milking units may also influence the amount of air entering the equipment. Most units used with pipeline milkers in stanchion barns provide for introduction of a controlled amount of air at the claw, to reduce the pressure difference between the teat cups and the milk line. Milking units supplied by different manufacturers vary in the amount of air admitted and the method of introduction. Admission of the smallest amount consistent with satisfactory milking is recommended. A given volume of air probably would cause less activation in the milk hose if introduced intermittently instead of continuously.

Risers, including milk hoses, are the most serious cause of induced rancidity in many pipeline milker installations. Two ranches have been investigated where the activation during lift from the milking units to the milk line was sufficient to induce rancidity. On these ranches milk samples taken from individual cows did not go rancid spontaneously but were very susceptible to induced rancidity. This emphasizes the importance of reducing as much as possible the height that milk must be elevated with air bubbling through it. In the experiments described above, the activating effect of risers was decreased by reducing the total lift accomplished, reducing the amount of air and increasing the milk flow-rate. No advantage was gained by the use of sloped or stepped risers, or by changing the pipe size from 1½-in. diameter most commonly used.

No measurable activation was observed in experiments with straight pipeline sections, mounted either horizontally or with a slight downward slope, but slight activation occurred in pipe sloped up 0.1 in. per ft. Fittings such as elbows and T's induced more rancidity than straight sections of pipe of the same length. These results suggest that pipeline installations should be made with a slight downward slope for horizontal runs, and that the number of fittings be kept at a minimum.

Either a bag- or plate-type filter installed in a vertical section of the vacuum line caused more activation than a riser alone. Since no induced rancidity developed when either filter was placed in a vertical discharge line from a pump, this appears to be a more satisfactory location for installing a filter.

The method of removing milk from vacuum may have a marked influence on the amount of activation it receives. Neither the 3500 rpm centrifugal pump, when operated intermittently in accordance with the supplier's recommendations, nor the diaphragm pump induced rancidity enough for it to be of practical significance with milk of normal susceptibility. Continuous operation of a centrifugal pump at a flow rate below its capacity induced rancidity rapidly. Throttling the pump on the discharge side to keep it flooded, produced a marked reduction in activating effect, but not as much as did intermittent operation. The releaser alone did not induce rancidity, but in practice releasers are frequently used in conjunction with risers and such a combination is inferior to a properly operated pump.

Normal variations in the susceptibility of milk to induced rancidity must be recognized as an important factor determining whether milk will develop rancidity after passage through a pipeline milker installation. Rancidity has not been detected in milk produced on many ranches where the pipeline milkers have features that would be expected to induce rancidity. On the other hand, ranches with installations that appear to be well-designed and operated have encountered difficulty with the defect. In many cases rancidity is encountered only during short periods, when the milk is most susceptible. Attention should be given to reducing the susceptibility of the milk as much as possible—by such measures as the use of green succulent feeds, when available, and the elimination of cows producing the most susceptible milk, especially those in advanced lactation. However, application of the results reported above to reducing activation in a pipeline milker to a minimum is an important step in the control of induced rancidity.

When rancidity is encountered in raw milk, samples should be taken for determining whether the pipeline milker is a contributing cause. If convenient the use of bucket units for one day should quickly establish the extent to which the pipeline milker may be inducing the flavor. Samples taken from individual cows and stored under refrigeration for 24 hours should help establish the incidence of spontaneous rancidity and guide the elimination of cows producing the most susceptible milk. If a refrigerated farm tank is used, samples taken from the discharge of the milker and from the tank may be used in determining whether the treatment that the milk receives in the tank contributes to the activation. If the pipeline milker appears to be an important cause of the induced rancidity, bucket units may be used temporarily, while corrective measures are being taken.

SUMMARY

A number of ranches have been investigated where rancidity was induced by activation treatments that the milk received in pipeline milkers. Experiments are described that were designed to determine what conditions and component parts of pipeline milkers are the

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IODOPHORS AS PRESERVATIVES FOR MILK

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Iodophors (combinations of iodine with suitable nonionic wetting agents and acid) have been shown to be particularly effective in the destruction of bacteria of importance in the dairy industry[3]. Furthermore, they appear to be less affected than hypochlorites by the presence of organic matter [2, 3]. Since unscrupulous persons may consider adding them to milk as a preservative, studies were conducted to determine the effectiveness of a typical iodophor for this purpose.

Experimental

Iosan*, a detergent-sanitizer formulation for dairy farm use, was selected for these studies. Since the recommended use-dilution is only 25 ppm, it is highly improbable that more than a trace would be picked up by milk passing over equipment treated with such a solution. To confirm this, 2.5 gallons of warm (90°F) solution of Iosan containing 25 ppm available iodine were sucked through each of four milker units, then poured through strainers, fitted with filter pads, into shipping cans. The latter were then rotated so as to treat all inner surfaces. Because of the low surface tension of the solution, considerable foam remained on strainers and in milker pails and cans. Milk taken from the first can filled was checked for "off" flavor but none could be detected. This test was repeated, with the same result.

The minimal detectable concentration of Iosan was determined by adding various amounts to both raw and pasteurized milks and having three or four experienced persons taste them for "off" flavor. A decided difference was noted between the first supply of Iosan (No. 1) and a subsequent one (No. 2). Number 1 could be just barely detected at 16 ppm while for No. 2 this point was reached at 8 ppm. As the concentration of available iodine was increased beyond these points, an increasingly bitter and unpleasant flavor developed.

To determine the effect of several concentrations of Iosan upon the bacterial flora of raw milk, samples were obtained from large storage vats at a local dairy† These were selected in place of lower count milks in order to get a widely representative flora. The samples were subdivided and the desired concentrations of Iosan added. The control was plated, then all samples were incubated at approximately 16°C for 5 hours to encourage bacterial growth. Samples were then plated[1] and plates incubated at 32°C for 48 hours.

Table 2—Resazurin Reduction Times* of Milks Treated With Iosan As A Preservative
(Tests run after 5 hours incubation at 16° C.)

Date	Control	Iosan No. 1	Iosan No. 2	
		16 ppm	8 ppm	16 ppm
Jan. 12/54	1	1	1	1
19	0.5	0.5	0.5	0.75
Feb. 3	0.75	0.75	0.75	0.75
9	1.5	1.5	1.5	1.5
11	3.0	3.5	3.0	3.5
19	0.5	0.5	0.5	0.5

*Hours required for reduction beyond the Munsell P7/4 endpoint.

In studying the preservative effect of quaternary ammonium compounds in milk, Johns and Pritchard[4] found that the resazurin reduction test reflected the bacteriostatic effect of the germicide more uniformly than did the plate count. Consequently, the resazurin test was also run on each series of samples in the present studies.

Results and Discussion

The effect of these concentrations upon bacterial growth in the milk is shown in Tables 1 and 2. While bacterial growth in these milks was slightly depressed in the presence of 16 ppm available iodine, the effect was too small to be of practical significance.

The results with the resazurin test were in very close agreement with those obtained by the plate count method.

No reason can be advanced for

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Table 1—Plate Counts of Milks Treated With Iosan as a Preservative
(Expressed as thousands per ml)

Dates	Initial count	After 5 hrs incubation at 16°C.							
		Control		Iosan No. 1		Iosan No. 2			
				16 ppm		8 ppm		16 ppm	
			%		%		%		%
Jan. 12/54	410	580	100	510	87.9	930	160	320	55.2
19	4,800	11,000	100	13,000	118	15,000	136	9,100	82.7
27	3,500	20,000	100	15,000	75.0	20,000	100	23,000	115
Feb. 3	1,600	8,700	100	6,700	77.0	7,400	85.1	6,400	73.6
9	1,000	2,800	100	2,300	82.1	2,400	85.7	2,200	78.6
11	410	800	100	780	97.5	940	118	770	96.3
19	7,000	16,000	100	17,000	106.3	22,000	138	19,000	119
Average			100		91.9		117.5		88.6

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Contribution No. 375 Bacteriology Division, Science Service, Canada Department of Agriculture, Ottawa.

*We are indebted to West Disinfecting Co. Ltd., Montreal, for furnishing samples of this product.

†Most samples were of milk which had been held at the plant for over 24 hours; some growth of psychrophilic organisms may have occurred before the initial plating.

MILK and FOOD SANITATION

ESTABLISHING AND MAINTAINING ABBOTTS QUALITY MILK CONTROL PROGRAM*

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Abbotts Dairies, Inc., Philadelphia, Pa.

Observations on work of eight fieldmen maintaining a milk supply for fluid use.

Essential factors are (a) proper herd management with respect to health, housing, sanitation and milking practices, (b) proper equipment adequately cleansed after each use; and (c) proper storage of milk on the farm.

Records must be kept by fieldmen showing details of bacteria, sediment, flavor, and odor checks for each patron on the supply. Microscope and smear from incubated samples recommended for rapid determination of type and extent of contamination.

Fieldman must be intelligent, energetic, and respected by producers.

On behalf of ABBOTTS DAIRIES, INC., I wish to express our appreciation for the invitation to attend this meeting and discuss our methods for quality control of the raw milk supply.

We have recently celebrated our 75th Anniversary and like so many of the larger companies, started out in a small way with a push cart, a store, and a few customers, and grew to our present size mainly by a constant increase in business.

The policy of the company has been to provide the customers with the finest dairy products available. The methods used were developed about 1912 by Charles E. North, a young medical student interested in preventive medicine. He discovered that the infant mortality rate at New York's infant feeding stations was raised or lowered in direct proportion to the quality of the milk available.

By educating the producers on simple methods of sanitation, connected with daily milking activities, his products were made available with greatly improved flavor, keeping quality, and safety from a public health standpoint.

Mr. C. R. Lindback, the President of the Company at that time, saw in this program a distinct opportunity to develop the business by improving the quality of the products, and proceeded to incorporate this system into a quality control program for the entire supply. Much of the success of this program has been due to the energy and competent work of Mrs. A. K. Eaton, with whom many of you are acquainted. Upon Mr. Lindback's death in 1950, a long time associate, Mr. Ridgway Kennedy, Jr., became our new President and is carrying on the program with the same vigor and determination.

*Presented at the 40th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., East Lansing, Michigan, September 1 – 3, 1954.

SUPERVISORY PROGRAM

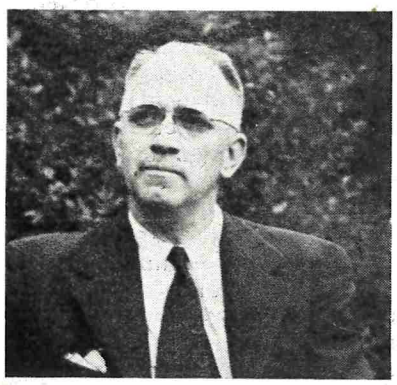
The fundamentals of milk sanitation were written by Dr. Herbert W. Conn of Wesleyan University in Farmer Bulletin No. 2 of the U. S. Department of Agriculture many years ago. They are: –

Healthy cows
Clean Cows—udders and hands
Clean, well ventilated stables
Clean utensils
Low temperature storage of milk.

After educating the producer in these procedures, how effectively he carries them out is checked by a series of sediment tests, plate counts, breed smears, and daily examinations by competent receiving personnel. This quickly reveals a supply for what it really is and when failure to comply is indicated, a competent fieldman takes over, advising with the producer on the necessary changes in his management.

We have a force of eight experienced men, one of whom is a veterinarian. All are familiar with good dairy farm practice, utensil sanitation, fundamentals of bacteriology, receiving platform requirements, standard methods for making sediment tests, agar plate and breed counts, and an understanding of good producer relations. Each one averages about 180 dairies and supervises—

Farm activities dealing with herd health
Farm sanitation and inspection
Utensil Sanitation



Alan B. Miller graduated from Rutgers College in 1917. He served in the U. S. Air Force in 1918. Operated a dairy farm in eastern Pennsylvania, and has been fieldman and Supervisor of Farm Sanitation for *Abbotts Dairies, Inc.*, for 30 years.

Problems of procurement.

Working with men of every level of intelligence, this work is interesting and challenging. Their of the greatest hurdles to overcome in influencing producers is indifference and complacency. I am reminded of a silly poem applicable to the situation.

"I eat my peas with honey
I've done it all my life
It makes the peas taste funny
But it holds them on my knife."

Such complacency is no easy matter to overcome. Each fieldman is on his own and may work out his problems as he sees fit. Low counts, good farm conditions and clean good flavored milk, spell out his success.

HERD HEALTH

Tuberculin testing of all animals is compulsory everywhere and fieldmen are charged with the responsibility of keeping the program up to date.

A Brucellosis eradication program, now under way, should result in completely tested herds within a short time.

Yearly physical examinations of milking cows are required on all herds. This is important. The work is done partially by our own veterinarian and partially by private practitioners. Their herd conditions are checked by monthly

Breed counts made on samples that have been incubated three to four hours. This combination of both udder and milk checking not only detects mastitis in its early stages, but it is highly educational to the dairyman, encouraging the daily use of the strip cup and frequent checking with Brom Thymol strips in his efforts to ship low count milk.

The frequency with which mastitis appears in the supply has caused us no little concern and an analysis of our experience leads us to believe that control is closely associated with the management of the herd.

Immersion of milker teat cups between each cow and washing of udders with sanitizing solutions are standard recommendations, but many producers successfully avoid infections without resorting to these practices. To prevent this we are principally concerned with:

1. The age and condition of inflations.
2. Were they properly washed after the last milking.
3. Is the udder washed with a clean cloth and warm solution of a good cleanser.
4. The length of time the milker is on the cow.
5. Is the vacuum pressure kept down to the recommended figure.

These, in our experience, are the major sources of infected udders—with special emphasis on the last two items, — short-time milking and low vacuum pressures.

We are often find one man using three, four, and even six units, with machines in operation on udders for as long as 15 minutes. Vacuum pressure as high as 20 inches is too often found, with operators entirely unaware of the damage done to the udders of their cattle.

DIRT IN MILK

Sleek, well groomed cattle are an advertisement for any dairyman and indicate pride and good management, frequent clipping, and daily grooming when stabled.

Adequate udder washing procedures are necessary to provide a supply of milk as free of undesirable soil organisms as can be expected. Farm visits and sediment testing with "off the bottom" testers keep the record very clear as to where herd management is weakest and where more than average attention from the fieldman is needed. While we are particularly interested in elimination of any dirt from the milk, it still seems necessary to use strainers. An engraved tile has been recovered from excavations on the site of "Ur, of the Chaldees", which shows a woman straining milk. After 5,000 years we are still straining milk and it seems the only improvement that can be offered is an 18 quart stainless steel strainer with a positive seal single service strainer disc.

An energetic representative of one of the larger merchandizers of strainer pads has an illuminating demonstration of how not to use strainers. By asking producers to retain used discs from several milkings for inspection and comparison by himself and our fieldman, the producer is often shamed into a better washing job.

Some of the men are so embarrassed by what they see on their own strainer pads that attempts are made to wash them off before inspection. This evasion is obvious to the inspector and frequently we use this means of convincing reluctant shippers of the damage being done to the milk supply. There is little reason other than indifference for a producer to see his daily strainer pad and do nothing about improving it.

BACTERIA CONTAMINATION

The frequency of examination made on milk supplies and the response of patrons to unsatisfactory results have a very definite relationship to the final flavor and condition of the pasteurized supply. One monthly thermoduric count on shipments from each producer is provided; on shipments of premium milk, there are additional raw plate counts five times a month. With an alert fieldman, contamination can usually be quickly traced down and eliminated.

Too often visible sources of some types of contamination are difficult to locate. Our field force undertook an investigation of this condition and, after many hundreds of trials, came up with a plan of developing the active organism in the original sample of milk by incubating for three to four hours or longer and then making a Breed count.

An amazing picture of careless farm management began to reveal itself as a result of this work and the men have found it necessary to re-educate producers on the importance of managed milking programs: —

Equipment cleaning programs (too many just want to wash once a day)

Rubber replacement program

Airline and Pulsator cleaning, etc.

It is interesting to note that the yearly farm labor turn-over is as high as 30 percent—especially in those areas close to industrial centers. This means that one out of every three men must be freshly trained, each year, in matters of milk sanitation.

Vocational Agricultural Training in High Schools and 4-H Club Work, it would seem, should be training men along these lines as well as in production problems. The records however indicate an abysmal ignorance on the part of these boys on matters of farm sanitation, managed milking programs, and herd health.

EQUIPMENT

It is estimated that daily milk supply daily passes through 30,000 feet of rubber tubing on the farms. To care for this under ideal conditions would be difficult, and scattered around on 1600 or more farms, it is not surprising that much of the bacterial contamination found is traceable to this source, particularly to improper cleaning after the night milking. The usual treatment with cold or lukewarm water is insufficient to remove the fat accumulations, which remain as fertile breeding grounds for bacteria and the constant source of rubber deterioration. To correct this our producers are asked to provide an adequate supply of hot water (180° if possible) double wash-tubs, brushes, and a good cleanser. Rinsing with lukewarm water; soaking in cleaner for 5 minutes. Brushing, and then rinsing with the hottest water available is recommended, and when used keeps equipment in a satisfactory condition. Glass clean surfaces are needed and soaking in warm cleaning solution for 5 minutes after each use is absolutely necessary.

Sanitizers of all sorts have been tried. Since there is too little

evidence available to indicate that a properly cleaned surface is improved by treatment with any sanitizer now available and until there is practical evidence of the value of these materials we do not recommend them. The application of water at a sterilizing temperature is certainly desirable whenever possible and uniformly effective under all conditions. The Industry finds hot water sterilization for use in its plants superior to any other system and just why any less effective system should be tolerated on producing units is beyond understanding. We have been able to control and constantly improve our supplies without resorting to any chemical sterilizing.

FARM INSPECTION

Farm inspection reports are posted on all dairies every six months. Inspectors from eight different agencies check our supply. One makes 100 percent inspection each year. The others make frequent cross section checks of farms and incoming milk by means of sediment tests and Breed counts.

Standards covering the most extreme requirements of any agency are enforced on all farms making any portion of the supply available, on approval, for shipment wherever needed.

One of the difficulties in rating large groups of producers by different men is to have each one place the same value on what they see and for each one to see the same thing. One man sees cracks in the ceiling, another is chiefly observant of floors and yards, while another is particularly interested in the conditions of the equipment, etc.

Many inspection agencies have developed numerical scoring systems, obviously in an effort to minmize the human error and bring about more uniformity of judgement. We developed one ourselves. However, all of these systems have one weak point inasmuch as they give little or no weight on the score card to the record on flavor and odor, sediment and bacteria—at the time the inspection is made.

Clean, safe milk can be made under a variety of conditions ranging from ideal to deplorable. To be sure, the better the conditions, the easier it may be to do this successfully, but the largest single factor in providing a supply you may be proud of is the individual who

Selects the cows
Feeds and cleans the cows
Milks the cows
Operates the milking machine
Handles the milk
Ships the milk 365 days in a year.

There is no file of 90, 95, or 100 percent perfect score sheets that insures a perfect product. The only insurance is that vital information secured by day after day checking on the incoming supply for flavor and odor, dirt, and bacterial contamination.

In an effort to use this information effectively each man is equipped with a *"Lefax Note Book"* in which is recorded for each producer

Bacteria Records
Sediment Records
Butterfat Tests
Temperatures of shipments
Monthly production
T. B. Blood Testing and Physical Examination records.

On the back of the sheet he records his visits and findings. Here is a revealing picture of each producer. It is an effective piece of equipment for the fieldman.

We would not have you believe this program secures completely satisfactory results. It can be contradictory and even embarrassing, for what you think to be the source of trouble may turn out to be something entirely different.

I am reminded in closing of the story of a boy forbidden by his father to go to a Burlesque Show because he would see there things he should not see. Of course the boy went, and when his friends asked him if he saw there anything he should not have seen, he answered, "Boy I'll say I did, — I saw Father there".

A fieldman's work is never done, there is always something more—something to challenge his ingenuity, something that will further safeguard the supply. The men with whom he works will not all regard him as a friend, but they must respect his knowledge, ability, and willingness to help solve their problems.

A competent fieldman is indispensable to any milk supply that you would constantly improve and enlarge.

This program has proved to be saleable to producers and effective in giving long time direction to their efforts. We plan to extend both its scope and effectiveness.

DAIRY FIELDMEN'S AND PLANT OPERATOR'S CONFERENCES TO BE HELD AT PURDUE

Two one-day dairy meetings will be held in November and December, 1954 at Purdue University according to an announcement by Professor H. W. Gregory, Head, Dairy Department. These meetings are the Dairy Fieldmen's Conference, November 30, and the Dairy Plant Operators Conference December 1.

The conferences are a continuation of the series held annually in cooperation with the Indiana Dairy Products Association. For further information write to: Professor V. C. Manhart, Smith Hall, Purdue University, Lafayette, Indiana.

SOL PINCUS TO SPEAK IN ITALY

Sol Pincus, Consulting Sanitary Engineer, formerly of the World Health Organization, has been invited as one of the foreign experts to take part in the International Congress on the Underdeveloped Areas to be held in Milan, October 10 to 16. He will read a paper on The Problems of Sanitation and Engineering in the Underdeveloped Areas of Italy. The purpose of the Congress sponsored by official and educational agencies of Italy is to gather together contributions of Italian and foreign scholars on the subject of the underdeveloped areas. Following the close of the Congress he will visit various public health and engineering workers in Western Europe.

A STUDY OF MILK LOSSES AS INFLUENCED BY RATE OF EMPTYING MILK CANS* **

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The amount of loss of milk due to stickage was estimated at various dumping rates under plant conditions. The dumping rates ranged from five to ten cans per minute. The losses at these rates ranged from 0.20 to 0.75% respectively. The fat test of the milk lost due to stickage was higher than that of a composite sample of all the milk delivered. The results were in agreement with those of previous workers. These estimates may be used by farmers to estimate their losses from this source and by milk handlers to estimate their losses at the receiving room.

Whenever milk is delivered in the conventional 40-quart can to the dairy plant, some of the milk is lost because it sticks to the inside of the can or because it drains from the can after the can has been emptied into the weigh vat. Reliable estimates as to the actual amount of this loss are not readily available. The term "dumping" is a common expression used to describe the emptying of the milk from the can into the weigh vat. The milk remaining in the can after dumping is usually referred to as stickage. The extent of this waste of milk may be influenced by many factors among which may be the individual doing the dumping, the temperature of the milk, the fat test of the milk, the breeds of cattle involved in the production of the milk, the amount of creaming which has taken place, and the fullness of the cans.

The elimination of this loss of milk due to stickage has been used to demonstrate the advantages of the bulk handling of milk on the farm. Those dairymen using bulk handling have their milk measured in the tank by means of a calibrated rod. Therefore, they are paid for the total volume of milk in the tank without any reductions due to stickage losses. This loss of milk due to stickage also contributes to the sewage problem of most dairy plants.

The length of time that the milk can is allowed to drain over the weigh vat will influence the amount of milk loss due to stickage. Schwarzkopf[2] called attention to this fact in summarizing the recommendations of the Task Committee studying reduction in dairy plant wastes. Hansen[1] has reported data on the actual amount of stickage in milk cans. He was interested in the difference between the stickage in stainless steel and tinned steel milk cans. He found that there was no significant difference between the stickage in these two types of cans, but that the drainage time is of great importance in determining the amount of stickage in either type of can.

The purpose of this study was to determine the amount of loss of milk due to stickage under practical plant conditions as influenced by the rate of receiving milk and emptying cans. An attempt was made to hold all the other variable factors as constant as possible so that only the effect of dumping rate would influence the amount of stickage. Since the study was conducted under what are considered to be average practical plant conditions, the data so obtained should be of interest for use in estimating the losses of milk caused by stickage.

METHODS

The facilities of the receiving room of the Department of Dairy and Food Industries, University of Wisconsin, were used in this study. The data on stickage losses were obtained by using a truck load of milk from the same patrons for each determination. This particular load of milk was considered to be representative of that received at the University dairy plant. About 3,000 pounds of milk were delivered daily from the six patrons on this load. The route covered approximately eight miles. The largest of the producers usually delivered thirteen 40-quart cans while the smallest sent in six cans. The fat tests of composite samples of the milk of the respective patrons varied between 3.0 and 3.9 percent during the period of the study. The average weight of milk delivered per can was 72.9 pounds. By using the milk from this particular route, values could be obtained which would apply to many dairies having similar operations.

The loss of milk due to stickage was measured at various rates of dumping. A different rate can imply two conditions. In one case a slower rate of dumping means that the can has a longer time to drain into the weigh vat before it is pushed into the can washer. This will result in more complete draining of the milk from the can into the weigh vat. In the second case a slower rate of dumping implies that the cans spend the same interval of time over the weigh vat regardless of the rate of dumping. As a result the proportion of the milk flowing into the weigh vat remains the same whatever the rate of dumping. Therefore, unless there is some provision for collecting and salvaging the milk which drains between the weigh vat and

Harold Rapp obtained his B.S. degree from Cornell University in 1952. He received his M.S. degree from the Department of Dairy and Food Industries of the University of Wisconsin in 1954. This paper is based on a section of a thesis submitted by the senior author in fulfilling the requirements for his Master's degree.

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the can washer, the stickage loss is constant and does not depend on the dumping rate. The former situation was the one applied in this study.

Dumping rates were measured in cans per minute. The dumping rates were determined by adjusting the speed of the can washer and checking with a stop watch. For example, in a normal operation when the can washer is set for eight cans per minute the metal "dog" which pulls the can through the washer comes forward to the front of the can washer eight times each minute. Each time the "dog" comes forward a can is pushed onto it. Immediately after a can is pushed into the washer, another can is dumped and inverted over the weigh vat until the "dog" comes forward again. Then this can, too, is pushed into the washer. When the "dog" is operating more rapidly (the dumping rate is faster) the period of inversion over the weigh vat is less.

In this study the cans were not pushed into the washer directly after emptying. Instead, they were allowed to drain into the weigh vat for a time corresponding to the rate of operation of the can washer. Then at the time they would normally be engaged by the "dog" and pulled into the can washer the cans were uprighted and then lifted from the track. The milk remaining in the can as stickage was removed as follows.

Two hundred milliliters of distilled water at room temperature was added to each can. The cans were then shaken in the manner prescribed by Standard Methods when determining the bacterial content of cans[3]. The rinsings were all poured into one container and the rinsed cans were then returned to the can washer for cleaning.

The weight of the milk-water rinsings was determined. Then the percentage of milk in the milk-water rinsings was determined by the turbidometric method of Hansen[1] as follows.

Using a composite sample from the entire load, six dilutions, 0.125, 0.250, 0.500, 1.000, 2.000 and 3.000 percent by volume were made up with distilled water. The percent transmission of each of these dilutions was determined by means of an Evelyn colorimeter using a 540-mu filter. A standard curve was prepared for each day's milk. The same dilutions were made from the milk-water rinsings. From the percentage transmission of these dilutions, the percent of milk in the rinsings could be determined from the standard curve. It was then possible to calculate the percentage loss of milk due to stickage.

Part of the ordinary procedure of dumping milk at the University of Wisconsin Dairy is to collect the milk which drains from the cans while they are moving from the weigh vat to the can washer. This milk is discarded. Routine fat test of this drainage milk indicated it to be higher than that of a composite sample of all the milk delivered. Since this drainage milk represents an important part of the stickage milk, and because a high fat test in this milk increases the significance of the stickage loss, the difference between the Babcock tests of the daily accumulation of drainage milk and that of composite samples of all the milk delivered on the same day were determined.

The test of the drainage milk was determined directly from the pail of drippings located under the entrance to the can washer. Composite samples of the milk delivered were collected by means of an automatic sampling device located in the raw milk line. Previous experience with this device in which the composite sample was compared with a sample from the well mixed contents of the raw milk tank had shown the composite sample to be truly representative of the milk delivered.

RESULTS

The results of this study are shown in Tables 1 and 2. The dependence of stickage losses on dumping rates, with the loss being greater at the faster dumping rates, is evident. Losses of only 0.20% were encountered at the relatively slow dumping rate of five cans per minute. Considerable variation in the loss at ten cans per minute was observed. These varied from 0.43 to 0.75% on successive days. Some of the many factors which may have caused these discrepancies are listed below. The data are in good accord with that of Hansen.

TABLE 1—THE RELATIONSHIP OF STICKAGE LOSSES TO DUMPING RATES

Dumping rate (cans per minute)	Stickage losses as percent of milk received
5	0.20
5	0.21
6	0.21
7	0.28
8	0.35
10	0.43
10	0.53
10	0.75

The data of Table 2 indicates that the fat test of the milk which is left in the cans after they are dumped is considerably higher than the mixed contents of the can. The daily tests of the drainage milk varied only from 5.4 to 5.6 percent while that of the composite samples for corresponding days also remained relatively constant at about 3.6 percent. Thus the loss is greater than the data of Table 1 indicates because of the high fat test of the stickage milk.

DISCUSSION

Although care was exercised at all times, it is conceivable that errors could have been encountered from several sources. As an example, the turbidometric procedure is probably affected by the temperature of the sample, the fat percentage, the physical state of the fat, the size of the fat globules, and the condition of the other milk constituents. The only attempt to control these factors was to carry out the experimental procedures in the same manner each time. Another factor is the human error in the dumper. On some days the dumper seemed to be more careful about spilling milk than others. From this point of view the discrepancies are desirable since they represent a range of values for stickage losses which may be experienced under practical conditions.

It may be said that the results are indicative of the losses due to stickage which probably are experienced in many plants. The increase in stickage loss due to the shorter drainage time at the faster dumping rates is shown. Since it is more economical from the manpower and machinery standpoint to dump at the faster rates, the economic loss of stickage and the increased sewage problem should be considered when taking advantage of higher capacity can washing machinery. It is common practice to

TABLE 2—TYPICAL DAILY RELATIONSHIPS BETWEEN THE BABCOCK TEST OF COMPOSITE SAMPLES OF THE MILK DELIVERED AND THE MILK ACCUMULATED FROM THE DRAININGS OF CANS ENTERING THE CAN WASHER.

Test of composite sample %	Test of drainage milk %	Difference between tests %
3.6	5.4	1.8
3.5	5.4	1.9
3.6	5.6	2.0

collect the drippings from the cans moving into the can washer.

CONCLUSIONS

There is a definite loss of milk when it is handled in 40 quart cans due to stickage of the milk in the cans at the time that they are dumped. This loss is greater the faster the dumping rate. This waste milk represents a definite monetary loss to the milk producer.

The elimination of this loss of milk has been used as one of the reasons for promoting the bulk handling of milk on the farm. While it is true that possible savings of milk would result when it is handled by the bulk system, the actual amount of the savings would be relatively small compared to the total cost of the bulk milk installation.

The greatest importance of stickage is derived from its nuisance as a sewage problem.

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HYDROLITIS RANCIDITY INDUCED BY PIPELINE MILKERS

Continued from Page 312

most troublesome causes of induced rancidity and how they may be modified to reduce activation of lipolysis. The procedure involved passing milk several times through individual sections of a pipeline milker under controlled conditions and examining samples taken after each pass for the intensity of rancidity that later developed during storage. Results are discussed and applied to the practical control of rancidity induced by pipeline milkers. Among the more troublesome conditions causing induced rancidity are admission of air to the milk line, low milk flow-rate, elevation of warm milk under vacuum with air bubbling through it, inclusion of a filter and numerous fittings in the vacuum-section of the milk line, and continuous operation of a starved centrifugal pump. Variations in the susceptibility of milk to induced rancidity appear to be important in determining whether milk will go rancid after passage through a pipeline milker.

ACKNOWLEDGMENTS

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IODOPHORS AS PRESERVATIVES FOR MILK

Continued from Page 313

the greater effect upon flavor of the second supply of Iosan.

While these studies were conducted with a single iodophor formulation, the indications are that iodophors are unlikely to act as effective preservatives in milk in concentrations which would escape detection by taste. Furthermore, it is most improbable that concentrations detectable by taste would be picked up accidentally through inadequate draining of utensils or equipment treated with an iodophor solution at the recommended dilution.

SUMMARY

The maximum concentration of Iosan, a representative iodophor, which would escape detection by taste was ineffective as a preservative in milk.

ACKNOWLEDGEMENTS

Thanks are extended to G. Briscoe, C. A. Gibson, D. J. Swan, and A. H. White for assistance in determining the threshold of taste of Iosan in milk.

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THE PRESENT STATUS OF GRADES AND STANDARDS OF MILK AND CREAM FOR DAIRY PRODUCTS

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A single standard of quality for all milk is proposed by some persons. In other words they argue that milk for manufacturing dairy products should be of the same high quality as that used for market milk. The authors feel that there is no logical reason why all milk for human consumption shouldn't be required to meet the same quality standards. However, it will be a long time before such a single standard of quality is practical. In fact, it appears impossible at the present time to obtain agreement regarding the essential quality factors of milk for the manufacture of dairy products.

In 1949 ,the Standards Section of the Dairy Branch, of the then Production and Marketing Administration, United States Department of Agriculture, surveyed the state departments of agriculture, state departments of health, state agricultural colleges, and other interested parties to determine whether uniform standards for milk for manufacturing purposes were needed. An overwhelming majority of the replies indicated the need for such uniform standards. As a result, a preliminary draft of standards was prepared and distributed for discussion and comment. Based on the replies received, proposed United States Standards for Grades of Milk for Use in the Manufacture of Dairy Products were published in August, 1950. These proposed standards established three grades. The basis for the grades were flavor and odor, acidity, physical character, sediment, and bacterial requirements. These grades were proposed as voluntary grades to serve as a basis from which uniform state grades could be established. After their publication, we were unable to obtain agreement from all interested segments of the industry as to the limits to be set for the quality factors used to establish the grades. As a result, the issuance of the standards for grades was indefinitely postponed.

Standards for Milk for Manufacture

A study of the present provisions in state standards for grades of milk for use in the manufacture of dairy products shows that there is a need for uniform grades uniformly applied.

Of our 48 states, only 3 have definite grades for manufacturing milk based on more than one quality factor. For first grade milk, 2 of these states have a sediment requirement of not over 2.5 mg and the third state a requirement of not in excess of 0.5 mg. To establish bacterial estimates for first grade milk, methylene blue reduction times of not less than 3, 3½, and 5½ hours respectively are specified by the 3 states. In addition, 1 state specifies an acidity of not more than 0.19 percent for first grade milk. All 3 states specify that the milk should be free from undesirable or unclean flavor or odor and any foreign substance. For second grade milk methylene blue reduction times of not less than 3 hours, less than 3½ but not less than 1 hour, and less than 5½ but not less than 2½ hours are specified. Each of the three states has a sediment requirement of not more than 2.5 mg for second grade milk, and 1 of the states also has an acidity requirement of not in excess of 0.19 percent. Two of the 3 states specify that milk not meeting grade 2 requirements is illegal milk. The third specifies that milk having in excess of 2.5 mg sediment should not be accepted, but that an "undergrade" milk of less than 2½-hours methylene blue reduction time can be accepted and tested weekly until the conditions have been corrected, or until the patron has been excluded from the market.

One state defines two acceptable grades and 1 unacceptable grade of milk based on sediment contents of 0.5, 3.0, and in excess of 3.0 mg. In addition, a visual, as well as a taste or smell, inspection before dumping, is specified.

Twelve states either list requirements for acceptable milk or define illegal or nonacceptable milk. Among the requirements for acceptable milk are sediment requirements of : No. 2 or better (No. 3 borderline); less than Class 3 (Class 3 acceptable for 10 days); No. 3; and "fair;" Class 2 or better (Class 2 based on *U. S. Sediment Standards for Milk and Milk Products* 0.50 mg disc). The classes are in accordance with state or industry standards which usually are not recorded on a milligram basis. The sediments specified as causing the milk to be unacceptable are 2.5 mg

D. R. Strobel, received his BS degree, VPI, in 1940, and MS degree in Dairy Technology, OSU, in 1941. Called to active duty as an artillery officer, he was on active duty for 4 years—33 months of which were spent in the South Pacific and 6 months in the QM Research and Development Laboratory. Released from active duty as a Captain in 1945, he was employed by Armour Creameries for approximately 2 years, in charge of quality control and quality improvement in the Indiana, Kentucky, and Tennessee area. After serving as Assistant to the Chief, Dairy Division, N. C. Dept. of Agr., he entered the U. S. Dept of Agriculture in 1949, as Dairy Manufacturing Technologist, Dairy Division, Agricultural Marketing Service to work in developing standards for milk and milk products. Transferred in June 1954 to Foreign Agricultural Service, USDA. Has published several papers in the field of milk technology. Is a member of the International Association of Milk and Food Sanitarians, American Dairy Science Association, and Maryland, D.C. Dairy Technology Society.

or more (if at end of ten days or seven tests not 0.5 mg or better, milk is unacceptable): 3 mg or more; excess of No. 3; Class 4; No. 3; and "dirty."

The following bacterial requirements are given for acceptable milk: 2,000,000 direct individual count; 1-hour methylene blue; and 2½-hour methylene blue (allowed 10 weeks to meet acceptable requirement). One state specifies requirements for acceptable manufacturing milk, pasteurized, as follows: Five-hour methylene blue or 800,000 plate count; sediment test of "fair." One state permits acceptance of 20-minute methylene blue milk for 45 days; and another state requires methylene blue tests to be run once a month but sets no limits as to reduction time.

Including the three states that use both bacterial and sediment requirements as factors in establishing milk grades, there is a total of 8 states having bacterial requirements and 13 states having sediment requirements. Three of these states also have temperature requirements for the milk at the time it is received at the plant. As the maximum limits for acceptance, 2 specify 70° F, and the third specifies not over 8° F above the average water temperature of the area. All include the provision that the temperature requirements do not apply if the milk is delivered within 2 hours from the time of milking.

The frequency of applying the sediment and methylene blue tests varies among the states. Nine specify that the sediment test should be made at least twice a month while 4 states specify testing at least once a month. Five states specify a bacterial determination once a month and three specify twice a month.

It is evident from this brief outline of the requirements of the existing state standards or specifications for manufacturing milk that we are far from having a uniform set of standards uniformly applied.

STANDARDS FOR CREAM

A need also exists for a uniform set of standards for grades of cream for use in the manufacture of butter. Proposed standards were issued by the Department of Agriculture in January, 1951, but the outcome was the same as that for milk, and the final issuance was indefinitely postponed. Three grades based on flavor and odor, titratable acidity, physical character, and sediment content were proposed.

A study of state standards for grades of cream for use in the manufacture of butter reveals that 17 of the 48 states have established such grades. As would be anticipated, with the greater number of states having cream grades than those having milk grades, there are many more differences in the various requirements and a greater lack of uniformity.

Fifteen states define a sweet or premium grade cream with about the same general description as to flavors, odors, etc. A butterfat requirement is specified by only 1 of the 15 states. All but 1 specify an acidity of not more than 0.2 percent at any time before use. The exception is an acidity of 0.35 percent. Only 3 specify a sediment standard and this ranges from "practically free" to a No. 3 (2.5 mg).

The description of first grade cream is generally uniform for the 17 states except for butterfat requirements defined by 5 states as follows: Not less than 25 percent (3 states); 30 percent; and not less than 20 percent or more than 50 percent. The acidity standards for first grade cream range from 0.3 percent to 0.8 percent, 7 states not stating a definite acidity requirement. The sediment requirements range from "practically free" to No. 3 for 4 states, the remaining 13 not setting a sediment standard. Two states limit time of delivery to at least every four days.

Most of the 17 states described second grade cream as having "objectionable flavors and odors to a moderate degree." The flavor defects allowed under this general statement vary among the states. The acidity listed by 8 states is "too sour for Grade one." Three states specify 0.3 percent to 0.6 percent, 0.6 percent, and 0.7 percent acidity respectively; and the remaining 6 states do not specify an acidity standard. Eleven states do not have a sediment standard for second grade cream; three have a standard of No. 3; two allow "slight traces;" and one allows "small amount of objectionable sediment." Two states recognize a third grade cream.

Including the 17 states that have established grades, there is a total of 26 that define unlawful cream. The general descriptive terms used are uniform and 20 states have no other requirements. Acidity in excess of 0.6 percent, 0.8 percent, and 1.5 percent is unlawful in 4 states; and No. 3, and No. 4 sediment pads are unlawful in 2 states. Twelve states require that unlawful cream be denatured to prevent use for human food.

A price differential to be paid between grades is provided for by 10 states, and ranges from minimums of one to three cents, and maximums of three to five cents. Delivery time of 24 hours from station to plant after purchase of cream is established by 8 states. Two of the 8, allow a longer delivery period if held below 50° F, and one allows twice a week delivery, October through April, and 1 specifies 48 hours. In 6 states, sediments are run on first deliveries and then once a month; in 2 once a month; in 2 every two weeks; and in 2 as "required by regulations."

SUMMARY

It is, therefore, apparent that we are far from having uniform standards for grades of either manufacturing milk or cream. With this realization and the further knowledge that the present standards are not enforced 100 percent, it is quite evidence that we are a long way from a single standard for milk or cream.

It appears logical that a concerted effort should be made to have uniform high quality material going into a food as widely used as manufactured dairy products. Such an effort is necessary if we are to have high quality finished products and overall quality improvement. We need to offer to the consumer high quality dairy products and we realize that the higher the quality of the raw material, the higher the quality of the finished product manufactured from it. There exists a definite challenge for the states, in cooperation with industry, to develop uniform standards for manufacturing milk and cream.

THE HAMMOND STORY

MAYOR VERNON C. ANDERSON

This is the Hammond story, the story of a down-at-the-heels community in the land of big oil, big steel, and criss crossing railroads five years ago, which took off its coat, rolled up its sleeves, and decided to do something about it. Five short years, and five Clean-Up, Fix-Up Campaigns, later this industrial Indiana city won the Grand National Award in the National Cleanest Town Contest—the Ernest T. Trigg Trophy. In the interim Hammond won first place in its population category in 1949, 1951, 1952 and 1953.

This amazing metamorphosis is a story that should be told. In fact, President Eisenhower in his telegram of congratulations to the City of Hammond said, "The Hammond program is worthy of study by all American communities".

When we launched our first all-out, Clean-Up, Paint-Up, Fix-Up Campaign in 1949, Hammond was dying a slow death. Progress was something connected with the past, and the present was as dark as our current relations with Soviet Russia. Every sound program of civic improvement was debated to death and our city was divided into armed camps, each fighting the other for special advantage. We were walking a treadmill, which exacted a great toll of civic energy, but which got us nowhere. Civic pride was as dead as a corpse, and the words of our people were not "What can *we do* to help?" but rather, "Why doesn't the city do something about it?" The results were dirty streets, alleys piled high with garbage, open garbage dumps, houses and businesses in need of paint and repair, poor streets, broken sidewalks, and badly needed civic improvements lagging because of the argumentative attitude of our people. We were a typical dismal, dirty, industrial city bogged down in the rut of hopelessness which so often leads to blight and deterioration.

ORGANIZATION OF PROGRAM

Then in 1949 we decided to launch a dynamic Clean-Up, Paint-Up, Fix-Up Campaign in which every family and organization in this city of 100,000 people would be given a role to play. Something happened in that 1949 campaign. For the first time in many years we joined hands and went to work on a common task of civic improvement. Everybody from the kids in first grade to the top executives of the community took part in that campaign. They discovered it was fun to work together, and amazing what could be accomplished through united effort, that—"It was better to light one candle than to curse the darkness".

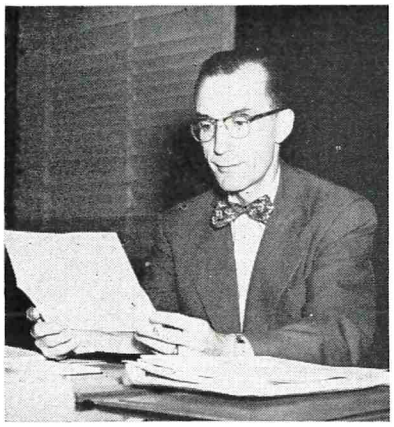
We won first place in the National Cleanest Town Contest that year in our population category, but we won more than that — we won a flaming new civic spirit, a spirit which has sent us striding down the road to our great potential. In the five years since then, we have built more new homes, new churches, and new schools than in any previous twenty-five year period in our history, we moved from the darkness of a dismal factory town into the brightness of a clean, fresh, sparkling community, and we have continued to tick off one badly needed civic improvement after the other *with the united support* of our people.

How was it possible for a city in the heart of industrial America, in the shadow of oil refineries and steel mills with the usual industrial population to win the Grand National Cleanest Town Award in competition with all the cities and towns of America? What is the magic potion, the Aladdin's Lamp which wrought Hammond's civic miracle?

EXECUTION OF PROGRAM

In Hammond we carefully choose our annual campaign chairman, as well as the chairmen of each of his seventy-five committees. We prefer a young man with drive and enthusiasm to head the campaign and we infuse new blood into the Clean-Up, Paint-Up, Fix-Up Committee each year to give us the benefit of fresh eyes and new enthusiasm.

Last year our Chairman, Cecil R. Johnson, a young engineer was loaned to us by our local utility company. He worked all year, paid by his company, and furnished the outstanding leadership which won Hammond the Grand National Award.



Vernon C. Anderson is now serving his 7th year as Mayor of Hammond, Indiana. He is in his early forties and is generally recognized as an able administrator. Impartial observers say he is the best Mayor, Hammond ever had.

During his administration Hammond has won national recognition in the field of cleanliness, traffic safety, fire prevention, low crime rate, and good government.

He has served two terms as President of the Indiana Municipal League. He has sponsored and steered a number of statutes beneficial to cities and towns through the Indiana General Assembly.

He is a Sunday School teacher, coaches his church basketball team, and is District Chairman of the Republican Party. The following address delivered before the Annual meeting of the Indiana Association of Milk and Food Sanitarians on June 9, 1954 indicates, we believe, the reason he has been such an outstanding Mayor.

PUBLIC COOPERATION

The foundation of our success is the fact that in Hammond everybody gets into the act. We start out with more than 20,000 public and parochial elementary school children, who are instructed to bring home check lists to their parents and to have them check off the things they agree to do to improve their properties, and then to sign them, and return them to their teachers. These elementary school kids are the campaign's top salesmen. They keep after Mother and Dad till the job gets done. Mother and Dad hate to lose face with little Johnny and Mary so they fulfill their pledges 96 percent according to our actual neighbor-

hood checks. The teachers in turn do an excellent job of presenting the story to the boys and girls in their respective classes.

We launch our campaign each year with a truly colorful parade. We have five senior high schools in town, and we have developed a traditional competition among them by awarding a trophy to the high school which has the best section in the great Clean-Up, Paint-Up, Fix-Up parade which draws 30,000 to 40,000 spectators each year. This annual competition not only taxes the ingenuity of our high school youth but it leaves a lasting impression for cleanliness and good citizenship, which will be carried into their adult lives. Each high school selects its queens who ride in convertibles in the parade. Their bands march in the parade and they work for weeks on their respective floats religiously carrying out the Clean-Up, Paint-Up, Fix-Up motif. In addition, school organizations participate following the Clean-Up theme. To illustrate last year, one high school built a working life size model of a Dutch Windmill with hundred of high school fellows and girls marching in real Dutch attire including wooden shoes. The competition is so keen that last year when the winner was announced at the end of the parade the losers burst into tears. This great annual parade has become a major event in Hammond and creates such a splash that it gets our dynamic campaign off into high gear.

In addition, each school in the community conducts its own Clean-Up, Paint-Up, Fix-Up program on its own building and grounds, and in its own respective rooms from the first grades through high school. Essay and poster contests with worth while prizes to the winners add further zest and interest to the school program. And a rat trap program in which the boy who builds the best working model of a practical rat trap, sponsored by the City Health Department, won national recognition two years ago in Life Magazine in an interesting feature article. Still concentrating on youth several thousand Boy Scouts and Cub Scouts annually rake and clean unsightly vacant lots. We are thus developing in our youth a desire for a clean, bright, sparkling city through an active participation in this great annual program.

Our churches participate. Preachers, priests, and rabbis urge their people to participate in all the languages and tongues of our great industrial population. Printed Sunday church programs remind their people of the importance of this great annual campaign and people are reached here that could be reached in no other way. As a result of our church participation almost every church building in Hammond has been renovated, beautified, or abandoned and rebuilt. Our church facilities today are superior in beauty and condition to any I have seen anywhere.

INDUSTRIAL COOPERATION

Hammond industries get into the act in a big way with every local industry represented on the Industry Committee. Plant buildings are painted, cleaned, and repaired both inside and out, fences are kept in a good state of repair, and plant lawns and flowers give many of the plant yards a park-like appearance. Unsightly buildings have come down and hundreds of plant eyesore conditions have been eliminated during the past five years. Rome was not built in a day and good industrial housekeeping requires constant attention. Recently the manager of one of our worst original industries sent me a letter in which he said, "I am happy to acknowledge that Clean-Up, Paint-Up, Fix-Up efforts in my plant are actually paying us dividends. I apologize for my original resentment when your committee urged me to correct our past bad housekeeping practices". This industry is now one of the finest in appearance of our smaller plants.

Hammond is criss crossed with railroads. Five years ago their rights of way, their buildings, their crossing gates, and the crossings themselves were in a deplorable condition. In addition steam locomotives were constantly belching out dense black smoke and cinders over large areas of our city. Today their structures are well kept, freshly painted new automatic safety gates protect our crossings, their rights of way are clean and attractive, the crossings at grade are kept smooth for motorists, and deisel locomotives have replaced the dirty steam monsters which previously polluted the air. The railroads have been one of the most cooperative forces in Hammond's Clean-Up, Paint-Up, Fix-Up Campaigns. A typical case in point was the Monon Depot in the very heart of our shopping area. Trains at this depot blocked traffic for long intervals and parking facilities were lacking. Our Clean-Up, Paint-Up, Fix-Up committee urged that the depot be moved south to facilitate the flow of traffic. The Monon depot was sold and a modern attractive new depot was constructed out of the shopping area with adequate parking facilities for Monon patrons. Both the city and the railroad benefited through this fine cooperative project. Hundreds of similar projects, large and small, have resulted from the efforts of our Clean-Up, Paint-Up, Fix-Up Railroad Committee.

Merchants and small business men get into the act, broken down into their respective categories such as grocery stores, drug stores, gasoline filling stations, etc. Through the efforts of our Clean-Up, Paint-Up, Fix-Up committees competitors vie with each other in the fields of cleanliness and beautification. In addition the various business districts of Hammond compete with each other for attractiveness, and each district has a year round organization working on long range programs to improve their respective business areas. Hammond is a great shopping center and currently two huge neighborhood shopping centers are under construction. These will further strengthen the competitive spirit which had its origin in Clean-Up, Paint-Up, Fix-Up and which is fast making Hammond's shopping facilities the most attractive in the entire Chicago area.

LABOR'S COOPERATION

Organized Labor plays a major role in Hammond's Clean-Up, Paint-Up, Fix-Up program. In fact labor plays a dual role. A high percentage of our Labor Unions have built attractive new buildings to house their activities. But their most important contribution is on our annual feature project. Each year we select what we call our "feature project", something which sorely needs to be done, but which cannot be done with tax money or

cannot be done by the person or organization because of lack of funds. Typical of our feature projects was our 1952 project – the complete rehabilitation of a poor negro church. Labor donated its services, and business and material houses donated the necessary materials running into thousands of dollars. When completed this little negro church became one of Hammond's most attractive places of worship. The entire project was financed and done by the people from our Caucasian population, and this in spite of the fact that in Hammond the negro represents scarcely 1% of our population of 100,000 people.

In 1953 our feature project was the conversion of an old brick coach house into an attractive "Teen Age Center" for the Y.W.C.A. Here again the labor was donated by organized labor and the building materials by local business houses.

We feel our annual feature project gives personality to our great annual Clean-Up, Paint-Up, Fix-Up Campaign. It opens up participation to hundreds of people who would otherwise be left out, and makes them feel they belong to this great community effort.

COMMUNITY COOPERATION

Every department of local government gets into the act, and this combined with the cooperation of the people local government serves, creates an unbeatable team. Thousands of tons of trash and garbage are hauled away to our efficient Sanitary Fill Disposal Field, and the Saturday pick up days are a marvel of smoothness and cooperation well organized in advance to get the job done.

City buildings are cleaned, painted and dolled-up to set the right kind of an example for our people. City equipment is cleaned, painted, and shined up. Everything is done to set an example for our people which will leave them without excuse to emulate our efforts.

Hammond service clubs offer prizes for the various contests we sponsor and contribute liberally in committee workers. A high percentage of those who head up this great annual program are member of Lions, Rotary, Kiwanis, Optimists, Jaycees, and the Exchange Club. One of our service clubs the Hessville Lions Club in 1953 built two attractive brick shelter houses in our two Hessville Parks and gave them to the city as a gift, at an estimated cost of $36,000. This is typical of the new community spirit our great annual Clean-Up, Paint-Up, Fix-Up Campaigns have built. Our people have learned that government can't do *everything* for *everybody,* that the people and organizations of the city must give something of *themselves* to make Hammond a better city in which to live.

Our Hammond newspapers and radio stations are in the forefront of each Clean-Up, Paint-Up, Fix-Up Campaign. This is a tribute to their good judgement. They recognize full well the tremendous influence this annual program has been in the uplift of our city. Clean-Up, Paint-Up, Fix-Up pictures, full page ads, editorials, and news stories are prominent features, full page ads, editorials, and news stories are prominent features in our local newspapers during the annual drive. Spot announcements and news stories get into every home via radio over our local stations. Newspaper and radio publicity is augmented by thousands of posters, stickers, bumper signs, and other media obtained from the Clean-Up, Paint-Up, Fix-Up Bureau in Washington, all of which get wide distribution. Only a deaf, dumb and blind person has any excuse to say he has never heard of our Clean-Up, Paint-Up, Fix-Up Campaign in Hammond.

Perhaps the greatest single contribution is made by our army of neighborhood chairmen and individual home owners. The combined results of their efforts is a mighty mountain of achievement. Thousands upon thousands of people improve their homes, their yards, their garages, their alley lines, their sidewalks, and their attitudes every year. The national honors we have won make them proud to live in Hammond and they want to do their part to keep us in the forefront of cities everywhere. I am told we have multiplied the sale of paint, lumber, roofing, concrete, other building materials and clean-up supplies ten times what they once were, since we started our annual campaign five years ago.

To further illustrate how the Hammond Clean-Up, Paint-Up, Fix-Up Campaign has grown the book which we subnit in the National Cleanest Town Contest recording our achievements and telling the story of our campaign, has grown from slightly over 100 pages in 1949 to 435 pages in 1953, weighing almost 100 pounds. Our book is the documented story of our Hammond Campaign. It records the detailed record of the accomplishments of each of our 75 committees and represents months of earnest endeavor. It is organized and prepared by the Art Department of one of our local high schools under the direction of the chairman of the campaign.

This is the Hammond Story of what Clean-Up, Paint-Up, Fix-Up Campaigns have meant to this great industrial city. I am convinced that the same sort of campaign with the same dynamic enthusiasm we pour into it in Hammond will effect civic miracles in any city or town in America. I believe this, as strongly as I believe in God. I challenge communities everywhere to emulate our example.

ROBERT S. WILSON APPOINTED CANADIAN REPRESENTATIVE EX-CELL-O CORPORATION

The rapidly expanding demand for Pure-Pak containers in Canada is revealed in the appointment of Robert S. Wilson as Canadian sales representative for Ex-Cell-O Corporation's Pure-Pak Division.

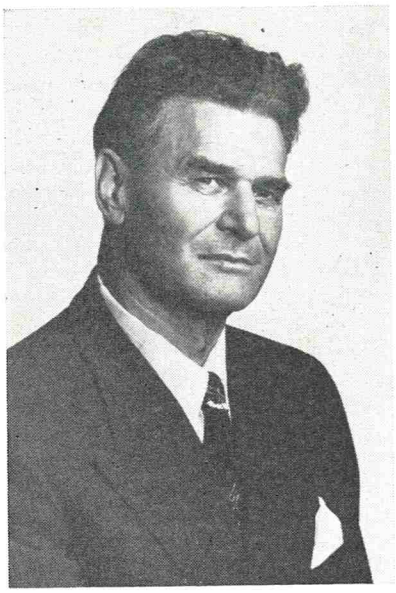
In making the announcement, George Scott, Vice-President, Pure-Pak Sales, stated, "With Canadian usage of Pure-Pak containers increasing ten-fold since 1951, the expansion of Ex-Cell-O's Canadian facilities with headquarters at its London, Ontario plant, is in keeping with the rapidly growing use of Pure-Pak equipment by the Canadian dairy industry. Pure-Pak installations are now in operation in practically every major market from Montreal, Quebec to Vancouver, British Columbia."

Wilson, a veteran of the Royal Canadian Air Force, formerly represented the Krim-Ko Corp. of Canada, Ltd., and is well known among Ontario dairymen. Married and the father of three children, Bob will make his home in London, Ontario.

PROGRESS IN BULK FARM TANKS AND TANKER PICK UP

C. B. A. (Bill) Bryant

Field Service Director, Filter Products Division, Johnson and Johnson Chicago, Ill.



Born and reared on a Michigan farm, and educated in high school and junior college Mr. C. B. A. ("Bill") Bryant promoted power farming equipment, and sold the first Fordson tractor to a farmer in the United States. Entering employment by Johnson & Johnson, he became field sales manager of their Filter Products Division, introducing the use of a cotton filter disk at the farm level. He has written, published, and lectured extensively all over the United States.

Recently on a Saturday afternoon at Ft. Wayne, Indiana, my telephone rang. Answering it the voice said, "Hello, Bill, this is John. I am at home in Vermont. Monday we are sending two of our bright young men on a two weeks trip West to visit Farm Tank installations east of the Mississippi." He added, "We are now one hundred percent on farm tank operation at three of our cities and will push forward toward a similar goal at all points."

One week later, on a Friday evening when I was at Corvallis, Oregon, again my telephone rang in my hotel room. Answering a voice said, "Hello, Bill, this is Herman at Minneapolis, Minnesota. I am leaving Monday for the Northwest Pacific Coast. I want to visit Cooperatives and Independents who have 'Bulk Farm Tank Operations' which might be quite similar to what we might experience up here should we extensively go into such a program". (They have an operation now of over 100 Farm Tank patrons.)

On the evening of March 25th, at Lancaster, Ohio, I was the speaker, with my movies, for the Annual Banquet of Deeds Bros. Dairy, who thus yearly entertain their producers and families. Bill Deeds, the manager, was one of the early pioneers for 100% operation of "Bulk Farm Tanks with Tanker Pick Up." One hundred ten persons were in attendance. All were owners of bulk farm tanks, having had experience with them for over one year. Several present expressed their feelings. All were most enthusiastic about this new method over the old. Many had small herds of 10 to 15 cows, and during some months were milking as few as 8 cows. Among these dairy farmers were those who have what might be termed ordinary general farmers, raising a family and paying off the mortgage. A few had excellent tiled milk rooms—milking parlors, continuous stainless steel or glass pipe line equipment with good size herds. As the Deeds Bros. Dairy is one hundred percent bulk farm tank operation, the receiving room is eliminated. These people operate among the rolling hills of southeastern Ohio.

The tanker truck goes over narrow old farm type roads. Our passenger auto, without chains, could not get up their snow-covered, icy hills when I took my moving pictures. At one place we had to back down the hill and go around. The tanker truck, with dual wheels and a two tank compartment to distribute the milk load for traction, without chains went right up over the same hill we could not get over. The driver informed me he formerly when driving a milk can truck also had difficulty making this and similar hills.

Progress in Northwest

My travels and observations have indicated to me that possibly fastest progress toward this new system of handling milk at the farm has taken place in our Northwest. They possess certain natural facilities that assist their action. The dairy farms are generally larger—good hay and pasture, with rich soil and plenty of rainfall well distributed over the year. Most milk haulers are employees of their milk organizations and do not personally lose a patron turning from milk can haul to a tanker truck, therefore this Northwest dairy industry has very rapidly been converting itself to this newer system. Evidence of this is my February information given me by Mr. Sam Graham, Director of Transportation for Portland, Oregon, Dairy Cooperative Association. They now have over 400 farmer patrons Grade A having bulk farm tanks. They are now also operating nine "Stub Nose" tanker pick-up trucks. These they find to be most economical for their type of hilly terrain and farmer lanes and drives.

Mr. Oscar Mock, Superintendent of Whatcom County Dairymen's Association at Lynden, Washington, spoke of new tanker trucks being equipped with "power take off" from their truck motor to the milk pump on the truck so that this is the power for all pumping of the milk from bulk farm tank in farmer's milk house to the tank on the truck. These have no electric motor on truck with electric cord to plug in at each milk house to operate the milk pump on the truck. In this area it was experienced that when tanker was at farm electric power might be temporarily off, delaying hauler. During a 24-hour period electric current is not off sufficiently to affect cooling of milk in the bulk farm tank. My observations in other sections of the United States has been that seemingly this is no problem. However, this illustrates how "necessity is the master of the occasion" when progress and economy are at stake. At a recent meeting March 2nd at the Manufacturers' Short Course of the State Agriculture College of Utah at Logan, Utah, Mr. Rowland answered two most vital and interesting questions—the first: "Were the dairymen signed up for this added expense of change to farm tanks

prior to Secretary of Agriculture Benson's announcement of future parity to 75% as of April 1st?" His answer was yes. My second question: "Have any of these farmers asked to cancel or have cancelled their agreement for their Bulk Farm Tank, etc., since Secretary Benson's announcement?" The answer was no. So the dairymen of long years standing who are the backbone of our industry evidently have faith in the value of progress and that which is proving of "labor appeal" and general economics to them.

All who are a part of this rapidly growing enterprise are very intelligent people. None have stood still or gone backward. All have progressed and have evidently answered all new questions which have arisen. Most manufacturers have made such progress that at the moment few important new changes are being made. So it would seem that no organization or individual need hold back because of any anticipated distinctly new models. In fact, in re-visitation back to places photographed five years ago, I find old models of bulk farm tanks yet doing a fine job in protecting at the farm high quality produced milk.

In-place Cleaning

Going hand in hand with the Farm Tank and being rapidly installed in all sections of the Nation is the continuous pipe line system and milking parlors. These have "labor appeal." I have, because of popular demand, edited a 15-minute amateur color movie reel on this subject from my extensive library of film. This shows the continuous pipe line, both stainless steel and glass, in stanchion type barns as also installations in various kinds of milking parlors. Several different makes of releasers are included. Special attention in recording these scenes was given to the in-place cleaning equipment and action under operation. At several places with stanchion milking barns, I have photographed installations of glass and stainless steel having as much as 250 feet of line. I have shown the action and turbulance of rinsing water and sanitizing solutions being used. At all places (many in number) all have testified to their complete satisfaction and that of their official city inspection of leaving the lines up for cleaning and sanitizing. This is one "labor appeal" feature. In fact, in one large fluid milk market where this system is very extensive and has been in use for several years, it is not unusual to hear regulatory authorities say, "Leave the lines up, and properly clean and sterilize them. Take them down and contaminate them."

With this continuous pipe line system we have observed and taken in action color movies of several in-the-line filters, these filtering the milk of the entire herd, in some cases numbering 15 to 150 cows. Where a tubular, or so-called sleeve or sock filter is used, the dairy farmer may be tempted to use it again, usually not realizing that it may be the source of future bacteria contamination. There are now ready for the market, and I have photographed them in color movies, stainless steel metal holders using a large diameter single service fibre-bonded disk. This filter medium being single service and not a woven fabric "destroys" itself with one using. When placed in a milk line beyond a woven fabric used in the sleeve filter it seems to catch fine extraneous matter which may have passed through the former. This single service fibre-bonded disk, when mounted after using, is the dairymen's Self Sediment Test, and when clean it is truly his "BADGE OF MERIT". Even when milkers are very careful and do an extra fine job of preparing cows for milking, these disks show some sediment. It is also a safety factor in having a continual check to stimulate carefulness for watching one's self as well as his employees. This is equally desirable where the usual milk strainer formerly used on the milk can is now used on the cover (hole provided) of the bulk farm tank. Several milking parlors, having filters for each milking machine unit, use single service fibre bonded filter disks. These are very adequate for this at-home sediment examining purpose.

Sediment Tests on Tank Milk

At all meetings questions are asked as to how sediment tests are taken of the farm tank milk; and how this compares with the well known off-the-bottom of the milk can test made at the milk company's receiving dock. The state of Wisconsin has been informed of the work by Dr. H. E. Calvert, of the Dairy Division of the University of Wisconsin at Madison, and I believe a bulletin on the subject is available. I have photographed the dairy farmer in his own milk house, at the side of his bulk farm tank, witnessing a sediment test being taken by a sanitarian. This has a most pleasing psychological effect. Now the dairy farmer for the first time may see this important quality check, same as he experiences now the measurement of his milk, and the taking of the butter fat and bacteria sample, with the all-important thermometer temperature reading of the coolness of his held milk, temperatures ranging 40° or lower.

Producer Reaction

I have now visited 360 dairy farms in many states from coast to coast and from Mexico to Canada, which have bulk farm tanks. On each of these calls I have asked each dairyman the same three questions. They are: First, what interests you most in this new system for handling your milk? All have immediately (without exception) taken me to the measuring stick and replied, "The weight of our milk established right here in our milk house."

Second: What is the next important value to you?" Again I have had a unanimous answer: "The butter fat sample being taken for our milk right out of our tank here at the farm. We feel it is the most satisfactory way."

Third: What interests you next? Here there were a few different reasons given, but for the majority the answer was: "The temperature as shown by their thermometer on the tank." They add, "We know we are keeping our milk of high quality well protected." At these 360 farms I have recorded the temperature at all 40° or lower except two, and on these the temperature was 42°

So throughout our great nation progress toward new findings and new equipment go forward, continual improvement being made in learning by doing. Today all audiences everywhere include persons who are a part of this system and contribute much (because of being a do-er) to general discussions. Less than two years ago this was rare. So the parade goes by, adding daily to its ranks by onlookers from the sidelines, falling in line and in step.

Association News

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REPORT BY COMMITTEE ON BUTTER

American Dairy Science Association

The Executive Board of the American Dairy Science Association has accepted the report of the committee on butter of the Manufacturing Section as a document which merits the serious consideration of all those who are striving to improve the quality and acceptability of butter.

A DEVELOPMENT PROGRAM FOR THE BUTTER INDUSTRY

A committee appointed by the American Dairy Science Association has been working for several years to develop plans for a program for the butter industry. The committee has come up with a four-point program dealing with quality improvement, summarized herewith:

(1) Raise the quality of butter manufactured.

(2) Refine the tests used for determining the quality of milk, cream, and butter, and use these tests more extensively.

(3) Sponsor a long-time research program involving the manufacture, storage, and merchandising of butter.

(4) Standardize the color of butter by general trade areas.

The detailed report follows.

It is the committee's belief that its function should center primarily on sponsoring activities that have for their purpose the improvement and standardization of the quality of butter as sold to the ultimate consumer. The butter industry should sponsor a vigorous, continuing research program involving the manufacture, storage, and merchandising of butter. The cooperation of equipment manufacturers, experiment stations, creameries, and merchandisers is necessary. An industry that manufactures and distributes 1.4 billion pounds butter per year must not stand still.

The following 4-point program is recommended:

I. Improvement of Butter Quality

A. *Object*

The butter manufactured should be brought into the highest possible grade. The creameries should manufacture butter of uniform composition, high quality, attractive color and of excellent keeping quality.

B. *Method of Procedure*

(1) All states, individually, should establish laws and/or regulations governing minimum sanitary requirements for producing and handling milk and cream, avoiding variations of regulations in the general geographical areas. This should include suitable standards for sediment content as well as standards for general quality.

(2) The industry should sponsor compulsory payment for milk and cream in accordance on the basis of quality. The grades and price differentials should be such that they will favor the grade of milk or cream that will be suitable for the manufacture of the higher grades of butter. All milk or cream, no matter what grade, should be transported in sanitary, well-protected containers to the creamery.

(3) Milk and cream quality improvement educational programs should be intensified. They should be a part of the dairy extension programs at each agricultural college and of the state dairy producers' and butter manufacturers' associations.

(4) Where butter is manufactured in sizable amounts the state agricultural college should offer a butter scoring and analysis service to the creameries. Information regarding the correction of defects in quality should be reported to the buttermakers. To be successful, industry cooperation and perhaps state plus industry financing may be necessary. Cooperation with the state departments of agriculture is desirable. Reports should be kept confidential to the extent that the origin of the samples be withheld from public knowledge.

(5) Agricultural colleges in states where butter is an important manufactured product should offer short courses in butter manufacture.

(6) Certificates of proficiency should be granted to buttermakers whose ability to make butter can be proved, both by actual manufacture and by oral and written examination.

(7) States that do not have a creamery inspection system should adopt one. This should include inspection of condition of building and surroundings, rodent and insect control, physical condition of equipment, sanitation, sewage disposal and water supply.

II. Tests for Quality

Further improvement and simplification of tests for determining the quality of milk, cream, and butter are desirable. As the demand for butter of higher grade increases, the several quality tests that are now available should be refined and more widely used. For example, tests for keeping quality, pH, yeasts and molds, coliform bacteria, extraneous matter, metal contamination, enzymes (lipase), lipolytic and proteolytic bacteria, and water insoluble and butyric acids, should be more commonly used for checking the quality of pasteurized cream and butter.

III. Manufacturing, packaging, storing, distributing butter

A. *Object*

The object should be to develop methods for procurement of milk and cream, and for manufacture and distribution, so that butter of excellent quality can be economically manufactured and offered to the consumer at prices as favorable as possible.

B. *Method of procedure*

(1) The problems of the butter industry should be determined, then funds for a long-range research and development program should be obtained. Experiment stations that have the facilities should test new methods of manufacture and test new equipment.

(2) Butter may deteriorate during storage as the result of (a) the growth of microorganisms, (b) enzyme activity, (c) action of chemical catalyzers, and (d) exposure to odors. Research is necessary to find methods that are most

satisfactory for manufacturing, packaging, and storing, so that the butter will retain its desirable flavor from the time it leaves the churn until it reaches the consumer.

(3) There also is a need for experimentation for the purpose of further improvement of the body, texture, and spreadability of butter, and, more than anything else, for work with the buttermakers to apply improved techniques.

(4) Consumer tests might be made to determine the type of character of butter most desired by the public.

(5) The utilization of buttermilk should be fully investigated.

IV. Standardization of the color of butter

It is recommended that the standardization of the color of butter by general trade area be sponsored by the butter industry in cooperation with agricultural colleges.

Committee on butter:

G. H. Wilster, Oregon State College, Corvallis, Oregon, *Chairman*

D. L. Fourt, University of Idaho, Moscow, Idaho

C. A. Iverson, Iowa State College, Ames, Iowa

Chris Jensen, North Dakota Agricultural College, Fargo, North Dakota

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W. L. Slatter, The Ohio State University, Columbus, Ohio

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For many years, Klenzade Products, Inc., Beloit, Wisconsin, has maintained a Technical Reference Library for Klenzade staff and field representatives. A vast amount of technical literature has been assembled on various specific cleaning and sanitizing tasks in the dairy industry. In addition to the many technical articles and bulletains prepared by the Klenzade Research Staff, the library material has also been supplemented by hundreds of technical papers presented at the various Klenzade Annual Seminars over a period of the past few years.

The Klenzade Technical Library probably represents the largest and most important assemblage of cleaning and sanitizing data ever accumulated in the dairy industry. Now this store house of knowledge is being made available to the industry, without charge, through the convenient use of Klenzade Library Cards.

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Free Klenzade Technical Library Cards may be obtained from the home office, Klenzade Products, Inc., Beloit, Wisconsin, or from any of the many Klenzade branch offices throughout the country, or from your local Klenzade representative. Arrangements have also been made for Dairy Show visitors to obtain Klenzade Technical Library Cards at Klenzade booth number 402, Dairy Exposition, Atlantic City, October 25-30. Cards may be checked at the booth and the literature will be mailed to the visitor's home address or plant.

CLEANING INSTRUMENTS FEATURED BY OAKITE

Two cleaning devices, designed to speed cleaning in dairy plant operations, will be featured by Oakite Products, Inc., at Booth No. 110 at the Dairy Industries Exposition in Atlantic City in October.

Made expressly for cleaning milk tank trucks and storage tanks, the Oakite Model 531 Interior Tank Cleaning Unit consists of a motor-driven shaft fitted with a four-nozzle head. It is designed in such a way that the nozzles rotate about two axes which are at right angles to each other, and at such speeds that all surfaces receive the direct impact of the recommended Oakite detergent solution during each complete cycle. The Unit is most frequently suspended from the tank manhole, and is sealed in operating position by three clamps and a heavy rubber gasket. Detergent solution or rinse water is introduced through an outside fitting which is provided with a pressure gauge.

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The Oakite Interior Tank Cleaning Unit is said to minimize the use of hoses, scaffolds, ladders, buckets, and brushes, and to make it unnecessary for the operator to enter the tank for cleaning.

The Oakite Hot Spray Unit, Model 521, will also be featured at the Oakite booth. The Unit consists of an electric motor, a pump, a solution tank, and solution hose with a spray gun—all mounted on wheels for easy maneuvering about the plant. The Unit is designed to discharge solution at a rate of up to 2 gallons a minute, under pressures up to 75 pounds per square inch. According to the manufacturers, the operator can work as far as 50 feet around the Unit without moving it, and can clean up to 12,000 square feet in just half an hour. The Hot Spray Unit is being used successfully to clean pasteurizers, holding tanks, waxed-carton filling machines, and weighing vats.

Also on display will be Oakite materials and methods for conveyor lubrication and scale removal, hand washing operations, milkstone removal, bottle and can washing and steam cleaning. Representatives at the booth will include F. L. Oldroyd, vice-president in charge of sales; D. X. Clarin and E. F. Connolly, division managers; Ken C. Tucker, dairy industries manager; and B. F. Fay, J. A. Seybold, H. F. O'Reilly, E. A. Fleisch, J. S. Todd, W. H. Halstead, and C. Harding. The men will make their headquarters at the Hotel Traymore.

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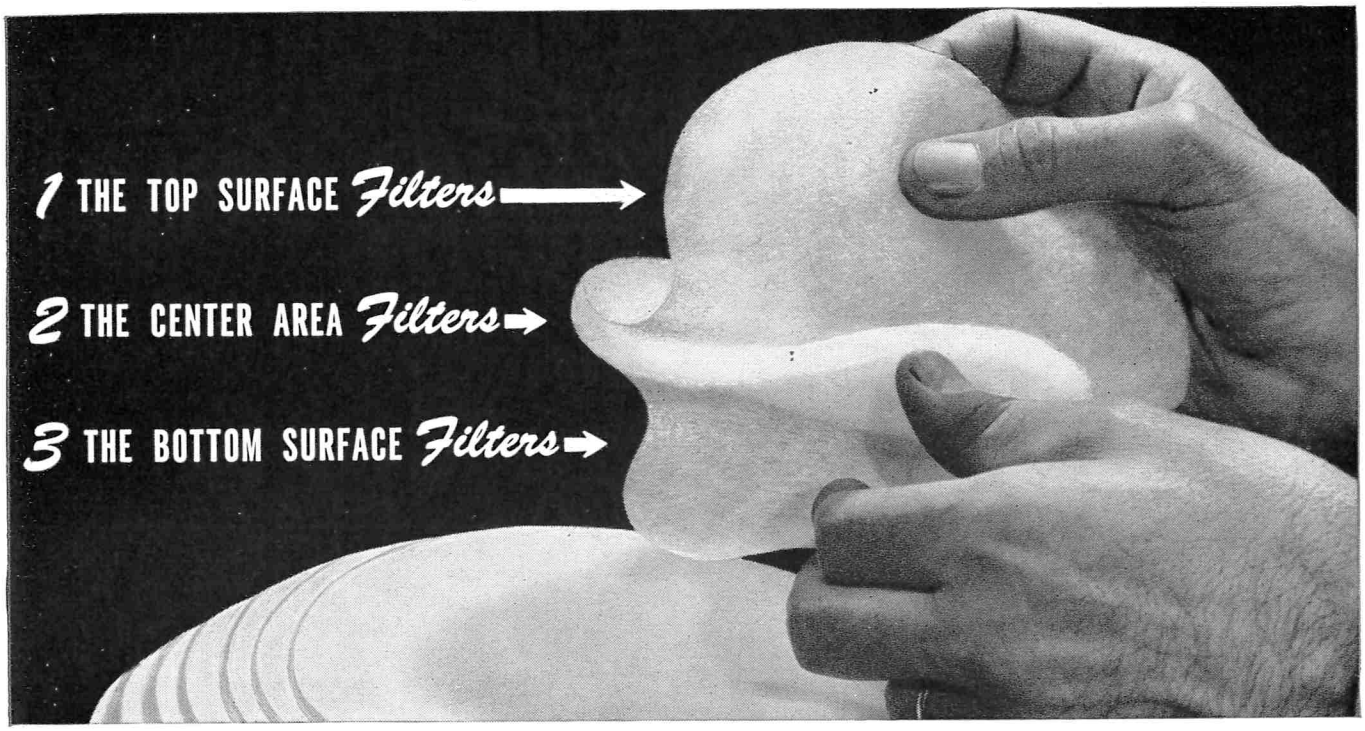

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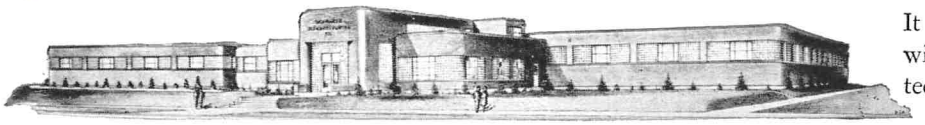

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