Prepared in cooperation with the International Association of Ice Cream Manufacturers and the Milk Industry Foundation

BOOK REVIEWS


The chapters are as follows: The nature of and its role in biochemical processes, by Dietrich; Reactions at interfaces in relation to biological problems, by J. P. Danielli and J. T. Eds.; Chlorophyll fluorescence and photosynthesis, by E. G. Wassink; Thiol groups of biological importance, by E. S. Guzman Barron; Pectic enzymes, by H. Lineweaver and E. F. Jansen; The synthesis of polysaccharides: A biological study of polymerization, by E. J. Hehr; The biological transformations of starch, by S. Pest; Some problems of pathological wilting in garlic, by E. Glaumann. The character is highly international, since 6 of the chapters are by European scientists.

The subject indices of this volume, as a table of contents of the individual volumes which have appeared so far, seem to be adequate.

F. E. Nelson


Contrary to the usual custom, this volume is the end of the series issued in 1951. The chapters include Oxidoreduction in chloroplasts, by R. Menninger; The mechanism of fixation of carbon dioxide by heterotrophs and autotrophs, by M. F. Utter; Enzyme-substrate compounds, by F. Chance; The specificity of certain enzymes, by E. Smith; The enzymic hydrolysis and synthesis of acetylcholine, by D. Nachmansohn; The present status of starch chemistry, by K. H. Meyer and G. C. Gibbons; Reactions of starch degradation and synthesis, by K. S. Wilson; Biological methylation, by F. Chance; Reaction of borate with substances of biological interest, by C. A. Zittle.

F. E. Nelson

ANIMAL DISEASES

W. D. Pounden, Section Editor

An investigation of pleuropneumonia-like organisms isolated from the bovine genital tract.


Two members of this group of organisms were isolated from the genital tract of cattle. The "S" strain appeared to be saprophytic and hence a contaminant of the discharges from the tract. The "P" strains appeared to be involved in an inflammation of the genital tract which seemed to be connected with infertility. These latter strains required the presence of blood serum to grow on agar.

J. J. Jezeski


Studies were made of the changes in composition of bovine milk following experimental infection, via the lacteal duct, with Coxiella burnetii. Four experimental animals were injected with infected chick yolk-sac tissue while 2 control animals received normal yolk-sac suspensions; 2 quarters of each animal were injected. Total nitrogen, non-casein nitrogen, chloride, butterfat, nonfat solids and pH values of the milk increased, while casein, lactose, milk volume and water decreased. These changes were found in milk from both groups of animals, but magnitude and duration of the changes were greater in that from the experimental animals. Even in this group, however, the major fluctuations in these constituents, as well as any fever, disappeared by the 8th day after injection. No fever was found in the control animals. The authors conclude that the experimentally induced Q fever infection caused these greater fluctuations in the constituents of milk from the experimental animals.

D. D. Deane


The ring test was performed on a total of 1,039 composite milk samples of which 176 gave positive results. These herds were blood tested for brucellosis and, where reactors were found, persons who had been exposed were asked to submit to a blood test. Of 326 persons blood-
tested, 40 were positive, although only 2 of these had undulant fever symptoms. O. R. Irvine


This test is known as the ABR or Abortus Bang Ring Test discovered in 1937. The test is widely used in Scandinavian countries and in Finland. Since 1947, Demark has accredited herds as free from brucellosis on the basis of 3 consecutive negative ring tests of milk can samples followed by 1 negative blood test.

In the United States, results in Minnesota on 8,469 herds show an over-all efficiency of 68% in locating infected herds by the ring test as compared with Danish reports of 82%. The ring test has the merit of being simple and easy to make without the need for blood samples. Frozen milk, colostrum and possibly mastitis milk give false results. It may be affected by vaccination and cannot be applied to bulls, heifers and dry cows. The ring test is a valuable supplement to blood testing but it should not be used alone. Unless used as an adjunct to blood testing the ring test may lead to confusion. A. C. Dahlberg

BUTTER

O. F. Hunziker, Section Editor


The partition of Fe between butter and butter milk was about as expected, but the concentration of Cu in the butter fraction was about 6 times that anticipated. Partitioning of Fe and Cu was unaffected by cream acidity. Traces of the 2 metals (<1 ppm.) caused deterioration of flavor during storage. Fe led to a metallic flavor that usually disappeared during storage. Cu catalyzed oxidation of the triglycerides, especially in the more acid butters, and sometimes caused tallowy flavors due to the oxidation of unsaturated fatty acids in the butterfat. W. C. Frazier


Predicting storage life or kind of deterioration of experimental or commercial butters was not feasible on the basis of their acidities, salt content or Cu and Fe content. Storage of butter at higher-than-normal temperatures did not enable predictions of storage life to be made. A promising, rapid "oven" sorting test is described for detection of incipient oxidation or presence of traces of Cu and Fe responsible for the defect. The butter is held in a glass dish, so that there is a defined ratio of surface area to depth of butter, in an oven at 110° C. for 4 hr.; then aldehyde values are determined by Schih method and used as the sorting test. W. C. Frazier


Deterioration in flavor and odor of various butter samples during storage was studied by organoleptic evaluation of fat and serum and increase in amino nitrogen of the serum. Protractive and cheezy types of off-flavor were detected in the serum rather than the fat and their presence was correlated with increased amino nitrogen. S. Paton


Investigations of the causes of off-flavored butter due to a parchment paper indicated a high content of Cu and Fe might be responsible for part of the defective flavor. Parchment paper containing more than 3 ppm. of soluble Cu and 1 ppm. of soluble Fe were likely to cause off-flavor in butter. W. C. Frazier


With adequate precautions, why butter could be made equivalent to sweet cream butter in keeping properties. The author discusses detail the production of quality whey butter. The headings: (a) handling whey, including skimming procedure; (b) handling whey cream and (c) churning whey cream. H. Pyenson


The electric cream cooler developed at Michigan State College is of the dry-box type. Tests showed that cream stored in the cooler developed about half the acidity of cream held under "normal farm methods". The flavor score was approximatly 1 point higher. Cost of operation depended on the amount of cream cooled and ranged from 4.5 kwh-20.3 kwh/wk. It is suggested that cost of cooler and operation might be paid for from increased income from high quality cream. T. J. Claydon


Since the greatest use of butter is as a spread for bread, spreadability is of vital importance. If butter will not spread, the consumer may make a substitute. During the winter season but...
CHEESE


Cheese curd particles, containing some whey, are freeze-dried to less than 2% moisture.

R. Whitaker


The cheese industry in the U. S. now utilizes about 10% of the milk produced on farms. The amount used has steadily increased during the past 20 yr. and further increase is to be expected. Industry trends are discussed briefly under exports, imports, consumption, pasteurization, rindless cheese, mechanization, utilization of whey, and developments in retail handling.

T. J. Claydon


Use of mold-ripened cheeses in certain commercial food preparations has its limitations. To overcome the disadvantages, use of cheese flavor extracts and synthetic Roquefort-type flavors was investigated. Flavor concentrates from natural cheese were obtained by oil extraction or steam distillation. A mixture of methyl amyl ketone and butyric acid gave a satisfactory synthetic blue cheese flavor.

T. J. Claydon


A slicer for cutting cheese into measured quantities is described.

R. Whitaker


Creamed cottage cheese must contain at least 4% fat. Creaming mixtures usually contain from 14-20% fat and more than 20% solids. Mixtures that have been held cold for 12 hr. are most desirable. The dryness of the curd governs the type of creaming mixture employed. One part 20% cream to 6 parts curd or 1 part 14% creaming mixture to 4 parts curd give suitable results. Several suggestions are offered for mixing procedures.

T. J. Claydon

CONDENSED AND DRIED MILKS; BY-PRODUCTS

F. J. Doan, Section Editor


The packaging system of Maple Island, Inc., for its powdered dairy products includes: (a) storage of products for packaging in drums under vacuum; (b) specially designed contamination-proof feed-in method; (c) double vacuumizing for uniform O2-free filling; (d) automatically
controlled inert gassing of containers; (e) a generator unit right in the plant to provide all inert gas; (f) an integrated lab technic for detecting "leaks" and checking on O₂. Details of the various steps in the packaging process are given.

T. J. Claydon


A spray drier is described for milk and other fluids, consisting of a long tube, with the air directed through the tube from a frusto-conical-shaped chamber to insure uniform parallel air flow in the tube. The milk to be dried is introduced at the entrance to the long tube. The drying gas can be dehumidified and recycled if desired.

R. Whitaker


A centrifugal atomizing spray wheel is described for drying milk, etc.

R. Whitaker


A design for a spray dryer of the centrifugal wheel type, suitable for spray drying dairy products, is described.

R. Whitaker


A small hand device for reconstituting powdered milk consists of a cylinder and piston with discharge orifices designed to cause violent agitation.

R. Whitaker


A device easily punches a hole in evaporated milk cans.

R. Whitaker


A lid is described which holds 2 punches which when pressed down on an evaporated milk can form 2 openings in the can with edges bent inward, 1 for pouring and the other for an air vent.

R. Whitaker


Modification of the method previously reported for hydrolysis of Swiss cheese whey protein given satisfactory results with cheddar protein. The chief differences are in temperatures and lengths of time involved. Details of the processes are given for precipitation of protein and its subsequent enzymatic hydrolysis.

T. J. Claydon

DAIRY BACTERIOLOGY

P. R. Ellis, SECTION EDITOR


The nitroreductase test, employing milk acid and ß- naphthylamine reagents to determine the conversion of added nitrates to nitrates, was investigated as a method of evaluating the bacteriological quality of milk. Procedures for preparing reagents, applying and interpreting the test are given in detail. Results indicated that milk recovered aseptically as possible contained no nitroreductase activity during a 10-hr. incubation at 37° C. Boiling or pasteurizing destroyed its nitroreductase activity. Milk reduced with very little care showed a low nitrites after 2-hr. incubation which was approximately proportional to their bacterial content.

The course of the formation of nitrites constitutes a deduction as to whether coliform organisms constituted the majority present. The nitroreductase test appeared well adapted for detection of milk and for use as a quality control test.


The author presents a very excellent thorough review of the subject and raises the question of the use of the coliform test in other dairy products, such as ice cream, dry milk, etc. It is concluded that "the coliform test is well adapted for use in milk and milk products' plants to certain that plant equipment is properly cleaned and handled." It is necessary to carefully interpret the results to assure correct application of the test.

A. C. Dahm


For detection of E. coli in pasteurized milk, Ringeling test is widely used in the Netherlands. Five ml. of pasteurized milk are added to 50 ml. of "acid broth", prepared from an extract of fat-free meat in 1000 ml. of water, to which peptone and 0.5% NaCl are added. After cubating at 37° C. for 24 hr., a loopful is streaked on Endo plates. E. coli must be absent. The results of this test are usually reported as satisfactory when prescribed. A weak acid reaction (pH 5.5) usually results. Acidification to various levels with H₂SO₄ was tried. A pH of 5.0 provides...
be a distinct advantage over lower and higher titles.

W. C. van der Zant


Although there is no single test to solve the dairy milk problem which is so varied in its aspects, the resazurin test is a very useful tool. In 1947-1949 in Schenectady compliance of milk with bacterial standards has increased from 28.0-84.8%, pasteurized milk from 40.3-84.8% with standard plate count and form count improved from 79.8-94.4% compliance.

The rennet resazurin test has been used on all individual cans of producers' milk and on mixed-samples to indicate mastitis and high bacterial counts. The program is to test the milk promptly do field work with producers. On 2nd day cans of poor milk are rejected. The dairy industry is required to inspect farms annually, make monthly tests of producers' milk sediment and bacteria. File veterinary certificates on health of herds and inspect farms dealing faulty milk.

A. C. Dahlberg


Milk is preserved by a small amount of a non-soluble chloride.

R. Whitaker


This study was prompted by the general use of antibiotics and sulfa drugs in controllingudder infections and the problems which they have caused by slow acid development in cheese making.

Samples of milk to which 5-50 units of penicillin/ml. were added were held at 5-10°C. for 24 hrs. up to 24 hr. The bacterial counts were reduced but not sufficiently to affect the quality of milk. The effect on coliform bacteria is erratic. The cup assay method of testing for coliform in milk was used. In one case a herd of cows fed with penicillin produced milk that was safe the day following treatment, in another the test showed 0.42 units/ml. in the mixed milk. Somewhat similar results were obtained with sulfadimine and sulfapyridine.

These products interfered with normal souring of milk and it is reasonable to conclude they would not be present in milk for human consumption.

A. C. Dahlberg


A bacteriophage and a susceptible strain of *Rhizobium trifolii* (clover nodule bacteria) were used in experiments to test the assumption that single phage particles initiate multiplication in liquid cultures as well as on solid media used in the plaque-count technique. An extensive statistical treatment of results involving many replicate determinations indicated that phage multiplication could be initiated by single phage particles. Better agreement to the single particle hypothesis was obtained with young (1 d.) rather than old (5 d.) cultures. As the age of the bacterial culture increased, a smaller proportion of viable phage particles succeeded in starting phage multiplication.

J. J. Jezeski


Process difficulties arising from presence of bacteriophage and antibiotics in milk supplies constitute a growing manufacturing problem. Penicillin, streptomycin and aureomycin, which are used most extensively in treatment of mastitis, all have a definite inhibitory effect on the lactic streptococci. Heat treatment does not destroy antibiotic activity. Good tests, as yet, have not been developed for antibiotics nor have methods for discarding a number of milkings been worked out. Bacteriophage action on lactic cultures is characterized as a partial or complete cessation of acid production as the sensitive culture is lysed by the bacteriophage. Some resistant strains of bacteria may be present in a culture, or secondary organisms may develop that are resistant. The rate of increase of bacteriophage particles is extremely rapid. One strain of bacteriophage usually will act upon only a limited group of lactic streptococci. The substitution of a culture from an entirely different source frequently gives at least temporary relief. Most bacteriophage strains survive pasteurization and some strains will tolerate 150°F. for 120 min. Heating to about 190°F. for 1 hr. will destroy the bacteriophage, as will autoclaving.

H. Pyenson


The name Streptozyme has been applied to a lysing enzyme, produced by several strains of lactic streptococci. The substitution of a culture from an entirely different source frequently gives at least temporary relief. Most bacteriophage strains survive pasteurization and some strains will tolerate 150°F. for 120 min. Heating to about 190°F. for 1 hr. will destroy the bacteriophage, as will autoclaving.

R. Whitaker


A strain of *S. lactis* capable of producing high yields of nisin in milk was cultured under a variety of conditions in an attempt to increase production of the antibiotic. Continuous sub-culturing and attempts at chemically induced variation did not produce any notable changes. Nisin was
stable in culture fluids in presence of developed acid but was inactivated by heating at pH 6-9. If developed lactic acid was neutralized, growth was increased in the presence of glucose until pantothenate became limiting. Optimum yields of nisin were obtained at pH 6 in the presence of sufficient glucose and pantothenate.

J. J. Jezeski


The properties of nisin control the type of assay possible for this antibiotic. Various assay methods were investigated, including dilution methods, bactericidal method and lage phage method. Limitation of these methods are discussed and conditions required for a valid assay procedure are stated.

J. J. Jezeski


Using Staph. aureus as the test organism, 40 strains of lactobacilli possessed antibiotic properties. These strains, representing about 3% of those tested, were obtained mostly from Gruyere cheese produced in different areas in France. One organism was studied in detail and best growth conditions established.

R. Whitaker


Twelve strains of molds (5 Aspergillus niger, 2 each of Penicillium glaucum, A. flavoryzea and A. fumigatus, and 1 of P. italicum) were isolated from local market butter; spores of all 12 strains were able to grow in sterilized butterfat containing as little as 0.5% moisture; development of ketones reached a max. after 50-d. incubation at 37° C. Water extracts of the molds were found to contain lipoxidase, peroxidase, dehydrogenase and oxidase. The mechanism of rancidification of fats embodies the initial step of hydrolysis of glycercides by lipases, followed by rapid oxidation of fatty acids by simultaneous action of fatty acid oxidases on lower saturated acids, lipoxidase, oxidation of unsaturated acids and dehydrogenase desaturation of the saturated acids, and secondary decompositions by peroxidase of peroxides formed by autoxidation and lipoxidase activity.

H. J. Peppler


In the fermentation of sucrose and fructose by a heterolactic bacterium, trioses, pyruvic acid and acetaldehyde were found to be intermediate products. Phenylhydrazine oxalate was used in the fixation of these compounds during fermentation by washed living cells.

J. J. Johns


A yeast extract-sodium lactate medium used to isolate a strictly anaerobic microorganism from fistulated sheep. The organism was identified as Veillonella gazogens and was capable of producing acetic acid, propionic acid, CO₂ and hydrogen from lactate, but was unable to grow in any of the common sugars. The fermentation of this organism on lactate was studied by means of the Warburg technique and the finding that succinic acid was decarboxylated to produce propionic acid and CO₂.

J. J. Johns


Manometric experiments utilized washings of the organism capable of producing propionic acid. The mechanism of propionic acid formation from lactate appeared to be from lactate to pyruvate to oxaloacetate to fumarate to succinate to propionate plus CO₂. Tartrate was not attacked if the organism was grown on lactate. Using Na₂C₁₄Ο₃ fixed in the carboxyl group of propionate during the fermentation of lactate and the formation of propionic acid produced from lactate increased by the CO₂ concentration in the media.

J. J. Johns


Organisms of the genus Propionibacterium appear to produce propionic acid mainly by carboxylation of succinic acid produced by either lactate or glucose. The pH of the fermentation apparently governs the ratios of propionic acid and acetic acids produced in these fermentations and, in addition, variations in CO₂ tension may influence these ratios. Organisms included Propionibacterium shermanii and P. shermanii zae.

J. J. Johns


The maximum amount of cetyltrimethylammonium bromide (CTAB) adsorbed by suspensions of bacteria varies with the individual bacteria, and the form of the uptake curve is an adsorption isotherm. Suspension of the CTAB solutions resulted in a release of protein showing maximum absorption at 260 mμ a positive bacteria showed, in addition to that of 260 mμ-absorbing substance, a loss of glutamic acid and inorganic P from the


An apparatus is illustrated and described for dispensing agar without wetting the tube near its lip.

W. C. Frazier

DAIRY CHEMISTRY

H. H. Sommer, Section Editor


The complexity of the milk system increases with application of heat, and new techniques are required to assess the effects of heating. When milk is heated, the first major change is the denaturation and subsequent coagulation of the whey proteins. At 143° F. for 30 min. or 160° F. for 15 sec., from 5-10% of these proteins are denatured. The organism belonged to the field group D.

J. J. Jezeski


The results are given of a study in which fat determinations were made of ice cream mixes by the following methods: (a) Mojonnier test (as standard), (b) Kissel test, (c) Swope test, (d) butyl alcohol test, (e) Nebraska or Crowe test, (f) Overman-Garrett test, (g) Minnesota test no. 1, (h) Minnesota test no. 2 and (i) perchloric acid test.

Most of the tests using alcohol as a reagent gave results that were considerably higher than the Mojonnier results and consequently can not be considered satisfactory. Only the perchloric acid test and the Minnesota no. 1 test gave results that were in acceptable agreement with the Mojonnier results. These tests both averaged 0.013% above the Mojonnier fat tests.

W. C. Cole


The authors worked out 2 modifications of the method developed by Smith, Fritz and Pyenson for determining the butterfat content of ice cream employing mixtures of perchloric and acetic acids. Procedures are given for (a) high and medium fat mixes and (b) low fat mixes. The authors stress the importance of adhering closely to these procedures if satisfactory results are expected.

W. C. Cole


The study adapted the Gerber butyrometric method to the determination of fat in cheeses. Cheese (2 g.) is weighed onto a tared piece of cellophane. The cheese is rolled like a cigarette in the cellophane and injected into the butyrometer containing 10 ml. of Gerber H₂SO₄. Water is added to make up the sample to 11 g. after which 1 ml. of amyl alcohol is added. The
sample is shaken until digested, then placed in a water bath at 65–68° C. for 15 min., during which time it is agitated frequently. Following centrifuging 10 min. and tempering in the water bath for 10 min., the test is read and the fat content derived from the formula:

\[
% \text{fat} = \frac{\text{reading} \times 11}{\text{wt. of sample}}
\]

Comparison of results from the method with those from others was found satisfactory, except that with aged cheeses, the Gerber adaption yielded high results, presumably due to inclusion of fermentation products such as free fatty acids, which might be excluded in other methods.

S. Patton


Wide use of 2,4-dichlorophenoxyacetic acid (2,4-D) as a weed killer makes it desirable to have a method for determining very small quantities of this acid in foods. The 2,4-D first is separated from the milk constituents by extraction of fat with ether and precipitation of casein by acid. Soluble proteins are removed from the casein-free filtrate by precipitation with phosphotungstic acid. The 2,4-D is extracted from the protein-free filtrate with ether and determined colorimetrically by use of chromotropic acid. Concentrations of less than 0.2 ppm. of 2,4-D (0.1 mg./pt. of milk) can be determined by this procedure.

B. H. Webb


Some WIA were removed during the centrifuging step in the continuous process, since the amount present in the separated oil before vacuumation was less than that of the cream. Little difference was noted in the WIA content of the oil before and after vacuumation and in the finished butter. Neutralization of the oil neither increased nor decreased the WIA. Butters churned from the same vat of cream by the continuous process and with a barrel churn contained the same amount of WIA. With the continuous process, about one-third of the butyric acid present in the cream was retained in the oil. No butyric acid was lost as a result of vacuumation, neutralization and churning of the oil. Most of the butyric acid present in cream was not present in butter churned by a barrel-type churn. The mold mycelia content of butter made by the continuous process was much less than that made in a barrel-type churn.

F. J. Babel


Ten samples of butter were tested for, after neutralizing the other-water solutions of butter with NaOH to (a) a decided pink color, (b) a decided pink color with 0.5 ml. NaOH in excess and (c) a decided pink color with 2.0 ml. NaOH in excess. Statistical treatment of the data indicated a significant difference in WIA with use of 2.0 ml. NaOH in excess that necessary to give a decided pink color. However, no significant difference resulted from neutralization to a definite pink color, and 1 ml. NaOH in excess of this amount. In another study of 20 butter samples, 1 sample showed 28% of WIA /100 g. fat when neutralized to a definite pink color and 548 mg. when an excess of 0.5 ml. NaOH was added. This sample was neutralized with lime. Further tests showed that neutralization with lime gave butters which were sometimes much higher in WIA when tested with the regular procedure (neutralization to a definite pink color plus 0.5 ml. NaOH) than in butter neutralized to a faint pink color.

F. J. Babel


The A.O.A.C. methods give the freezing point of milk as −0.550° C. and state that this is sufficiently accurate that any milk showing more than 3% of added water shall be considered to be adulterated with water. The added water shall be determined by the formula:

\[
\text{Added water} = \frac{T-T'}{T} \times 100,
\]

in which \(T = -0.550\) and \(T' = \text{determined freezing point}\).

Tests on 1,450 fluid market milk samples showed only 0.63% of them to have freezing points lower than −0.550; 40% of the samples came within the limits set by the A.O.A.C. pure milk. The frequency distribution showed a peak at −0.531° C., with 33% of samples being between −0.530 and −0.535° C.

The question was raised concerning the accuracy of the present standard on modern milk to indicate the amount of added water.

A. C. Doak


After adsorption on columns of active alumina, enzymes were located by brushing various substrates along the length of the column. After suitable short incubation periods, specific reagents capable of producing color reactions with the end products were likewise brushed over the columns. Sites of specific enzyme activity could be located by the appearance of color.

J. J. Jenks
DAIRY ENGINEERING
A. W. FARRALL, SECTION EDITOR


A vacuumizer is a piece of dairy plant equipment designed to remove entrapped air and odors. BREuninger's Dairy, Phila., has the 1st commercial installation. The air is a cylinder approximately 3.5 ft. high and 2.5 ft. in diameter, installed between the time pasteurizer and the homogenizer inlet. A 20,000 lb. of milk/hr. The milk is distributed at the top of the cylinder by a shallow pan with a perforated bottom. A pump of 12 in. removes the air and odors as the milk falls about 2 ft. to the bottom of the cylinder. An added advantage, not supported by objective tests, is lower bacteria counts, due to depriving bacteria of needed oxygen. The manufacturer is Chester-Jensen Co., Chester, Pa.

D. J. Hankinson


A state committee cooperates with the 3A since. An application has been made to the 3A by the International Milk and Food Sanitarians and it looks as if a copyright may be granted. Milk standards have been approved for fittings, storage tanks, weigh and receiving tanks, homogenizers and high speed pumps, thermometer wells for storage tanks, automotive transportation tanks, electric motor attachments, tinned strainers, and timing of HTST pasteurizers by salt activity test.

A. C. Dahlberg


A discussion of the various factors that go into the proper automatic control system and various applications in the dairy industry is presented.

H. Pyenson


An automatic liquid supply means for power washing separator. By inserting a self-cleaning separator into a dairy plant, solutions for cleaning the discs while the bowl is rotating are provided.

R. Whitaker


A self-washing centrifuge which removes the outer wall of this separator bowl to permit escape of cleaning fluids and slime.

R. Whitaker

DAIRY PLANT MANAGEMENT AND ECONOMICS
L. G. THOMSEN, SECTION EDITOR


A satisfactory milk supply cannot always be assured by sanitary codes alone. It can be done only by a combination of proper sanitary codes and proper pricing to assure an adequate and dependable supply of safe, wholesome milk.

The problem of an adequate and dependable supply has been the basis for 2 major acts of Congress. The 1st deals with the pricing of milk for special markets, as given in the Agricultural Adjustment Act and the Agricultural Marketing Agreement Act. This provides for the pricing of milk in various markets. The 2nd deals with support prices for selected dairy products, based upon government purchases at selected price levels. These support price purchases of cheese and butter have been extensive but they have established minimum price levels for milk for manufacturing purposes.

A. C. Dahlberg


Data are presented showing the effect of (a) methods of feeding cans to washer on milk losses, (b) recovery of drainable milk, (c) accumulative effect of progressive drainage, (d) total milk solids collected from 25 freshly dumped 8-gal. cans. It is shown that: (a) Incomplete recovery of milk from freshly dumped milk cans is a common source of waste. The volume of milk which remains in the dumped can is affected by the manner in which the cans are dumped and fed into the can washer. By providing for a slight pause over the weigh tank, milk losses are reduced substantially. (b) Nearly 50% of the drainable milk which remains in properly handled cans may be recovered at the load position. Therefore, means should be provided wherever possible to divert this milk into either the weigh tank or receiving tank for immediate use. (c) If the can washer is equipped with a sanitary extension to provide at least 21.5 sec. drainage beyond the load position, much milk can be saved. The milk zone of the extension should be made of stainless steel and of sanitary design, so that all parts can be easily cleaned. (d) Prolonged drainage, at least in warm weather, does not appear to be worthwhile, since 21.5 sec. beyond the load position recovered approximately 95% of all drainable milk, whereas doubling the drainage time saved less than 5% additional solids. Further study of this problem will be necessary to determine the effect of winter weather on the recovery of milk from the cans. (e) The recovered milk should be fully utilized, otherwise...
it is still a part of the waste problem. If it is collected in a sanitary manner, it will be of the same quality as if it had drained directly into the weigh tank. The fact that the can is in motion while draining does not reduce the wholesomeness of the drained milk. C. J. Babcock


Automatic food merchandising equipment helps to solve the problem of in-plant feeding of employees in small plants. It helps prevent accidents, reduces absenteeism, decreases labor turnover, increases production and improves morale. Automatic food service provides quality food and saves time, money and facilities. The advantages of the service are being recognized and installations are increasing.

T. J. Claydon


At the Los Angeles office, Carnation installed Remington Rand’s simplified unit invoice accounting plan. The streamlined system for accounts receivable permits highly efficient handling from 1 central office. Control is maintained over shipments from 40 condenseries and over 100 branch sales and brokerage offices throughout the country. Operation of the system is explained.

T. J. Claydon


The successful handling of employee grievances is an important problem in business organizations. A technique which has proven successful is summarized as follows: (a) locate the grievance, (b) talk with the employee, (c) get all the facts, (d) take appropriate action, (e) convince the employee of the fairness of the action. Each step is discussed briefly.

T. J. Claydon

FEEDS AND FEEDING

W. A. King, Section Editor


Within 3 hr., after ingestion of Na₂S³⁵O₄ by a goat, appreciable quantities of radioactive cystine and methionine were found in the milk proteins, the peak activity being reached within 24 hr. of feeding. In the proteins of milk, serum albumin and rumen contents the radioactivity was observed to be proportional to the amount of each sulfur-containing amino acid in the protein, suggesting that cystine and methionine were synthesized in the rumen at an equal rate and used by the tissues to form new protein quantities needed.

H. J. Pe


Strained rumen contents from hay-fed sheep, serving as the source of protozoa were inoculated into small fermentation flasks containing solutions of glucose, fructose or sucrose. Scopoic granules of a glucosan giving a purplish color with iodine were observed in the holotrich flagellated protozoa and were liberated by the cells with a synthetic detergent under conditions. Other simple sugars were converted into the polysaccharide granules by the protozoa during in vitro fermentation. A glucosan substance could be isolated from protozoa directly from the rumen itself from 2-4 hr. of feeding.

J. J. J.

HERD MANAGEMENT

H. A. Herman, Section Editor


During the past 45 yr. labor requirements for caring for dairy cows have been reduced 10-15%. In the Northeast milk shed the future of present dairy barns was constructed 50 yr. ago. There needs to be radical change before labor requirements can be reduced.

The pen stable may reduce cost of construction by 50%. When used with the "cow eating" system, much labor is saved. The pipe or pipeline system of milking is the greatest advance in milking ever offered to the dairyman. By utilizing these 3 features much labor can be saved.

The pen stabling requirements of the New York State Dept. of Health are presented. It is realized that some sanitarians have misgivings about cows sleeping on the manure pile, crying the years of effort to get dairymen to remove manure daily from the barns and yards. The quality of milk can be excellent under good management and milking practices.

A. C. Dahl


Under extreme winter conditions, removal of moisture from dairy stables is a problem due to the difficulty of doing so without chilling the manure. Results of a study in which dryers were compared when floor and ceiling ventilators were used are presented. Heat loss during times of water removal were less with ceiling ventilators. Outside temperatures ranged from -9 to -30° F.

O. R. H.
ICE CREAM


A device for scraping the base of the cow's mouth is described in which the cow's mouth is inserted between an inverted U-shaped frame and an inverted V-shaped frame, the lower frame being adjustable to the height of the cow's mouth.

R. Whitaker


A control device is designed to be installed on the top of the milk-collecting receptacle to allow disconnection of the receptacle from the suction line of a milking machine when flow of milk from the receptacle stops.

R. Whitaker


A device for restraining cattle to permit branding and applying horn-inhibiting material to the horns is described. The device consists of a wire frame to fit into the nostrils and with a headband in front of the mouth.

R. Whitaker


A shaped rigid electrical heating coil thermostatically controlled for warming the water in stock watering tanks is described. R. Whitaker


The apparatus is designed for restraining cattle to permit branding, clipping, etc., and a method for restraining cattle to permit branding, clipping, etc., is described.

R. Whitaker


A scraping tool for scraping the base of the cattle and applying horn-inhibiting material to the prepared area is described.

R. Whitaker

ICE CREAM

C. O. Dahle, Section Editor


Some manufacturers have made high-fat ice cream containing 10-11% solids-not-fat and 15% sugar. Farm pressure groups have tried to keep the fat standard high on the assumption that it will create a greater demand for their products. Some manufacturers have made high-fat ice cream for competitive reasons. In recent years the per capita consumption of ice cream has been declining from 4.9 gal. in 1946 to 3.4 gal. in 1951.

The ice cream industry is vulnerable to a decrease in consumer purchasing power and the industry may suffer if the consumer's purchasing power decreases. Manufacturers of ice cream find their costs increasing, making it necessary to pass this along to the consumer by increasing prices. The problem that faces the industry today is to bring ice cream back to within the reach of the middle- and low-income groups. If the industry wants to hold its own against the competitive forces of the other food industries, it may be desirable to consider the manufacture of frozen products which contain less fat and put more emphasis on the serum solids.

W. H. Martin


At present 4 states and the District of Columbia have an 8% fat standard, 25 states have a 10% standard, 13 states have a 12% standard, 1 has a 13% standard and 3 have a 14% standard. Today commercial ice cream contains about 12-14% fat, 10-11% solids-not-fat and 15% sugar. Farm pressure groups have tried to keep the fat standard high on the assumption that it will create a greater demand for their products. Some manufacturers have made high-fat ice cream for competitive reasons. In recent years the per capita consumption of ice cream has been declining from 4.9 gal. in 1946 to 3.4 gal. in 1951.

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W. H. Martin


This reports preliminary experiments with several stabilizers used in ice cream. Mix whipability and viscosity, as well as body and texture of the ice cream were considered in comparing the following ice cream stabilizers used in the concentrations indicated: 0.15% sodium carboxymethyl-cellulose, 0.15% sodium cellulose sulfate, 0.05% Irish moss, 0.25% sodium alginate and 0.33% gelatin.

Sodium cellulose sulfate and gelatin gave mixes of the lowest viscosity. All except the gelatin mix gave better whipping properties than the control mix with no stabilizer when frozen in a batch freezer. All of the stabilizer samples showed improved body and texture as compared with the no-stabilizer control. It is concluded that sodium cellulose sulfate and domestic "Irish" moss col-
laid warrant further consideration as ice cream stabilizers.

W. C. Cole


Experimental mixes were pasteurized by the HTST method by holding them at 170, 180, 190, and 200°F, respectively, for 15 sec. After processing, the mixes were aged 18 hr. and then frozen in both batch and continuous freezers.

There was a tendency for mix viscosity to decrease as pasteurization temperature increased but the body and texture characteristics of the ice cream were but little affected by pasteurization temperature. Mixes pasteurized at 190 and 200°F did not develop off-flavors during a 6-mo. storage period, whereas those pasteurized at 170 and 180°F did develop off-flavors.

W. C. Cole


The Vacreator has been used for the pasteurization of cream for butter-making, milk for cheese making, and for ice cream mix. A further study of last process was made. A test organism, Micrococcus MS102, was used to give a count of 500,000–1,000,000 in the mix.

The heat-resistant test organism is destroyed at 175°F for 25 sec., and at 190°F for 1.4 sec. in the Vacreator. This compared with 155°F for 30 min. in laboratory vat equipment. Also these 3 heat treatments gave similar results for destruction of the usual bacteria in the mix. The body, texture and flavor of ice cream were satisfactory.

A. C. Dahlberg


Details are given for a freezer for continuously producing ice cream and other frozen confections.

R. Whitaker


A design is given for an ice and salt vertical-type ice cream freezer, with the sides of the freezing chamber slightly tapered and the dasher powered by a shaft entering the freezer from below.

R. Whitaker


Frozen fruits require careful treatment and storage to develop their best characteristics in ice cream. The fruits discussed are strawberries, peaches, raspberries, pineapples and cherries. The main job of the cold packing plant is to safe-guard perishable fruit quickly in as near ideal condition as possible and to be able to use it for future use. The addition of stabilizers to fruit packs has not gone beyond the experimental stage and is far from general acceptance.

W. H. Maunder


Flavoring material, liquid at warm temperatures but solid at sub-freezing, is injected into semi-frozen ice cream, where it forms irregularly shaped pieces. The flavored ice cream is passed through another freezer to complete freezing operation and thoroughly distributing material.

R. White


Previously published results showed it advantageous to use fruit extracts along with black walnut oil in making various fruit ice cream. A report of experimental results in which oil extracted from black walnut screenings was added to a mix used in making black walnut ice cream.

Black walnut oil added at the rate of 0.5 ml./45 lb. of mix markedly improved the flavor of the ice cream. Homogenization of the oil and oil increased the flavor intensity, as compared to adding the oil without homogenization. Ice cream fortified with black walnut oil and without black walnut granules, was preferred to ice cream with granules alone.

W. C. Cole


Cans are held in place and prevented from turning in the sleeves of ice cream cabinets. Metal rings and inflated bags.

R. White

182. Standardizing the half-gallon retail container. A. H. Bayer, Gen. Ice Cream Trade Committee of the International Association of Ice Cream Manufacturers to standardize 0.5-gal., rectangular ice cream container. Also revealed that there were at least 6 different containers on the market whose calculated cubic content varied from 111.58–116.25 in.³, from the actual calculated cubic content of the 0.5-gal. container is 115.5 in.³.

The committee developed special equipment for measuring the actual distortion resulting from assembling a carton empty, the additional carton developed when filled with soft ice cream from the freezer and then the additional distortion after hardening. An attempt is being made to develop a standardized carton.

W. H. Maunder

R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker


R. Whitaker

Use of self selection display ice cream cabinets in supermarket is considered an innovation that is here to stay. Cabinet location within the store is considered an important factor for successful sales.

The author predicts: (a) There will be no appreciable seasonal fluctuations of ice cream sales by the food retailer. (b) Improved refrigerated merchandising equipment will be developed to increase impulse buying. (c) Food department stores will handle 1 or more demand brands of ice cream. (d) Larger unit sales (0.5-gal., 3-qt. and gal. units) will replace present preponderance of sales in pints. (e) Ice cream insulated bags may be eliminated with the development of special insulated cartons.

W. C. Cole

191. Insulated packages. Anonymous. Ice Cream Field, 58, 2: 16-18, 20. Aug., 1951. "Factory-insulated ice cream packages are now being used by such concerns as H. P. Hood & Sons, the Borden Co., Bowman Dairy Co. and others. The procedure used in 1 plant is given. Plain white paraffined cartons are filled with ice cream and quick-hardened. Except for a notation as to flavor, this linerless package is unprinted. The package of hardened ice cream is next slipped into a sleeve-type corrugated insulator and then overlapped with waxed paper, carrying brand name, flavor of product and advertising message. The insulated sleeve may be precut or die-cut in the plant. Coding similar to that used by the frozen food industry is used in some plants. This type of packaged ice cream now is being tested in various localities. Several makes of equipment suitable for insulated packaging operations are now available."

W. C. Cole

192. Home storage capacity for ice cream. V. M. Rabuffo. Ice Cream Trade J., 47, 12: 22, 100. Dec., 1951. "Twenty-four million refrigerators and 3,400,000 home freezers have been sold since 1946 making it possible for millions of homes to have ice cream available at all times. The most popular sizes in home freezers are those with 11-16.9 ft.³ capacity."

W. H. Martin

MILK AND CREAM

P. H. Tracy, Section Editor

193. A study to determine the optimum temperature and point in process for the clarification of market milk. B. J. Demott, H. C. Hansen, E. D. McGlasson and J. C. Boyd. Univ. of Idaho, Moscow. Milk Dealer, 41, 3: 48, 83, 85. Dec., 1951. "The more milk is heated and agitated, the more the extraneous matter will dissolve into the milk. Variations in clarification temperatures have no effect on the number of leucocytes removed and make no difference in the percentage of bacteria killed in subsequent pasteurization. Cream volume on the pasteurized sample is..."
affected most if the clarification is done at 135° F. and affected about equally when clarified at 40-50° F. or at 143° F. after pasteurization. Optimum temperature for clarification of market milk is 40° F. or lower, preferably before any agitation or heat is applied to the milk. C. J. Babcock


Results indicate that there is not a close relation between the cell count and sediment in homogenized milk. This was the case with milk from individual cows or pairs of cows homogenized without clarification and with mixed herd milk subjected to different clarification treatments. It was concluded that cell counts are of little value as a criterion of the effectiveness of sediment prevention. Storing homogenized milk in square qt. bottles placed on a rack which holds them on a corner at 45° angle provides a simple measure of sediment. Results obtained confirm previous reports that clarification after homogenization, rather than before, is more effective in reducing sediment. However, clarification at any point in the process will normally give satisfactory control of sediment; best results may be expected when milk is clarified hot following homogenization. Where clarification before homogenization is more convenient, cold clarification is preferable. Data are presented showing (a) cell count and Hotis tests on original milk and sediment ratings and color of sediment in homogenized milk from individual cows or pairs of cows, (b) influence of different clarifying conditions on sediment rating and cell removal and (c) sediment ratings and cell removal from homogenized milk processed with different clarification procedures in a commercial market milk plant. C. J. Babcock


Samples of unpasteurized milk obtained from a processing plant were treated with 2 m.e.v. X-rays at dosages up to 1,830,000 Roentgen (R). Dosages up to 100,000 R. had no effect on the flavor of the milk, but at higher levels of irradiation the milk acquired an undefined off-flavor. A dosage of 146,000 R. was required to destroy 99.5% of the microorganisms detectable by the standard plate count. Samples receiving dosages of 146,000 R. or above remained salably fresh at 10° C. for periods in excess of 28 d. Irradiation levels of 146,000 or less had no apparent effect on vitamin A and riboflavin content, but a dosage of 300,000 R. caused a 40% decrease in riboflavin and slight destruction of vitamin A. E. R. Garrison


A jacketed tank with a built-in trough at the top of the tank is designed so that milk entering into the tank forms a film as it runs the wall and is heated or cooled, depending on the temperature of the circulating medium which can be controlled by a propeller-type agitator suspended from it. R. White


A device for locking glass milk bottles vents theft during the interval between on the door step and removal by customer. R. White


A design for a milk delivery vehicle having refrigerated storage space and unrefrigerated for empty cases is described. R. White


A refrigerated truck for delivering milk and other dairy products, with an inclined door opening into the back of the driver's compartment, is described. R. White


In this 12-bottle case, L-shaped dividers in milk bottles in place. R. White


A rack for holding glass and paper milk bottles is described. R. White


A refrigerated cabinet for storing cold milk samples is described. R. White


A reusable container is described for holding cream under gas pressure and provided with a valve controlled discharge spout for dispensing whipped cream. R. White


A device for dispensing gas-whipped cream from a pressurized container is described. R. White
Milk secretion

V. R. Smith, Section Editor


Milk secretion indicates that on stimulation a 2nd milk-ejection hormone may be secreted by the mammary gland without becoming rancid. In extensive experiments with babies, a solution of the powder compared with fresh human milk showed no significant difference in composition of human and milk. There was slightly less riboflavin/g. There is used in the diet of the baby during the first milking after the first secretion of milk. W. C. van der Zant


Short review on the above subject. I. Peters

Nutritive Value of Dairy Products

E. Jenness, Section Editor


The average figure for New Zealand raw milk is 0.87 mg of riboflavin/g. There was slightly less after pasteurization of the milk. W. C. Frazier


The Netherlands, boiled cows' milk is used in the diet of the baby during the first 6 months. A survey is given of the factors that influence the condition of the curd of cows' milk. Methods such as dilution, heat treatment, addition of acid, removal of Ca, treatment with lytic enzymes and increasing the number of fat globules, are described for changing the hard curd to a soft one. The growth of babies fed boiled cows' milk was practically the same as that of babies fed human milk. Cows' milk for babies usually is boiled for 3-5 min., which renders its curd sufficiently soft to make homogenizing unnecessary. W. C. van der Zant


Results of experiments designed to test the effect of cocoa upon the possible use of Ca and protein conducted at the University of Illinois and studies conducted at the Universities of Wisconsin and Chicago on the per capita milk consumption of families, students and factory workers show that chocolate milk is a nutritious food, containing milk nutrients in a concentration equal to or approximating that of the unflavored milk from which it is made. Judging from the results of human studies with high levels of cocoa in the diet, there is no cause for concern that cocoa present in chocolate milk will interfere with the body's use of milk nutrients. When chocolate milk is available the trend is toward increased total milk consumption. C. J. Babcock


Chocolate milk is a food of high nutritive value. It is an excellent source of Ca, P, protein and most of the vitamins. There is considerable evidence that essential nutrients present in milk are more readily utilized from this source than from many other sources. There is no evidence that the presence of chocolate flavoring reduces the availability to humans beings of any of these milk nutrients. Experimental evidence obtained from adult humans consuming large quantities of cocoa indicates that the presence of chocolate flavoring does not result in decreased utilization of Ca and P of milk. There is no evidence from experiments on humans which indicates that nutrients of milk are less well digested in the presence of chocolate flavoring. Sugar present in chocolate milk contributes to the energy value of the milk. The milk, as commonly consumed, should produce no harmful effect on adults or children. As cocoa powder or chocolate syrup added to milk inhibits growth of bacteria likely to be found in milk, their addition after pasteurization offers little danger of contamination. The process of combining the ingredients through heating, in itself, produces a pasteurizing action. As an added precaution, most dairies pasteurize their chocolate milk after the mixing of the ingredients. C. J. Babcock


Liver mitochondria of rats injected with 4-12 mg. thyroxin over a period of 24-72 hr. exhibited lower rates of aerobic phosphorylation (av. esterified phosphate, 4.9%) than preparations from untreated rats (av. esterified phosphate, 19.2%). Thyroxin added directly to the reaction mixture containing normal mitochondria lowered the esterification values only when mitochondria were exposed to thyroxin for 30 min. at 0° C. before testing. The uncoupling action of thyroxin on oxidative phosphorylation is the primary effect on the basal metabolism rate; its other effects are considered as secondary responses to this change.

H. J. Peppler


Beef liver catalase was crystallized from the filtrate of fresh liver extracts treated with a cold solution of chloroform and alcohol (1:2). Further purification was accomplished by dissolving the crystals in a minimal quantity of water, removing a white amorphous impurity by centrifugation and chilling the remaining solution to crystallize catalase.

II. J. Peppler


A strong test for peroxidase is reported for the saliva of sheep, cow, dog, cat, horse and man. Tenfold conc. of salivary peroxidase was achieved by (NH₄)₂S₂O₃. H. J. Peppler


A peptidase specific for the hydrolysis of glycylglycylglycine, L-alanylglycylglycine and l-leucylglycylglycine was purified by trichloroacetic acid (TCA) precipitation. Extracts of minced calf thymus possessed greater tripeptidase activity than those obtained from minced fresh thymus.

H. J. Peppler


This paper brings together for ready reference the basic principles and relevant facts in the use of suitable germicides to destroy microorganisms. The material is covered under the three main headings: (a) selection of suitable product; (b) methods of using germicidal solutions; (c) aids in results.

H. F. Petters


The following factors which are of importance in the flu washing of pipes are discussed: (a) Construction of line. (b) Concentrations of chemical cleaning compounds. (c) Temperatures of cleansing and sanitizing solutions. (d) Time involved in circulating for cleansing. (e) Application of friction. It is stated that pipe lines are properly constructed and that cleaning methods are applied, experiment clearly demonstrated that such lines remained clean in place.

C. J. Bau


Pyrex glass tubing was installed in the plant at Cornell Univ. and in a milk plant at Geneva, N. Y. on the basis of in-place cleaning and subjection to bactericidal treatment. Cleanliness of glass pipes could be observed visually. Degree of sterility was determined by the plate count and the effect on bacterial content of passing through the pipe line.

The circulating system of cleaning was consisting of flushing with cold water followed by circulating alkaline cleaning solution at 140° F. for 5-10 min. Bactericidal treatment consisted of circulating water at 180° F; 1% chlorine solution of 200 ppm. for 5-10 min. Glass piping was maintained in a satisfactory state of cleanliness and sterility.

A. C. Dahlke


Vending machines have almost unlimited possibilities. It is estimated that at least 1 billion dollars of merchandise are sold yearly in machines.

The Sanitary Code of New York City does mention vending machines but they come under the general scope of food distribution. The part has enumerated 15 points in sanitation which must be met in food vending machines.
SANITATION AND CLEANSING


The effectiveness of pricing milk may depend entirely on health regulations.

In 1949, the New York City Board of Health ordered that cream for ice cream had to come from plants it inspected. The market order was to set a high price to producers on this cream. Cream plants used a minimum of this cream so sales decreased. In 1949 the Sanitary Code was changed to permit importation of western cream. Hearings then were held to reduce the price of cream for ice cream and more New York milk was used for this trade.

New York has a closed fluid cream market and Boston has an open one, due to sanitary health regulations. Before price regulations New York cream was $2.60/40-qt. can over Boston cream. With New York state price regulations this price differential remained, but under Federal-state price control the price spread increased to $8.17/can. In New York City the consumption of fluid cream decreased at a time milk consumption increased and the low cream consumption has continued.

The dating of milk bottle caps in New York City is required in the sanitary code but it increases costs, especially by returned milk, and is not required in most markets. A. C. Dahlberg