ANIMAL DISEASES
W. D. POUNDEN, SECTION EDITOR


Br. abortus was recovered in 42 of 100 Bang's reactor cattle sent to packing plants for slaughter. The tissue showing the highest incidence of recovery of the organism was the supramammary lymph nodes with 28 positive cultures found. The next highest incidence was in the uterus with 15 positive isolations. In 29 animals the organism was recovered from sites other than the supramammary lymph nodes or uterus. These findings emphasize the potential exposure to Brucella by persons engaged in handling carcasses of Bang's reactor cattle.

D. D. Deane


The possibility of demonstrating uterine infection with Brucella by an agglutination test of uterine fluid before the blood test is positive was first demonstrated on 39 slaughterhouse cows. Three cows with blood titers of 0, 40 and 640 were found to have uterine titers of 160, 640 and 160, respectively. Brucella were isolated from the uterine mucosa. Cows with high blood titer invariably had a high uterine titer, so the method is most helpful in checking cattle in a herd negative to blood test. Tests were made in 2 such herds in which abortions appeared. Uterine fluid was secured from a tampon placed in the vagina. Several cows were found with positive uterine titers and negative blood titers. Two of these later aborted and others still pregnant have developed positive blood titers. Following abortion the uterine titer was very much higher than the blood titer.

E. W. Swanson

BUTTER
O. F. HUNZIKER, SECTION EDITOR


Composition control involves the proper percentages of butter components during the commercial life of the butter, rather than solely at the time of removal from the churn. The authors point out and explain the relative importance of errors that may be made during the manufacturing process. In a churning of 1,000 lb. of fat, an error of 0.1% in the initial moisture or salt test and an error of less than 2 lb. in the amount of salt and water added will cause an error of 0.1% in the fat of the butter. An error in cream weight of 60-80 lb. (depending on cream test) also will cause an error of 0.1% in the fat of the butter. Relatively large errors (0.6%) can be tolerated in the vat test of the cream without giving an error above 0.1% fat in the butter. The addition of water late in the final working process, high initial moisture and short final working times contribute to composition changes following manufacture. Procedures and precautions are given for the fat test of cream and for determination of moisture and salt in butter.

T. J. Claydon


The author gives a review of the factors that influence the quality of creamery butter. Some of the essentials for quality control mentioned are high quality cream supplies, butter manufacturing report, neutralization, pasteurization, churning, equipment and sanitation, water supply, packaging and laboratory service.

H. Pyenson


A review of the inauguration of the Dairy Research Division in Canada is given plus data of the research conducted on butter by the division. Some of the major problems which have received attention in the first 27 yr. are creamery sanitation, the cause and control of butter defects, wrapping and packaging, surface deterioration in storage butter, workmanship, laboratory control and molds and yeasts.

H. Pyenson

393. Report on the preparation of butter

Results of a collaborative study of 5 methods for the preparation of butter samples for analysis are given. Comments and criticisms of the methods given by collaborators are presented.

F. J. Babel


A small tube is provided on the neck of a milk can to maintain the air above the product in the covered can at atmospheric pressure.

R. Whitaker


A device for cutting butter into small pats as required for serving is described.

R. Whitaker


Pats are cut from a quarter-pound stick of butter as desired by this device.

R. Whitaker


Samples of margarine from 15 manufacturers have been analyzed for vitamin A, moisture, fat, curd, salt, ash and antioxidants. Thirty samples yielded the following average values: 15.11% moisture, 80.70% fat, 1.42% curd, 2.96% ash and 2.91% salt. The average vitamin A content of 10 manufacturers was 4062 I.U./100 g., while for 5 small producers was below labelled point. Qualitative tests for 5 types of antioxidants indicated that none of these were present. Vitamin A was estimated by the antimony trichloride method.

O. R. Irvine

CHEESE

A. C. Dahlberg, Section Editor


Rind rot is due to: (a) surface mold growth on the cheese due to lack of proper temperature and humidity control in the curing room sanitation; (b) improper rind formation; (c) wet headings and boxes; (d) paraffining and lodging in excessive surface moisture which has accumulated from the preceding 3 causes or from condensation moisture due to temperature changes at time of paraffining the cheese.

H. Pyenson


Cheese was processed at 75 °C. for 5 min., using 25 g. citric acid and 0–25 g. Na₂CO₃/kg.; 300 ml. of water was added. Experiments were run with fresh and ripened Gouda cheese and with a mixture of 70% fresh and 30% ripened Gouda cheese. The best process cheese was obtained at pH values 5.5–5.6. At lower pH levels it was grainy with a strong acid flavor. At higher pH levels it was mealy with a bitter or soapy flavor. Fresh cheese melted sufficiently but lacked flavor; ripened cheese did not melt completely. The above mixture yielded process cheese of good quality. The processing temperature for the mixture was varied between 60–85 °C. and the cheeses stored at 10, 20, 30 and 37 °C. After 0, 10, 20 and 30 d. the quality was checked and the bacteria count determined. Storage temperatures of 30 and 37 °C. were too high; at 10 °C. the quality was still good after 30 d. Processing below 80 °C. gave increasing bacteria counts with decreasing temperatures. These counts all showed considerable increases during storage.

A. F. Tammsa


It has been reported that Brucella organisms survived the temperature used during the manufacture of Italian cheese from infected raw milk. After pasteurization of the milk, no viable Brucella organisms could be recovered from either the milk or the curd prepared from this milk. The authors strongly recommend that all milk should be pasteurized before manufacture into cheese as a safety precaution from the public health standpoint.

H. H. Weiser


Yogurt culture replaces the regular starter in manufacturing cottage cheese at a Toronto company. The "short-time" method is used together with a coagulator, but specific details of the method are not given.

O. R. Irvine


A collaborative study was made of a revised method used to detect gum tragacanth, gum karaya and carob bean gum in creamed soft curd cheese. The revised method is outlined in detail. The method outlined had a sensitivity of approximately 0.05% for gum tragacanth and carob bean gum and a sensitivity of about 0.1% for gum karaya.

F. J. Babel
CONDENSED AND DRIED MILKS; BY-PRODUCTS

F. J. DOAN, SECTION EDITOR


A study was made of the acidity test for milk using the present method (Method A) recommended by A.O.A.C. (17.6 ml. milk diluted with an equal volume of CO₂-free water and titrated to the phenolphthalein end-point with 0.1 N NaOH; indicator used at the rate of 0.5 ml. of a 1% solution in neutral alcohol) and another method (Method B) using greater dilution and more indicator (17.6 ml. milk diluted with 2 volumes of CO₂-free water and titrated to the phenolphthalein end-point with 0.1 N NaOH; indicator used at the rate of 1.0 ml. of a 2% solution in neutral alcohol). Greater dilution of the milk sample and use of more indicator permitted earlier detection of the end-point and the pH of the neutralized solution was in the range of 8.0 to 8.3. It was recommended that the acidity test for milk be amended to conform to Method B.

Ash determinations made on samples of milk using 5- and 10-g. portions showed that equally satisfactory results could be obtained with the smaller sample. F. J. Babel


Heat stability is imparted to evaporated milk by blending raw milk with a volume of specially treated milk, depending on the heat stability desired. The special treatment consists of heating some of the same raw milk in the range of 250 and 300° F. for about 2 sec. at the higher temperature or about 4 min. at the lower temperature to produce excessively stable milk. The mixture of milk is evaporated and sterilized in the conventional manner. R. Whitaker


The requirements and process for the production of desirable nonfat milk solids are described briefly. The low temperatures used have no significant effect on the albumin and are mainly responsible for the desirable characteristics of the powder. The powder is particularly suitable for increasing solids-not-fat in fluid milk and in some kinds of cheese. T. J. Claydon


Coffee or tea is leached with citric acid, concentrated, neutralized and added to milk and sugar. The mixture is dried after being made slightly alkaline. R. Whitaker


Satisfactory cottage cheese can be made from skim milk supplemented with nonfat dry milk solids and condensed skim milk. Data are presented showing the results of supplementing skim milk with each of the above solids. With the addition of 6 and 9% solids as either condensed skim milk or nonfat dry milk solids, the per cent of total solids recovered was greater than in case of either the use of no additional solids or the addition of 3% solids. However, the per cent recovered was no greater with 9 than with 6% added solids. This suggests that a maximum recovery is reached with the addition of about 6% solids. The per cent of total solids recovered was greater with condensed skim milk than with nonfat dry milk solids, but the maximum recovery occurred upon the addition of about the same amount of solids with each concentrate.

G. J. Babcock


Milk powder is stabilized with calcium lactate and lacto-phosphate, corn starch and calcium sulphate in this method. R. Whitaker


Sweet whey having a pH of no lower than 5.8 is treated with a cationic exchanger to replace Ca and Mg ions with alkali metal or hydrogen ions, which reduces the pH to 4.0-4.7. The whey is heated and the coagulated proteins are removed before concentrating and crystallizing the lactose. R. Whitaker


Acid whey, having a pH of 4.0-4.7, is heated and the coagulated protein removed. The clear whey then is heated and the coagulated proteins are removed before concentrating and crystallizing the lactose. R. Whitaker


Whey is heated with lime at pH 5.8-6.8 to coagulate the protein. After filtering, the Ca and Mg are removed from the whey by a cation exchange material and the lactose is crystallized...
from the concentrated product. R. Whitaker


This investigation was undertaken to provide accurate engineering data for the design of lactic acid plants and to determine the effect of a shift in equilibrium upon the viscosity of diluted lactic acid solutions. The viscosity values could be correlated in linear equations by plotting the logarithm of the viscosity against the logarithm of the absolute temperature. B. H. Webb


An edible product of puddling-like consistency is made by concentrating whey having a pH of 6.0–6.6 and having 1.5–3.0% of the solids as Ca to a total solids content of 25–55%. The heavy body is obtained by heating the concentrate to 200–280°F. R. Whitaker


The desirability of utilizing dairy by-products, the nutrient content of whey and the problem of sewage disposal make the utilization of whey as a food an important issue in the United States. Several methods of recovering whey protein were studied and the solubility of the final products compared. The methods involved the use of various ion exchange resins and precipitation agents, together with different drying processes. The passing of whey through ion exchange materials precipitated by heat and CaCl₂, homogenizing and spray drying produced a product with the best solubility, although it was not comparable to non-fat milk solids. Preliminary tests on the use of the product in certain dairy and baking products gave encouraging results. Of the methods used for the recovery of lactose, it was found that whey treatment with ion exchange resins gave lactose of 93.9% purity, compared with 98.7% where no ion exchange materials were used. T. J. Claydon


Eighteen per cent cream is pasteurized at 180°F. for 30 min., cooled to 140°F. and homogenized at 3,000 lb. pressure. Following cooling to 105°F., 1 qt. of Yoghurt starter is added to 40 qt. of the above cream and the product ripened at 95–100°F. for 6–8 hr, until an acidity of 0.65–0.70% is reached. The resulting product contains approximately 867 cal./pt. J. A. Meiser, Jr.


The influence of incubation time, incubation temperature and per cent of inoculation was studied by varying 1 factor at a time, leaving the others constant. Increase in any 1 of the 3 factors mentioned favors the lactobacilli, which are more acid tolerant and have a higher optimum growth temperature than the streptococci. If these 3 factors are not balanced properly, then either cocci or rods will disappear after a period of time and in both cases the properties of the yoghurt will be affected adversely. The optimum proportion between rods and “diplococci” in a ripe yoghurt culture was found to be about 1:1.

A. F. Tamsma


The firmness of whole milk yoghurt (2.5% fat) was determined and the influence of several factors investigated. As the temperature and acidity are important factors they were kept constant. Measurements were carried out at 18°C. and at an acidity equivalent to 95–100 ml. 0.1 N NaOH/100 g. of yoghurt. The milk was cultured at 45°C. Composition and treatment of the milk were found to be important. An increase in the total solids gave a firmer curd. Milk from the beginning of the lactation period caused low firmness, while milk from the end of the lactation period caused whey separation. Pasteurization showed different effects on different kinds of milk. For normal milk the best pasteurization seemed to be 5 min. at 85°C. Homogenizing generally had a beneficial effect on the firmness. It was found the best to do this after pasteurization and before inoculation. Small amounts of rennet worked favorably on firmness and whey separation; however, it adversely affected taste and texture. Addition of CaCl₂ or Na oxalate generally gave no improvement; however, in case of a Ca shortage as caused by excessive heating, addition of CaCl₂ worked favorably. No close correlation could be established between firmness and whey separation.

A. F. Tamsma

Also see abs. no. 436.

DIARY BACTERIOLOGY

P. R. Elliker, Section Editor

Attempts were made to formulate a new medium for plating dairy products that would eliminate the difficulties encountered with cloudiness due to the added milk and the use of beef extract which is a non standard product of unknown composition in TGEM agar.

One successful medium contained Difco yeast extract, Difco proteose peptone, dextrose and agar. Peptones such as Difco tryptone, BBL trypticase and BBL polypeptone could be substituted for the proteose peptone. Other yeast extracts, however, could not be substituted satisfactorily for Difco yeast extract.

Lower counts were found when a BBL agar containing trypticase, phytone, dextrose, sodium citrate and sodium chloride was used in place of the standard TGEM medium. Lower counts also were obtained with a medium containing BBL yeast extract, BBL phytone, dextrose and sodium succinate. However, a BBL agar medium containing phytone, polypeptone and dextrose gave significantly greater counts than the standard medium. The addition of very small quantities of Na₂SO₄ and cystine to this latter BBL medium produced no further increase in counts. Substitution, omission or difference in amounts of certain ingredients were found to have predictable quantitative effects on counts.

The authors conclude that a medium to be satisfactory for use in the standard plate count must contain at least 3 different nutrients: a yeast extract (Difco) or a plant peptone (BBL peptone), an animal peptone and a carbohydrate.

The authors presented a short method for testing the significance of mean differences of logarithms of paired plate counts.

D. D. Deane


This report covers the work being carried out in an effort to find a plating medium to replace the standard TGEM medium for dairy products. On the basis of results obtained, the committee recommends the use of either Difco's tryptone glucose extract (milk) agar or BBL's trypticase glucose extract (milk) agar be authorized.

Investigations are in progress on 2 milk-free agars that might be suitable for plating milk. The average plate count with one of these was slightly below, and with the other slightly above, the desired range limit of ±5% that would assure little or no difference in numbers when compared to the count on TGEM. Further modifications of these 2 media are being studied in an effort to reduce this difference to a negligible amount.

D. D. Deane


The standard plate count has emerged as one of the best methods for control of raw or pasteurized milk. This count and the coliform tests are the yardsticks of measuring existing conditions in a dairy.

H. Pyenson


The ring test has been modified to use capillary tubes rather than test tubes. Stained Brucella abortus antigen was prepared as for the tube method. Stained antigen was drawn 5-7 mm. into a 90-mm. capillary tube of 0.8 mm. bore, followed by milk to fill. The tube then was inverted and the lower end placed in plasticene allowing mixing of the antigen and milk. In milk with high agglutinin content a strong positive reaction is noted within 5 min. The method was compared with blood test and tube ring test on 428 cows from 9 herds. The ring tests and capillary tests were 96.3 and 93.8% efficient, respectively, in locating infected animals as shown by the blood test. The capillary test produced only 27 false positives compared to 69 for the ring test, showing that doubtful tests can be read more clearly in the capillary method. Other advantages of the capillary method are a saving of time (test may be read 1 hr. sooner), a saving in amount of antigen used, the possibility of using homogenized or skim milk as well as whole milk, and eliminating cleaning expense by discarding the used capillary tubes. The capillary method is simple and practical and has a greater over-all agreement with the blood test than has the milk ring test. It is proposed that it could be used to detect many Brucella infections in individual animals.

E. W. Swanson


Many kinds of antibiotics are being used at the present time in treating udder infections. Elimination of these products into the milk is recognized. Hence, the inhibitory effect upon starter culture organisms and consequent rendering them inactive is a serious problem.

The author suggests a comprehensive education program to inform the dairymen of the dangers involved in allowing these antibiotics to get into milk.

H. H. Weiser


Experimentation on individual cows showed the presence of antibiotics in milk did not impair the accuracy of the regular phosphatase test. The Stoltz-Hankinson modified phosphatase test was not satisfactory in detecting presence of antibiotics in raw milk; rather, it indicated a variation in phosphatase content of milk from different cows.

J. A. Meiser, Jr.


A comparison was made of the effect of sodium hypochlorite and quaternary ammonium compounds on the destruction of lactic acid streptococcus bacteriophage. Hypochlorite solutions in concentration of 50 and 100 ppm. destroyed the phage more effectively than quaternary ammonium compounds. However, at 200 ppm., both quaternaries and hypochlorites inactivated the phage in 15 sec. Phage strains for both Streptococcus lactis and Streptococcus cremoris showed different degrees of resistance to quaternary ammonium germicides. H. H. Weiser


Two loops, the first of 0.3 mm. wire with an inside diam. of 1.5 mm. and the second of 0.5 mm. wire with an inside diam. of 3 mm., are used to transfer definite volumes of cultures to 2 dilution tubes and to spread fluid from the final dilution on an agar plate. Using 20 ml. of diluent and the 2 loops, counts with a ratio of 1:30 between successive dilutions may be obtained. The same technique is used for making clearing counts of bacteriophages. In this case, the final dilution from the bacteriophage suspension is made into a tube containing about 10⁶ sensitive bacteria/ml. O. R. Irvine


Three solid media, violet red agar, deoxycholate agar and brilliant green bile agar, were used for tracing coliform bacteria in pasteurized milk. The technic followed was according to the American “Standard methods for the examination of dairy products, 9th ed., 1948.” Identification tests were based on the Imvige reactions. More than 90% of the typical looking colonies were coliform bacteria. The coliform flora of pasteurized milk was caused by contamination after pasteurization. Escherichia coli was found only in a few cases. Deoxycholate agar was found the best medium for tracing coliform bacteria in 1 ml. pasteurized milk. Based on selectivity, accuracy, easy technic and quick results, the solid media were preferred over the liquid media. A. F. Tamsma


In Belgium water supplies for dairy plants are investigated for E. coli by dividing 50 ml. of water into 5 tubes with brilliant green bile and observing gas production after 48 hr. at 37°C. For determination of E. coli the positive tests are inoculated in tryptone and the indol reaction employed. The water is considered unfit for use in dairy plants when gas is produced in more than 1 tube or when indol is formed from only 1 tube. The authors investigated the percentage of positive indol tests that were due to E. coli. Identification tests were based on the Imvige reactions. More than 100 water samples from about 70 dairy plants were investigated. Of the 84 positive indole tests, 45 were confirmed as being E. coli. About 30% of the waters with 1 positive tube of the 5 was judged incorrectly when only the indole test was used. A. F. Tamsma


A method is presented for the rapid determination of germicidal potencies of fast-acting germicide solutions. The test consists of mixing equal volumes of a bacterial suspension of an actively motile coliform organism and the germicide solution to be tested. A hanging drop preparation is prepared immediately and examined with the aid of the microscope. Cessation of motility 30 sec. after mixing usually indicates a concentration of germicide that would kill most of the organisms in the same length of time. Results of this test correlate fairly well with those obtained with the percent kill test carried out in the laboratory. The test can be used in the laboratory and the field on chlorine compounds and all quaternary ammonium compounds. D. D. Deane


Toxicity of the normal even-numbered saturated fatty acids from C₄ to C₁₈ and oleic acid, toward different lactobacilli, E. coli, A. aerogenes, S. faecalis, and P. vulgaris was investigated in the search for factors contributing to the differences in the bacterial flora of breast-fed infants and that of infants fed cow's milk. C₄, C₆, C₁₀ and C₁₈ saturated fatty acids and oleic acid do not interfere with the growth of the bacteria tested. The bacteriostatic effect of C₆ through C₁₄ acids for the gram-negative and gram-positive bacteria varied over a wide range, but the ratios of the number of moles of the fatty acids required for 50% inhibition in the case of each organism to the number of carbon atoms were similar. It was established that each increase in 2 carbon atoms increased the average molar toxicity 3.5 times;
however, molar solubility decreased on the average of 3.4 times with each increase of 2 carbon atoms over the range of C₄–C₁₈.

The more sensitive a bacterium is to the inhibitory effect of the C₁₉ acid, the greater the number of fatty acids which will cause bacteriostasis. Gram-negative bacteria were least susceptible to the bacteriostatic effect of the C₈ and C₁₀ saturated fatty acids and were not inhibited by the C₁₂ or C₁₄ members of the series.

Differences in the bacterial flora of breast-fed and artificially fed infants may depend upon the extent of fat digestion and absorption. It was suggested that dietary factors affecting protection against saturated fatty acid toxicity may be important.

H. J. Peppler


A concentrate of the citrovorum factor (CF), obtained from desiccated liver powder by fractional precipitation from Al₂O₃ columns was found by assay with Leuconostoc citrovorum 80811. to contain 176 CF units/µg, as compared with the 152 units/µg of the synthetic compound resulting from the formylation and reduction of pteroylglutamic acid (PGA). Upon assay for folic acid activity the synthetic product had a value of 0.572/PGA. The remainder of the CF concentrate was calculated to be approx. 70%. H. J. Peppler


The role of orotic acid and ureidosuccinic acid, growth factors for Lactobacillus bulgaricus 09, in the biogenesis of the pyrimidine components of ribonucleic acid was determined by growing the lactobacillus in a pyrimidine-free basal medium containing orotic acid labeled in position 2 with C¹⁴ and di-ureidosuccinic acid labeled in the ureido carbon atom. Counts of the purified purines and pyrimidine derivatives isolated from the harvested cells established that orotic acid serves as a source of the pyrimidine components of ribonucleic acid, and ureidosuccinic acid is an acyclic biological precursor of the pyrimidine ring.

H. J. Peppler

Also see abs. no. 400, 401, 415, 416.

DAIRY CHEMISTRY

H. H. Sommer, Section Editor


Purified rennins of very high activity were prepared. The amino acid composition of the hydrolysates of these preparations was studied by paper chromatography. Several fractions were obtained from the purified rennin by paper chromatography showing strong enzyme activity which was comparable to the density of their color development with a benzidine reagent. Whether these fractions represent distinct molecular species is not known as yet. The active enzyme was separated from the inert material of a crude commercial rennet powder by chromatography. The action of rennin on milk and casein also was studied by chromatographic techniques. It would appear that rennin causes an unfolding and breaking of the α-casein molecule with the appearance of several large polypeptides. No free amino acids were detected after rennin action on casein.

O. R. Irvine


Analytical data obtained by use of the Cu serum, acidic serum and sour serum methods were used to construct a graph showing the reduction in immersion refractometer reading at 20° C. in relation to the % of added water in milk. Detection of watered milk using serum tests and A.O.A.C. minimum values is almost impossible except for the grosser adulterations. Any interpretation of serum refractometric data, with regard to added water in milk, was considered to be dependent upon the investigation of the serum of milk from the same source in its unaltered normal condition.

F. J. Babel


A method is outlined in detail for the determination of lactic acid in dairy products by a chromatographic method. The method as outlined was used in a collaborative study and comments of collaborators concerning the method are given. In general, the results obtained by the method were considered fair. Recovery of lactic acid from barium lactate averaged 88%.

F. J. Babel


A report is given of the progress being made in providing more adequate control over the use of chemicals in the food supply.

D. D. Deane

Also see abs. no. 402, 403, 409, 410, 411, 412.

DAIRY ENGINEERING

A. W. Farrall, Section Editor


The low-temperature evaporation technique, first applied to concentrated frozen orange juice...
now is being used for the production of new milk products in the U.S. Many unanswered questions are being investigated in the National Research Council laboratories of Canada, in order to make it a more accepted product, although it has already gained a place in the retail market. Concentrated frozen milk also may play an important part in bringing about an increased consumption of dairy products, once research has developed a stable product economically.

H. Pyenson


An evaporator in which the heating is accomplished by causing the product to pass between 2 heated corrugated plates, 1 of which is removable to facilitate cleaning, is described.

R. Whitaker


One of the chief advantages of spray drying is the ability to obtain rapid, uniform drying of heat-sensitive materials. To better understand the spray drying process, quantitative data were obtained on the relative magnitude of the change in particle size that could be obtained with available operating variables of a Bowen-type spray dryer. A minimum deviation in particle size was desirable. Particle size affected the density, solubility, flowability and caking tendency of the product, sodium silicate. Particle size varied between 27 and 112 µm and the standard deviation between 11 and 40 µm. Variations in bulk density were recorded.

B. H. Webb


Details are given covering a design for a head for a homogenizer suitable for processing dairy products.

R. Whitaker


Short descriptions and simple illustrations detail insulation applications. Among applications covered are cold pipes, pipe hangers, tanks, ducts, walls, columns, beams, concrete slabs, ceilings, roofs and floors.

H. L. Mitten, Jr.


A water ejector was used to evacuate rapidly the ammonia and air from a large coil-type evaporator so that repairs could be made. After repair of the coil, the ejector also was used to remove air ahead of the ammonia for a quick return to service.

H. L. Mitten, Jr.


During the emergency period, proper selection and care of motors is essential. Motors should be selected on the basis of the type of job involved. The different types of motors and their applications are described.

T. J. Claydon

DAIRY PLANT MANAGEMENT AND ECONOMICS

L. C. Thomesen, section editor


The following types of data were obtained from commercial plants, covering periods of from 8–13 mo., and were treated statistically by the Shewhart control chart for variables: (a) bacterial plate counts of fluid milk, (b) butterfat losses in skim milk made into cultured buttermilk, (c) cheese yield per 100 lb. of milk, (d) fat losses in buttermilk and (e) per cent fat in butter churned. The fraction defective chart method (or per cent defective chart) was used in checking for incidence of solder pellets in cans of evaporated milk.

The usefulness of the above 2 statistical quality control methods in the field of dairy manufacturers is discussed. The theory behind the methods used is explained. An example chart for collecting data is included. Formulas used in converting the data for presentation in graph form are shown.

I. Peters


Since several million dollars worth of products are given away each year in overfilled packages, weight control is extremely important. Manual spot checking is not adequate for modern high-speed packaging lines. The Selectrol electronic check-weigher is an electronic computer and servo-control using statistical methods. It provides a high-speed control system that is economical and completely automatic. It will check up to 90 packages/min., and automatically adjusts the filler. Because of more accurate control and reduction in weight variations, the average package overfill can be reduced.

T. J. Claydon


A survey of milk ordinances indicates a trend toward removing restrictions against milk processed outside the city. Out of 40 representative markets contacted, 24 out of 29 replying reported their present ordinances do not restrict the market to local distributors, and that outside milk dealers may and do distribute milk in their markets. Among the few markets reporting ordinances which restrict milk distribution to milk pasteurized within the city limits or a short distance beyond them, one indicated outside milk is being distributed in the city despite the ordinance. An-
FEEDS AND FEEDING

other reported the ordinance prohibited outside milk but was not enforced. Sixteen markets reported they accept on a reciprocal basis milk inspected by health departments of cities where the milk is pasteurized and packaged, although some indicated they also required certification by state health departments. Six revealed they required direct inspection of milk sources by the local inspection service; two reported they did direct inspection at present but were willing to work out reciprocal agreements with other markets; and one indicated milk will be accepted in the market during an emergency, even though it is inspected at the production source by outside agencies.

C. J. Babcock


The installation of the I.A.I.C.M. system of financial and cost accounting has improved control of operations in all phases of the business in Canada. The system has improved general accounting and cost information.

H. Pyenson


Data show the waste/route/year of 7 major items of delivery expense due to lack of proper cost control and maintenance. The 7 items are: gasoline, oil, sundries, tires, repairs, labor and body repair cost. The causes of waste and some of the preventive steps to avoid higher cost of operation are discussed. The difference between good and poor operation of delivery fleets of 50 routes amounts to $481.51/route/year or a total of $24,077 for the fleet per year. This is equivalent to the profit on 102 routes at 6% profit margin or on more than 20 routes at 2% profit margin.

C. J. Babcock


There are many problems in the dairy industry in Canada and some require urgent and immediate attention. Government agencies must continue to play an important role in dairy research and the processing branch of the industry is interested in research. A committee on dairy processing has been established for the purpose of examining and reporting upon the status of dairy research in Canada.

H. Pyenson


In dairy production research, greater stress is being placed on projects concerning breeding, feeding, management and sanitary milk production. In marketing and economics greater attention will be needed in the future to studies of potential markets, the possibility of increasing the demand for dairy products as a whole and the collection of statistical and economic information for the dairy industry at large. In the field of dairy processing or manufacture the Canadian dairy industry must meet the competition not only of dairy products from other countries but also of other foods. Investigations are under way for butter boxes and wrapping substitutes.

H. Pyenson


Best education for work in the dairy processing industry is a combination of academic courses and practical plant experience. The training of dairy technologists—dairy plant managers and leaders, teachers and research workers—for the dairy industry is a cooperative effort between the college and the industry. The records show that many outstanding graduates have been lost to the dairy industry because of failure on the part of management to give proper recognition and to provide the opportunities of advancement.

H. Pyenson


Universities have made important contributions to dairy research. At the University of Saskatchewan the research work being conducted for the past 4 yr. has been: (a) A method for utilizing whey from cheese as an animal feed supplement. (b) A study of body and texture of ice cream using combinations of sugars. (c) The efficiency of the new Shain Reagent for the determination of fat in dairy products. (d) Determination of pH in cheese. (e) Condensed frozen milk. (f) Solubility of dry milk solids. (g) Determination of fat in dairy products. (h) Butterfat content of ice cream. (i) Chocolate dairy drinks.

H. Pyenson

FEEDS AND FEEDING

W. A. King, Section Editor


The stability of a number of vitamin A and carotene concentrates when mixed with dry carriers and when kept under varying storage conditions was determined. The reaction rate constants and the storage time for 50% loss in carotene were calculated and these provided a simple mathematical means for comparison of storage stabilities. When storage temperature was decreased, stability was increased. A concentration increase from 3,000 to 300,000 I. U. per pound greatly increased stability. The effect of the carrier on stability of the vitamin often was obscured by other variables. The effect of the vitamin source often was overshadowed by other environmental conditions. Relatively stable dry mixtures of high vitamin A potency can be prepared by using a proper combination of temperature, concentration, carrier and vitamin source.

B. H. Webb

453. Spectrophotometric determination of beta-carotene stereoisomers in alfalfa. F. Stitt, E.

A colorimetric procedure is outlined in detail for the assay of vitamin A. The method outlined is a modification and simplification of the previous method. Results obtained by 75% or more of the collaborators were as close to the calculated values as might be expected for this type of chemical assay. The method was considered valuable in estimating the vitamin A content of mixed feeds.

F. J. Babel


Digestibility trials were conducted on 6 grade Shorthorn steers using 6 rations of hay and hay with increasing quantities of Western Canada feed no. 1 oats. The coefficients of digestibility of the nutrients were calculated by difference from the mixed rations. As the quantity of oats increased their digestibility decreased, the decrease for total digestible nutrients being of the order of 5 absolute %, while that for protein was less and was not statistically significant. Similar trials with barley and linseed oil meal show that the effect of plane of nutrition is most marked in the case of barley and very slight with linseed oil meal.

O. R. Irvine


Iodine in 3 forms, potassium iodate, dithymol diiodide and an experimental iodide complex prepared by Merck and Co., was put up in 50-lb. salt blocks and subjected to outside exposure and manger feeding. The potassium iodate and dithymol diiodide blocks retained a high percentage of their original iodine content under both of these conditions. The iodide complex rapidly lost all iodine. Potassium iodate was physiologically available to swine and sheep. The methods of determining iodine in the above combination are described.

O. R. Irvine


Grain alcohol stillage supplemented with glucose and animal stick liquor has been refermented with A. gossypii and this process was found to increase the riboflavin content of the stillage 1000-fold. Other nutritionally important factors, including vitamin B₁₂ and an unidentified chick growth factor, were found. This factor may have a role in practical animal nutrition.

B. H. Webb

GENETICS AND BREEDING

N. L. Van Demark, Section Editor


Gross and microscopic pathology of 154 repeat breeder cows with normal estrous cycles and apparent absence of genital abnormalities palpable per rectum (J. Dairy Sc., 32, 237) was studied. Of 103 cows slaughtered 3 d. following insemination, 16 had oviduct pathologic alterations including 8 hydrosalpinx, 3 pyosalpinx and 5 chronic interstitial salpingitis. Of 51 cows slaughtered 20-35 d. following insemination, 6 had major pathologic changes including 2 pyosalpinx and 4 chronic interstitial salpingitis. Photomicrographs of typical pathologic oviducts are presented. Ova were recovered from 2 of 3 cases of unilateral hydrosalpinx, from 2 of 5 cases of unilateral hydrosalpinx and from 2 cases of unilateral pyosalpinx in which the ovulatory side was not affected. Ova were not recovered in presence of bilateral pyosalpinx nor from 4 of 5 cases of chronic interstitial salpingitis. Some of the oviduct pathology also was connected with cases of purulent metritis or pyometra. Serosal nodules were present in 75 of the 154 cows.

E. W. Swanson
ICE CREAM

G. D. DAHLE, SECTION EDITOR


The primary purpose of corn syrup solids in ice cream is to improve body and texture. Since corn syrup solids are neutral in flavor and low in sweetening value they may be used to build up and references to the application of this adaptation are given. L. O. Gilmore


The Issaquah Creamery at Issaquah, Wash., is the first firm in the U.S.A. to employ an automatic system for handling bulk dry sugar. In this system, the bulk sugar is delivered to the plant in a special truck having a capacity of 20,000 lb. The sugar is discharged from the truck into a sugar storage bin (45,000-lb. capacity) located on the plant roof. The sugar as needed is discharged and automatically weighed into a hopper which can be swung over the mix vat by means of an overhead crane and dumped into the mix. This system, which was developed by the Amalgamated Sugar Co., eliminates the use of bags entirely, saves labor and storage space, protects the product against dampness and rodents and speeds up the mix making operation. W. H. Martin


An ice cream stabilizer consisting of approximately 7.65% carboxymethyl cellulose, 3.85% Irish moss, 0.38% soya whipping protein, 4.60% KHCO₃, 19% Na citrate and 64.52% partially refined corn starch containing some protein is described. The soluble Ca and Mg of the ice cream mix are pptd. by the bicarbonate and citrate. R. Whitaker


Five abundant Canadian seaweeds were rated from a chemical standpoint as to their suitability as sources of alginate. Three species are apparently equal to seaweeds that are being used commercially elsewhere. Details are given of the methods of extraction, purification and yields. O. R. Irvine


This work shows how the molecular weight of sodium alginate can be determined by measuring the values of the osmotic pressure, P, in the presence of low concentrations of NaCl, and extrapolation of P/C to C = 0, where C is the concentration of sodium alginate. For different samples of sodium alginate, the slope of the curve P/C against C was independent of the molecular weight. Molecular weight values from 48,000 to 186,000 were obtained. The intrinsic viscosity of the different samples was linearly related to the degree of polymerization. (Author's abs.) O. R. Irvine


The amount of carrageenin extracted from a sample of rinsed Chondrus crispus increased linearly with temp. of extraction up to 100° C., and more slowly thereafter up to 110° C. Heat treating carrageen or replacing the Ca and K in it with Na increased the yield of carrageenin at lower temperatures.

The viscosity of carrageenin extracts obtained at different temperatures increased and the concentration required to increase the viscosity of milk to 15 centistokes (i.e., the "suspending cone" for cocoa in milk) decreased with temp. of extraction up to 60° C. Above this temp., the viscosity decreased and the suspending concentration increased. The increase in viscosity is attributed to the extraction of higher polymers of carrageenin with increased temp., the decrease to heat depolymerization during extraction.

Carrageenin, which was most effective in hot milk, had high suspending power compared with that which was most effective in cold milk. Concentrations required to give viscosities of 15 centistokes in milk were closely correlated to the same viscosity in 0.05 N NaOH solutions. O. R. Irvine


In determining fat, 5 g. of a properly prepared sample are extracted with 3 portions of petroleum ether, centrifuging after each extraction and decanting and combining the extracts. The solvent then is evaporated and the flask weighed to obtain the fat content.

Total sugar is determined on the residue after
the remaining ether has been removed. Fifteen g. of water are added to the dry residue and mixed; the suspension then is clarified by the addition of basic lead acetate. The total sugars are determined by refractometry measurements on a few drops of the clear liquid taken with a pipet from well below the surface. O. R. Irvine


Seventeen primary (or single) colors are now permitted for use as food colors in Canada, the same colors as in the United States. Before sale, all food colors that are synthetic dyes must be certified to the government of Canada as being of purity prescribed for use in and upon foods and must be sold in packages clearly labelled as food color. H. Pyenson


Continuous hardening units increase freezing capacity by 275-300%. They contribute to superior quality and texture of the ice cream, due to much shorter hardening time and volume control during freezing. The equipment originally was developed for quick freezing fruits and vegetables and now has been modified for cartons. Present equipment is of 300-gal./hr. capacity. Rapid freezing is achieved by sliding cartons through channels of refrigerated metal. The unit is 7.5 x 27 x 9.5 ft. and is installed in an insulated room with about 2 ft. access all around and on top. The 300-gal./hr. unit requires 8 tons of refrigeration operating at -30° F. Ammonia or Freon can be used. The equipment is made by Food Machinery and Chemical Corp., San Jose, Cal. T. J. Claydon


Code dating of individual ice cream cartons affords the ice cream manufacturer a method for protecting quality of his product from the time it is produced until it reaches the consumer. The ice cream industry, until recently, has used code dating only as a guide to proper stock rotation in the hardening room. The code dating of individual packages can be of incalculable value in exercising proper control over stock turnover in dealers’ cabinets. To be effective in this connection, it is essential that each individual carton and not merely the outer package be code dated. In this plant each carton is stamped with a number representing the day of the year when the ice cream was frozen.

Pint cartons are imprinted with the code date by means of a wheel-type printing device which is attached to the automatic filling equipment. Outer packages, gallons and half gallons can be coded by mounting the coder on the side or on top of the conveyor. Stamping bulk containers with the name and address of the manufacturer can be done with a special marking device mounted on the conveyor. This equipment reportedly saves expense over having the bulk containers printed at the factory. Details of the equipment are described. W. J. Caulfield


A vertical-type small freezer is described, having a fan attached to the drive shaft for circulating the air surrounding the freezing chamber to facilitate rate of freezing. R. Whitaker

MILK AND CREAM

P. H. Tracy, Section Editor


During the past 15 yr. the square paper bottle has been generally adopted by the industry. Paper packaging is highly sanitary. Paper containers are durable if properly packaged and conveyors are used in the plant. A much larger marketing area may be handled with the paper container, since there is less weight to haul from the plant and no return load. Approximately 29% of all milk consumed in the United States in 1950 was purchased in single service paper containers; approximately 28% of the fluid milk volume is wholesale and of this 55% is in glass and 45% in paper. H. Pyenson


Approximately 90% of the larger dairies of the United Kingdom have standardized on the 38mm bottle. The author believes it would be a grave mistake to switch from the 56mm to the 48mm bottle in Canada at this time since it appears the 38mm bottle is destined to be the universal standard for milk bottles in many countries. H. Pyenson


The results of a survey of the quality of market milk sold in retail stores throughout Wisconsin are reported. The quality of milk was determined by scoring it for flavor and odor, bacterial content, container and closure, temperature and sediment. All the samples were given full credit for temperature and for sediment. The most common flavor criticism was “oxidized”, which was found in 34.8% of the samples. “Feed” flavor appeared in 31.6% and “cooked” flavor in 26.4% of the samples. Other flavor criticisms were “cowy”, “scorched”, “acid”, “rancid”, “lacked flavor” or “flat”. 85% of the samples examined had a standard plate count of less than 30,000/ml and the remaining 15% had standard plate counts of over 100,000/ml. Unprotected pouring lips were
found on 15.8% of the containers and 23.8% of the containers had partially protected pouring lips. The fat content did not enter into the scoring of samples, but it was found that the average test of all samples was 3.67%. The average for regular milk was 3.69% and the average for the homogenized milk, 3.62%. The results indicate that attention must be given to improvement in flavor of the finished product. Efforts must be put forth to overcome oxidized, feedy and cooked flavors and some attention must be directed to prevention of other off-flavors. C. J. Babcock


Experiments with 11 mechanical refrigerated delivery units showed that in addition to decreasing the cost of refrigeration, these units had these advantages: (a) By controlling the temperature within the body of the delivery unit, the milk was delivered to consumers at a temperature not exceeding 40°F. (b) The milk containers were free of dirt or other accumulated debris which frequently are present when wet ice is used. (c) Delivery units were cleaner looking. (d) The appearance of delivery salesmen was neater, as the trucks could be loaded when they came in from a day's run rather than in the a.m. just prior to going on the route. (e) The manual icing of the milk on trucks was eliminated. Following this experiment, all of the milk trucks were refrigerated, thus eliminating the ice bill which on the basis of the 1946 cost would have been tremendous. Furthermore, it eliminated the manufacture of ice in the plant, saving space for additional cooling rooms. All trucks are loaded at the end of the day's run with the next day's requirement and placed on the refrigeration line where thermo expansion valves regulate the temperature. A truck refrigerated in this manner for 8 hr. regardless of its size, retains an inside temperature of about 40°F. for 6–8 hr., which is more than enough to complete delivery at the last stop on any given route. C. J. Babcock


To provide rapid cooling, aeration and deodorization of milk in a can, an air-driven motor is mounted in the lid which operates an impeller on a vertical shaft extending into the can. Exhaus. tair from the motor passes downward into the can to aerate the milk and to sweep out odors liberated from the milk. R. Whitaker


The bulk system for collecting milk from farms at the Green Valley Farms in Haddonfield, N. J., is discussed. The milk is picked up daily with a 2-compartment trailer tank, each compartment having a capacity of 1,500 gal. The number of cows milked per farm ranges from 14–48 with an average of 28, and the rated capacity of the producers' tanks in gallons ranges from 60–200, with an average of 142 gal. Some of the advantages of the bulk system are: (a) It has resulted in improving milk quality as evidenced by greatly reduced bacterial counts. (b) Milk comes into the plant at temperatures below 40°F. eliminating need for further refrigeration upon arrival. (c) Two men took 4 hr. (a total of 8 hr.) to pick up the milk at night in cans; for the equivalent amount of bulk milk, 1 man will take 6 hr. on the tanker, resulting in a labor time reduction of 25%. (d) The cost of operating can washing equipment and labor cost of personnel operating the can washing equipment are saved. (e) Valuable floor space has become available in the pasteurizing plant through release of can washing equipment. (f) The tanker is available for overnight storage of milk, as required on a 6-d. pasteurizing schedule. C. J. Babcock


A study was made to determine if the use of O₂ according to the Wiser system, could increase the keeping quality of the milk, as it has with the Hofius-Richter process. (Experiments were carried out with 4 different technics.)

1. O₂ injection in the milk pipes between heater and regenerative section. The pasteurization apparatus could not resist O₂ pressures of 8 kg./cm.² according to the Wiser system. Tests were run with Spirala, Plates and Stassano pasteurizers at pressures up to 4–5 kg./cm.² and decreased milk capacity. Keeping quality tests were carried out in 3 different procedures. One lot was held at 50°C; another at 15°C. and the third was held at 50°C. for 24 hr. and then held the remaining time at 15°C. The milk was examined for bacteria count, coli titer, acidity, boiling test, phosphatase and peroxidase tests and organoleptically. Results for treated and untreated milks were practically the same.

2. O₂ and milk were brought together at the bottom of an open cylinder placed between the preheating section and the clarifier. This cylinder was filled with glass beads and provided with an outlet through which the surplus O₂ escaped. Tests were carried out at 8 kg./cm.² injection pressure and an O₂ consumption of about 1 l. for 1 l. of milk. No perceptible differences appeared in the bacteria count, coli titer and acidity. The organoleptic quality of the treated milk was slightly better.

3. Experiments were also carried out by using O₂ injection at 15 kg./cm.² pressure and O₂.
consumption of about 1 l. for 1 l. of milk in an open cylinder provided with partitions and placed between heater and regenerative section. Only 1 of the 10 trials gave a very good result; the others were a little better or gave the same result.

4. In order to obtain a better mixing of the milk with the O2, technic 3 was modified by using a second cylinder with partitions. The outlet of the first cylinder was so arranged that all the time a gauge pressure of 1 kg. was used. Tests were run with injection pressures of 15, 12, 8 and 4 kg./cm.2 and the O2 consumptions were held about 1, 0.75, 0.5 and 0.25 l., respectively, per l. of milk. At 15 kg./cm.2, the treated milk kept better in storage at 15 ° C. Bacteria count and coli titer were lower most of the time and the milk sometimes kept 12-15 hr. longer. At 12 kg./cm.2 no difference was found. At 8 kg./cm.2 in general the treated milk kept longer at 15 ° C. At 4 kg./cm.2 no difference was observed except a slight improvement in the organoleptic quality.

Due to the irregular results of these experiments, the authors are still uncertain about the merits of the Wiser process.

A. F. Tamsma


A method is presented for measuring the blood pressure of cows by means of an electronic apparatus connected to a direct-writing galvanometer. Use of plastic tubing from the vessel cannula to the apparatus gave suitable pressure tracings but failed to show a number of superimposed waves which were transmitted in lead tubing. Measurements were made on 105 dairy cattle showing diastolic pressures of 90-130 mm. Hg and 140-180 mm. Hg systolic pressure with 40-70 mm. Hg pulse pressure, all taken from the common carotid artery. Jugular venous pressures ranged from 2-10 mm. Hg. The taking of venous and arterial pressures also was followed by electrocardiograph recordings. The advantage of the method is the compactness of the apparatus and simplicity of operation, but a disadvantage is the long warm-up period required to secure stable readings.

E. W. Swanson

SANITATION AND CLEANSING

K. G. Weckel, Section Editor


Hidden information difficult to bring out by any other method is obtained by use of time and motion study in analyzing cleaning operations. Good layout of equipment, sanitary lines and cleaning equipment aids in reducing cleaning time. The cleaning operation should be planned for each piece of equipment. Cleaning aids are sanitary pipe and fittings, racks for small parts, tables with wheels, wash tanks equipped with power driven solution-fed brushes and separator and clarifier disc washers.

H. Pyenson


Sanitary control is more difficult in the ice cream than in the liquid milk industry. In sanitary regulations governing ice cream, one of the fundamental problems will be the establishing of tolerable bacterial plate count and B. coli minima. Points to consider in getting low B. coli counts are listed under equipment, supplies, personnel and general.

H. Pyenson