ABSTRACTS OF LITERATURE

BOOK REVIEWS


This is a comprehensive summary of available information on the composition of feeding stuffs and their digestibility by the five most common species of mammalian farm animals, namely: cattle, sheep, goats, swine, and horses. The data presented resulted from a thorough analysis of American and foreign literature involving approximately 11,000 original digestion experiments conducted during the past 80 years.

The book is divided into four sections. The first two are bibliographical, listing the authors whose research data have been included in this publication and the feeding stuffs and species of animals studied by each. Section I is arranged alphabetically by authors and section II is a cross-index of the first, arranged alphabetically by feeding stuffs. Section III lists the common and scientific names of plant and of animal sources of feeding stuffs. The final section consists of a tabulation of the composition and digestibility of the various feeds. With the exception of the table including data from investigations with sheep and with goats, the results from digestion trials are presented separately according to species of animal. Data tabulated include digestible nutrients and composition of feeding stuffs as offered to animals, digestion coefficients, and digestible nutrients and composition of feeds on a moisture-free basis.

This compilation has required a tremendous amount of time and effort on the part of the author. Since this book is the first of its kind to be published, it should be of great service to all who are interested in livestock nutrition or composition of feeding stuffs.

N.L.J.


This book was written in Portuguese with the purpose of surveying the recent knowledge of the biochemistry of milk and facilitating the understanding of the various phenomena concerning this product. It is divided into four major parts. In the first part, milk is defined and its organoleptic characteristics and physical, chemical, and biological properties are discussed. The second part is devoted to the study of the chemical composition of milk; this is treated with comparatively greater detail than is employed in the other portions of the book. The action of the various chemical, phys-
The metabolism of milk is discussed in the fourth section. A diagram summarizes this portion of the book. The appendix gives some very general information concerning the various milk products.

The book is written in a very definite and organized sequence. Charts, diagrams, and illustrations are presented generously to facilitate the understanding of the subject. Throughout the book, the different facts discussed are related to the various problems encountered in the practical dairy industry work. However, little detail is given in regard to the actual commercial processing of milk, and the reader is expected to resort to other books for this kind of information. Most of the references are to condensed, evaporated, and powdered milk, with few references to cheese, ice cream, and butter.

Frequent citations to the original publications, including many which have appeared in recent years, are made throughout the book. Failure to arrange the bibliographical citations either alphabetically or chronologically and to adopt a uniform system of citation in the text of the book reduces the usefulness of this portion of the work.

R.E.M.

BACTERIOLOGY


Forty years ago agar plates were incubated 5 days at 20°C. plus 2 days at 37°C. on the assumption that most bacteria, including pathogens, would grow. Because the 7-day incubation was impractical, 37°C. for 48 hr. became accepted. Lately it has been observed that there are greater variations in plates incubated at 37°C. than at lower temperatures. The maximum growth range for some bacteria is close to or above 37°C. Intra- and inter-incubator temperatures vary more at 37°C. than at lower temperatures, some incubators showing zones as high as 45°C. It is proposed to lower incubation temperature to 32°C. for 48 hr.


Of 299 duplicate counts made on raw milk, 278 varied less than 50%, 18 between 50 and 100%, and 3 over 100%, the highest being 191%. The average variation was less than 20%. The author deplores the attitude that there is no point in exercising care with the technique because "the error
inherent in the method is greater than the error which will be introduced'. Rather, human error accounts for much of the so-called error of the method.

D.P.G.


T he lots of Difco tryptose specifically suppressed growth of 5 strains of Brucella abortus. The factor was not active against strains of B. melitensis, B. suis, or 6 other bacterial species. The factor in 2% tryptose was brucellacidal in 48 hr. against 400 to 500 organisms per ml. The factor is neutralized by blood, serum, Difco agar, and aqueous extracts of a number of plant and animal tissues.

D.P.G.


The medium has the composition: water, 1,000 ml.; Difco yeast extract, 3.0 g.; Proteose no. 3 peptone, 5.0 g.; lactose, 10.0 g.; agar, 15.0 g. Adjust to pH 6.9 and add 0.1 ml. tergitol-7 and 2.5 ml. of 1% bromthymol blue. Incubate 20 hr. at 37° C. Escherichia produces yellow colonies surrounded by yellow zones. Aerobacter produces greenish-yellow "gum drop” colonies, larger than Escherichia colonies and usually surrounded by yellow zones. Colonies of paracoli and other organisms not fermenting lactose usually are surrounded by blue zones. Some strains of Neisseria catarrhalis grow but produce minute, rough, blue colonies with blue zones. No other bacteria have been observed. Proteus spp. have less tendency to spread. There is no inhibition of coliforms, permitting recovery from minute inocula. Counts are about 30% higher than on other media.

D.P.G.


Lactobacillus spp. isolated from milk and milk products usually are considered to be strains of L. casei (Orla-Jensen) Holland. These form smooth colonies and dextrorotatory lactic acid. In the present study a number of cultures isolated as rough or filamentous colonies from various parts of the human body, and usually considered as strains of L. acidophilus (Moro) Holland, have changed their characters over a period of years and now are
identical with cultures of *L. casei*. It is concluded that *L. acidophilus* and *L. casei* are rough and smooth strains of a single type. D.P.G.


Thermoduric streptococcus infection of the udders of cows caused an increased bacterial count of high-quality pasteurized milk. Milk from infected udders contaminated the equipment. This contamination was eliminated in routine cleaning and sterilizing after infected cows were located and removed from the supply. Detection of infected cows was difficult because the symptoms and physical appearance of the milk were not the same in each case. Laboratory pasteurization of the milk from each cow was necessary to confirm physical findings and to locate infected cows.

The thermoduric streptococcus apparently does not normally reside in the udder. These bacteria evidently are not important in milk from a public health standpoint but are important to the plant since they affect the pasteurized milk count. D.P.G.


An agar plate stored in an electric refrigerator loses an average of 0.1 ml. of moisture each day. This is detrimental to microbic growth. Moisture loss can be reduced by storing plates in metal cylinders and sealing the joint between top and bottom sections with waterproof adhesive tape, parafilm, or a rubber band. The vent hole also should be sealed. Tubes of culture media can be sealed with parafilm. D.P.G.


The incompletely identified bacillus appeared as long rods in chains, rods with central and pleoral globi, and dumbbell forms. A life cycle was observed beginning with long rods and ending with clumps of globi. Increasing nitrate content of the medium resulted in formation of filaments resembling mycelium. On blood agar the bacillus was a non-hemolytic, small, plump rod. The variations were non-permanent, the bacillus reverting to its original forms when transferred to standard milk agar. The presence of the bacillus had no effect upon the milk product. D.P.G.
CHEESE


Lactic starter was added to one lot of cheese as a control and lactic starter and a supplemental starter containing lactobacilli were added to each of the other lots. Lactobacillus casei (3 types), L. arabinosus, L. pentosus, L. fermenti, and L. plantarum grew rapidly in the cheese. From 50 to 500 millions per g. were present at from 2 to 12 weeks, depending on species, numbers added, and temperature of ripening (50 to 60° F.). L. fermenti produced gas and objectional flavor. L. casei increased acidity but not proteolysis; it increased flavor of “acid” nature and “short” body. Some strains of L. arabinosus, L. pentosus, and L. plantarum increased flavor and did not produce objectionable acidity. Other strains had little effect on quality.

L. bulgaricus, L. helveticus, L. lactis, and L. acidophilus were not detected after 2 weeks at either temperature, and the cheese grades were the same as those of the corresponding controls.

CHEMISTRY


Casein and other proteins were heated to 110–203° C. for 18 hr. in boiling, inert hydrocarbons. Solubility decreased with increasing temperatures up to 153° C., but there was no change in total N and little change in amide N. Above 153° C. extensive degradation occurred.


A relatively pure protein, such as casein, is dispersed in an alkaline solution and forced through an orifice into an acid-coagulating bath to form a continuous thread which then is stretched and finally hardened by means of a formaldehyde bath maintained between pH 4.5 and 7.0.

CONCENTRATED AND DRY MILK; BY–PRODUCTS


Because of the decreased volume accompanying the use of plastic cream
instead of frozen 40% cream, considerable saving in transportation and storage costs results.

The following procedure was used successfully in one plant. Cream testing 50% fat first was separated from fresh milk. The cream then was pasteurized at 170°F for 30 min. After cooling to 130°F, it again was run through a separator to produce cream testing 80% fat. Then it was forced through an internal tubular cooler by means of a worm-drive, which cooled the cream to 60°F. Cans filled with the cream were frozen and stored in a sharp room maintained at −20°F.

W.C.C.

DISEASES


Brucellosis still is erroneously believed to be a regressive, rare, and self-limited disease. Infection of susceptible persons will continue as long as contaminated food is ingested or there is contact with infected cattle, goats, swine, sheep, or horses. Only the relatively severe acute illnesses are diagnosed and reported. Chronic infections outnumber the acute by at least 10 to 1, but chronic infections rarely are diagnosed.

Mortality at present usually is low, but higher rates may occur in the presence of epidemics of the more virulent suis infection carried by raw milk. Cross-infection apparently is increasing; thus the hog or the cow may transmit melitensis or suis to man. Huddleson has estimated the following annual losses for Michigan alone, all from an estimated 108,000 infected cows: 222,904,000 lb. of market milk or enough to supply 557,000 persons for 1 year; 11,140,200 lb. of butter, enough to supply 655,300 persons for 1 year; 16,240 calves, representing 1,299,200 lb. of veal or 6,494,000 lb. of beef or a proportionate amount of dairy products if the calves were raised as milk-producing animals. On one farm 82% of the expected pig crop, or 54,180 lb. of dressed pork, was lost through infection.

Detailed discussion is given to failure to diagnose human chronic cases. The writer deplores the defeatist attitude toward treatment and calls for increasing “brucellosis-mindedness” and continued investigation. He concludes: “Pasteurization of all dairy products must remain the greatest bulwark against human infection until methods of control can be perfected.”

D.P.G.


The approximately 4,000 cases of human brucellosis reported annually to state health departments indicate that there are at least 30,000 to 40,000
actual cases. A method of laboratory diagnosis is needed that will reveal milder forms of the disease. A therapeutic agent is needed for the control of brucellosis in animals. The development of better methods of control, diagnosis, and treatment is one of the most pressing problems facing the medical profession.

D.P.G.


Sulfanilamide, sulfathiazole, sulfadiazine, sulfamerazine, sulfapyrazine, 2-sulfanilamido-5-bromo pyrimidine, and 2-sulfanilamido-5-chloro pyrimidine were administered orally to 2 cows. Sulfapyridine was administered to 4 cows. Each cow received 90 g. of the appropriate drug in 3 equal doses at intervals of 4 hr. Blood and milk samples were collected from each cow at 6, 10, 22, 34, and 46 hr. after the initial drug dose. These were tested for free sulfonamide concentrations. The last 3 samples of both blood and milk were tested for total sulfonamide concentrations.

Sulfathiazole, sulfapyrazine, and sulfadiazine attained maximum blood levels of less than 5 mg.% of the free drug. Only the latter was demonstrable in the milk, attaining a concentration of 1.1 mg.%. All the other drugs attained maximum blood levels ranging from 5 to 13 mg.% free drug. Only sulfanilamide and sulfapyridine came through the mammary gland in concentrations approaching those found in the blood. Sulfapyridine reached higher levels in both blood and milk.

D.P.G.


Sodium sulfamerazine was injected intravenously into 34 cows and 1 bull as a cure for foot rot. In all but one case, recovery was rapid, complete and satisfactory. Cows with secondary infections involving the deeper structures of the foot may require 4–6 days for recovery; other cases require only 2–3 days. Optimal dosage is approximately 3 g. of sulfamerazine per 100 lb. of body weight and should be given in a single dose. No toxic results were noted.

T.M.L.

FEEDS AND FEEDING

Dehydrated alfalfa meal obtained from field-chopped alfalfa contained slightly less carotene than did meal produced in the conventional manner from long alfalfa, which was chopped just prior to dehydration. Before dehydration, the field-chopped hay lost about 3% of its carotene per hour, but it lost less carotene during dehydration than did the long hay. Field chopping apparently does not seriously reduce the carotene content of alfalfa meal.

B.H.W.


The vapor pressure of water adsorbed on dehydrated alfalfa was measured in the region of 2.2 to 14.1% moisture and in the temperature range from 17 to 50°C. Typical S-shaped adsorption isotherms were obtained. Protein content of the meal had little effect on vapor pressure. Blanching prior to dehydration did not alter the position or shape of the vapor pressure curves.

B.H.W.


Alfalfa meal held in storage cave at about 38°F and 82% relative humidity showed improved carotene stability at low-temperature storage and when the moisture content of the meal was held higher than its moisture at the time of milling. No advantage was derived from the use of waterproof packaging for meal storage.

B.H.W.

**FOOD VALUE OF DAIRY PRODUCTS**


A compilation of recent literature dealing with composition of cow's and human milk and colostrum, including tables on essential amino acids, fatty acids, vitamins, and minerals, is presented. Comparisons between the two types of milk are made wherever possible. 59 references. I.P.

**ICE CREAM**

458. *Effect of Different Homogenizer Valves on Some Abnormal Ice Cream Mixes.* A. Leighton, Division of Dairy Research Labora-
Mixes which were difficult to whip when processed in the conventional manner were found to whip easier with a change in homogenization procedure. Comparative trials in which portions of the same mix were homogenized with an old first-stage valve, a new first-stage valve, and with the second-stage valve operated at pressures normally used with the first-stage valve revealed that best results were obtained when the mix was processed with the second-stage valve only. It further was shown that the portion of the mix processed with the old first-stage valve produced a mix of better whipping ability than when the new first-stage valve was employed. The use of a multi-flow homogenizer likewise produced a mix with better whipping properties than when processed with either of the first-stage valves. The use of a high pressure on the second-stage valve not only improved the whipping ability of the mix but also made the mix thinner, so that it handled better on the cooler, reduced the motor load in freezing, and produced better ice cream with respect to its body and texture.

When mixes of low whipping ability containing 8, 12, and 16% fat were used, the improvement in whipping ability through the use of the second-stage valve was most pronounced with the higher fat mixes. The whipping ability of chocolate mixes, as well as mixes prepared from butter, was improved by processing with the second-stage valve only. With mixes of normal whipping ability, there was little or no difference in the behavior of mixes treated with the first-stage as compared with that processed with the second-stage valve only. In another trial with a normal mix, better results were obtained with the first-stage valve than when the mix was processed with the second-stage valve.

No explanation for differences in the whipping ability of these mixes could be found from a microscopic examination of them. On the basis of the Farral index, all mixes showed satisfactory breakup of the fat globules. One explanation for the differences observed is that in some way the adsorption of protein on the butterfat globule was more thorough in mixes when processed with the second-stage valve only. Results obtained in this investigation indicate the need for a better way of expressing homogenization efficiency.

W.J.C.


The origin, method of manufacture, and the possible advantages and disadvantages for use in frozen dairy foods of a number of stabilizing agents, including gelatin, carob bean, pectin, dariloid, Irish moss, quince-seed extract, gums, and sodium carboxymethyl cellulose, are discussed.
The general nature and properties of several emulsifying agents being offered to the ice cream industry are presented. These emulsifying agents serve much the same function as egg yolk in ice cream. Their use will result in faster whipping, smaller air cells, a drier ice cream, and a smoother texture. One possible disadvantage of using emulsifying agents in ice cream is that they may cause shrinkage.

W.J.C.


The following specifications are given for a good liquid sugar-sucrose:
Color, white and crystalline clear; sugar, sucrose 99.5% and invert 0.5% of total sugar; ash content, 0.1% of total solids; brix, not higher than 67.5; pH 6.3; bacteria, less than 1,000 per ml.; B. coli, negative. Taking the sirup density with a brix hydrometer calibrated to 68° F. after diluting the sirups to twice their weight with water is recommended.

Ice cream plants in metropolitan areas or communities in which refineries are located profitably may use liquid sugar provided their annual minimum sugar consumption is 300,000 lb. In communities away from these areas, a minimum of 500,000 lb. annually would be required to make the necessary installations profitable. Delivery in drums is uneconomical, but delivery by tank trucks of 1,000 to 2,500 gallon capacity or in tank cars of 6,000 to 8,000 gallon capacity is considered good practice. The pipeline from the street level to the storage tanks should be at least 2.5 in. in inside diameter and may be of galvanized iron.

Protection from moisture and the use of "Sterilamps" in storage tanks are recommended. Accurate weighing of sirup delivered is imperative and the use of weighing tank scales for all liquids going into the pasteurizer is recommended.

Iron in liquid sugar is objectionable because it will cause undesirable discoloration in chocolate ice cream and may contribute to oxidized flavor in general. The claim is made that invert sugar in liquid sugar to the extent of 15% of the total sugar content is satisfactory for ice cream manufacture, but texture difficulties may result if this value is exceeded. The amount of invert sugar can be increased to 20 or 25% in the case of ices and sherbets. Mention also is made of using a blend of liquid sugar (sucrose) and corn sirup in the ratio best suited for plant needs. For miscellaneous purposes it is well to have a small amount of dry sugar on hand.


A classification and brief description is given of the sweeteners commonly used in ice cream. Literature is cited to show that the concentration at
which the sweetness of sweeteners is evaluated materially influences the results. When corn sugars are used in combination with sucrose they seem sweeter than when tasted alone.

It is stated: "For each pound of cane sugar to be replaced about 1.0-1.1 pounds of dextrose, 1.3-1.5 pounds of high conversion corn sirup, 1.7-2.0 pounds corn sirup solids, 2.5 pounds of regular sirup, 1 pound of invert sirup, 1.3-1.4 pounds of honey should be used."

Several methods of inverting sugar, as reported in the literature, are cited, and brief mention is made of the use of honey as a sweetener.

W.C.C.


The author claims that best results are obtained in sweetening ice cream, ices, and sherbets by using two or more sweeteners. A combination of \( \frac{1}{2} \) dextrose, \( \frac{1}{4} \) corn sirup, and \( \frac{1}{8} \) cane or beet sugar is recommended. W.C.C.


Reference is made to a survey by the Homemakers Guild of America in which it was reported that 77.1% of the women interviewed preferred to buy all their food and household needs in one store but only 3.6% were buying their "take-home" ice cream in the one-stop super markets. An additional 22 1/4% were buying their "take-home" ice cream in smaller neighborhood grocery stores, and 79.3% of the carry-out ice cream was being sold in non-grocery outlets.

Sales of ice cream in grocery-type stores are on the increase, as the author's company sold 22% of its ice cream to grocery stores in 1945, 23% in 1946, and an even larger percentage in 1947.

The value of point-of-sale advertising and suitable display cabinets properly located is stressed for selling ice cream. Insulated bags and, in some cases, dry ice in addition, are considered helps in selling ice cream in the grocery store. Proper pricing of the ice cream and maintaining quality are essential to successful selling. W.C.C.

MILK


Heat-resistant coliforms rarely, if ever, were found in the final product.
in a milk-plant study of raw, line, and final milk. A study of 1,000 samples of raw milk over a period of 1 year showed that far fewer coliform organisms are found in raw milk than commonly are used in the laboratory pasteurization of coliforms. When reasonable numbers of test organisms were used, complete kill always was obtained when employing the technic of complete submersion, but not when two techniques for partial submersion were used. It is concluded that coliforms are not found after laboratory pasteurization when the proper method and reasonable numbers of organisms are used. Heat-resistant coliforms seem to have no practical significance in the coliform testing of pasteurized milk.

D.P.G.


The vitamin C content is preserved and the development of certain off flavors retarded by deaerating milk prior to bottling under air-free conditions. The authors describe a continuous method of deaeration by spraying the milk at a temperature of 105–115° F. into a vacuum chamber where an amount of water is evaporated equal to about 0.5 to 2% of the weight of the milk and the temperature is reduced by about 7 to 15° F. The deaerated milk is removed continuously from the bottom of the chamber at approximately the rate at which it enters and is then cooled and packaged under subatmospheric pressure to prevent aeration. A regenerative heating and cooling step may be employed for greater economy. R.W.


An apparatus in which liquids, such as milk, may be deaerated or gaseous or readily vaporizable materials may be removed continuously is described. The product is introduced as a spray through a perforated pipe into a cylindrical tank maintained under vacuum. A definite volume of gas-free liquid is allowed to collect in the bottom of the tank and then is removed continuously by means of a pump from an outlet at the bottom. A leveling device controls the rate of intake and the volume of deaerated liquid maintained in the chamber. R.W.

Undesirable flavors found in milk coming from the farm, listed in the order of their frequency, are: (a) feed and weed, (b) cowy or barny, (c) salty, (d) rancid, (e) bacterial, (f) flat, (g) bitter, and (h) foreign. The cause and prevention of these undesirable flavors are discussed. C.J.B.


The Dixie Dairy Co. of Gary, Indiana, has made effective use of the Indiana State champion 4-H Club demonstration team to help sell the company’s producers on quality milk production. The team is used at farm group meetings. The program for the meetings and the team script are given.

C.J.B.


Milk or cream in the conventional type of can is kept cold by means of a jacket which fits loosely over the can and is sealed to a base plate on which the can rests. Cold water is admitted into the space between the can and semiporous jacket.

R.W.


To keep milk strainer pads clean and protected a dispenser has been developed comprising a covered cylindrical storage receptacle with a hinged bottom door through which the pads are easily removed one at a time as required.

R.W.


A description of the cooperative advertising and promotion plan developed in 1938 by milk dealers in Dayton, Ohio, to move surplus milk is given. The record of accomplishments is worthy of the attention of dealers in other cities.

C.J.B.


To remove cream from the top of a bottle of milk there is submerged into the cream layer a device consisting of a cylinder having a flange and gasket for sealing the top of the device to the cap seat of the bottle and a perforated
bottom which permits most of the cream to be poured off without mixing with the lower layers of low-fat milk.  

R.W.

SANITATION AND CLEANSING


Careful distinction is made between reversal of the bacteriostatic activity of cationic detergents after contact with bacteria and neutralization of activity before contact.  Anionic detergents tested did not reverse the activity of two cationic detergents.  However, in one instance, bacteriostatic action of zephiran against Gram-negative bacteria was neutralized, while the same action against Gram-positive bacteria was not neutralized.  Zephiran has a high degree of selectivity and possesses several hundred-fold greater activity against Gram-positive than against Gram-negative bacteria.  D.P.G.


A suitable inactivator for the antibacterial action of quaternary ammonium germicides must meet certain requirements.  It should, as completely as possible, neutralize the bacteriostatic and bactericidal actions of the quaternaries and maintain the neutralized state for a prolonged period of time.  The neutralizing agent itself should not possess antibacterial properties.  Several anionic detergents, including soaps, do not meet these requirements.  A series of compounds that give a precipitate in the presence of quaternary ammonium solutions failed to inactivate completely the germicidal action of the latter.  A sulfonic acid derivative, the sodium salt of symmetric bis (m-amino-benzoyl-m-amino-p-methylbenzoyl-1-naphthyl-amino-4,6,8-trisulfonic acid) carbamide, closely meets the requirements for an inactivator.  D.P.G.

MISCELLANEOUS


The importance of soil conservation to the dairy industry is discussed and methods are set forth whereby milk dealers and other businessmen can support the national program.  C.J.B.