Abstracts of the Literature of Milk and Its Products During 1946

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(Abstracts of the literature of food sanitation will appear in our May–June issue.)

Abstracts as published in several journals during the year 1946 are the basis for the following summary of literature in the field of the dairy industry. Consequently many of these papers were printed in 1945. However, the summary is not restricted to either of these calendar years. Limited space made it impossible for us to include all articles that are worthy of mention, but we estimate that about four-fifths of the available literature has been covered.

The following abbreviations have been used:

CA means Chemical Abstracts, vol. 40 (1946)

DSA means Dairy Science Abstracts (1946), volumes 7 or 8


In a few cases, the volume and year of a reference is different from those of the year 1946; specific publication data are fully given.

Analysis

A trustworthy method for the determination of the amount of crystallized fat in cream reported by Adriani and Tamsma is based on colorimetric measurement of the latent heat of crystallization of the fat (1). A colorimetric procedure for determination in milk of total protein, or of casein alone is reported by Alvarez and Medin R. to replace advantageously the Kjeldahl and Deniges methods (2).

Milk treated with 60 mg/liter of trichloromethane can be kept without refrigeration for three days, report Bertrand and Lemoigue and still have no objectionable odor, color, nor bacterial survival (3).

Browne estimates sucrose and lactose content of mixtures, particularly sweetened condensed milk, by a method based on the fact that NaHSO₃ decreases the optical rotation of aldose sugars (4).

Erroneously high total solids values by the Richmond formula occur since a milk adulterated by skimming along with watering can have the same sp. gr. as genuine milk according to Desai and Patel (5).

Antergan (N-dimethylaminoethyl-N-benzylaniline HC1) is colorimetrically determined in milk by Dubost (6).

Boric acid as a preservative in milk can be detected by a flame test reported by Goding and Cason (7).

The accuracy of the Hillig method for determination of lactic acid in milk is found by Gould not to be affected by heating prior to analysis (8).

Determination of citric acid in milk and cheese by Gunner and Emilsson involves bromination of the milk and cheese filtrates followed by liberation and measurement of the bromine (9).

Preparation of a very pure whey protein by treatment of milk with NaCl and HC1 is reported by Hard and Ashworth, who also found that 95 percent of the whey proteins are denatured by 45 minutes of heating at 80 degrees (10).

Heinemann states that a dairy product containing more than 20 percent moisture cannot be satisfactorily analyzed using the Karl Fischer reagent (11).
That fat acids in glycerides of milk are distributed in a pattern of widest possible distribution is the postulate of Jack, Henderson, and Hinshaw derived from low temperature milk fat precipitation data (12).

Kreveld describes an improved technique for counting fat globules in milk which makes use of a slide and cover glass etched with lines (13).

The phosphatase test can be adapted to the detection in cheeses of raw or improperly pasteurized milk, reports Lampert (14).

Heat-labile sulfur can be detected and roughly determined in milk by a method reported by Lea, in which nitrogen gas carries sulfur from the milk solution to a zinc acetate solution through which it is bubbled (15).

Unsatisfactory determination of milk solids content of bread by methods employing solvent extraction (which fails to recover all the fat) and of butterfat content by steam distillation methods are reported by Munsey (16).

The fat content of milk chocolate was determined by Offutt who compared a modified technique of Hillig's unified method with a modified Roese-Gottlieb method, the latter yielding results about 1 percent lower (17).

More accurate values for the phosphatase content of milk and cheese are obtained according to Horwitz by modifying the Sharer laboratory phosphatase test to give a two-fold increase in the amount of phenol produced over the present Sharer test (18).

Traces of Cu in milk are determined by Cranston and Thompson using an ion-exchange resin in conjunction with a polarographic measurement (19).

Nicloux's method for determination of alcohol is modified and adapted to fermented milk by Teixeira e Silva by use of K$_2$Cr$_2$O$_7$ with H$_2$SO$_4$ to produce a bluish green to yellow green color (20).

Using as a standard the very accurate Mojonnier Method of testing 80 percent cream, Heinemann approves the results with 80 percent cream obtained by use of the Kohman Calculated Method, a rapid control test suitable for billing purposes (21).

A colorimetric method for NH$_3$ in fluid and dry milk capable of satisfactory reproducibility is based upon reaction of NH$_3$ with alkaline phenol and sodium hypochlorite, reports Choi, et al. (22).

Homogenized and unhomogenized milks with 3.2 and 4.4 percent fat content was analyzed by the Mojonnier and Babcock tests by Harland and Davis who found an average discrepancy between the two tests with homogenized milk of 0.102 percent (23).

The Sharp and Hart equation for calculation of total solids in milk is in error and is corrected by Herrington to yield values about 3/4 percent higher. The corrected equation:

$$\text{Total solids} = 1.2537 \times \text{Fat} + \frac{268.0 (Q + 3)}{Q + 1000}$$

where $Q$ = Quevenne readings (24).

Milk heated for one hour at 116° C was found by Gould and Frantz after correction for retention to contain 9.9mg of formic acid per 100 ml which represented 49 percent of the total titratable acidity increase (25).

The determination of salt in butter and new cheese is reported by Arbuckle as more accurate using a mercurimetric titration method with S-diphenylcarbazone indicator. The method is not adaptable to Cl determination in milk or in sterilizers or where digestion of the sample is required (26).

In performing the resazurin and methylene blue tests with raw milk, Davis, Jones, Newland, and Wilby report that allowing the temperature to fall below 37.5° will favor very good or very bad milks whereas milk of fair to good bacteriological quality will be given lower scores (27).

Microbiological assay of dry skim and whole milk, evaporated milk,
fresh milk, and casein for amino acids gives values not markedly different from chemical analytical methods according to Hodson and Krueger (28).

A satisfactory apparatus for the preparation of butter samples for analysis described by Meuron features a rotating, specially shaped blade in a cylindrical jar (29).

Titratable acidity in fresh milk is caused by inorganic phosphates according to Robinson and Samson (30).

Modified Babcock tests with homogenized milk were studied by Trout and Lucas in an effort to perfect a procedure that would eliminate the formation of curdy or charred material in the fat column. Use of a water-alcohol mixture in place of the final addition of water prevented the charring effect (31).

The specific gravity of many pasteurized milk samples tested by Walker is not in agreement with values by Richmond's calculation because milk has not stood long enough to allow maximum contraction which results upon the solidification of the fat globules (32).

Added water in milk is conclusively detected by observing the freezing point depression of milk (Hortvet test). The minimum value of this most constant physical property of genuine milk is 0.530 degrees. (Anonymous) (33).

The Mean value of the pantothemic acid content in dried skim milk is given by Loy as 32.5 yg. per g. of sample (368).

**Bacteriology**

A strange reaction in sterile milk (colored with methylene blue) is reported by Cross who warns of need of care in sterilizing milk lest a reaction occur not of bacterial origin (34).

Of 2 anaerobic and 15 aerobic species of bacterial spores, Bacillus cereus, B. mycoides, B. albolactis, and B. metiens were relatively resistant to penicillin used by Curran and Evans to determine its preserving action in milk (35).

An outbreak of malty taint in milk, caused by Streptococcus lactis, was controlled by rigorous sanitation at the farm as reported by Davis, Jones, Wilby and Granfield (36).

The presence of two phosphatases in butter and buttermilk was concluded by Guittoneau, Chevalier, and Jerrouse who observed maximum activity at a pH of 4.2 and at 7.6-7.8, the former still active after heating to 73° for 50 minutes, the latter destroyed at 63° for 20 minutes (37).

Acidogenic and ammoniacal fermentation in the artificial broad bean milk is prevented by boiling the milk, LaBarre and Poupard record (38).

A gram-positive diplococcus believed by Virtanen and Nikkila to cause malty flavor in butter by splitting pyruvic acid forming acetic acid resembles aroma bacteria in their behavior (39).

Aromatic substances in milk such as biacetyl from oxidation of acetoin, are produced by Streptococcus diacetoilactis according to Carlinfanti (40).

Infantile cholera may result, warns Guyot by feeding condensed milk that has been contaminated, after opening of the can, by a lower yeast, a torula, carried by gnats (41).

Hussman states that B. putreficis, one of the most dangerous spore-forming contaminants of milk, can only be effectively controlled in cheese making by controlling the pH, maintaining, for Emmenthal, a pH of 5.18-5.50, for Edam a pH of 4.8 (42).

The action of phosphatase on casein which has been dissolved in KOH, buffered, and treated with pancreatin, is very slow and not unimolecular, reports Lofgren (43).

The phosphatase of milk is a metalloprotein reports Massart and Vandendriesche, with zinc as the metal. The phosphatase is inhibited by KCN and cysteine, not inhibited by NaF, and is activated by Zn and Mg ions (44).

The effects of the fatty acids of but-
terfat and corn oil upon growth of micro-organisms depend upon the vita-


min and amino acid content and fatty acid concentration of the butterfat and oil, report Spector (45).

Caseolytic and lipolytic cultures that would thrive in butter at 8 degrees C were identified by Jezeski and Macy as of the genus *Pseudomonas, Flavobac-
terium, Alcaligenes,* and *Achromobac-
ter* (46).

Dahlberg interprets the more rapid growth in pasteurized milk of coliform bacteria over all other kinds by point-
ing out that the coliform bacteria are almost entirely recontaminants in pas-
teurized milk and hence unlike other bacteria present, have not been made dormant by heating or refrigeration (47).

That acid alone in milk is not suffi-
cient to cause death of the tubercle bacilli is proven by Mattick and Hirsch, who show that milk containing lactic acid producing bacteria but not a antibiotic diplococcin is infective (48).

Organisms in cheese responsible for epidemics of disease include *E. typhosa,* the *Salmonella* group, *Clostridium botu-
linum,* and *staphylococci,* reports Fab-
ian, in suggesting a combination of pasteurization and a 90-day holding pe-
riod to combat spread of viable bacteria by cheese (48b).

Microscopic examination of producer samples of milk from cows for the presence of long chain streptococci is reported to be reliable by Johnson and Bryan (299).

High coliform counts in milk before pasteurization call for increased attention to the pasteurization process and subsequent handling of the milk points out Craig (300).

Origin and control of thermoduric and thermophilic bacteria found in milk are reported by Fabian (332).

An ingeniously devised set of equipment for determining the thermal death range of bacteria in milk is described by Gilcreas and O'Brien (333).

Acidified milk samples exhibited increased bacterial counts after incuba-
tion, reports Waisman and DeSoriano (339).

The standard plate counts of the cream and skim milk separated from raw whole milk were 65.6 and 125.5 respectively, report Ulvin, and Cree (340).

The origin of lactic acid bacteria important to cheesemaking is the sub-
ject of a controversy between Thöni and Mosimann (349).

Bacterial counts of milk obtained using the standard agar and the modi-
field medium of Barkworth and Davis were not different, report Lax and Sesa (350).

A milk culture medium containing papain is described by Buittonneau and Chevalier (351).

Control of dust contamination in agar plates was effected by Gambrell and Ostrodek by attention to details of laboratory construction and equip-
ment (352).

In an improved Quebec colony counter described by Richards and Heijn the colonies are seen against a dark field (353).

Resazurin disk values compare favorably with mean colony counts, report Golding & Jorgensen (354).

The resazurin and methylene-blue tests compared somewhat similarly as measures of the keeping quality of milk, report Anderson and Wilson (355).

Staining with acridine orange is re-
ported by Strugger as eminently suited to the examination of milk (356).

Estimation of bacteria and of the nitrogen distribution in cheese is facil-
tated by use of sodium citrate solution, report Knudsen, Sorensen and Overby. (357).

Plate counts are given by Hiscox for milk powders reconstituted with warm, cold, and sterile water (358).

Plate counts of dried milks recon-
stituted in different ways and at differ-
ent temperatures are reported by Higginbottom (359).

Aneurin in cow and goat milk is determined by using the thiocchrome and manometric analytical methods, according to DeJong (367).

Milk is reported to contain the enzyme fibrinogenase by Buruiana (370).

**Butter**

The flavor of butter is determined to a large extent by the flavor of the cream from which it is made according to Babel (49).

Summer butter contains a fat soluble substance, not a known vitamin, distilling in the higher fraction containing acids of 14 and more carbon atoms, which Boer, Jonsen and Kentie describe as growth promoting (50).

Two methods of continuous buttermaking are described by Gemmill, each characterized by removal of all liquid as skim milk rather than buttermilk (51).

In a study of causes of gumminess and off-flavor in southern butters, comparative values for percentage fat in cream, acidity of cream, pH of butter serum, hardness, and melting point of butter, etc., for Texas butters and several northern state butters are tabulated by Hanson, Arbuckle, and Shepardson (52).

The determination of gas content of butter in a modified procedure of Hills and Conochie makes provision for free and dissolved gas (53).

Uneven salt distribution in butter correlated generally with maximum bacterial activity, mottling of color, according to Hoecker and Hammer, whereas abnormal flavor was found in butter lacking uniform moisture distribution (54).

Reid discusses the prevention of various odors in butter (55).

Moisture and light are responsible for increases in acidity and rancidity respectively in both cocoa and cow butter as found by Sjostedt and Schetty (56).

Analytical constants for ewe butter listed by de Mingo and Calles include Polenske value (5.45), Grossfeld short acid number, (44.14) and Grossfeld butyric acid number minus short acid number (24.34) all of which are key criteria in differentiating between ewe and cow butters, the ewe butter values being higher (57).

Analysis of samples of Indiana butter over a nine year period by Gregory and Horrall revealed a general trend toward more samples having 80.00 to 80.99 per cent butterfat, a similar trend toward a lower salt content and revealed little correlation between mold mycelium count and organoleptic quality (58).

Peroxide number and aldehyde number, varying from 0.0 to .6 for the former, 0.01 to 1.61 for the latter, for Norwegian butter tested by Storen and Dovle showed 88 percent correlation. The values 0.16 and 0.15 respectively are normal values for Norwegian creamery butter, little correlation existing between the values (59).

The fishy and oily taste of Finnish butter, attributed to the Fe (12.32 y/g) and Cu (0.81 y/g) content can be remedied, as reported by Storgards, by addition of buffer salts which raise the pH from 4.5 to 6.0 (60).

In preparing butter samples for analysis one must avoid cooling after the sample has been softened, warns Vorhes, lest segregation take place (61).

Undissociated propionic acid very definitely inhibits the growth of molus, reports Olson and Tracy, in recommending the use of the acid in treating butter paper wrapping (62).

Metallic flavour developed as the main defect of butter kept in rusty containers, reports Hamilton (273).

Use of carotene for coloring butter is found satisfactory by Swartling who urges means of reducing the cost of carotene (274).
Dunkley and Wood discuss standardizing the pH of butter with carbonate neutralizers (275).

The Calcium balance in rats was found negative when butter or margarine were included in the diet, reports Westerhind (313).

Continuous buttermaking processes are presented by discussion of the operation of various pieces of equipment (325).

**Butterfat**

The properties and preparation of a satisfactory New Zealand dry butterfat similar to the ghee of India are reported by Barnicoat (63).

A dry butterfat product, liquid at icebox temperatures, and maintaining most of the original butter values is described in a patent granted to Buxton (64).

Hydrogenation of butter fat as reported by Kentie and Nanta is accomplished in alcohol solution at 40° in 2 hours time under 1 atmosphere with 15 per cent Raney nickel. No reduction of the carboxyl group occurred (65).

Repulsive forces between milk-fat globules are demonstrated by Kreveld by comparing the actual count of globules in a unit sized cell with the count assuming random distribution (66).

Butterfat losses to the buttermilk in the churning of cream are placed by Mortensen at the average value of 1.35 per cent and are greater with 26 per cent cream than with 33 per cent cream (67).

The fat globules in cream are in the majority composed of crystallized fat and are large in size in contrast with fat globules of skim milk which are liquid fat and small sized as reported by Mulder (68).

Rats fed butterfat rations showed greater average consumption of the ration and thus greater average gains in weight than those fed corn oil rations, report Parrish, Shimer, and Hughes (69).

The known constants for butterfat are tabulated by Petersen, with data indicating seasonal variations in refractive index and Reichert-Meissel number (70).

A dry butterfat product described by Wiley and Coombs has good keeping quality even in the tropics without refrigeration (71).

Physical stability of frozen cream is helped by use of freshly drawn milk, proper maintenance of the milk, quick freezing, and low temperature storage all these factors related to the preservation of small unclumped fat globules, report Bell and Sanders (72).

Feeding cows cottonseed oil increases the fat content of the milk only for a short period after which time, as Davis and Harland observed, the fat content returns or drops below normal (73).

A satisfactory hardened butter substitute described by the Australian government is composed of 94 per cent butterfat, 3 per cent peanut oil, and 2 per cent dried skim milk and 1 per cent salt (277).

**Casein**

Iodinated casein fed to cows produced increases in milk production by 16–33 percent with minimum body weight loss. Certain more active samples of iodinated ardein (from ground nuts) produced similar weight loss, while other samples of iodinated ardein and samples of iodinated ox blood plasma were ineffective in producing milk gains (74).

Blaxter describes the results of an extensive experiment in which cows were fed iodinated casein in 30 g. daily doses. The mean increase in daily milk yield was 5.44. The diet caused loss in weight but had no effect on the incidence of mastitis, lameness, or abortion (75).

Casein utilization in mice was enhanced reports Bosshardt, Ayres, Ydse, and Barnes, by factors contained in two liver fractions (76).
The thyroxine content of iodinated casein is determined by Reinecke et al. by first hydrolizing the casein with 40 per cent barium hydroxide, extracting with butanol, and then determining the iodine content of the extract. Iodinated casein preparations can be made that contain 3 to 4 per cent thyroxine, 20 to 30 times the content in U.S.P. thyroid material (77).

Methionine supplied by casein is suggested by Mason, Theophilus and Noller to explain the excellent growth characteristics of a rice diet plus butter with casein for superior to either butter or casein alone with the rice. Rice plus butter alone has adverse growth effects (78).

Tough casein curds are precipitated from a mixture of dried and fluid skim milk in a patented process described by Oatman (79).

The nitrogen of acid hydrolyzates of casein was largely retained and utilized when injected into hypoproteinemic dogs, stated Frost, Heinsen, and Olsen (80).

L. casei factor (folic acid) combined with 18 per cent casein-containing diet was reported by Kornberg, Daft, and Sebrell to be effective in correcting granulocytopenia, a casein deficiency disease, in rats (81).

An aqueous dispersion of casein prepared according to a patent of Smith, can be utilized in food preparations (82).

Heat coagulation of milk was shown by Torboli to be due to a conversion of caseinogen to a dephosphorated material precipitated by the calcium salts (83).

Skim milk curd, which is 75–80 per cent water, 10–15 per cent protein, 0.3–3 per cent lactose and other organic and mineral matter owes its food value to its casein content, the most important protein present, and its flavor to the lactic acid as reported by Vidal (84).

The dialyzate of an enzymically hydrolyzed casein reported by Wrettland containing 80–85 per cent free amino acids and 15–20 per cent low-molecular weight peptides was sufficient to maintain the nitrogen retention in rats tested (85).

The manufacture of rennet and acid casein is discussed and tests are summarized (291).

Casein is dried by infra-red lamps with half the energy expenditure required using coal as a source of heat (292).

Cheese

Advantages of low temperature curing (below 40 degrees F) of cheese as against high temperature (60 degrees F) are discussed by Ericson (86).

Mysost cheese from goat or goat and cow milk is described by Fischer (87).

Supplementary surface salting of cheese, necessary to develop the desired flavor, tends to increase H₂O content of the cheese, reports Hostettler et al., who overcome the latter effect by increased heating and stirring of the curd (88).

Minas cheese was studied by Rogick with attention to maturation changes which revealed decomposition of the lactose after the 10th day (89).

Factors considered by Hanson et al. that affect the quality of short-cure cheddar cheese include amount of rennet used in coagulation, salt used, methods of manufacture, temperature and duration of ripening process, and washing pH values (90).

The matting of cheese is related by Harrison and Robert to the acidity addition of fat, rennin, steapsin, lipase, protease, and amylose (91).

Hathaway and Davis, in testing 27 cheeses for the riboflavin contest varies from 13.5 to 1.2 y per g. found goat, Velveeta, Mel-o-Pure and Liederkranz highest in content, cream cheese lowest (92).

Cheddar cheese retains about 61 per cent of the original Ca, 53 per cent of
the P, and 23 per cent of the riboflavin of the milk used in its preparation. These retention values were almost the same using pasteurized milk. Irvine Bryant et al. report retention values for cream, cottage, brick, and blue cheeses as well (93).

Retention values: Cream—84.4 mg per cent Ca., 86 mg per cent P., 280 y per 100g Riboflavin; Cottage—85 mg per cent Ca., 146 mg per cent P., 288 y per 100g Riboflavin; Brick—57.7 mg per cent Ca, 58.7 mg per cent P., 27.4 y per 100g Riboflavin; Blue—46.2 mg per cent Ca., 43.3 mg per cent P., 30.1 y per 100g Riboflavin.

Keiling found that rennet plays a definite part in the ripening of cheese from experiments in which diluted rennet and curds were first heated together (94).

Control of the flavor of brick and related smear-ripened cheese can be effected by regulation of the surface smear caused by various micro-organisms, Langhus Price et al. suggest (95).

Proteins are responsible for the binding of water in cheese curds finds Mocquot from studies with curds in sugar solutions (96).

Excellent quality cheese can be made from milk pasteurized by heating to 160° F. by direct steam, reported Marquardt and Yale (97).

Ca and P values, considerably higher in Swiss and Edam and cheddar cheeses than in cream cheese and miscellaneous types tested by Zahrudt, Lane, et al. bear no relationship to the state of origin or the flavor of the cheeses (98).

Babel reports that slow acid production and in some instances almost complete cessation of and production in cheddaring of cheese result in the presence of bacteriophage (99).

A cooking temperature of 104° F. for cheddar cheese results in retardation of acid development but Babel advises that this heating does not explain large decreases in or actual stopping of the acid production (100).

The volatile fatty acids in cheese can readily be determined by the method of Kosikowsky and Dahlberg, a direct distillation method (101).

A minimum of 60 days of ageing for commercial cheeses such as cheddar was reported by Gilman et al. at sufficient assurance against finding viable Brucella abortus organisms (102).

The volatile fatty acids of cheese are determined by a method reported by Smiley et al., which is based upon an ether extraction followed by distillation of the extract and of the residue (103).

Maximum vitamin A potency of Wisconsin cheddar cheese was found to occur in samples made in September and October whereas minimum values were found in the March–April period, report Higuchi and Peterson (104).

Factors affecting the development of acid in cheese-making are discussed by Platon (271).

Cottage cheese curds made from pasteurized milk were washed, salted packed and frozen for storage, reports Marquardt (278).

Preparation of Serac cheese, a whey cheese of 80 per cent moisture, 3–9 per cent fat and 14 per cent to 20 per cent protein content is described by Hondiniere (279).

Propionate brushed on the surface of cheese was reported by Dorsey to prevent mold formation for at least a year (304).

Cheese and curds in general evoked greater volumes of gastric juices than did milk, found Poliskov, in experiments with dogs (315).

Preparing cheddar cheese from pasteurized milk is discussed in a preliminary report which includes suggestions for speeding up the ripening time (336).

The effects on starters after heating, cooling, salting and acidifying were
studied by Sjöström by measurements of Eh, bacterial numbers, and diacetyl formation (343).

Theories and methods of bacteriophage infection in cheese making are presented by Whitehead and Hunter (344).

Nichols and Wolf report widespread occurrence of phage attack in cheese starters. Heating of the bulk starter milk to 90° C for one hour allows a large safety margin (345).

Variable results obtained in attempts to control the flavor of cheddar cheese by inoculation with L. Casei and S. cremoris are reported by McDonald (346).

A Sporotrichum is reported by Guittonneau and Haas to be a normal ripening agent for certain cheeses (347).

Thermobacterium yoghurt as an acidifying agent in coagulated and subsequently sterilized milk proved a suitable culture medium for Roquefort cheese mould (348).

**Evaporated Milk**

Evaporated milk allowed to remain in opened cans produces a discoloration with coffee found by Gould to be attributable to the rusting of the can and in no wise to the amount of lactic acid (105).

Condensed and evaporated milk processing is described by Ray who tabulates for French condensed and English evaporated milk (106):

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<table>
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<tbody>
<tr>
<td>H₂O</td>
<td>25.5</td>
<td>67.47%</td>
</tr>
<tr>
<td>fat</td>
<td>10.0</td>
<td>9.10%</td>
</tr>
<tr>
<td>protein</td>
<td>9.0</td>
<td>8.75%</td>
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<tr>
<td>lactose</td>
<td>12.6</td>
<td>12.74%</td>
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<tr>
<td>ash</td>
<td>1.9</td>
<td>1.94%</td>
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<tr>
<td>sucrose</td>
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</table>

Finding that human milk is low in vitamin C the first eight months of the year, Bogdanova recommends a 100 mg. daily supplement of ascorbic acid to lactating women (107).

The fat acids of human milk analyzed by Brown and Orians consisted largely of those acids of 18-20 carbon atoms (108).

Garry and Wood review dietary requirements in human pregnancy and lactation. Over 400 references given (109).

Evaporated milk stored at 100° F. for seven months showed insignificant lactic acid increase but did show a marked titrable acidity increase 71.3 per cent attributable to formic acid, reports Gould, Weaver, and Frantz (109B).

**Health and Disease**

A milkborne outbreak of infectious hepatitis is reported by Murphy, Petrie and Work (310).

Whereas milk consumption in Massachusetts has increased, milk-borne diseases have decreased, reports Feemster (311).

Migraine headache was caused by milk in a patient with a 30-year history of the affliction, report Wolf and Unger (314).

Underpasteurization of milk in South Africa leads Pullinger to suggest putting the process into the hands of the government, a co-operative society or a public utility corporation (320).

The bacterial count in milk kept in home refrigerators did not rise significantly until the eighth or tenth day, a survey by Supplee-Wills-Jones Milk Co. revealed (338).

Thermophilic counts in commercially pasteurized milk in Sao Paulo were between 600 and 55,000 per ml, states Rubens (342).

High incidence of tubercle bacilli in the milk of Cape Town leads Horwitz to urge compulsory pasteurization (361).

Brucella melitensis, found in cheese, caused twenty cases of brucellosis according to Sofia (362).

An epidemic of septic sore throat at Salmon Arm, B.C., was milk borne as traced by Bowering, et al. (363).

Raw milk was a source of a wide-
spread scarlet fever epidemic in Copenhagen, reports Jepsen and Hansen (364).

HUMAN MILK

Fifty percent of human milk samples showed inhibition phenomena explained by Ballestero to be attributable to bacteria developed during lactation (110).

One of the bacterial flora of human milk reported by Ballestero is found strongly acidogenic, others are weakly so, the former showing inhibitory behavior towards growth of fecal spore-bearing anaerobic bacteria (111).

The vitamin content of human milk of mothers fed controlled and self-chosen diets is extensively studied in a series of experiments at Research Lab, Children's Fund of Michigan. (Macy et al.) Vitamin content of cow milk is compared with that of human milk (112).

Neuweiler reports the absence of ascorbic acid oxidase in human milk (113).

The vitamin D levels in the milks of pregnant women reached a maximum of only 62 I.U. per quart when given fish-liver oil (at most 480,000 I.U. of supplement) report Polskin, Kramer, and Sobel (114).

Dilution of human milk with as little as 10 per cent of cow milk (pasteurized but not boiled) can be detected as reported by Rodkey and Ball by testing for the cow milk enzyme xanthine oxidase (115).

A valuable milk mixture substitute for human milk is reported by Escudero (316).

ICE CREAM

The total solids content of ice cream mix and of sweetened condensed milk are determined by Doan and Livak using the Dietert Moisture Teller, (which makes use of forced heated air) more accurately than by the Mojonnier techniques of the "Official Method" (116).

Ice cream is a much richer source of carotene than whole milk, a good source of riboflavin but is lacking in ascorbic acid in tests by Holmes, Kuzmeski et al. (117).

Light colored honeys are reported by Lucas to be suitable for use in ice cream (118).

Ice cream stabilized by use of the fat fraction after Musher's patent is described as superior in quality (119).

Milk sherbets stabilized by addition of a high protein, low-starch oat fraction after Patent 2,395,060 (Musher) are of excellent quality (120).

Five new ice cream formulas necessitated by recent sugar and dried milk shortages in Great Britain are given by Pompa (121).

The sugar content of ice cream can be reduced 10 per cent to conserve sugar report Pyenson and Tracy if milk-solids-not-fat or other solids are raised to improve texture (122).

Ice cream overrun is greatly increased by an egg product patented by Scott and Parsons (123).

Dried ice cream mixes made from skim milk which had been fore-warmed at 180° F. for 5 minutes before condensing, Pyenson and Tracy report, did not develop oxidized flavor and were very palatable after a year's storage (124).

Oral administration of penicillin using an ice cream base is reported to effect satisfactory relief of the patient (283).

Palatable ice cream is possible with sugar content as low as 11 per cent reports Josephson (284).

Commercial ice cream formulas are supplied by Leighton (285).

The Post-war trend in the frozen dessert industry is toward increased quality, confirms the committee report (334).

Bacteriological control of ice cream is covered by El-Gheriany and Kiani (360).

LACTOSE

Crude and technical lactose suitable for food products is manufactured...
from cheese whey by Webb and Ramsdell by clarification, concentration, crystallization, and centrifuging of the whey (125).

The effect of the rate constant of the equation for the first order reaction represented by the dehydration of lactose upon the distilling time required in the total method for determining moisture of dry milk products is discussed by Choi et al. (126).

**Margarine**

Vitamin A in margarine can be satisfactorily determined by an improved type photo-electric photometer described by Bowen, Gridgeman, and Ongnmann, who measure the absorption of the SbCl₃-vitamin A complex at 620 my (127).

Margarine fat composed of hydrogenated vegetable oils is digested to an identical extent (97 per cent) as butterfat, Deuel reports (128).

Fortified with vitamin A as reported by Feigenbaum, margarine maintains the full vitamin content six weeks (129).

Addition of small amounts of an aqueous mixture of lecithin, glyceryl monostearate, and cottonseed oil to margarine reduces spattering and leaking and improves texture, reports Stanley (130).

Margarine manufacture is discussed by Feron who covers methods starting materials, quality, and economics (131).

An efficient margarine factory layout described by Petrov includes a Gerstenbert emulsifier, evaporation cooling drum, and a vacuum mixer (132).

**Milk**

Average indican contents of human milk, cow milk, and goat milk are reported by Aceto and Spinelli to be 30 y per cent, 124 y per cent and 192 y per cent respectively (133). Curds from fresh whole milk which had been boiled, cooled, and inoculated with a small quantity of preformed curds were found by Chitre and Patwardhan to contain more riboflavin, less nicotinic acid, and more thiamine than the original milk (134).

In studies on the heat coagulation of milk, Cole and Tarassuk found not only a characteristic difference between goats and cows milk but also marked differences in the nature of the coagulum produced (135).

Milk, raw or pasteurized, whole or skimmed was found by Cooperman-Ruegamer et al. to be a good source of the monkey-antianemia factor (136).

Soybean milk, nearly as good as cows milk, was prepared by De and Subrahmanyan (137).

The proteins: lipoids ratio in milk is reported by Garino-Canina and Cassella-Jandolo as 0.97-1.02 (138).

Skimmed milk powder which had been extracted with ether when mixed with butter, margarine, corn oil, cottonseed oil, peanut, or soybean oil produces with all the same growth effects in rats, reports Deuel, et al. (139).

Citrates are present in skim milk as tricalcium citrate reports Eilers and Jense. A method for quantitative determination of citric acid in the presence of excess lactose is given (140).

Existence of a calcium caseinate-calcium phosphate double compound in milk is shown by Eilers et al., from consideration of titration data, of ultramicroscopic observations, and of flocculation data (141).

Skim milk, Headley found, produces faster and more economical gains in pigs when incorporated into the dry lot diet than did a protein mixture composed of 40 per cent meat scrap, 30 per cent linseed meal, and 30 per cent alfalfa meal (142).

Goats milk contains the same amount of fat and ascorbic acid as cows milk but less riboflavin, report Holmes, Lindquist, and Greenwood (143).
Surplus albumen in cows diet did not affect the quantity of milk or its milk fat content, report Inchausti, Tagle et al. (144).

Cow, sheep, and human milk averaged 222 mg/liter of total choline, 129 mg/liter of nonhydrosol choline, and 15-35 mg/liter of free plus combined hydrosol choline, the choline substances being found mostly in the aqueous phase of milk, in studies by Kahane and Levy (145).

The action of milk lipase on tributyrin is suggested by Kelly as an indicator of rancidity in milk (146).

Pitocin activates of the tributyrinase in both normal and rancid milk is reported by Kelly (147).

Significant gains in quantity and fat content of milk resulting from feeding cows concentrate mixtures containing 5.3 per cent fat leads Loosli, Maynar, and Lucas to conclude that 1 lb. fat intake per day increases the production of fat-corrected milk (4 per cent) 2.6 lbs. per day (148).

Lipase breaks down into compounds that off-flavor milk, according to Roberts and Wylie, who give treatments for the control of lipase in fresh milk (149).

Shimwell and Evans use as a clotting agent for milk a bacterial proteinase, produced by growing bacteria in a nutrient medium (150).

The fluorine content of milk from cows given water containing 500 ppm of F did not exceed 0.5 ppm in test conducted by H. V. Smith, M. C. Smith, and Vavich (151).

Soates reports that persistent low acidity in grade “A” pasteurized milk is a result of the loss of CO₂ in slow pasteurization (152).

The electric conductivity of milk increases on standing due to the lactic acid that forms. Tapernaux, Desrante, and Bequet suggest deacidification by an electrolytic process (153).

Incidence of milk fever in dairy cows was not reduced by administration of 1 million units of vitamin D daily for 5 weeks, reports Hibbs et al. (154).

A satisfactory sterilized caramel milk made by mixing a caramel base with plain and concentrated milk is reported by Webb and Hufnagel (155). And as yet unidentified substance of low molecular weight responsible in part for the cooked flavoring in heated milk is indicated by dialysis experiments on raw milk conducted by Hankinson, et al. (156).

Homogenized milk, when frozen and stored at a constant low temperature remained normal for very long periods, reports Babcock et al., but when exposed to room temperature for 1/2 hour and then stored at a higher temperature than originally flat or oxidized flavor appeared on subsequent thawings (157).

“Excellent” flavor milk took a longer time to judge than did off-flavor milks as reported by Trout in studies that led to the average judging time of 7.2 seconds (158).

Since sterilization of food products containing milk results in rapid coagulation of the milk protein, Webb and Hufnagel recommend use of binders to take up moisture, homogenization, use of whey protein, and sterilization with a minimum of stirring to a smooth, heavy-bodied product (159).

H₂O₂ in small amounts in milk as a preservative destroys the ascorbic acid, reports Bisogni and Calendoli (160).

Rotary beating improved the texture of the white sauces made from homogenized milk which tended to show separation of fat in the preparation of the sauces, report Tomson and Trout (295).

Alpine milk is higher in lactose, calcium and chloride and lower in phosphate and cascin than other French milk, reports Mathieu (365).

**Miscellaneous**

Sorghum roots and chaff are reported by Barbera to be suitable for dairy
cattle feeding since analysis reveals the HCN content below the toxic limit (161).

From a consideration of the comparative values obtained in feeding cows tuberin and linseed oil cakes, Bonnet, Gasnier, and Leroy propose the feeding of tuberin as a remedy for the scarcity of digestible albuminoids which is responsible to a large degree for low milk production (162).

Galactose utilization in rats fed skim milk is greatly increased by the presence of fat as found by Bontwell Elvehjem and Hart (163).

Injection of 174 y of labeled Cobalt into the blood stream of a rumen fistula cow resulted in only very small amounts being found in the milk and when injected directly in the rumen none was found in the milk, as reported by Comar et al. (164).

No significant differences between the quantity, fat content, or mineral content of the milk of a group of pastured cows fed a diet including mineral salts (CaCO₃, Ca₃(PO₄)₂, Fe₂O₃, NaCl, MaCo₃) and of a group not fed the salts were observed at the end of 15 weeks by de Man, Sjollema, and Groshue (165).

Potato leaf silage fed to cows in tests by Dijkstra resulted in satisfactory milk production (166).

The protein requirements of cows on Oahu, Hawaii, where considerable protein supplement was necessary was reported by Henke to be supplied by air dried garbage, soybean oil meals, and sesame-oil meal (167).

Refection in rats is not effected by an addition of a small amount of milk to a vitamin free diet. Hopkins and Leader indicate that refection never occurs in the presence of starch or adequate vitamins (168).

AIV fodder was proven by Hvidsten to be the best source of carotene in winter feeding of cattle, producing an increase of vitamin A in winter milk from 900 IU/liter of 4 per cent milk to 1200 IU/liter. Summer milk from pasture fed cattle averaged 1900 IU/liter of 4 per cent milk (169).

A milk beverage prepared after a patent of Jackson from cocoa, malt and whole milk retains original food value and flavor and keeps well (170).

Cobalt sulfate is recommended by Keener, Percival, and Morrow to cure a mineral deficiency disease in cattle exhibiting certain described symptoms (171).

Coagulation of milk by rennin is not affected following addition of 75 mg per cent of Na dibutyl naphthalenesulphonate, probably, say Laporta and Mossini, because of removal of Ca ion as a complex (172).

A homogenized cream substitute is described by Mason and Justensen who emulsified vegetable or animal oils with aqueous vegetable flour suspensions (173).

Moore reports that the disturbance in the ascorbic acid synthesis in the vitamin A deficient calf does not effect the spinal fluid pressure (174).

Vaccenic acid, an oleic acid isosmer present in butterfat in considerate amounts was shown by Brouwer and Jonker-Scheffener to be present in greater amounts when the cows were fed summer rations than when fed winter rations (175).

Mare milk, Fredenberg reports analysis reveals, is low in protein fat but rich in lactose, and thus cannot be used for infant feeding without addition of 1 to 1.5 per cent cow milk fat (176).

In buffalo milk Ghoneim reports: protein percent = 3.43 + 0.116 × fat percent heat value (cal. per kg milk) = -110.33 fat (percent) + 278.63 (177).

Goat milk as analyzed by Holmes et al., contains 137mg, percent Ca, 17mg percent Mg 170mg percent K, 112mg percent P, 4.4 percent fat and 3.4 percent protein (178).

Dairy cows consumed less silage and
produced less milk when fed a phosphoric acid treated alfalfa silage than when fed corn silage, reports Monroe et al. (179).

Milk production was similar from cows fed simple and complex grain rations containing about the same protein content in tests by Monroe and Krauss (180).

Rennet hysteresis in milk is explained by Pyne by assuming a Ca caseinate-phosphate compound to act as protective colloid (181).

Diets containing an abundance of milk, liver, riboflavin, and xanthine show little inhibitory behavior towards methylcholanthrene carcinogenesis in mice, whereas the same diets show remarkable inhibitory behavior towards dimethyl-aminoazobenzene carcinogenesis, report Strong and Figge (182).

Addition of 3 to 3.5 g per liter of lactic acid to Escudero milk precipitates the casein, sterilizes the milk for 24–48 hours, and prevents bacterial growth if later contaminated, according to Waisman (183).

Rat milk quantity and quality is studied by Mueller and Cox as related to mineral and yeast intake with certain significant results (184).

Norton finds that feeding cows fresh bakers' yeast in amounts as great as 80g produced no changes in fat content of the milk and caused no increase in the cows' appetites (185).

Extension of colostrum-feeding of cows produces weight gains and increases in the blood plasma vitamin A, as reported by Sutton and Kaeser (186).

A low-calcium, acid whey results when the casein is put with $\text{H}_2\text{DO}_4$ at a certain pH in a patent granted Windfeld-Hansen (187).

In an experiment reported by Shepherd, Woodward et al., cows fed rations partly or wholly composed of various potato ensilages or rations of chopped raw potatoes showed good gains in live weight and kept up their milk production (189).

Studies with Ca-deficient New Zealand cattle showed doses of 80g Cu $\text{SO}_4$ non-poisonous, but 200-400g lethal (190).

An excellent artificial buttermilk powder is made from dried whole and skim milk, malted flour and cane sugar, reports Fikler (288).

Milk sera, including whey, are discussed by Pien from the standpoint of their utilization (289).

Australian commercial lactic acid production from whey is reported (290).

**Nutrition**

The entire milk supply from birth to five years of age of four groups of children was: for the first (control) group, irradiated evaporated milk; for the second, plain evaporated milk and cod liver oil (one lb. daily contg. 1500 units vitamin D and 15,000 USP units vitamin A; for the third group, irradiated evaporated milk and carotene (ten drops daily equivalent to 2250 USP units vitamin A; for the fourth group, irradiated evaporated milk and 10 drops carotene and brewers yeast (½ tbspn. equiv. to 0.5 mg vitamin B, and 0.2 mg riboflavin). Rhoades et al. found no significant differences in the groups at the end of four years as concerns growth, dentition, and intelligence, and dental caries in all groups were comparatively low (191).

The nutritional quality of the proteins in bread evaluated biologically are reported by Carlson, Hefner, and Hayward who found 6 percent white milk bread and 5 percent white soy bread equal to each other and superior to all whole wheat bread (192).
Use of casein in place of corn meal in the diet of rats administered carotene resulted in increased digestion of carotene and increased storage of vitamin A in the liver according to Fraps (193).

Twenty percent milk fat and twenty percent triolein diets both produced more rapid growth of rats than did 20 percent trilaurein or fat free diets, in experiments conducted by Henderson, Jack, et al. (194).

That less than one quart of milk daily will supply the calcium requirement of a pre-school boy was the conclusion of the Mmes. McLean, Jensen et al. (195).

The average content in milk products of the San Francisco area of numerous nutritive constituents is tabulated by Sharp, Shields, and Stewart in relation to the effects of manufacture and storage (196).

The utilization by the body of the calcium in milk was found by Steggerda and Mitchell to be the same whether the milk were pasteurized, homogenized, modified, or whether citrates were added (197).

In 72 matched pair experiments by Wolman with children no measurable differences were observed in certain intragastric responses to “soft curd,” homogenized, and “hard curd” plain pasteurized milk (198).

Pasteurized or boiled milk fed white mice was found by Forti adequate for all normal life functions (199).

Addition of 6 percent nonfat dry milk solids was found by Riggs, Beaty and Johnson to improve the nutritional value of water bread, enriched water bread and whole wheat bread (200).

Mueller reports that cocoa in milk is thought to destroy certain vitamins (287).

Powdered Milk

Milk powders with fat contents of 1, 26, 28, 30 percent, moisture contents 2, 3, and 5 percent were stored for periods up to 16 weeks at temperatures of 40–140°F. in experiments reported by Bryce and Pearce. All showed deterioration when stored above 60°F. A moisture content of 3 per cent was found preferable for storage of all powders. Bryce reported maximum photolysis of riboflavin in skim milk powder at 4450 ang. (201).

Whole milk powder is stabilized in storage by wheat germ oil antioxidants or by antioxidants that develop in the milk powder on storage in moist atmospheres or at high temperatures by report Chaoman and McFarlane (121).

Cereal-bean-silkworm pupa powder and whole milk powder have the same digestibility, growth, and bone-building properties when fed to rats according to tests by Choo Yu Chen (203).

That increases in oxygen content in the headspace of packaged dried whole milk result from diffusion of oxygen from entrapped air cells within the powder particles is substantiated by Coulter and Jenness. The oxygen level can be reduced effectively by means of inert gas packing or by holding under a vacuum (204).

Problems involved in gas-packing dry whole milk as discussed by Coulter and Jenness include factors that determine the amount of air entrapped in the milk-powder and means of removing the oxygen from the powder (205).

Milk is vacuum dried by means of radiant heat according to a patent of Gentele (206).

Dehydrated mixtures of egg and milk decrease in palatability under storage conditions much more rapidly than milk powders of similar protein and fat content according to Pearce, Whittaker, et al. (207).

The rate and extent of sorption of CO₂ by dried milk powders are related by Pearce to fat content and to CO₂-N₂ mixture ratio. These authors further report milk powders are more rapidly deteriorated by sunlight than by ultraviolet light alone (208).

0.8 percent oxygen in milk fat, cor-
responding to 0.2 percent oxygen in the atmosphere of dried milk, is the maximum value allowable without experiencing off-flavoring autoxidation, but Schaffer, Greenbank et al. reported limited but good keeping qualities by maintaining oxygen concns. below 5 percent in the atmosphere of dried milk (209).

Compression of spray dried whole-milk powder to a density of 1.15-1.20 is as effective as gas packing in reducing the interstitial oxygen, as reported by Thiel who also found cellophane and waxed paper ineffective in preventing oxygen reabsorption (210).

The relative keeping qualities of Australian dried whole-milk and skim milk powders were studied by Thiel and Pont who found the flavor of reconstituted gas-packed whole-milk powder just as good as that of skim-milk powder reconstituted with fresh butterfat, both powders stored under the same condition (211).

Organoleptic tests were shown by Pyenson and Tracy to be the only accurate way of measuring the keeping quality of powdered whole milk, the peroxide test not satisfactory correlated with flavor scores (212A).

With dried milks, a final oxygen content in the container of 1 percent can be obtained, report Schaffer and Holm by two evacuation stages each at 3 mm pressure, with a 3 to 4 day intervening holding period (212B).

Studies on the compression of dried milk powders by Miller reveal that the maximum pressure desirable is 5,000 lb. per sq. in., since among other things, greater pressure resulted in a plastic-like product (282).

Gas-packed dried whole milk was found to keep better than dried skim-milk (286).

A dry milk that is adaptable for manufacture of ice cream of excellent quality is the subject of U. S. Patent 2,383,070 to Mook (309).

Improvements in white bread by incorporation of dried milk as reported by Wilder and Williams include better shape, colour of crust, and better taste (324).

**Quality**

The yellow color and milk fat content, not necessarily dependent upon each other, increase and flavor is better in milk from cows fed alfalfa diets in contrast with milk from corn fed cows, as reported by Garrett and Bosshardt. These also verified that cows can select B-carotene from plant carotenoids and concentrate it in the milk fat. A-carotene in milk fat was found less stable than B-carotene (213).

S. J. Rowland appeals for increased attention to the non-fat solids of milk in their relation to cattle feeds, breeding and to the pricing of milk (214).

Tallowy flavor in milk believed to result from oxidation of the lipid fraction of the milk is shown by Krukovsky and Guthrie not to develop in the presence of H2O2 but instead to develop only when a catalyst such as Cu and an excess of H2O2 are present (215).

The relationship of sediment to milk flavors is studied by Marquardt who proposes a definite dirt in milk control program (216).

**Regulation**

Bacterial population and keeping quality of milk generally poorly correlated and often not congruent are used together in judging milk by two tests described by Davis (217).

Milk from udders positive towards the bromthymol blue test for mastitis had a higher pH, less non-fat solids, less casein, more total nitrogenous matter, a softer curd and 28 percent lower yield than that from negative udders in tests by McDowall, who found that milk from udders testing negative but with high leucocyte count had the same change in composition as that from positive test udders (218).
A better basis than the specific gravity for detecting watering of milk is the C.S.D. (Sero-densimetric constant) value, report Perri and Klantschnigg in tabulating C.S.D. values for milks in Macerata Province (219).

The testing program in Britain and suggestions for improvements in the handling of milk and milk equipment are discussed by Phillips after considering the results of routine reazurin and other tests (220).

Pasteurization recording charts are interpreted by Gotta with respect to regulatory requirements (221).

Sanitary standards for milk storage tanks as set forth by the I.A.M.S., the U.S.P.H.S. and the Dairy Industry Committee cover the size, material, construction, openings, agitators, tilt, motors and top access of the tank (222).

As little as 0.05 percent of raw milk contaminant in pasteurized milk and non-ripened cheese can be detected by a modified phosphatase test reported by Sanders and Sager (223A).

Fischer and Staub report occurrence of 30 percent watered milk that exhibited unique behavior when overfrozen, the dispersing agent freezing first into an ice layer 90 percent water, the milk freezing last (223B).

From studies on the absorption and deterioration of synthetic rubber milker inflations, Jensen and Bortree report boiling inflations in strong lye solution to effect satisfactory sterilization (224A).

Watering of buttermilk is best detected gravimetrically, declares Kveton, by determining the dry substance content which should lie between 8 and 11.6 percent (224B).

The dairy plant operator's control system is reviewed by Levowitz from the standpoint of a state-supervised, industry maintained system of control of the milk-sheds (298).

The Wisconsin Dairy enterprise is increasingly being influenced by out of state standards and ordinances (301).

Improvements in the control program of the U.S.P.H.S. and the Connecticut State Department are discussed by Robertson in the interest of achieving conformance to the standards (312).

Missouri cities adopting the State Standard Milk Ordinance are responsible for their own milk control with state assistance available for enforcement, reports Young (317).

A vigorous score card system for milk products plants in California is reported by Ghiggoile (318).

Rockford milk, not improved by introduction of the Standard Ordinance, was produced in equal quality and at one third the cost of supervision under the Gunderson plan (319).

Pasteurization of milk is on the increase in Vermont following passing of a State law for milk control, reports Bremer (321).

The milk quality control program in Sheboygan, Wisconsin, includes use of the Myers-Pence technique, reports Widder (322).

Excessive water in butter is discussed by Hoton in its legal implications (323).

Field use of the cyroscope in the control of milk watering is urged by Corash (328).

Platform tests for quality of incoming milk recommended by Trout include the dipper-strainer and odor test as most useful (329).

Licensing of butter and cheese makers in Oregon aims to maintain high standards in production, reports Wister (330).

Suggestions to the milk inspector by one having the dairy plant operator's viewpoint are given by Lucas (331).

Laboratory tests concerned with vigilance over the safety, the sanitation, and the nutritional value of milk are criticized by Geiger, Engle & Marshall (335).
**Abstracts of Milk Literature**

**Technology**

The thermostability of malted milk, less stable than milk due to its lower buffer capacity and high pH level, is reported by Bezsonov and Mazokhina to be improved by adding stabilizers (225).

Objective farm odors can be removed from dairy products by addition of 50–200 ppm biacetyl, and onion and garlic odors can be removed by treatment with chloramine-T or chloramine-B, reports Christensen and Sturhahn (226).

Though low temperature pasteurization of condensed sweetened milk as a measure to prevent gelation is advised by Eilers and Korff from studies on the viscosity and of the voluminosity of the solids, yet high temperature sterilization of the product can be accomplished if the proteins are stabilized by small amounts of added potassium citrate (227).

Studies of the viscosity of skimmilk by Eilers and Korff indicate decrease in viscosity on heating to 40 or 45 degrees, increase on heating above 65, because of denaturing of the protein, and decreases in the temperature range 0–40 degrees because of a reversible change in the caseinate fraction. A linear relationship is found to exist between change in voluminosity of milk and the rheological concentration (228).

Butter or a dehydrated butter oil are produced from cream by heating to 170–190°F, centrifuging, homogenizing, and stratifying to remove the concentrated fat (229).

Not one of the four wrappers tried by Saitner and Friebe for Tilsit cheese, parchment impregnated on one or both sides and lacquered on one or both sides, proved satisfactory, for they all adhered to the cheese and all passed exudations from the cheese on long storage (230).

A synthetic butter was produced by esterifying with glycerol the C_{11} and C_{12} fractions of oxidized wax paraffins. Anonymous (231).

Use of 0.3 percent H_2O_2 for keeping milk 30 to 40 days is reported by Romani (240).

Steam sterilization is reported by Bowyer, Fisher et al. superior to hot-hypochlorite which is better than cold-hypochlorite, whereas detergent alone is ineffectual (232).

In a patent granted to Chapin a sitable, water dispersable shortening is prepared from pasteurized 1:1 concentrated skimmilk (233).

Pasteurization of milk by sweeping through with warm oxygen as reported by Guittonneau, Bejambes et al. causes deacidification by removing the CO_2, inhibits the growth of heat-resistant or aerobic lactic acid bacteria but stimulates certain aerobic forms which may cause curdling (234).

Continuous manufacture of amino acids from protein material is accomplished by bubbling acid vapors into a suspension of casein, wheat gluten or gelatin and collecting the hydrolyzate as formed through a filter (235).

Plain tin plate induces deterioration in stored butterfat more rapidly than does lacquered or washed tin plate or glass as reported by Lea who suggests use of a lacquer coating which contains an antioxidant (236).

Preparation of lactic acid from a solution containing lactose with lactic acid bacteria feeding on wheat germ or whey is patented by Myers and Weisberg (237).

By homogenizing 2000 lb. 15 percent condensed natural buttermilk, 600 lb. fat and 4 lb. NH_4 alginate at 150–60°F, followed by spray drying, a non-greasy powdered shortening, improving baked goods by its utilization, is prepared by North, Alton, and Little (238).

A granular, non-greasy shortening with high free available fat is prepared in a patent granted North, Alton, and Little from 30 percent condensed skim-milk (239).
Detergency of the highest order was obtained by using 0.10-0.15 percent wetting agent-metaphosphate detergents, Jensen reports, measuring with the spectrophotometer the light transmission of the washings of milk films on glass (241).

Botwright recommends the quaternary ammonium salts as safe and effective germicides for the food industries (242).

Milk plant wastes such as spilled milk, leaks in valves and pipes, etc., are discussed by Hahn in an effort to effect their elimination (243).

Quaternary ammonium and phosphonium compounds were reported by Mueller, Bennett, and Fuller as the only satisfactory dairy sterilizing agents of 42 surface-active agents tested (244).

Butter quality was markedly affected as a result of use of the detergent \( P_4Z \) with wooden churns, reports Hedemann (272).

Causes for milk rejection listed by Furnia, Manson, and McHale include poor cooling, dirty utensils, and mastitis (276).

Cheese moulds made of alloys, stainless steel and a plastic that are corrosion resistant are reported by Schwarz and Hagemann (280).

Fourteen methods of packaging cheese are summarized, these including fast freezing, waxing, canning, bottling, etc. (281).

Temperature control in the H.T.S.T. pasteurization process discussed by Hall involves due attention to measuring and recording instruments (293).

Functional requirements in designing dairy barns include those of stall and milking room (294).

Wilster describes many technological developments that have brought the butter industry to its present sound status (296).

Water and sewage problems in milk sanitation discussed by Warrick and Wisniewski cover well construction, plumbing, and milk waste treatment (297).

Sterilization of milk by compression to 2,500 lb./sq. in. followed by spray injection into a heated zone, is the subject of U. S. Patent 2,401,077 to Johnston (302).

The details of lactic acid production from whey with \( L. \ bulgaricus \) are given by Swaby (303).

Since scale formation in bottles increases cleaning costs, Piper reports on scale removal and prevention (305).

Use of an ice bank designed by Minster is said to insure against breakdown and power failure (306).

Pasteurization and irradiation are accomplished by use of ultra-violet light in German equipment described by Langton (307).

Pasteurization effected in 20 seconds is described in U. S. Patent 2,390,872, issued to Dahlberg and Holland (308).

The fiber milk container, rectangular in shape, is predicted to be produced to the tune of 10 billion in 1947 according to Baselt of American Can Company (326).

Square milk bottles are recommended by Hall as helpful in reducing the cost of milk distribution (327).

At concentrations of 1:500 to 1:250, alkyl dimethyl benzyl ammonium chloride has no germicidal action in milk reports DuBois and Dibblee (337).

Thomé and Nilsson warn that a separator is a source of infection when used as a means of clarifying pasteurized milk (341).

**Vitamins**

The weighed mean vitamin A potency of creamery butter in the state of Washington is reported by Ashworth, McGregor, et al. to be 17,900 IU per lb. No correlation was found between vitamin A activity and acidity or type of flavoring, coloring, neutralizing, and pasteurization of the butter (245).

Vitamin A but not carotene pos-
sesses a strong positive correlation to the butterfat content of cows' milk as reported by Citeaux et al. from extensive studies that indicate the need of adding vitamin A to winter rations for cows (246).

The results of feeding rats milk diets containing succinylsulfathiazole are interpreted by Day, Wakim, et al. as evidence of a low concentration of "folic acid" and vitamin K in evaporated and dried cow milk (247).

The vitamin A content of Arizona butter averaged 17,457 IU per pound as reported by Farrankop (248).

Relation of the vitamin A levels in milk to that in the feeds is studied by Farrankop, Smith et al. as a function of different feeding methods (249).

Hepatic reserves of vitamin A in cattle were lost proportionally to the decrease in carotene intake as found by Frey and Jensen (250).

Vitamin D deficiency may result in calves kept in the barn all winter without feeding sun-cured hay report Hibbs, Krauss et al. from considering case histories of calves (251).

Holmes reports that the riboflavin content of mares' milk increased from 0.13 mg/liter to about 4 times this value upon administering 350 mg. of riboflavin daily for 4 days (252).

That the etiology of deficiency diseases is influenced by the metabolic route and by intestinal resorption as well as by mineral and vitamin content of food is shown by Krupski (253).

The nicotinic acid, biotin, and pantothenic acid content of milk was assayed by Lawrence, Herrington, et al. by a modified procedure. Pantothenic acid and biotin contents were correlated but nicotinic acid was not related to either. All three were stable during pasteurization and exposure to sunlight (254).

The vitamin A content of butter from Ayrshire cows is reported by Lord to be 31 IU with pasture feeding and 15 IU per g. fat with stall feeding (255).

Milk and milk products in 1941 furnished the people of the U. S. 1,600 I.U. of vitamin A per person per day or nearly ½ of the allowance as revealed in a survey made by Maynard et al. Further results of the survey indicate 36 percent of all creamery butter is winter butter with an average vitamin A potency of 11,200 units, the balance is summer butter with 18,000 I.U. (Survey conducted by Bur. Dairy Ind. and Office of Expt. Stations.) (256).

Vitamin A deficiency in cows results in degeneration of basal metabolism indicated by diarrhea, blindness, etc.; increased food intake with 50 percent loss in weight, 25 percent decrease in protein utilization, digestion depression, and lesions of tissues, according to results of tests by Ritzman, Colovos et al. (257).

Raw milk entering the manufacturing plants averaged 17.1 mg. reduced ascorbic acid per liter; pasteurized milk, 5.8 mg. per liter total vitamin C; reconstituted evaporated milk and powdered whole milk, 2.0 mg. and 12.5 mg. per liter respectively, in a survey by Stewart and Sharp (258).

Chocolate milk loses riboflavin photochemically only 12 percent in 4 hrs. A rapid fluorometric method for determining riboflavin in chocolate milk is reported by M. R. and C. R. Shetlar and J. F. Lyman to compare well with other methods (259).

Carotene is reported by van Zeben to be a poor source of vitamin A since carotene is only incompletely transformed into the vitamin after absorption (260).

Vitamin A requirements in calves are reported by Lewis and Wilson to be 250 U.S.P. units per kg of body weight, somewhat similar to that of young rats and infants (261).

Vitamin A potency of Ohio butters tested by Krauss et al. showed little decrease on storage for 12 months at 0° F. (262).

Vitamin A potency of Idaho butters tested by Theophilus et al. showed less seasonal variation than the carotene content, the former being 12,499 I.U.
in February and 19,281 I.U. in October (263).

Evaporated milk, reported by Doan and Josephson to be a highly suitable medium for vitamin C fortification, is most satisfactorily fortified by use of the sodium salt of ascorbic acid (264).

Neither thiamine hydrochloride nor methionine were found by Shaw effective in treating ketosis in dairy cattle. Cases of spontaneous recovery from ketosis indicate the need of caution in seeking treatment (265).

Pantothenic acid, niacin and biotin contents of milk were reported for one year by Stefaniak and Peterson who observed seasonal variations as a result of feeding changes only in the biotin content (266).

Values for vitamin A and carotene contents of milk were reported for one year by Stefaniak and Peterson who observed seasonal variations as a result of feeding changes only in the biotin content (266).

Values for vitamin A and carotene contents of Kansas butter given by Parrish et al. were higher when good pasture conditions prevailed than when little or no pasture existed (267).

Because milk undergoes rapid loss of ascorbic acid and significant loss of riboflavin on exposure to sunlight, Josephson et al. urge consumer education in the care of milk (269).

Deaeration of milk is recommended by Guthrie since this prevents development of oxidized flavors and is of importance in vitamin C preservation (269).

The milk of cows fed cod liver oil, developed either an oil flavor or an oxidized flavor, reports Guthrie. The reduced ascorbic acid content increased only when the cow received the oil by drenching, not by mixing with the feed (270).

The carotene-vitamin A ratio in butterfat is 1:3 before pasture and 1:1.5 during pasturing as colorimetrically determined by Ronnenberg (366).

Nicotinic acid content in milk is reported by Morel and Baratte (369).

REFERENCES

2. Rev. quim. farm. (Santiago, Chile) 3, No. 33, 6 (1945); C. A. 1239.
10. J. Dairy Sci. 28, 879-86 (1945); C. A. 1241.
11. J. Dairy Sci. 28, 845-51 (1945); C. A. 1606.
13. Rec. trav. chim. 61, 29-40 (1942); C. A. 1241.
14. J. Dairy Sci. 28, 751-7 (1945); C. A. 965.
15. Analyst 71, 227-8 (1946); C. A. 4153.
23. J. D. S. 27-29.
25. J. D. S. 431-7; C. A. 6182.
27. J. Dairy Sci. 28, 901-20 (1945); C. A. 1240.
31. Analyst 70, 372-3 (1945); C. A. 142.
33. Trans. Texas Acad. Sci. 28, 132-4 (1944); C. A. 2542.
34. J. Bact. 52, 89-98 (1946); C. A. 6120.
36. Compt. rend. 218, 1006-8 (1944); C. A. 3836.
37. Ann. ACF-AS 8, 82 (1942); C. A. 1611.
39. Suomen Kemistilehti 17B, 33 (1944); C. A. 6701.
40. Chimica e industria 27, 82-4 (1945); C. A. 7431.
Abstracts of Milk Literature

42. Chimie & industrie 47, 111 (1942); C. A. 7432.
44. Enzymologia 11, 261-5 (1945); C. A. 5785.
45. Arch. Biochem. 11, 145-54 (1946); C. A. 7279.
46. J. D. S. 439-449.
47. J. D. S. 651-54.
51. Food Industries 18, 841-3, 996, 998 (1946); C. A. 6182.
55. Creamery J. 57, No. 5, 32-3 (1946); C. A. 4814.
56. Mitt. Lebensm. Hyg. 37, 142-6 (1946); C. A. 5503.
57. Ion 6, 299-305 (1946); C. A. 7431.
60. Suomen Kemistilehti 18A, 26-8 (1945); C. A. 6700.
64. U. S. Patent to National Oil Products Co. (1946); C. A. 6714.
65. Rec. trav. chim. 64, 159-64 (1945); C. A. 3837.
70. Fctte u. Seifen 51, 25-7 (1944); C. A. 4814.
72. J. D. S. 213-19.
73. J. D. S. 839-43.
74. J. Endocrinol 4, 219-20 (1945); C. A. 114.
77. J. Biol. Chem. 161, 599-611 (1945); C. A. 2175.
81. Science 103, 646-8 (1946); C. A. 4782.
82. Australian 115-354 (1942); C. A. 968.
84. Froid 1944, No. 35, 4-16; Chimie & industrie 53, 413 (1945); C. A. 5850.
85. Acta Physiol. Scand. 11, 279-83 (1946); C. A. 4779.
86. Food Industries 18, 1177-9, 1306, 1308, 1310, 1312 (1946); C. A. 7432.
87. Chimie & industrie 47, 260 (1942); C. A. 7432.
89. Bol. ind. animal (Sao Paulo) 7, No. 3-4, 81-98 (1944); C. A. 4446.
93. Sci. Agr. 25, 817-32 (1945); C. A. 1241.
94. Ann. fermentations 8, 93-104 (1943); C. A. 5850.
95. J. Dairy Sci. 28, 827-38 (1945); C. A. 1608.
96. Compt. rend. 221, 121-3 (1945); C. A. 1948.
99. J. D. S. 598-604.
100. J. D. S. 589-95.
101. J. D. S. 861-70.
102. J. D. S. 71-84.
103. J. D. S. 307-14.
104. J. D. S. 789-792.
106. Bull. assoc. chim. 61, 94-100 (1944); C. A. 2543.
107. Pediatriya, No. 1, 22-7, (1946); C. A. 7326.
108. Arch. Biochem. 9, 201-19, (1946); C. A. 6600.
109A. Nutrition Abstracts and Revs. 15, 591-621 (1946); C. A. 5177.
109B. J. D. S. 33-40.
110. Rev. soc. argentina biol. 21, 86-93 (1945); C. A. 374.
111. Ibid. 94-110; C. A. 374.
112. Am. J. Diseases Children 70, 135-41 (1945); C. A. 1565.
116. J. Dairy Sci. 28, 921-6 (1945); C. A. 146.
121. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
123. Patent to Musher Foundation, Inc. (1946); C. A. 2558.
124. Food 14, 266-7 (1945); C. A. 142.
126. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
128. Food 14, 266-7 (1945); C. A. 142.
130. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
131. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
132. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
133. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
134. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
135. J. Dairy Sci. 28, 921-6 (1945); C. A. 1607.
Abstracts of Milk Literature

185. J. Dairy Sci. 28, 927-32 (1945); C. A. 1239.
186. J. D. S. 13-26; C. A. 2506.
187. Danish Patent to Ivar Winfield-Hansen, (1940); C. A. 3205.
192. Cereal Chem. 23, 305-17, (1946); C. A. 4811.
199. Arch. fisiol. 43, 118-65, (1943); C. A. 41, 183.
200. J. D. S. 1-10.
205. Food Industries 18, 352-5, 486, 470, (1946); C. A. 5162.
206. Swedish Patent to J. G. W. Gentele, (1940); C. A. 968.
209. J. D. S. 145-50; C. A. 6181.
212A. J. D. S. 1-10.
212B. J. D. S. 207-11.
213C. J. D. S. 849-59.
215. Hig. i Sanit. 10, No. 12, 31-8, (1945); C. A. 7430.
220. Chimie & industrie 47, 263, (1942); C. A. 7432.
221. Soap, Perfumery, Cosmetics 19, 651, 180, (1946); C. A. 7432.
224. Compt. rend. 222, 458-60, (1946); C. A. 5338.
225. U. S. Patent to Gamma, (1946); C. A. 6186.
240. Chimia e industria 26, 134-6, (1944); C. A. 3199.
244. J. M. T. 9, 22, (1947).
246. Ann. agron. 15, 520-54, (1945); C. A. 5814.
253. Z. Vitaminforch. 14, 295-300, (1944); C. A. 6579.

259. J. Dairy Sci. 28, 873-8, (1945); C. A. 3107.
264. J. D. S. 625-8.
265. J. D. S. 131-139.
266. J. D. S. 783-87.
267. J. D. S. 91-8.
268. J. D. S. 273-83.
269. J. D. S. 359-68.
270. J. D. S. 349-57.
271. Svenska Mejeritidn 34, 9 pp. (1942); D. S. A. 231.
274. Svenska Mejeritidn. 37, 7 pp. (1945); D. S. A. 230.
278. Food Industr. 17, 501, (1945); D. S. A. 231.
279. Lait 23, 308, (1943); D. S. A. 232.
283. Ice Cr. Rev. 29, 39, (1945); D. S. A. 233.
284. Ice Cr. Rev. 28, 100, (1945); D. S. A. 233.
288. Lait 22, 1, (1942); D. S. A. 234.
289. Lait 23, 193, (1943); D. S. A. 234.
292. Lait 23, 289, (1943); D. S. A. 235.
293. J. Dairy Res. 14, 1, (1945); D. S. A. 236.
299. J. M. T. 197.
302. Food Ind. 18, 1810, (1946).
306. Food Ind. 18, 1016, (1946).
308. Food Ind. 18, 281, (1946).
309. Food Ind. 18, 907, (1947).
315. Trans. Moscow Agric. Acad. No. 31, 267, (1944); D. S. A. 250.
322. J. M. T. 8, 294, (1945); D. S. A. 241.
323. Latit 22, 218, (1942); D. S. A. 241.
325. J. M. T. 351.
328. J. M. T. 322.
332. J. M. T. 269.
333. J. M. T. 156.
335. J. M. T. 171.
337. Milk Dealer 35, 42, (1945); D. S. A. 259.

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