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BIBLIOGRAPHY ON BUTTER OIL

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PREFACE

Milk fat has always been highly valued as a food, and much attention has been given to its conservation. The usual methods of conserving it have been by the production and storage of butter or of the fat from which the other milk constituents have been removed. The problems of its conservation for any great period of time are principally those related to bacterial growth and enzyme action and to spontaneous chemical reactions with the oxygen of the atmosphere.

Butter oil and milk oil are the terms applied in the United States to the milk fat which remains after the curd and water have been removed from butter. Terms used in other countries are: Australia, dehydrated butter; Egypt, samna or samn; England, clarified butter; France, beurre fondu; Germany, Butteröl, Butterschmalz, Flössbutter, geschmolzene Butter, gesottene Butter, Kuhschmalz, Rindschmalz, Schmalz, Schmelzbutter; India, ghee or ghi; Iran, roghan; Switzerland, eingesottene Butter.

This bibliography includes material on the preparation, properties, keeping quality, and uses of pure milk fat; the manufacture, preservation, and storage of butter oil; and the conservation of shipping space in shipping it to the Tropics and other places. Material dealing with milk fat in dairy products is not included.

In the preparation of the annotations, the same terms have been used in referring to butter oil as were used by the author in the work cited.

Call numbers following the citations are those of the United States Department of Agriculture Library, unless otherwise noted. Abbreviations used are those in United States Department of Agriculture Miscellaneous Publication 337, Abbreviations used in the Department of Agriculture for Titles of Publications. Items marked with an asterisk (*) have not been examined.

Acknowledgement is made of the assistance of George E. Holm, Head, Division of Dairy Research Laboratory; Alan Leighton, Chemistry; George R. Greenbank, Chemist; and E. O. Whittier, Chemist, all of the United States Bureau of Dairy Industry.

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GENERAL

Anonymous. (1)

beurteilungsgrundsätze bei der reklamation von butterschmalz. Molk. Ztg. [Hildesheim] 54: 1496, 1540. 1940. 44.8 M73

A discussion of the rules of a dairy organization regulating the sale of butterschmalz, especially that which has a bleached surface.

——— (2)

"great achievement"; dry butter-fat and tropical spread. Primary Prod. [Sydney] 20(22): 10. 1943. 23 P95

The development of dry butter and tropical butterfat spread in Australia.

Heublein, M. (3)

butterschmalz -zuteilung, -lagerung und -verwendung. Molk. Ztg. [Hildesheim] 54: 1283. 1940. 44.8 M73

Essentially the same article *in* Milchw. Zentbl. 69: 289–290. 1940. 44.8 M59M

A discussion of the properties, quality, color, use, etc. of butterschmalz.

L., K. (4)

eingesottene butter aus rahm mit methylenblau versetz. Schweiz. Milch Ztg. 67: 140. 1941. 44.8 Sch92

Methods for the removal of the green color from eingesottene butter by the addition of charcoal or by washing the butterfat are described.

Mohr, [W.], and Eichstädt, A. (5)

die einwirkung von rahm und butterfett auf metalle sowie die qualitätsbeeinflussung von butter und butterschmalz durch metalle. Molk. Ztg. [Hildesheim] 50: 1480–1482. 1936. 44.8 M73

Translated into English, with slight omissions in text and omission of tables, *in* 10th World's Dairy Cong., Rome-Milan (1934) 2: 95–100. 1934. 44.9 In8210

Single metals and metal combinations used in pure form or plated were completely immersed in cream during heating and during heating and souring. The effect of these metals on the flavor of both butter and butterschmalz is discussed, and it is stated that tinned and enameled vessels and vessels made of V_2A steel proved most satisfactory.

Nyasaland Protectorate. Veterinary Department. (6)

ghee production. Nyasaland Vet. Dept. Ann. Rpt. 1942: 7–8. 41.9 N98

The amount of ghee produced at Government supervision centers and by independent dairymen is reported.

O., L. (7)

butterschmalzprüfungen für die fachgruppe für untersuchung von milch und milcherzeugnissen in hamburg. Molk. Ztg. [Hildesheim] 55: 52. 1941. 44.8 M73

A report of a meeting of investigators in which the quality, and testing of butterschmalz are discussed.

VARADACHAR, K. S., comp. (8)
THE GHEE PROBLEM IN INDIA. [A SYMPOSIUM.] Current Sci. [India] 1: 400–402. 1933. 475 Sci23

Contents: The Metabolism of Fat, by B. N. Banerji; The Dietetic Value of Ghee, by N. C. Datta; Adulteration and Analysis of Ghee, by Y. V. Srikanteswara Iyer; The Chemical Aspects of the Ghee Problem in India, by P. Ramaswami Ayyar; Ghee Substitutes, Their Manufacture and Trade, by R. Bhattacharjee.

ADULTERATION AND ANALYSIS

ANONYMOUS. (9)
CLARIFIED BUTTER (GHEE) IN AFRICA. [Gt. Brit.] Imp. Inst. Bul. 36, pp. 13–18. 1938. 26 G79

The chemical and physical constants of samples of ghee made from fresh cream from Gambia and from Anglo-Egyptian Sudan are recorded, with the method used in the manufacture.

The amount of ghee produced in various parts of Africa is briefly discussed.

——— (10)
THE TILE TEST OF PURE GHEE. Indian Farming 4: 205. 1943. 22 In283

If ghee, upon absorption by porous earthenware, leaves a white residue it is said to be adulterated. The test was found wholly unreliable.

——— (11)
DIE UNTERSUCHUNG VON BUTTER UND SCHMALZ. Repert. der Analyt. Chem. 4: 233–234. 1884. Libr. Cong. QD71.R4

The chemical analysis of butterschmalz is discussed and standards are suggested for the judging of the product.

ATHAVALE, V. T., and JATKAR, S. K. K. (12)
REFRACTIVE DISPERSION OF OILS AND FATS. I. DISPERSION OF GHEE AND VEGETABLE OILS. Indian Inst. Sci. Jour. 21 A (3): 15–25. 1938. 513 In23

The refractive dispersion constants of butter oil are found to be sufficiently different from vegetable oils to account for color fringes on a simple type butyrorefractometer. It should be possible to detect adulteration of ghee by measurement of both refractive index and dispersion using the green and violet lines of the mercury arc.

*BAGCHI, K. N., and DAS GUPTA, S. M. (13)
DIFFERENTIATION OF COW GHEE FROM BUFFALO GHEE BY ITS CAROTENE CONTENT. Inst. Chem. India Jour. Proc. 13: 28–34. 1941.

"The carotene content of cow and buffalo ghees is 4–8 (mean 6.1) and 0–0.2 (mean 0.11) yellow units per g., respectively. It is suggested that the ghee may be differentiated by this means."—Brit. Chem. and Physiol. Abs., B., III: 80. 1942.

——— and MAZUMDAR, N. S. (14)
IMPORTANCE OF PHYTOSTERYL ACETATE TEST IN DETECTING HYDROGENATED FATS IN GHEE. Indian Jour. Med. Res. 24: 233–237. 1936. 448.8 In22

The reliability of this test is upset by the presence of "vegetable ghee." The technique of the test is given in detail together with indications which are important for the detection of hydrogenated fats.

BARNES, J. H., and SINGH, A. (15)
"POLI OIL," A NEW ADULTERANT OF GHEE—INDIAN CLARIFIED BUTTER-FAT. Analyst 41: 72–73. 1916. 382 An1

Poli oil, a product from an Indian weed, is being used to adulterate ghee and butterfat. The analytical constants of a specimen are given.

BHATTACHARYA, R., and HILDITCH, T. P. (16)
THE FATTY ACIDS AND COMPONENT GLYCERIDES OF INDIAN GHEE. Analyst 56: 161–170. 1931. 382 An1

The analytical characteristics and detailed fatty acid composition of cow and buffalo ghees are presented, together with a discussion of their glyceride structure.

BOLTON, E. R. (17)
GHEE (GHI). *In his* Oils, Fats and Fatty Foods, Their Practical Examination. Ed. 2, pp. 93–94, 129–131. Philadelphia, P. Blakiston's Son & Co. 1928. 389 B62

An analysis of adulterated ghee is given which points to adulteration with some solid fat.

A method of manufacturing ghee is briefly described, and a table showing the analysis of ghee from various sources is presented.

——— and REVIS, C. (18)
FURTHER ANALYSES OF GHEE. Analyst 36: 392–393. 1911. 382 An1

Additional analytical data of seven more samples are given.

——— and REVIS, C. (19)
SOME ANALYSES OF GHEE. Analyst 35: 343–346. 1910. 382 An1

A description is given of the usual procedure in manufacturing ghee. Adulteration is discussed, and the analytical results from 10 samples are given.

BOMBAY MUNICIPALITY. (20)
LEGISLATION TO PREVENT ADULTERATION OF GHEE. Indian Med.-Chir. Rev. 2: 584–590. 1894. U. S. Army Med. Libr.

The texts of a proposed law and of a proposed amendment to a previous law are recorded.

BOSE, A. C. (21)
PRELIMINARY NOTES ON THE STEROL IODINE VALUES OF OILS AND FATS BY THE BOLTON AND WILLIAMS METHOD. Analyst 60: 160–163. 1935. 382 An1

The Bolton and Williams values for fats and oils were corroborated. The sterol iodine value would not be useful in detecting adulteration of ghee with poppy-seed oil, niger-seed oil, yellow mustard oil, and similar materials.

BRAHMACHARI, B. B. (22)
CONSTANTS OF COW GHI AND LACTATION PERIOD OF THE ANIMALS. Allahabad Farmer 8: 207–208. 1934. 22 Al5

The influence of the lactation period is shown. As lactation is prolonged, the Reichert-Wollny value, saponification value, and refractive index of ghees made from milk of 48 cows, as studied statistically, indicate a progressive decrease in the first two values and an increase in the latter.

——— (23)
CONSTANTS OF PURE BUFFALO GHI. Indian Med. Gaz. 67: 623–625, graph. 1932. U. S. Army Med. Libr.

The Reichert-Wollny value, saponification value, refraction reading at 40° C., and iodine value of 51 samples of ghee were determined to obtain a standard range of values for this product.

——— (24)
CONSTANTS OF PURE COW GHEE. Indian Med. Gaz. 62: 318–322, graph. 1927. U. S. Army Med. Libr.

Analyses of more than 900 samples of ghee proved 35 percent to 40 percent adulterated. "The butyrorefractometer reading is unreliable as a test for the purity of cow ghee, and is of no use even as corroborating the inference based on the Reichert-Wollny value."

——— (25)
VALUES OF CONSTANTS IN THE ANALYSIS OF GHI FOR DETECTION OF ADULTERATION. Indian Med. Gaz. 70: 71–74. 1935. U. S. Army Med. Libr.

A mathematical study of the frequency of occurrence of the Reichert-Wollny values of 800 samples of buffalo ghee leads to the conclusion that of 348 samples giving values from 29 to 19, indicating possible adulteration, only 66 were certainly adulterated. The declaration is made that no buffalo ghee should be declared adulterated simply because its Reichert-Wollny value is less than 30.

BROWNING, K. C., and PARTHASARATHY, M. (26)
NOTE ON GHEE. Soc. Chem. Indus. Jour. 36: 118. 1917. 382 M31

Data presented show it is quite possible for pure ghee to have Reichert-Meissl numbers well below 30, i. e., as low as 18.86.

BUDHALAKOTI, U. D., and MUKHERJI, K. C. (27)
A NOTE ON THE KAUFMANN'S THIOCYANOGEN VALUE OF INDIAN BUTTER FAT (GHEE). Indian Chem. Soc. Jour. 12: 455–458. 1935. 385 In27

The linolic acid percentage in a number of butterfat samples was calculated by multiplying the difference between the iodine value and the thiocyanogen value by 1.104. It is fairly constant.

CHRISTIAN, B. C., and HILDITCH, T. P. (28)
THE ESTIMATION OF FULLY-SATURATED GLYCERIDES AS AN AID IN THE ANALYSIS OF FATS. Analyst 55: 75–90. 1930. 382 An1

The proportion of fully-saturated glycerides in a fat is in most cases characteristic of a fat. The detection of carcase fats in ghee is possible by estimation of saturated glycerides but it is not wholly satisfactory.

CRANE, J. C., and HORRALL, B. E. (29)
PHOSPHOLIPIDS IN DAIRY PRODUCTS. I. DETERMINATION OF CHOLINE IN MILK FAT. Jour. Dairy Sci. 25: 651–658. 1942. 44.8 J822

Summary: "A modified Roman micromethod has been found applicable to the analysis of extracted milk fat for choline. A method for the determination of choline-bearing phospholipids in dairy products was thus found."

CREAC'H, P. (30)
LES FRAUDES DU BEURRE AU TCHAD, LEUR DÉTECTION.—LA VALEUR DE L'INDICE DE VALENTA. Ann. des Falsif. 22: 4–16. 1939. 389.8 An72

Butterfat is marketed in the form of ghee. The Valenta index enabled the detection of 10 percent vegetable-oil adulteration or 8 percent animal fats. Sesame oil was an exception but could be detected by the Fillavecchia and Fabris test. Bellier's test was not satisfactory for vegetable oils.

DAJI, J. A. (31)
A NOTE ON THE SAMPLING OF GHEE. Poona Agr. Col. Mag. 30: 141–142. 1939. 22 P79

To obtain a representative sample of ghee which has separated into a liquid and a solid layer it is necessary to first melt and stir the ghee, since the analytical constants of the two layers are not the same.

*DAROGA, R. P., and SIDHEVA, J. B. (32)
DETECTION OF FOREIGN FATS IN SINDHI GHEE. Indian Chem. Soc. Jour., Indus. & News Ed. 1: 91–94. 1938.

The phytosterol acetate test (as modified by More) is more reliable in the detection of foreign fats than are the Reichert-Polenske-Kirschner processes as shown by experiments upon ghee.—Based on abstract *in* Chem. Abs. 33: 762. 1939.

DIETZELL, B. E., and KRESSNER, M. G. (33)
ZUR UNTERSUCHUNG DES BUTTERFETTES. Ztschr. f. Analyt. Chem. 18: 83–85. 1879. 384 Z3

An examination of a butterschmalz which because of its low insoluble fatty acid content appeared to be adulterated with both animal and vegetable fats.

DINSLAGE, E. (34)
MINERALÖL ENTHALTENDES BUTTERÖL. Ztschr. f. Untersuch. der Nahr. u. Genussmtl. 26: 199–200. 1913. 384 Z39

A report of the adulteration of butteröl with mineralöl.

*DOCTOR, N. S., and BANERJEE, B. N. (35)
ADULTERATION AND CONSTANTS OF GHEE. Bombay Univ. Jour. 8: 247–254. 1939. Libr. Cong.

The physical, chemical, and physiological constants, and sample history which have to be considered in determining the quality and purity of ghee, are tabulated for a number of ghees.—Based on abstract *in* Chem. Abs. 34: 2478. 1940.

——— BANERJEE, B. N., and KOTHAVALLA, Z. R. (36)
STUDIES ON SOME FACTORS AFFECTING THE PHYSICAL AND CHEMICAL CONSTANTS OF GHEE. Indian Jour. Vet. Sci. and Anim. Husb. 10: 63–80. 1940. 41.8 In22

The influence of the breed of cows, of feeding oil cakes, and of the method of preparation on the composition of ghee are discussed, and the range of variation of its physical and chemical constants is defined.

The decantation process and the boiling-off process of making ghee are described.

E., E. (37)
WIE ERKENNT MAN GEFÄLSCHTES BUTTERSCHMALZ? Süddeut. Molk. Ztg. 50: 900. 1929. 44.8 Su2

A brief reply to an inquiry for method of detecting adulterated butterschmalz.

FENDLER, G., FRANK, L., and STÜBER, W. (38)
KÜRZERE MITTEILUNGEN AUS DER PRAXIS DES UNTERSUCHUNGSAMTES DER STADT BERLIN. II. FLÜSSIGES BUTTERSCHMALZ. Ztschr. f. Untersuch. der Nahr. u. Genussmtl. 19: 370–371. 1910. 384 Z39

An examination was made of the liquid and solid portions of butterschmalz which had separated into a liquid and a solid layer on cooling. The Reichert-Meissl number of the liquid portion was noticeably high.

FRENCH, M. H., and RAYMOND, W. D. (39)
THE CONSTANTS OF MILK AND BUTTER-FAT IN TANGANYIKA TERRITORY. Analyst 61: 750–751. 1936. 382 An1

The butterfat constants of native cows are normal. Milk from grade cows of Government herds has a high butterfat content, normal to the Tropics, but the milk-solids-not-fat content is low.

GERMANY. KAISERLICHEN GESUNDHEITSAMT. (40)
BUTTER UND BUTTERSCHMALZ. *In its* Entwürfe zu Festsetzungen über Lebensmittel. Heft 2, Speisefette und Speiseöle, pp. 13–15. Berlin, Julius Springer. 1912. 389.55 G312

The composition and physical and chemical properties of normal butter and butterschmalz are described, as are analytical methods for examination. Processes of adulteration and imitation are discussed.

GHOSE, T. K. (41)
STATUTORY STANDARD FOR GHEE. Analyst 45: 444–447. 1920. 382 An1

At a conference of chemists of Calcutta it was decided that a sample of ghee would be declared as pure when the Reichert-Wollny value was 30 and above, and that a sample would not be regarded as adulterated unless it was below 28. The corporation standard of 30 was reduced to 28.

The analyses of many genuine samples of ghee derived from individual buffaloes and also from herds are given in tabular form.

GIRI, K. V., and BHARGAVA, P. N. (42)
DIFFERENTIATION OF OILS BY ENZYMIC HYDROLYSIS. AGAR PLATE METHOD AND ITS APPLICATION TO THE DETECTION OF ADULTERATION OF BUTTERFAT (GHEE). Indus. and Engin. Chem., Analyt. Ed. 9: 395–396. 1937. 381 J825A

The copper-soap test of Carnot and Mauban for lipase detection has been extended to the differentiation of fats and oils. The color reaction of a number of possible adulterants was studied, as was the color reaction of ghee. Twenty percent adulteration could be detected.

GODBOLE, N. N. (43)
THE DETECTION OF ADULTERATION OF BUTTERFAT (GHEE). (A SUGGESTED SOLUTION OF AN ALL-INDIA PROBLEM.) Current Sci. [India] 4: 578–581. 1936. 475 Sci23

In recommending that the various provinces in India adopt a uniform method for detecting adulteration, the author proposes that the A- and B-values (Bertram, Bos, and Verhagen) be used, rather than the Reichert-Meissl or other values. Color fringes in the refractometer betray adulteration.

A summary of standards adopted in various provinces in India is given in tabular form.

——— and KETKAR, V. V. (44)
EVOLUTION IN THE CHEMICAL METHODS OF GHEE ANALYSIS FROM REICHERT-MEISSL VALUE (1879) TO BUTYRIC ACID NUMBER (1927), AND ITS MODIFICATION (1935). Sci. and Cult. 2: 513–517. 1937. 475 Sci24

A review.

GODBOLE, N. N., and SADGOPAL. (45)
ANWENDUNG DER RHODANZAHL ZUR BESTIMMUNG DES PROZENTGEHALTES VON OEL- UND LINOLSÄURE NACH H. KAUFMANN IN INDISCHEN OELEN UND FETTEN, DIE FREI VON LINOLEN-SÄURE SIND. II. Allg. Oel- u. Fett-Ztg. 31: 435–438. 1934. 307.8 Al5

Utilizing the thiocyanate number (Kaufmann) and the iodine number, the oleic and linoleic acid contents of a number of Indian oils and fats, including butterfat, were determined and tabulated. The conclusion is that in oils and fats yielding no hexabromine number and containing no hydroxy acids, the thiocyanate number can be used to determine oleic and linolic acids.

*——— and SADGOPAL. (46)
BUTTERFAT (GHEE). Ed. 2, 176 pp. [Benares?], India, N. N. Godbole. 1939.

"This book claims to deal with the composition, nutritive value, digestibility, rancidity and adulteration of butterfat with special reference to the detection and the determination of the extent of adulteration . . ."—From review *in* India Farming 1: 409–410. 1940. 22 In283

*——— and SADGOPAL. (47)
BUTTER FAT (GHEE): ITS NUTRITIVE VALUE, ADULTERATION, DETECTION AND ESTIMATION. 48 pp. Benares, India, Benares Hindu Univ. 1930.

"Professors Godbole and Sadgopal in this interesting brochure have drawn attention to the importance of ghee in the dietary of the Indian peoples, to its widespread adulteration all over India and the difficulty that exists in the detection of such adulteration in many instances."—From review *in* Indian Med. Gaz. 66: 536–537. 1931.

——— TRIGUNAYAT, K. C., AMARENDA, and DATT, U. (48)
DIE BESTIMMUNG DER RHODANZAHL NACH H. P. KAUFMANN AN EINIGEN FÜR INDIEN TYPISCHEN OELEN UND IHRE ANWENDUNG ZUR ERMITTLUNG DES PROZENTGEHALTES DIESER OELE AN OEL-, LINOL- UND LINOLENSÄURE. I. Allg. Oel- u. Fett-Ztg. 31: 143–145. 1934. 307. 8 Al5

A method is given utilizing the thiocyanate number (Kaufmann) and the iodine number of fats and oils to determine their content of oleic, linoleic, and linolenic acids. The thiocyanate numbers of several Indian oils, including butterfat and ghee, are given.

HARRISON, W. H. (49)
THE ADULTERATION OF BUTTER AND GHEE. Pusa Agr. Res. Inst. Sci. Rpts. 1926–27: 28. 1928. 107.5 P97R

A method is outlined for the detection of ghee adulteration with animal fat, based upon the fractional precipitation, by alcohol, from dry acetic ether solution of the higher fatty acids. Under the outlined conditions pure butter and ghee yield no precipitate.

——— (50)
ADULTERATION OF BUTTER AND GHEE WITH ANIMAL FAT. Pusa Agr. Res. Inst. Sci. Rpts. 1927–28: 32–33. 1928. 107.5 P97R

Pure ghee made from buffalo milk from animals fed on cottenseed was shown to yield a precipitate (indicating adulteration) when treated in acetic ether solution with alcohol. A second treatment is outlined for indicating which of these samples may be considered genuine. The methods are not satisfactory for selection of vegetable fats, but in this case an abnormal iodine value indicates adulteration.

HAWLEY, H. (51)
CLEANING JENA GLASS FILTERS. Analyst 65: 27. 1940. 382 An1

Glass filters clogged with ghee may be cleaned by a short treatment with dilute hydrofluoric acid followed by washing.

——— (52)
THE DETECTION OF ADULTERATION OF BUTTER-FAT (GHEE). Current Sci. [India] 4: 815–817. 1936. 475 Sci23

Commenting on an article by N. N. Godbole (Current Sci. 4: 578–581. 1936), it is contended that the Reichert-Meissl value is as useful in detecting adulteration as are the A- and B-values (Bertram, Bos, and Verhagen). Light fringe color is useless since improved refractometers do not give fringes. A procedure is outlined to apply when the Reichert-Meissl value is inclusive.

HAWLEY, H. (53)
THE NEUTRALISATION VALUE OF GHEE (BUTTER-FAT). Current Sci. [India] 9: 337–339. 1940. 475 Sci23

The neutralization value of insoluble fatty acids in butterfat, expressed as the number of mg. of potassium hydroxide required to neutralize one gm. of insoluble acid, is shown to be useful in detecting adulteration with vegetable fats. Directions for making the test are given. Examples show the method useful as a preliminary to the difficult sterol acetate test.

——— (54)
THE PHYTOSTERYL ACETATE TEST AS A ROUTINE METHOD IN THE EXAMINATION OF BUTTER FATS WITH BORDER-LINE REICHERT-MEISSEL VALUES. Analyst 58: 529–531. 1933. 382 An1

A method of applying the test for detecting vegetable fat adulteration to relatively small samples of ghee (25 gm.) is given.

HEFELMANN, R. (55)
BUTTERÖL. Ztschr. f. Öffentl. Chem. 4: 450. 1898. 384 Z34

Figures are given from the examination of a butteröl of the abnormally high iodine number and butyric acid content typical of the decomposition products of melted butter.

HILDITCH, T. P. (56)
GHEE (INDIAN, EGYPTIAN) BUTTER. *In his* The Industrial Chemistry of the Fats and Waxes. Ed. 2, pp. 134, 291. London, Ballière, Tindall and Cox. 1941. 307 H54

The average analytical characteristics of ghee butter, its source and approximate annual production, and a brief description of the method of manufacture are included in this monograph.

HILGER, A. (57)
BUTTER UND SCHMALZ. *In his* Vereinbarungen betreffs der Untersuchung und Beurteilung von Nahrungs- und Genussmitteln sowie Gebrauchsgegenständen, pp. 217–222. Berlin, Julius Springer. 1885. 389 H54V

Methods are outlined for the chemical analysis of butter and butterschmalz, and reference is made to work forming the basis of these methods. Methods for identification of butterfat, coloring material, and adulteration are presented in some detail.

HOLM, G. E., and GREENBANK, G. R. (58)
MILK FAT. *In* Fundamentals of Dairy Science, by associates of Lore A. Rogers. Ed. 2, pp. 71–96. New York, Reinhold Pub. Co. 1935. 44 F96.

A discussion of chemical and physical properties of milk fat and its constituents.

——— WRIGHT, P. A., and DEYSHER, E. F. (59)
THE PHOSPHOLIPIDS IN MILK. I. THEIR DISTRIBUTION AMONG SOME MILK PRODUCTS. Jour. Dairy Sci. 16: 445–454. 1933. 44.8 J822

The isolation and the quantitative analysis of the phosphorus-containing fats in different milk products.

——— WRIGHT, P. A., and DEYSHER, E. F. (60)
THE PHOSPHOLIPIDS IN MILK. IV. THEIR CHEMICAL NATURE AND THEIR DISTRIBUTION AMONG SOME MILK PRODUCTS. Jour. Dairy Sci. 19: 631–639. 1936. 44.8 J822

A study of isolation, amounts, chemical properties, and constitution of the phosphorus-containing fats.

HORNBY, H. E. (61)
GHEE. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 1932: 75–76. 1933. 41.9 T15

A small experimental cooperative ghee-making center at Isabe is briefly described, and the analysis of the ghee and amount produced are given.

*JHA, J. B. (62)
TESTING OF GHEE BY MEANS OF A FLUORESCENCE ANALYSIS IN ULTRAVIOLET LIGHT. Indian Chem. Soc. Jour., Indus. & News Ed. 2: 159–160. 1939.

Vegetable-oil adulterants of ghee are easily detected under ultraviolet light by comparing the fluorescent color of a pure ghee and the sample under test. The fluorescent colors of a number of vegetable oils are given.—Based on abstract *in* Chem. Abs. 34: 3837. 1940.

JOGARO, C. V. (63)
AN OPTICAL INVESTIGATION OF SOME INDIAN OILS. II. RAMAN EFFECT. Indian Acad. Sci. Proc. Sect. A 4: 459–462. 1936. U. S. Natl. Bur. Stand. Libr.

An observation was made of the Raman spectra of vegetable oils and purified buffalo ghee.

Part I is a study of vegetable oils only.

KESAVA-MENON, A. (64)
SOME INDIAN OILS AND FATS. Soc. Chem. Indus. Jour. 29: 1428–1431. 1910. 382 M31

Ghee manufacture is described and analyses are presented of samples of cow and buffalo ghees, with data on other fats and oils examined by the author.

KIEFERLE, F., and ERBACHER, E. (65)
DIE BESTIMMUNG DES WASSER- UND FETTGEHALTES IN BUTTERSCHMALZ. Milchw. Forsch. 5: 662–673. 1928. 44.8 M5922

A comparison of different methods of determining water and fat content.

KÖNIG, J. (66)
BUTTER, SPEISEFETTE UND SPEISEÖLE. *In his* Chemie der Menschlichen Nahrungs- und Genussmittel. Ed. 4, v. 3, pt. 2., pp. 344–407. Berlin, Julius Springer. 1914. 389 K83C

Methods for the physical and chemical examination of butter are given in detail. Other than to define butterschmalz and discuss regulations concern-its use, no mention is made concerning the application of these methods to it. They are, however, the methods that would be applied in its examination.

KRUKOVSKY, V. N., and KNAYSI, G. (67)
A NEW COLORIMETRIC METHOD FOR THE DETERMINATION OF FREE FATTY ACIDS IN MILK FAT. Jour. Dairy Sci. 25: 659–661. 1942. 44.8 J822

The method is described.

KURTZ, F. E., JAMIESON, G. S., and HOLM, G. E. (68)
THE LIPIDS OF MILK. Pt. I. Jour. Biol. Chem. 106: 717–724. 1934. 381 J824

Part II *in* Jour. Dairy Sci. 22: 1011–1015. 1939. 44.8 J822

I. The Fatty Acids of the Lecithin-Cephalin Fraction, by F. E. Kurtz, G. S. Jamieson, and G. E. Holm. A study of the isolation of phospholipids from sweet-cream buttermilk powder, separated on the basis of their solubilities in ether, into two distinct fractions: an ether-soluble lecithin-cephalin fraction, and an ether-soluble sphingomyelin-cerebroside fraction.

II. The Fat Acids of the Sphingomyelin-Cerebroside Fraction, by F. E. Kurtz and G. E. Holm. The isolation of fatty acids by distillation.

LAXA, O. (69)
ÜBERHITZES BUTTERFETT. Milchw. Zentbl. 41: 673–675. 1912. 44.8 M59M

Physical and chemical constants before and after heating are reported.

MEISSL, E. (70)
UNTERSUCHUNGEN ÜBER DIE VERFÄLSCHUNG DES KÄUFLICHEN BUTTERSCHMALZES. Dingler's Polytech. Jour. 233: 229–235. 1879. Libr.-Cong. T3.D5

Eighty-four samples of butterschmalz were examined for adulteration; results are discussed and presented in tabular form.

MUTHANNA, M. C., and MUKERJI, B. (71)
DETECTION OF ADULTERATION IN 'GHEE' (CLARIFIED BUTTER) BY THE ULTRAVIOLET FLUORESCENCE TECHNIQUE. Current Sci. [India] 9: 120–122. 1940. 475 Sci23

Cow ghee and buffalo ghee and a number of their adulterants were exposed under the ultraviolet fluorescent lamp of the Hanovia-Muir type; results are indicated in tabular form.

The intensity of fluorescence is more or less proportional to the degree of adulteration, and that adulteration up to 10 percent can be detected by this method.

NARASIMHAMURTY, G. (72)
EFFECT OF AGEING IN PRESENCE OF AIR AND LIGHT ON THE CONSTANTS OF BUTTER-FAT. Analyst 66: 98–101. 1941. 382 An1

The experiments described were made with commercial samples of Indian butter and ghee. The Reichert, Polenske, and iodine values, and the free acidity are discussed.

——— and SURYANARAYANAMURTY, V. V. (73)
DETECTION OF ADULTERATION IN GHEE BY A STUDY OF ITS FLOUORESCENCE. Current Sci. [India] 9: 334–336. 1940. 475 Sci23

A study of the influence of the age of the ghee sample and of "Laktone" butter color. Measurement of the intensity of flourescence was made in a Pulfrich photometer having an improvised ultraviolet attachment.

Green fluorescence is no criterion of the genuineness of ghee. Relationships of green and blue fluorescence is no indication of age or purity of sample.

PETERSEN, P. (74)
UNTERSUCHUNG VON BUTTER UND SCHMALZ. Milch Ztg. 13: 607–608. 1884. 44.8 M59

Detailed procedures for testing butter and schmalz for moisture, fat content, salts, and adulterating fats.

PLYMEN, F. J., and AIYER, A. R. P. (75)
THE MUTUAL APPLICABILITY OF THE ANALYTICAL FIGURES FOR BUTTER FAT AND GHEE. India Dept. Agr. Mem., Chem. Ser. 6: 209–214. 1921. 385 In2

Since the analytical figures which are usually taken as criteria of butterfat purity are unaffected by the high-temperature treatment in preparing ghee and the low-temperature treatment of butter, the conclusion is drawn that such figures are applicable to either product.

PUNJAB DEPARTMENT OF AGRICULTURE. (76)
DETERMINATION OF ANALYTICAL STANDARDS FOR 'GHEE.' Punjab Dept. Agr. Ann. Rpt. 1938: 41. 1939 22 P961R

A brief report of work, which indicates that a suspicion of adulteration is justified in a ghee of Reichert-Meissl value below 25 and a refractive index greater than 1.451.

REICH, E. (77)
DIE BUTTER-SCHMELZPROBE. Milch Ztg. 22: 787–789. 1893. 44.8 M59

On the basis that physical examinations of butters taken in conjunction with chemical tests are valuable in determining the purity and quality of the product, data upon 44 butters are presented and discussed.

RICHMOND, H. D. (78)
NOTE ON SAMNA. Analyst 38: 252. 1913. 382 An1

Analyses are given of a few samples of commercial samna, some of which apparently do not consist of genuine butterfat.

RIEDEL, L. (79)
DIE TEMPERATURABHÄNGIGKEIT DER SPEZIFISCHEN WÄRME VON BUTTER. Ztschr. f. die Gesam. Kälte Indus. 45: 177–178. 1938. 295.8 Z3

The specific heats were measured of fresh unsalted butter and of ghee prepared from it.

RITTER, W. (80)
DER BUTTER-EINSIEDE-RÜCKSTAND. Schweiz. Milch Ztg. 64: 269–270. 1938. 44.8 Sch92

The amounts of albumin, milk sugar, milk salts, milk fat, and lecithin in the residue of eingesottene butter are discussed, with remarks on the flavor and aroma of the residue and its uses in the household.

——— and NUSSBAUMER, T. (81)
DER BUTTEREINSIEDERÜCKSTAND, DAS LECITHINREICHSTE MILCHPRODUKT. Schweiz. Milch Ztg. 65: 291, 297–298. 1939. 44.8 Sch92

The residue of eingesottene butter, which is rich in lecithin, was studied, and the properties, structure, phosphatide content, etc. are discussed.

RITTER, W. and NUSSBAUMER, T. (82)
UNTERSUCHUNGEN ÜBER DIE VORGÄNGE BEIM EINSIEDEN DER BUTTER. Schweiz. Milch Ztg. 63: 31–32, 37–38, 41, 49, 57. 1937. 44.8 Sch92

A discussion of reactions from heating, of the lecithin and water content, of the cooling and solidification, and of the rusting of containers.

RÖHRIG, A. (83)
FLÜSSIGES BUTTERSCHMALZ. Ztschr. f. Untersuch. der Nahr. u. Genussmtl. 16: 405. 1908. 384 Z39

In an examination of butterschmalz which when cooling had separated into a liquid and a solid layer, the Reichert-Meissl number of the liquid portion was exceptionally high. Rapid cooling appeared to have been the cause.

SANYAL, P. (84)
ADULTERATION OF BUTTER AND GHEE, WITH ANIMAL FAT AND VEGETABLE GHEE, AND ITS DETECTION. India Dept. Agr. Mem., Chem. Ser. 10:143–155. 1929. 385 In2

Two tests based upon the solubility of butterfat and ghee in mixtures of ethyl acetate and 93 percent alcohol have been devised to detect adulteration. One test failed in testing fat from buffaloes fed on cottonseed oil, and the other test was devised to meet this difficulty.

SCHAFFER, P. S., and HALLER, H. S. (85)
THE SOLUBILITY OF GASES IN BUTTER OIL, COTTONSEED OIL, AND LARD. Oil & Soap 20: 161–162. 1943. 307.8 J82

Of the gases investigated, carbon dioxide was by far the most soluble in butter oil; oxygen, air, nitrogen, and hydrogen solubility decreased in order. Measurements were made at 40° C. and 60° C.

SCHLEGEL, H. (86)
BUTTERSCHMALZ. Chem. Ztg. 30: 745. 1906. 384 C427

The adulteration of butterschmalz by small quantities of cocoa fat is not always to be detected, either by analysis or by the Polenske number

SOXHLET, [F.], RITTER VON. (87)
AUSDEHNUNG DES MARGARINEGESETZES AUF BUTTERSCHMALZ. *In his* Ueber Margarine: Bericht an das General-Comité des Landwirthschaftlichen Vereins in Bayern, pp. 174–184. München, J. F. Lehmann. 1895. 44 So9

The margarin law in relation to adulteration of butterschmalz is discussed.

SPAETH, E. (88)
BEOBACHTUNGEN BEI DER UNTERSUCHUNG VON BUTTERSCHMALZ- UND VON ANDEREN FETTPROBEN. Ztschr. f. Untersuch. der Nahr. u. Genussmtl. 1: 377–384. 1898. 384 Z39

Since the Reichert-Meissl number is a constant, little affected by heat and rancidity—in contrast to the saponification number, refractive index, and iodine absorption number—it is a wise precaution to determine it in the examination of fats.

——— (89)
ZUR UNTERSUCHUNG VON SCHMALZ (BUTTERSCHMALZ). Forschungs-Ber. über Lebensmtl. 1: 23. 1893. 384 F77

A greenish color in butterschmalz which appeared to have been caused by contact with a copper container, was found by microscopic examination to have been caused by mold, after other methods of examination showed the butterfat to be normal.

STEWART, A. D., and BANERJEA, N. L. (90)
SOME OBSERVATIONS ON THE PROCESS OF MAKING GHEE AND ITS EFFECT ON THE LEGAL STANDARDS. Indian Jour. Med. Res. 17: 141–146. 1929. 448.8 In22

A report of experiments on (1) the flavor and analytical values of ghee made from unboiled milk and from boiled milk with a starter (dahi); (2) variation of analytical constants, if any, of ghee with the change in the lactic acid content of dahi due to storage; and (3) effect of the increase of lactic acid content of dahi on its yield of ghee.

SUNAWALA, S. D., and KOTHAVALA, Z. R. (91)
STUDY OF THE VARIOUS STANDARDS ADOPTED FOR THE EXAMINATION OF INDIAN BUTTER AND GHEE. Agr. and Livestock in India 5: 480–488. 1935. 22 Ag83A

From the analytical results of a great number of samples of pure Indian butter and ghee, quite definite figures were obtained, which lead to a definite recommendation of analytical specifications for ghee and butter.

THALER, H. (92)
ÜBER DIE VERWENDBARKEIT DER CHROMATOGRAPHISCHEN ANALYSE ZUM NACHWEIS DER KÜNSTLICHEN FÄRBUNG VON FETTEN UND ÖLEN. 2. FETTCHEMISCHE FRAGEN IN DER LEBENSMITTELCHEMIE. Fette u. Seifen 44: 38–42, illus. 1937. 384 C422

The selective adsorption "chromograph" method is used in examining coloring materials and natural oils, including butterschmalz and fat from dried milk. The method is useful in establishing the presence or absence of artificial coloring matter in fats.

THIEL, C. C. (93)
THE DETERMINATION OF MOISTURE IN DRIED BUTTERFAT. Austral. Council Sci. and Indus. Res., Jour. 16: 135–138. 1943. 514 Au72J

While the toluene distillation method gave low results, the Fischer titration method and three heating methods gave satisfactory results.

——— (94)
THE SOLUBILITY OF WATER IN BUTTERFAT. Austral. Council Sci. and Indus. Res., Jour. 16: 139–141. 1943. 514 Au72J

Dried butterfat may be clear and yet contain water. The solubility of water in butterfat varied from 0.19 percent at 40° C. to 0.47 percent at 95° C.

TRIMEN, S. H. (95)
EGYPTIAN BUTTER AND SAMNA. Analyst 38: 242–251. 1913. 382 An1

The usual methods for making samna are described. Various constants for Egyptian butter and samna are given, and a microscopic method for differentiating among various fats is discussed.

VAKIL, K. H. (96)
CHEMICAL EXAMINATION OF GHEE. Soc. Chem. Indus. Jour. 34: 320. 1915. 382 M31

The analytical results of 10 typical samples of ghee obtained by the author are compared with some earlier analyses by others.

VENKATACHALAM, V. (97)
A NEW VALUE FOR BUTTER-FAT AND GHEE. Current Sci. [India] 5: 477–478. 1937. 475 Sci23

The titer value and the refractive index at 45° C. are determined in the insoluble fatty acids left after distillation in the Reichert-Polenske process. A value, calculated by means of an equation, which is more than 86.5, indicates adulteration in excess of 10 percent.

——— (98)
A ROUTINE TEST FOR THE DETECTION OF HIGHLY HARDENED OILS AND MUTTON AND BEEF FATS IN BUTTER AND GHEE. Analyst 62: 732–733. 1937. 382 An1

Since the glycerides of stearic acid are only slightly soluble in alcohol and are soluble in acetone, a mixture of alcohol and acetone can be used to separate these glycerides if present as adulterants in ghee.

WEIN, E. (99)
UEBER DIE ERKENNUNG DER ECHTHEIT VON BUTTER UND BUTTERSCHMALZ NACH DEN ÜBLICHEN UNTERSUCHUNGSMETHODEN. Allg. Deut. Nahr. u. Genussmtlk. 1: 57–58. 1898. U. S. Army Med. Libr.

Since in a number of authentic instances the Reichert-Meissl number was found to be below 26 for butter, the conclusion is drawn that it is not always an index of the food value of the fat or its adulteration.

WITTKA, F. (100)
GHEE UND VEGETABILISCHES GHEE. Allg. Oel u. Fett Ztg. 32: 196–199. 1935. 307.8 Al5

A discussion of the economic situation arising from the extensive use of vegetable ghee and hardened fish oils as adulterants of Indian ghee.

WRIGHT, P. A., DEYSHER, E. F., and HOLM, G. E. (101)
III. THE PHOSPHOLIPIDS IN BUTTERMILK AND THEIR EFFECT UPON THE ACCURACY OF VARIOUS FAT TESTS. Jour. Dairy Sci. 16: 460–466. 1933. 44.8 J822

The extraction and the quantitative determination of the phosphorus-containing fats in buttermilk, and their effect upon the accuracy of the Babcock, the modified Babcock, the Minnesota Babcock, and the Roese-Gottlieb tests.

——— and HOLM, G. E. (102)
II. THE PHOSPHOLIPIDS IN SKIMMILKS AND THEIR EFFECT UPON THE ACCURACY OF THE VARIOUS FAT TESTS. Jour. Dairy Sci. 16: 455–459. 1933. 44.8 J822

The extraction and the quantitative determination of the phosphorus-containing fats in skim milk.

CRYSTALLIZATION

*MOHR, W., BAUR, J., and EYSANK, E. (103)
STRUKTUR UND KONSISTENZ DES BUTTERFETTES. 3 pts. Vorratspflege u. Lebensmtl. Forsch. 2: 383–393, 509–520, 525–534. 1939.

I. Die flüssige Phase des Butterfettes, by W. Mohr and J. Baur. "A study of the condition and amount of the liquid phase in butterfat is reported. The method of measurement of this phase and the effect of changes in it on the structure of the butter are discussed."—Chem. Abs. 35: 4510–4511. 1941.

II. Festigkeit von Butterfett, by W. Mohr and J. Baur. "The firmness of butterfat depends not alone on the form and arrangement of the fat crystals but also to a marked degree on the amount and condition of the butter oil present. Moreover the butter oil may undergo an after-hardening."—Chem. Abs. 35: 6680–6681. 1941.

III. Beitrag zur Kenntnis der Phasen im sogenannten "festen" Butterfett (Butterschmalz), by W. Mohr and E. Eysank. Effect of type and extent of crystallization on the consistency and taste of butter oil.—Based on abstract *in* Chem. Abs. 35: 6681. 1941.

RITTER, W. (104)
DAS ERSTARREN DER EINGESOTTENEN BUTTER. Schweiz. Milch Ztg. 63: 517, 523–524, 533–534. 1937. 44.8 Sch92

Solidification was studied, and observation was made of the effect of crystallization on the properties of butterfat, of the physical and chemical basis of solidification, and of the practical procedure in cooling and drawing off the fat.

——— (105)
DIE MIKROSKOPISCHE UNTERSUCHUNG DER KRISTALLISATION DER EINGESOTTENEN BUTTER. Schweiz. Milch Ztg. 64: 429–430, illus. 1938. 44.8 Sch92
Same, with omission of illus., *in* Milchw. Zentbl. 67: 325–330. 1938. 44.8 M59M

A discussion of the effect of the addition of large and small crystals for seeding purposes to eingesottene butter, and also of crystallization without seeding. Several reproductions of microphotographs, taken with polarized light, are included.

KEEPING QUALITY AND DETERIORATION

*BEHRE, A. (106)
UNTERSUCHUNGEN ÜBER BUTTER UND BUTTERSCHMALZ. Ber. über die Tät. des Chem. Untersuchamts. der Stadt Chemnitz im Jahre 1908.

A chemical study of the changes in butter and butterschmalz during storage.—Based on abstract *in* Milchw. Zentbl. 6: 28–29. 1910.

Briggs, L. H. (107)
THE AUTOXIDATION OF BUTTERFAT. I. FACTORS INFLUENCING THE REACTION. II. COMPARISON OF TESTS FOR DETECTING OXIDATION CHANGES. Jour. Dairy Res. 3: 61–69, 70–79. 1931. 44.8 J823

I. The factors studied were moisture, light, metals, peroxides, acidity, triolein, glycerol, lactose, pasteurization, iodine, and curd.

II. In the first series of tests the acid, peroxide, and iodine values were determined on each sample, and in addition the reaction with the Kreis test was observed. In the second series the Kreis and Fellenberg tests were carried out with the usual reagents.

Dastur, N. H., and Banerjee, B. N. (108)
RANCIDITY. Current Sci. [India] 5: 99–101. 1936. 475 Sci23

Discusses the development of rancidity in fats and oils, methods for determining rancidity, and rancidity changes in ghee.

Delaye, L. (109)
CONSERVATION DU BEURRE PAR LA FUSION. Jour. de Pharm. d'Anvers 54: 369–379. 1898. U. S. Army Med. Libr.

In a hospital where large amounts of butter were procured and held for a considerable period, samples were subjected to heating to 105° C. and separated from water and curd. The resulting beurre fondu was stored in the laboratory, and one sample was examined after 7 months, three after 9 months, and one after 1 year. Each sample had kept without appreciable acidity.

It was concluded that fresh untreated butter is more digestible than beurre fondu, and the process of "fusion" was not recommended for hospital use.

Ewbank, F. C., and Gould, I. A. (110)
OXIDATION OF BUTTER OIL AS INFLUENCED BY PREVIOUS HEAT TREATMENT OF THE OIL, BUTTER, OR CREAM. Jour. Dairy Sci. 26: 409–418. 1943. 44.8 J822

Heating butter oil and butter to 127° C. for 30 minutes hastens oxidation of butter oil. Butter oil prepared from cream containing copper and heated to 85° and 95° C. was stabilized to oxidation.

Godoble, N. N., and Sadgopal. (111)
STUDIEN ÜBER DAS RANZIGWERDEN VON BUTTERFETT. Ztschr. f. Untersuch. der Lebensmtl. 72: 35–45. 1936. 384 Z39

East Indian buffalo ghee was exposed to conditions producing rancidity, and these conditions were standardized.

The influence of light, air, humidity, casein, metals, and rancid ghee on the formation of rancidity in fresh ghee was studied, and the properties of the rancid ghees were established by the determination of their chemical indexes and the composition of the fatty acids.

Gould, I. A., Moore, L. A., Ewbank, F. C., and Townley, R. C. (112)
RELATIONSHIP OF THE STABILITY OF CAROTENOIDS OF BUTTER AND BUTTEROIL TO FORMATION OF PEROXIDES. Mich. Agr. Expt. Sta. Quart. Bul. 26: 145–149. 1943. 100 M58S

Upon storage of butter oil carotenoid destruction accompanies peroxide formation. This is not true in butter.

Govindarajan, S. V., and Banerjee, B. N. (113)
ANTI-OXIDANTS OF GHEE. Indian Jour. Vet. Sci. and Anim. Husb. 10: 361–371. 1940. 41.8 In22

The protective action of various antioxidants against fat oxidation was investigated, and the use of the vegetable dye, kamala, in small concentrations for this purpose is described.

——— and Banerjee, B. N. (114)
THE USE OF KAMALA AS AN ANTIOXIDANT OF GHEE. Current Sci. [India] 8: 559–560. 1939. 475 Sci23

The effect of the addition of kamala on the oxidation of fat, as compared with several other inhibitors, is discussed and summarized in tabular form.

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GREENBANK, G. R. (115)
THE OXIDATION OF FATS IN STORAGE. Oil and Soap 13: 140–144. 1936. 307.8 J82

A study of the effect of air, heat, light, and moisture on the oxidation of butter oil in storage.

——— and HOLM, G. E. (116)
ANTIOXIDANTS FOR FATS AND OILS. Indus. and Engin. Chem., Indus. Ed. 26: 243–245. 1934. 381 J825

The antioxidant properties of natural pigments, phenols, other aromatic compounds, and aliphatic acids were studied for their effect upon various fats and oils, including butter oil.

——— and HOLM, G. E. (117)
MEASUREMENT OF SUSCEPTIBILITY OF FATS TO OXIDATION. Indus. and Engin. Chem. 17: 625. 1925. 381 J825

A recording device is described and illustrated for measuring the susceptibility of fats, especially butterfat, to oxidation by oxygen absorption.

——— and HOLM, G. E. (118)
A PHOTOCHEMICAL METHOD FOR MEASURING SUSCEPTIBILITY OF FATS AND OILS TO OXIDATION. Indus. and Engin. Chem., Analyt. Ed. 2: 9–10. 1930. 381 J825A

The rate of reduction of methylene blue in a fat or oil when catalyzed by light may serve as a measure of the rate of reaction of the initial oxidative processes and may therefore be utilized to determine the relative susceptibilities of butter oil and other fats and oils to oxidation.

——— and HOLM, G. E. (119)
THE PHOTOCHEMICAL OXIDATION OF FATS AND OILS. Amer. Chem. Soc. Abs. Papers, Meeting 99: 12A–13A. 1940. [Processed.] 381 Am33Pa

An attempt to evaluate accurately the catalytic effect of various bands of the spectrum upon the oxidation of various oils, including butter oil.

——— and HOLM, G. E. (120)
PROMOTING THE OXIDATION OF FATS AND OILS. RELATIVE EFFECTIVENESS OF DIFFERENT BANDS OF THE VISIBLE SPECTRUM. Indus. and Engin. Chem., Indus. Ed. 33: 1058–1060. 1941. 381 J825

The effectiveness of light in its ability to promote the oxidation of corn oil, cottonseed oil, lard, and butter oil was determined.

——— and HOLM, G. E. (121)
SOME FACTORS CONCERNED IN THE AUTOXIDATION OF FATS, WITH ESPECIAL REFERENCE TO BUTTER FAT. Indus. and Engin. Chem. 16: 598–601. 1924. 381 J825

The effects of moisture, free fatty acids, neutralization, steam distillation, and washing with hot water on the keeping quality of butter oil.

HENDERSON, J. L., and ROADHOUSE, C. L. (122)
FACTORS INFLUENCING THE INITIAL INDUCTION PERIOD IN THE OXIDATION OF MILK FAT. Jour. Dairy Sci. 17: 321–330. 1934. 44.8 J822

A study of the measurement of the influences of sunlight, of certain metals, and of submaintenance rations of the cow.

HOLM, G. E., and GREENBANK, G. R. (123)
QUANTITATIVE ASPECTS OF THE KREIS TEST. [I] and II. Indus. and Engin. Chem. 15: 1051–1053. 1923; 16: 518. 1924. 381 J825

A study of the relationship between oxygen absorption, organoleptic rancidity, and the color developed in the Kreis reaction in various fats, including milk fat.

——— and GREENBANK, G. R. (124)
TALLOWINESS IN BUTTERFAT. Soc. Expt. Biol. and Med. Proc. 20: 176–177. 1922. 442.9 So1

A study of the nature of the oxidation which occurs in butterfat when exposed to air.

HOLM, G. E., GREENBANK, G. R., and DEYSHER, E. F. (125)
SUSCEPTIBILITY OF FATS TO AUTOXIDATION. Indus. and Engin. Chem. 19: 156–158. 1927. 381 J825

The susceptibility of cottonseed oil to autoxidation, and the effect of ultraviolet light upon the autoxidation of cottonseed oil were studied. Evidence of the existence of loosely bound oxygen compounds termed "moloxides" in milk fat is presented.

——— SCHAFFER, P. S., and HALLER, H. S. (126)
BUTTEROIL AND ITS STABILITY. (Abstract) Jour. Dairy Sci. 26: 760–761. 1943. 44.8 J822

The spoilage of oils and fats by oxidation can be prevented only by exclusion of oxygen. Butter oils of less than one-half percent oxygen by volume prepared under a vacuum and sealed in nitrogen will keep for long periods.

——— WRIGHT, P. A., WHITE, W., and DEYSHER, E. F. (127)
THE KEEPING QUALITY OF BUTTERS. I. THE RATES OF DETERIORATION OF BUTTERS MADE FROM CREAMS OF DIFFERENT ACIDITIES AND STORED AT VARIOUS TEMPERATURES. Jour. Dairy Sci. 21: 385–398. 1938. 44.8 J822

The rates of deterioration were studied of sweet-cream butters and of butters made from creams of different acidities. These were scored and tested for peroxide value and bleaching time at intervals during storage.

KHUBCHANDANI, P. G. (128)
EFFECT OF CITRIC ACID AND SODIUM CITRATE ON FLAVOUR, AROMA AND KEEPING QUALITY OF BUTTER AND GHEE. Agr. and Livestock in India 9: 162–166. 1939. 22 Ag83A

Citric acid and sodium citrate added to cream increase the aroma of butter and ghee made therefrom. The keeping quality of the butter was found to be lowered, that of the ghee improved. Citric acid added to cultures gave improved flavor to butter without effect on keeping quality.

KIEFERLE, [F.] (129)
ZUR BUTTERSCHMALZ-FRAGE. Süddeut. Molk. Ztg. 48: 1181–1182. 1927. 44.8 Su2

The percentage of the various constituents present in butterschmalz and the effects of light and of type of container upon the keeping quality are briefly discussed; results of analyses of commercial and individual samples are tabulated.

KRAUS, A., and MÜLLER, M. (130)
UNTERSUCHUNGEN ÜBER DEN EINFLUSS DER HERSTELLUNG, VERPACKUNG UND DES KOCHSALZGEHALTES DER BUTTER AUF IHRE HALTBARKEIT MIT BESONDERER BERÜCKSICHTIGUNG DES VERSANDS IN DIE TROPEN. K. Gsndhtsamt. Arb. 22: 235–292. 1904. 449.75 G31

The keeping quality of both butter and butterschmalz was studied. Butter made from raw and pasteurized and from sweet and sour cream was made into butterschmalz and packed into four kinds of containers. The flavor and odor were tested and results are given for each package—after manufacture, after 6 months storage, and during transportation in both the refrigeration room and in the regular storage space of the ship. The remaking of butter from butterschmalz was also studied.

KRENN, J. (131)
KRATZENDER GESCHMACK BEI BUTTERSCHMALZ. Deut. Molk. Ztg. 59: 392. 1938. 44.8 Su2

A reply to a request for a remedy for rancid flavor in butterschmalz made from rancid butter, and for information as to what other uses can be made of such butter.

KÜHL, H. (132)
UNTERSUCHUNGEN ÜBER DIE KONSERVIERUNG DER BUTTER (SPEZIELL FÜR TROPENVERSAND). Deut. Vrtljschr. f. Öffentl. Gsndhtspflege. 45: 261–267. 1913. U. S. Army Med. Libr.

Experiments were made in pasteurizing butter and butterschmalz and storing it under unfavorable conditions for several months, to determine which method should be used in preparing butter for shipment to tropical countries. After storage the quality of the pasteurized butter was poor, while that of the butterschmalz was good.

MOHR, W., and BAUR, K. (133)
ÜBER DIE HALTBARKEIT VON BUTTERSCHMALZ. Molk. Ztg.[Hildesheim] 53: 2304–2305. 1939. 44.8 M73

Also *in* Deut. Fettwirtsch. 16: 665–666. 1939. 44.8 N11

The method of preparing butterschmalz for storage at different temperatures is described, and results are given of the keeping quality of samples tested after 7 and 11 months storage.

MUNDINGER, E. (134)
ÜBER DIE CHEMISCHEN UND BAKTERIOLOGISCHEN VORGÄNGE BEIM VERDERBEN DES BUTTERFETTES. Milchw. Forsch. 7: 292–331. 1929. 44.8 M5922

A review of recent work on the autocatalytic oxidation of fats and an attempt to clear up the diversity of opinion in this field.

NEWLANDER, J. A., and ELLENBERGER, H. B. (135)
COMPARATIVE KEEPING QUALITY OF CREAM, BUTTER AND BUTTER OIL. Vt. Agr. Expt. Sta. Bul. 299, pp. 10–16. 1929. 100 V59

Trials were conducted for periods of from 3 to 9 months with cream of both average and high quality held at 0° F., and with butter and butter oil made from the same quality of cream and held at different temperatures.

Results indicate that storage temperatures above 0° F. are not advisable for these products, although butter oil was kept in good condition for short periods of time as high as 50° F.

PATIL, V. H., and HAMMER, B. W. (136)
THE KEEPING QUALITIES OF GHEE. Jour. Dairy Sci. 11: 143–154. 1928. 44.8 J822

Ghee, butter, and butterfat were compared for keeping qualities at both room and cooler temperatures. Ghee was also studied when held in the dark and in diffuse light, when prepared by heating at different temperatures, and when made from poor butter. Methods of preparation, composition, and fat constants are discussed.

RITTER, W. (137)
DER NACHWEIS VON KUPFER IN BUTTER UND BUTTERSCHMALZ DURCH DIE PEROXYDASE-REAKTION. Schweiz. Milch Ztg. 62: 25–26. 1936. 44.8 Sch92

A discussion of the method of applying the peroxidase reaction to the determination of copper in butter and other fats. It was found that fat processed in copper containers gives a stronger reaction than does fat free from copper. Lecithin does not interfere with the determination.

——— and NUSSBAUMER, T. (138)
DIE OXYDATION DES BUTTERFETTES. I. DIE PEROXYDBILDUNG IM BUTTERFETT. II. DER EINFLUSS DES KUPFERS AUF DIE PEROXYDZAHL DES BUTTERFETTES. III. DER EINFLUSS VERSCHIEDENER SUBSTANZEN AUF DIE PEROXYDBILDUNG IM BUTTERFETT. IV. DER EINFLUSS DER FETTPEROXYDE AUF DIE HALTBARKEIT DES BUTTERFETTES. V. FAKTOREN, DIE DIE HALTBARKEIT DES BUTTERFETTES, SPEZIELL DER EINGESOTTENEN BUTTER, BEDINGEN. VI. DER EINFLUSS VON DIACETYL AUF DIE PEROXYDBILDUNG IM BUTTERFETT. VII. DER EINFLUSS VON KUPFER AUF DIE PEROXYDZAHL DES RAHMFETTES. Schweiz. Milch Ztg. 64: 59–61, 215–216, 465–466, 525–526. 1938; 65: 53–54, 61–62, 193. 1939; 66: 47–48. 1940. 44.8 Sch92

I. The presence of light, air, and copper; the addition of hydroquinone; melting and boiling the butter; overheating the fat; and storage temperature were all studied in relation to their influence on oxidation.

II. The influence of copper on the peroxide number was studied with butterfat stored at room temperature in the dark, in the presence of light, when heated in thin layers for 8 hours at 104° C., and on tallowy butterfat.

III. The influence of lecithin, egg, powdered buttermilk, hydroquinone, and an oatmeal preparation (Avenex) was studied, and the peroxide number of eingeschmolzene and eingesottene butter was measured.

IV. A study of the rate of formation of peroxides in different zones of the container, by the addition of benzoyl peroxide and after the addition of fat peroxides to pure butterfat.

V. Factors studied were bacteria, stability of the fat, boiling, phosphatides, water content, and methods of handling; also the relation of the water content to the rusting of containers.

VI. A study of the peroxide number of fat to which diacetyl had been added.

VII. The peroxide number of cream treated with copper sulfate and iron was studied, and also the action of sunlight upon the oxidation of cream.

*Roy, S. C., Das, J. C., and Mullick, N. K. (139)
EFFECT OF STORAGE ON PHYSICAL AND CHEMICAL CONSTANTS OF GHEE IN PREPARED FOOD. Inst. Chem. India Jour. Proc. 13: 81–88. 1941.

In prepared foods the constants of ghee are lowered by microbiological decomposition to an extent dependent upon the foodstuff, its moisture content, and the time and temperature of storage. Regulation storage prevents decomposition for 4 months; otherwise fat change occurs in 4 days. Nimki prevents decomposition.—Based on abstract *in* Chem. Abs. 36: 3861. 1942.

Schulz. M. (140)
BUTTERSCHMALZ ALS EISERNE FETTRATION DER MILCHWIRTSCHAFT. Deut Molk. Ztg. 58: 97–98. 1937.

The economic advantages of storing butterschmalz rather than fresh butter when prices are low and the keeping quality of butterschmalz are discussed, with remarks on its marketability.

*——— (141)
ÜBER DIE EIGNUNG VON BUTTER FÜR DIE HERSTELLUNG VON BUTTERSCHMALZ. Deut. Molk. Ztg. 64: 132–134. 1943.

The keeping quality of butterschmalz is dependent upon its antioxidant content, copper and iron content, and heat treatment. Knowing also that sweet-cream butter maintains its antioxidant content over long periods, a butterschmalz was prepared that kept 4 years.—Based on abstract in Chem. Zentbl. 114: 2358. 1943.

——— and Storck, W. (142)
VERSUCHE ÜBER HERSTELLUNG UND HALTBARKEIT VON BUTTERSCHMALZ. Deut. Molk. Ztg. 61: 143–145, 166–167, 956–958. 1940. 44.8 Su2

A process for the recovery of the butterschmalz is described (pp. 143–145) and illustrated, with a design of the equipment used. This process involves the heating of the butterfat to break the emulsion, followed by centrifuging and cooling of the butterschmalz. A comparison was made of the keeping quality of butterschmalz made from fresh sweet butter and from sour cream butter, as influenced by manufacturing methods and storage temperatures.

*The keeping quality of butterschmalz which was brown in color and had a burnt flavor from heating, was studied (pp. 166–167, 956–958) in relation to the effect of metals and the effect of the addition of an antioxidant (oatmeal extract).—Based on abstracts *in* Chem. Zentbl. 111 (1): 3045. 1940; 112 (1): 1369. 1941; and *in* Milchw. Literaturber. 159: 203–204. 1940; 164: 421–422. 1941.

Wiley, W. J. (143)
OXIDATION OF THE FAT OF BUTTER DURING COLD STORAGE. Jour. Dairy Res. 10: 300–309. 1939. 44.8 J823

A study of oxidation by measuring the fat-aldehyde value of the fat is presented. Experiments are discussed on the separate influences of lactic acid and ripening, of pasteurization temperature, of diacetyl and acetoin, and of steamed milk on oxidation; and of serum acidity on butterfat acidity.

MANUFACTURE

Anonymous. (144)
ANLEITUNG ZUM EINSIEDEN VON BUTTER. Schweiz. Milch Ztg. 68: 238. 1942. 44.8 Sch92

Describes briefly a method of manufacture.

——— (145)
DEHYDRATED BUTTER-FAT. Ice Cream Indus. 17 (8): 10. 1942. 389.8 Ic24

By the New Zealand Research Institute process, unsalted whey butter is melted over a steam jet and poured with the condensed steam into a cylinder which separates the water from the fat. It is then passed through a cream separator and dehydrated in a vacreator, cooled, and packed into sterile containers for shipment.

ANONYMOUS. (146)
DRIED BUTTER-FAT, A PROMISING INDUSTRY. Past. Rev. 52: 472. 1942. 23 Au75

Essentially the same, with title New Zealand's Dried Butterfat, *in* Farmer's Weekly [Bloemfontein] 64: 306. 1942. 24 F225

Butter is heated by a steam jet and the mixture is allowed to settle, after which the water, curd, and salt are separated by centrifuging. The fat portion is passed through a separator, pasteurizer, and two more separators. The final water is removed in a steam-jacketed chamber under high vacuum. It is then cooled and packed into tin containers, displacing all air, and hermetically sealed.

——— (147)
DRYING BUTTER FAT. Food Indus. 14 (10): 114. 1942. 389.8 F737

By the New Zealand Research Institute process, butter is melted by a steam jet, allowed to settle, and the watery portion is passed through serum separators to remove water, salt, and curd. The fat is then passed through separator, pasteurizer, and two more separators. The final water is removed in a steam-jacketed chamber under high vacuum, then cooled in a rotary cooler, and vacuum-packed in 4-gallon tins.

——— (148)
INTEREST IN DEHYDRATED BUTTER GROWS; AMERICAN PATENT DESCRIBES NEW METHOD. Dairy Rec. 43 (6): 18. 1942. 44.8 D148

Describes the hydrogenated butter method as patented by Frederic H. Penn (U. S. Patent No. 2,272,578, issued Feb. 10, 1942).

——— (149)
EIN NEUES BUTTER-KONSERVIERUNGS-VERFAHREN. Milch Ztg. 25: 138. 1896. 44.8 M59

In the proceedings of a meeting of the society, a discussion is recorded on a new process for the preservation of butter, as patented by R. Backhaus and P. Schach (German Patent No. 84,907, issued Apr. 30, 1895), and its possible effect on the butter supply, markets, prices, etc.

——— (150)
EIN NEUES VERFAHREN ZUR KONSERVIERUNG DER BUTTER. Milch Ztg. 24: 849. 1895. 44.8 M59

Observations are made on the discussion by H. Reimund, *in* Molk. Ztg. [Berlin] 5: 609–611. 1895. It concerns the process of preserving butter by salt, as patented by R. Backhaus and P. Schach (German Patent No. 84,907, issued Apr. 30, 1895), and the possible effect of the process on the butter supply, markets, prices, etc.

——— (151)
NOW—IT'S RECONSTITUTED MILK. DEMONSTRATIONS REVEAL WIDE POSSIBILITIES FOR UTILIZATION OF BUTTEROIL AND DRIED SKIM FOR PALATABLE FLUID CONSUMPTION DURING PRESENT EMERGENCY. Amer. Butter Rev. 4: 350, 352, illus. 1942. 44.8 Am37
Also *in* Amer. Milk Rev. 4: 282–283, illus. 1942. 44.8 Am38

A process for reconstituting fluid milk from butter oil, dried skim milk, and water, as discovered by Charles E. North, is briefly described, and remarks are made on its palatability, on the possibilities of its use by the Army at distant points, and on relaxation of laws concerning labeling.

AIYER, A. K. Y. N. (152)
METHODS OF BUTTER-MAKING, LOCAL AND IMPROVED. Mysore Agr. Dept. Gen. Ser. Bul. 9, 9 pp. Bangalore. 1916. 22 M99G

Methods of making both butter and ghee are described, and a comparison of the yield is given in tabular form.

ALEXANDER, W. (153)
PROCESS OF SEPARATING BUTTEROIL FROM MILK, SKIM-MILK, CREAM, BUTTERMILK, BUTTER &C. (U. S. Patent 1,401,853.) U. S. Patent Office, Off. Gaz. 293(4): 803. Dec. 27, 1921. 156.65 Of2

The process consists in heating such material under pressure to a temperature corresponding to low steam pressure sufficient to dissolve the casein present, and then separating the fat centrifugally.

BACKHAUS, R., and SCHACH, P. (154)
VERFAHREN ZUR HERSTELLUNG VON BUTTER BZW. VON KÄSE AUS DURCH SALZEN UNGENIESSBAR GEMACHTER CONSERVIRTER BUTTER UND MAGERMILCH. German Patent No. 84,907. Apr. 30, 1895.

Butter is made in the spring and summer with 10 percent or more salt and stored until needed. Then it is melted, mixed in an emulsor with skim milk, and separated centrifugally. The resulting cream may be used for making fresh-tasting sweet butter, or cheese similar to that made from fresh whole milk.

BAKER, H. D. (155)
BUTTER MAKING IN INDIA. U. S. Bur. Foreign and Dom. Com. Daily Cons. and Trade Rpts., No. 248, pp. 385–388. 1914. 157.7 C76D

Discusses the limited use of butter in India, the production and uses of ghee, the introduction and use of cream separators, and the enlargement of the Government dairy at Kirkee.

——— (156)
INDIA AS A MARKET FOR COTTONSEED OIL. U. S. Bur. Foreign and Dom. Com. Daily Cons. and Trade Rpts., No. 201, pp. 1111–1115. 1914. 157.7 C76D

The need in India for a cheap and satisfactory substitute for ghee is reported, and the manufacture, composition, consumption, sale and prices of ghee are discussed. Substitutes used for mixing with ghee are listed.

BAKER, J. C. (157)
MANUFACTURE OF MILK FAT. (U. S. Patent No. 1,413,092.) U. S. Patent Office, Off. Gaz. 297: 459. Apr. 18, 1922. 156.65 Of2

In the continuous process described, cream is separated from whole milk, cooled and agitated, then heated to melt the fat. The oil is separated from this product and the remaining ingredients are added to the whole milk used for the next run.

BALLHÖFER, H. (158)
BUTTERSCHMALZE, EINE NATIONALE FETTRESERVE. Deut. Molk. Ztg. 60: 1443–1444. 1939. 44.8 Sw2

The need for conservation of butterfat and the possibilities of making butterschmalz in large quantities at a central station instead of in small quantities by the farmers are discussed, with statements concerning the supply, quality, methods of manufacture, etc.

BIRKETT, C. B. (159)
DEHYDRATED BUTTER IN NEW ZEALAND. Canada Dept. Trade and Com., Com. Intel. Jour. 66: 594. 1942. 286.8 C16

Same *in* Canada Dept. Agr. Dairy News Let. 23 (6): 6. 1942. [Processed]. 44.9 C16Da

Same, with title, Dehydrated Butter, Results of Research in New Zealand, *in* Chem. Age 47 (1203): 61. 1942. 382 C427

Unsalted whey butter is melted over a jet of steam and run into a cylinder which automatically separates the water that settles by gravity from this solution. After passing through two cream separators the material undergoes a final process of dehydration in a vacreator. It is then cooled, put into sterile canisters, and sealed.

BUCHLER, W. (160)
BUTTER, CHEESE AND GHEE IN INDIA. Natl. Butter Jour. 22 (10): 42–44, illus. 1931. 286.85 B98B

Statements are made concerning the principal centers of butter trade, the manufacture and quality of butter, and the manufacture, uses, and manner of collecting and handling ghee.

BURMAN, M. M. (161)
WASTE-PREVENTING METHOD OF PREPARING OIL, FAT, LARD, TALLOW AND LIKE SUBSTANCES FOR STORAGE OR TRANSIT. (Brit. Patent No. 309,502.) July 11, 1930.

By this method ghee is treated with 10-percent hydrogenated ghee, and the mixture heated in a pan. When suddenly cooled it will form a solid compact mass that will not melt at hot weather temperatures.

DAVE, C. N. (162)
COMPARISON OF GHEE MAKING FROM CREAM AND BUTTER. Poona Agr. Col. Mag. 26: 142–147. 1935. 22 P79

Also *in* Agr. and Livestock in India 5: 742–748. 1935. 22 Ag83A

Material and methods used in experiments with buffalo milk are recorded, and statements show the differences in the yield of ghee from cream and from butter, the percentage of fat in the casein residue, and the economic aspects of the two methods.

DAVIES, W. L. (163)
DESI BUTTER. GHEE. *In his* Indian Indigenous Milk Products, pp. 35–60. Calcutta, Thacker, Spink & Co., Ltd. 1940. 44 D28I

Country butter manufacture, moisture content, flavor, and odor are discussed.

The manufacture of ghee from both butter and cream is described, with information on large-scale processes of manufacture and on heating, salting, flavor, odor, keeping quality, color, crystal texture, constants, adulteration, naturally abnormal ghees, and packing.

EUGLING, W. (164)
SCHMALZBEREITUNG UND BUTTERREGENERIRUNG. (ZUR DAUERBUTTER-FRAGE.) Jahresber. Landw.-Chem. Versuchssta. Landes Vorarlberg in Tisis 1882: 17–19. 1883. 105.9 B74

Brief report *in* Biedermann's Centbl. f. Agr. Chem. 14: 484–485. 1885. 384 B47

Experiments in making butterschmalz at the experiment station in the Alps are discussed, and methods are described.

FISCHER, A. (165)
HERSTELLUNG VON BUTTERSCHMALZ IM GROSSEN. Süddeut. Molk. Ztg. 48: 1479. 1927. 44.8 Su2

A reply to a request for information concerning the type of equipment to use, and the best and cheapest method of making butterschmalz.

FLEISCHMANN, W. (166)
SCHMALZ. *In his* Lehrbuch der Milchwirtschaft. Ed. 7, rev. by H. Weigmann, pp. 630–631. Berlin, Paul Parey. 1932. 44 F62L

A brief discussion of the terminology, manufacture, composition, storage, and use of butterschmalz.

FRENCH, M. H. (167)
THE MUSOMA GHEE INDUSTRY. East African Agr. Jour. 3: 283–289. 1938. 24 Ea74

Contents: Musoma Conditions; Review of the Development of the Musoma Ghee Industry; The Methods of Ghee Production; Improvements Being Encouraged by the Veterinary Department; The Direct Cream to Ghee Method; Quality of Musoma Ghee; Marketing of Musoma Ghee.

——— (168)
THE PREPARATION OF CLARIFIED BUTTER WITH DETAILS OF THE NEW "SOUR CREAM" METHOD OF PRODUCTION. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 1938 (2): 71–73. 1939. 41.9 T15

Explains the principles underlying clarification and describes the native methods of making ghee and the new "sour cream" method.

——— (169)
SOME OBSERVATIONS ON THE METHODS OF MAKING CLARIFIED BUTTER (GHEE) WITH SOME NOTES ON A NEW METHOD. [Gt. Brit.] Imp. Inst. Bul. 34, pp. 32–44. 1936. 26 G79

Translated into French, with title, Les Méthodes de fabrication du beurre clarifié ou "ghee," *in* Madagascar Bul. Écon. Trimest. (n. s.) No. 8, pp. 346–353. 1936. 270 M26Bu

The old native method of making ghee in Tanganyika Territory is compared with improved methods. A new method of making ghee by boiling washed fresh cream is also described.

FRENCH, M. H. (170)
THE SOUR CREAM METHOD OF MAKING CLARIFIED BUTTER (GHEE). [Gt. Brit.] Imp. Inst. Bul. 36: 349–350. 1938. 26 G79

A method of boiling sour cream without further treatment or washing, as used in Tanganyika Territory, is described, and the acidity and keeping quality of the resulting ghee are given.

*GASSER, E. (171)
DIE BUTTERSCHMALZ HERSTELLUNG EIN AKTUELLES PROBLEM. Milchw. Zentbl. 72: 37–45, 52–57. 1943. 44.8 M59M

English translation *in* Internatl. Inst. Agr. Monthly Bul. Agr. Sci. and Pract. 33: 435T–455T. 1942. 241 In 82

Gives a brief historical review, and discusses methods of manufacture, composition and properties, quality, storage, possible uses, and byproducts.

GHARE, B. K. (172)
PREPARATION OF GHEE. *In his* Manual of Dairy Farming (for Indian Students), p. 118. Cawnpore, B. K. Ghare. 1923. 44 G34

A brief description of the method of ghee manufacture.

GRARD, J. B. (173)
PROCÉDÉ DE CONSERVATION DU BEURRE. (French Patent No. 529,400.) Nov. 26, 1921.

The casein, lactose, and water are separated from melted butter by passing it through a centrifugal separator.

——— (174)
PROCÉDÉ DE RECONSTITUTION DU BEURRE. (French Patent No. 529,505.) Nov. 29, 1921.

Melted butter from which the casein, lactose, and water have been separated is precipitated into ice water for hardening.

HEINZERLING, C. (175)
CONSERVIREN DER BUTTER DURCH AUSSCHMELZEN. *In his* Die Conservirung der Nahrungs- und Genussmittel. 3. Die Conservirung von Milch, Eiren, Obst und Gemüse, Getreide, Wein und Bier, pp. 257-258. Halle, Wilhelm Knapp. 1884. U. S. Army Med. Libr.

A brief description of the method of melting the butter.

JULIEN, M. (176)
EIN PATENTIERTES VERFAHREN, DIE BUTTER ZU KONSERVIEREN. Milch Ztg. 29: 184. 1900. 44.8 M59

Patent not identified. Butter is heated in a container on a water bath at 40° C. until the nonfat solids are deposited on the bottom. The liquid fat can then be stored for a long time or shipped to other climates.

The fat can be remade into butter by adding 20 percent to 30 percent sweet or pasteurized milk and emulsifying under strong pressure.

KLEIN, J. (177)
DIE GEWINNUNG VON SCHMALZBUTTER (BUTTERSCHMALZ). *In his* Erfolgreiche Milchwirtschaft. Ed. 3, p. 221. Berlin, Paul Parey. 1922. 44 K672

The method of manufacture is briefly described.

KOTHAVALA, Z. R., and COX, S. (178)
RESULTS OF THE EXPERIMENT IN GHEE MAKING BY THE DESI (COUNTRY) AND SEPARATOR METHODS CONDUCTED AT THE GOVERNMENT CREAMERY, ANAND. Cent. Bur. Anim. Husb. & Dairying in India Jour. 1: 95–97. 1927. 49 In2

The two methods are described, and results are tabulated and compared for yield, sanitation, and financial returns.

LANGHEINRICH and others. (179)
HERSTELLUNG VON SCHMELZBUTTER. Molk. Ztg. [Hildesheim] 42: 2732, 2781–2782, 2831–2833. 1928. 44.8 M73

Detailed advice is given from several different sources to an inquirer who requested information on method of making butterschmalz, the percentage of loss, how to prevent oxidation, and the cause of tallowiness.

LEA, C. H., and HALE, H. P. (180)
THE PREPARATION OF MILK-FAT (BUTTER-FAT) FROM MILK. [Gt. Brit.] Food Invest. Bd. Rpt. 1938: 26–29. 1939. 389.9 G792R

Four experimental methods of making clarified butter (ghee) are described and results are given: (a) Prepared directly from butter; (b) prepared directly from cream; (c) cream or butter diluted with water and autoclaved; (d) diluted cream allowed to stand and centrifuged.

LEWES, G. (181)
WINKE FÜR DIE BUTTERSCHMALZBEREITUNG. Deut. Molk. Ztg. 54: 1552. 1933. 44.8 Su2

Describes method of manufacture.

LOFTUS-HILLS, G. (182)
REPORT ON EXPERIMENTAL COMMERCIAL PREPARATION OF BUTTERFAT. 22 pp., illus. [Melbourne?], Austral. Council Sci. and Indus. Res. 1941. [Processed.] 44 Au72

A process combining centrifugal separation and vacuum evaporation was studied for the large-scale manufacture of butterfat from butter, with particular reference to second-grade butter, an unexportable surplus of which is accumulating in Australia, and in order to supply quantities of the fat for tests of its commercial utility.

Scientific data are given with discussion, and the equipment used, procedure, and analytical methods are described.

The work was conducted at Longwarry, August to October 1941, by G. Loftus-Hills, E. G. Pont, C. C. Thiel, W. J. Wiley, A. Padgett, and K. Goodson. This report was prepared by G. Loftus-Hills.

MCDOWALL, F. H., DOLBY, R. M., BEATSON, E., and O'DEA, J. J. (183)
THE COMMERCIAL PRODUCTION OF DRY BUTTERFAT. New Zeal. Jour. Sci. and Technol. 24: 53B–78B. 1942. 514 N48

Reprinted as New Zeal. Dept. Sci. and Indus. Res. Dairy Res. Inst. Pub. 166, pp. 53B–78B. 1943. 44.9 D146

Progress report, with title, Dry Milk Production, by the New Zealand Dairy Research Institute, *in* New Zeal. Dept. Sci. and Indus. Res. Ann. Rpt. (1943) 17: 5. 330.9 N48

The method is described in which butter is melted by direct application of steam, the fat is separated by gravity and by the use of separators, and the butterfat obtained is dried under vacuum and hermetically sealed in tins.

*MAJER, G. (184)
BUTTERSCHMALZ. Wien Milchw. Ber. 2: 95–100. 1934.

Three methods of making butterschmalz are described, and the keeping quality is discussed.—Based on abstracts *in* Milchw. Literaturber 100: 418. 1935; *and in* Deut. Molk. Ztg. 56: 1509. 1935.

MARRE, F. (185)
PRÉPARATION DU BEURRE FONDU. Rev. Indus. du Lait 4 (41): 8–9. 1923. 44.8 R323

Describes method of manufacture.

*MAUL, G. P. (186)
BUTTERSCHMELZ- UND VERTHEILUNGSAPPARAT MIT SCHMELZ- UND DAMPFRAUM DAMPFABSCHLUSSROHR, KONDENSWASSERABFLUSSROHR, VERTHEILUNGSVENTIL MIT SKALA UND ZWEI SIEBEN IM SCHMELZRAUM. German Gebrauchsmuster (short term) Patent No. 90,179. Klasse 45. M. 6437. Jan. 31, 1898.

MAYA DAS, C. (187)
THE GHEE PROBLEM IN THE UNITED PROVINCES, INDIA. 10th World's Dairy Cong., Rome-Milan (1934) 7: 115–119. 1934. 44.9 In8210

Two methods of making ghee in the country are described, and a comparison is made of the percentages of ghee obtained from these methods. The adulteration of ghee and its remedies are briefly discussed.

MICHAEL, W. H. (188)
COTTON-SEED OIL, INDIA. COTTON-SEED-OIL BUTTER AS A SUBSTITUTE FOR GHEE. U. S. Bur. Mfrs. Daily Cons. and Trade Rpts. 3434: 7–8. 1909. 157.7 C76D

The method of manufacure, amount produced, and imports and exports of ghee in India are briefly stated in this report, which suggests the commercial possibilities of a substitute made of vegetable oil.

MILK OIL CORPORATION. (189)
IMPROVEMENTS IN MILK FATS. Brit. Patent Specif. 206, 840. Appl. Nov. 7, 1923.

To produce milk fat devoid of taste or odor, cream is separated from whole milk, diluted with water, and passed through a separator. The cream is then whipped, diluted with four volumes of warm water, and agitated until the oil is melted; then it is passed through a whey separator and through an oil separator to produce a dry oil.

"Note.—The application for a patent has become void. This print shows the specification as it became open to public inspection."

——— (190)
IMPROVEMENTS IN OR RELATING TO PROCESSES OF MAKING BUTTER. Brit. Patent No. 242,363. Nov. 12, 1925.

Milk oil and an emulsifying agent are mixed at a temperature above the melting point of the milk oil, stirred and cooled to a temperature below 80° F., then stirred again and cooled to 60° F., at which temperature the fat globules have a tendency to stick together. This mixture is pressed with a spoon, paddle, or roller to cause separation of butter.

*MOHR, W., and EICHSTÄDT, A. (191)
LA FABRICATION DU BEURRE FONDU. Milchw. Ztg. 69: 1018. 1933.

The temperature at which the butter should be heated, and the effect of several metals on the flavor of the beurre fondu are discussed.—Based on abstract *in* Lait 16: 309. 1936. 44.8 L143

MURRAY, F. (192)
GHI OR CLARIFIED BUTTER. *In* A Dictionary of the Economic Products of India, ed. by G. Watt. V. 3, Dacrydium to Gordonia, pp. 491–497. London, W. H. Allen & Co., and Calcutta, Office of the Supt., Govt. Print. India. 1890. 34.2 W34

Methods of preparing ghee in Bengal, Rajputana, and Madras are described, and information is given on yield, adulterants, packing, production, medicinal value, domestic and sacred uses, and prices and trade.

NOBLE, K. F. (193)
AUSTRALIAN PRODUCTION OF DEHYDRATED BUTTERFAT. Canada Dept. Trade and Com., Com. Intel. Jour. 67 (2027): 516–517. 1942. 286.8 C16

A process has been developed whereby butter can be converted to butterfat with a saving of about 20 percent in weight and without sacrifice of food value. The dehydrating plant comprises heating units for the liquefication of the butter, centrifugal separation of the butterfat, and vacuum evaporation for the removal of water.

NORTH, C. E. (194)
CONDENSED-MILK OIL. (U. S. Patent No. 1,494,698.) U. S. Patent Office, Off. Gaz. 322: 643. May 20, 1924. 156.65 Of2

Also issued to the Milk Oil Corporation as Brit. Patent No. 247,660. Mar. 4, 1926.

The process consists in washing the cream until the proportion of skim milk becomes negligible and then condensing the oil and water by evaporation to remove the water, under conditions of temperature which will cause the oil droplets to melt and coalesce.

——— (195)
CONTINUOUS PROCESS OF EXTRACTING OIL FROM MILK. (U. S. Patent No. 14,485,702.) U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924., 156.65 Of2

Milk is warmed and separated; and the separated cream is washed, cooled and whipped, melted with warm water, and then passed through a fat concentrator or whey separator, and through an oil separator or dehydrator. Continuous and automatic equipment is used.

NORTH, C. E. (196)

EXTRACTING OIL FROM MILK. (U. S. Patent No. 1,584,123.) U. S. Patent Office, Off. Gaz. 346 (2): 390. May 11, 1926. 156.65 Of2

A dilution of washed cream is heated and held at a temperature and for a time sufficient to break the emulsion and coagulate the casein. The casein is then separated from the oil by filtration.

——— (197)

EXTRACTING OIL FROM MILK AND CREAM. (U. S. Patent No. 1,485,696.) U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924. 156.65 Of2

Cream separated from whole milk is diluted and centrifugally washed until the casein is removed. The fat contained in the cream is diluted, melted, and passed through an oil separator. The fluid comprising the wash water, milk serum, and unrecovered fat particles are returned to the whole milk prior to the initial step of separation.

——— (198)

IMPERISHABLE BUTTER. (U. S. Patent No. 1,509,082.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

An emulsion is formed from pure milk oil, water, and a nondecomposable thickener such as agar. The milk oil and water are in such proportionate amounts as are present in natural creams. This product is then churned.

——— (199)

IMPERISHABLE MILK. (U. S. Patent No. 1,509,083.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

This process consists in emulsifying milk oil, water, and an emulsifying agent such as gum arabic, the milk oil and water being in such proportionate amounts as are present in the natural product imitated.

——— (200)

IMPROVEMENTS IN PROCESS OF MAKING BUTTER FROM ARTIFICIAL CREAM FROM MILK. (Brit. Patent No. 199,636.) June 28, 1923.

Also issued as U. S. Patent No. 1,485,699. U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924. 156.65 Of12; and French Patent No. 555,248. June 26, 1923.

Milk oil, skim-milk powder, and water are emulsified at 100° F., cooled to 55° F., and agitated in an ice cream freezer with paddles rotating at about 700 revolutions per minute.

——— (201)

IMPROVEMENTS IN THE PROCESS OF OBTAINING OIL FROM MILK. (Brit. Patent No. 206,918.) Nov. 15, 1923.

Also issued as French Patent No. 555,228. June 26, 1923.

Cream is separated from whole milk, diluted one or more times, and separated from the dilution water. Then it is whipped, heated, and diluted again with water and passed through a whey separator and through an oil separator to obtain a pure clear oil

——— (202)

MAKING BUTTER FROM MILK OIL. (U. S. Patent No. 1,509,088.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

The process consists in mixing milk oil and milk fluid at a temperature above the melting point of the milk oil, cooling to a temperature below 80° F., and stirring until complete emulsification results. When further reduced to below 60° F., it may be converted into butter by simple application of pressure.

——— (203)

PROCESS FOR WHIPPING RECONSTRUCTED CREAM. (U. S. Patent No. 1,509,085.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

Reconstructed milk was produced by homogenizing 4 percent of pure milk oil, 8½ percent or even more of dry skim milk or milk powder, and 88 percent of water. This mixture was emulsified and then passed through a cream separator, adjusted to produce a cream of not less than 30 percent milk fat. This cream, cooled to about 40° F., will whip readily.

North, C. E. (204)
PROCESS OF CHURNING CREAM. (U. S. Patent No. 1,509,084.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

The process consists in washing the cream to remove all of the ingredients of the milk except the fat globules and then churning the washed cream.

——— (205)
PROCESS OF EMULSIFYING AND CONVERTING FATS INTO CREAM. (U. S. Patent No. 1,584,126.) U. S. Patent Office, Off. Gaz. 346 (2): 390. May 11, 1926. 156.65 Of2

Dry skim milk is added to milk oil, and this mixture and water are fed continuously into a vessel where the materials are agitated to break the oil into an emulsion, which is displaced from the vessel by fresh charges of the mixture.

——— (206)
PROCESS OF EMULSIFYING MILK FAT. (U. S. Patent No. 1,525,251.) U. S. Patent Office, Off. Gaz. 331 (1): 186. Feb. 3, 1925. 156.65 Of2

Also issued as French Patent No. 587,886. Apr. 25, 1925.

Milk fat and milk solids-not-fat are mixed together, water is added in successive small amounts, and the mixture is agitated to effect emulsification.

——— (207)
PROCESS OF EMULSIFYING MILK OIL. (U. S. Patent No. 1,534,539.) U. S. Patent Office, Off. Gaz. 333 (3): 697. Apr. 21, 1925. 156.65 Of2

A natural-flavored reconstructed cream is produced by mixing together small amounts of milk oil and dried milk powder as a nucleus. This is stirred while further amounts of fluid milk and milk oil are added to form a pasty emulsion, to which more fluid milk is added to produce the desired consistency.

——— (208)
PROCESS OF EXTRACTING BUTTER-FAT OR OIL FROM MILK AND CREAM. (U. S. Patent No. 1,416,053.) U. S. Patent Office, Off. Gaz. 298: 461. May 16, 1922. 156.65 Of2

Cream is agitated to secure agglomeration of the fat particles, and water is added of such a temperature as will liquefy the particles and effect the rising of the fat in an oily layer.

——— (209)
PROCESS OF EXTRACTING OIL FROM MILK AND CREAM. (U. S. Patent No. 1,485,697.) U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924. 156.65 Of2

Cream separated from whole milk is diluted with water and subjected to a second separation, with a subsequent agitation or whipping. This agitated cream is heated sufficiently to melt the fat particles before final separation.

——— (210)
PROCESS OF MAKING ARTIFICIAL MILK. (U. S. Patent No. 1,474,843.) U. S. Patent Office, Off. Gaz. 316: 636. Nov. 20, 1923. 156.65 Of2
Issued also as French Patent No. 555,247. June 26, 1923.

Butterfat or milk oil is emulsified with water and skim-milk powder, chilled to about 40° F., and agitated until on standing, no plug of hard fat forms thereon. Water and skim-milk powder are combined and similarly chilled and mixed with the fat emulsion in proportions to form milk having the desired butterfat content.

——— (211)
PROCESS OF MAKING BUTTER FROM MILK OIL. (U. S. Patent No. 1,509,086.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

To make butter without churning, milk oil, milk solids-not-fat, and water are formed at a temperature above 96° F. into an emulsified paste of high fat concentration, then cooled to 65° F. or less, when the agglomeration of the fat particles is effected by pressing or squeezing, and the agglomerated fat is washed and worked.

NORTH, C. E. (212)
PROCESS OF MAKING BUTTER FROM MILK OIL. (U. S. Patent No. 1,509,087.) U. S. Patent Office, Off. Gaz. 326: 680. Sept. 16, 1924. 156.65 Of2

To make butter without churning, milk oil and fluid milk are formed at a temperature above the melting point into an emulsion having a high fat concentration, then cooled to 65° F. or less, when the agglomeration of the fat is effected by pressure.

——— (213)
PROCESS OF MAKING RECONSTRUCTED MILK OR CREAM. (U. S. Patent No. 1,494,439. U. S. Patent Office, Off. Gaz. 322: 593. May 20, 1924. 156.65 Of2.

Also issued as French Patent No. 583,908. Jan. 27, 1925.

A pasty emulsion is formed by mixing dried milk solids-not-fat and milk or butterfat, with only sufficient moisture to insure complete emulsion. The paste is then dissolved with such proportions of water as are present in natural milk or cream.

——— (214)
PROCESS OF OBTAINING MILK FAT. (U. S. Patent No. 1,485,698.) U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924. 156.65 Of2

Cream separated from whole milk is diluted with water and subjected to a second separation, with a subsequent agitation or whipping. This mixture is passed through a whey separator and then through an oil separator.

——— (215)
PRODUCING AGGLOMERATED CREAM. (U. S. Patent No. 1,678, 476.) U. S. Patent Office, Off. Gaz. 372(4): 976. July 24, 1928. 156.65 Of2

Natural cream is washed to remove substantially all solids-not-fat, and whipped until it has the consistency of a stiff paste without substantially increasing its volume. It is thicker and tougher than ordinary whipped cream.

——— (216)
PRODUCING MILK OIL FROM SOUR CREAM. (U. S. Patent No. 1,584,125.) U. S. Patent Office, Off. Gaz. 346(2): 390. May 11, 1926. 156.65 Of2

Cream is evaporated by the application of heat until all water is removed and complete coalescence of the fat globules results. The resulting oil is them filtered to separate out the curds suspended therein.

——— (217)
RECONSTITUTED MILK. OUR ANSWER TO WAR-TIME SHORTAGES. Milk Dealer 32 (1): 34, 36, 38, 40. 1942. 44.8 M595

A historical review of the manufacture of dry milk and milk oil and of methods and equipment used in the reconstitution of milk from them.

——— (218)
VERFAHREN ZUR GEWINNUNG VON ÖL AUS MILCH. German Patent No. 398,907. July 18, 1924.

Cream is whipped at 10° C. to 16° C. to promote clumping, after which it is diluted with water between 38° C. and 100° C., which causes the fat particles to rise in an oily layer, thereby indicating that before the water was added the fat particles had clumped rapidly under stirring.

——— (219)
VERFAHREN ZUR GEWINNUNG VON ÖL AUS MILCH. (German Patent No. 418,683.) Sept. 11, 1925.

Cream is separated from milk and diluted with hot water. Then separation is continued until a pure oil is obtained, after which it is dehydrated in an oil separator.

——— (220)
WERKWIJZE TER AFSCHEIDING VAN BOTERVET UIT MELK. Nederland Octrooi 12,863. May 15, 1925.

A procedure for the separation of fat from milk was accomplished by beating the cream into a whipped-cream-like foam and mixing, with continuous stirring, with approximately 20 volumes of water of a temperature between 38° C. and 100° C.

NORTH, C. E. and LARNER, H. B. (221)
PROCESS OF OBTAINING OIL AND CASEIN FROM CREAM. (U. S. Patent No. 1,584,124.) U. S. Patent Office, Off. Gaz. 346 (2): 390. May 11, 1926. 156.65 Of2

The cooled whipped sour cream is heated and sufficient water is added to make a mixture having a 20 percent fat content. This mixture is maintained at a temperature sufficient to melt the fat and coagulate the casein.

——— and LAYCOCK, J. L. (222)
EXTRACTING OIL FROM MILK. (U. S. Patent No. 1,485,700.) U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924. 156.65 Of2

Also issued to the Milk Oil Corporation as Brit. Patent No. 243,792. Dec. 17, 1925.

Cream after separation from skim milk is washed, frozen, melted, and diluted with water, and the resulting mixture is separated.

——— and PECK, G. C. (223)
PROCESS OF EXTRACTING MILK OIL. (U. S. Patent No. 1,485,701.) U. S. Patent Office, Off. Gaz. 320: 140. Mar. 4, 1924. 156.65 Of2

Also issued to the Milk Oil Corporation as Brit. Patent No. 247,617. Mar. 4, 1926.

Also issued to the Milk Oil Corporation as Nederland Octrooi 13,954. Dec. 15, 1925.

The process consists of washing the cream separated from the milk, curdling the remaining casein in the washed cream by the addition of rennet, diluting the cream, and separating and purifying the oil by centrifugal action.

PAUL, T. (224)
KONSERVIERUNG VON BUTTER FÜR LANGE ZEIT MIT HILFE DES ENTWÄSSERTEN BUTTERFETTES. Landw. Jahrb. f. Bayern 7: 83–87. 1917. 18 L24

Same, with title, Verfahren zur Haltbarmachung (Konservierung) von Butter für lange Zeit, *in* Chem.-Ztg. 41: 74–75. 1917. 384 C427

Brief review, by Th. Henkel, with title, Butter-schmalz-butter, *in* Deut. Molk. Ztg. 54: 36. 1933. 44.8 Su2

English review, with title, New Process for Preserving Butter over Long Periods, *in* Internatl. Rev. Sci. and Pract. Agr. [Rome] 8: 654–655. 1917. 241 In82

A method of preserving butter that will keep for at least a year is described. Butter is heated at 40° C. to 45° C., the fat separated, and when still warm heated salt is added. It is then filtered and stored in dark-colored bottles. The method of reproducing butter from the stored butterfat is also described.

PENN, F. H. (225)
HYDROGENATED BUTTER METHOD. (U. S. Patent No. 2,272,578.) U. S. Patent Office, Off. Gaz. 535(2): 322. Feb. 10, 1942. 156.65 Of2.

Freshly churned creamery butter from which water, curd, and albumin have been removed, is hydrogenated at 40° C. in a rocking bomb at 1,000 pounds pressure for 1 hour. When emulsified with water and allowed to stand, an edible butter results, which is plastic from 30° C. to about 43° C. and in which rancidity development is retarded at normal temperatures.

PHELPS, E. B., STEVENSON, A. F., and BAKER, J. C. (226)
MANUFACTURE OF BUTTER FAT. (U. S. Patent No. 1,404,054.) U. S. Patent Office, Off. Gaz. 294: 568. Jan. 17, 1922. 156.65 Of2

Recovering pure butterfat from butter consists in melting the butter; in washing it with pure water, with acidulated water, and finally with pure water; and in separating at each step the wash water from the fat.

——— STEVENSON, A. F., and BAKER, J. C. (227)
MANUFACTURE OF MILK-FAT. (U. S. Patent No. 1,354,683.) U. S. Patent Office, Off. Gaz. 279: 47. Oct. 5, 1920. 156.65 Of2

The process of obtaining pure milk fat from milk consists in separating out the cream; diluting the separated cream with a water solution of an acid, such as sodium chloride, to facilitate the modification of the surface tension of the milk serum, and separating out the cream from such solution.

PURCHASE, H. S. (228)
SOME EXPERIMENTS IN THE MAKING OF BUTTER, GHEE, AND CHEESE FROM CAMEL'S MILK. East African Agr. Jour. 9: 39–41. 1943. 24 Ea74

Ghee could be made from camel butter or cream, but it had a "camel" flavor. The melting point of the fat was higher than that of ghee from cow's milk. The Reichert-Meissl number was very much lower.

READ, W. S. (229)
THE "HAY-BOX" METHOD OF HEATING MILK, FOR INDIGENOUS GHI-MAKING. Agri. and Livestock in India 8: 269–272. 1938. 22 Ag83A

To save fuel, the "hay-box" is used as a means of storing heat. Morning milk is brought to a boil and placed in a container within a box, with hay packed under and around it.

This method was compared with other methods of preparing milk, and its advantages with respect to fuel economy and quality and amount of ghee produced are given in tabular form.

REIMUND, H. (230)
DAS BACKHAUS-SCHACH'SCHE VERFAHREN DER BUTTERKONSERVIERUNG UND BUTTERAUFFRISCHUNG. Molk. Ztg. [Berlin] 5: 609–611. 1895. 44.8 M732

A discussion of a method of preserving butter by salt during the overproduction season, according to German Patent No. 84,907, issued Apr. 30, 1895, and the possible effect on the butter supply, markets, prices, etc.

RIDDET, W. (231)
[DRY BUTTERFAT.] New Zeal. Dairy Bd. Ann. Rpt. (1942) 18: 8–10. 44.9 N489A

Also in Dairy Indus. 8: 499–502. 1943. 44.8 D1427

A continuous process for the production from butter of dry butterfat for shipment is described. Whey butter is easier to treat than creamery butter.

RIPPER, M. (232)
DIE SCHMALZBUTTERBEREITUNG ÜBER FREIEM FEUER UND DIEJENIGE UNTER ANWENDUNG EINES THERMOPHORKESSELS. Milch Ztg. 30: 515–516. 1901. 44.8 M59 (Reprint, 44 R48.)

Similar report, with omission of cost data, *in* Ztschr. f. das Landw. Versuchsw. Oesterr. 4: 967–971. 1901. 19 Z3

Experiments are described in which butterschmalz made by the thermophor method was compared in quality and composition with that made by the old method of heating. A statement of the differences in the cost of production is included.

RITTER, W. (233)
BUTTERSCHMALZ. Deut. Fettwirtsch. 17: 81–84. 1940. 44.8 N11

Methods and procedures in the manufacture are given, with information on crystallization, properties, keeping quality, oxidation, and handling.

——— (234)
EINGESOTTENE BUTTER. Schweiz. Milch Ztg. 62: 57–58, 65–66, 69–70, 77, 79, 87. 1936. 44.8 Sch92

Discusses method of manufacture, quality control, physical properties, differences between melted and eingesottene butter, and bacteriological and chemical defects.

——— (235)
DIE EINGESOTTENE BUTTER. Mitt. aus dem Geb. der Lebensmtl. Untersuch. u. Hyg. 28: 206–214. 1937. 389.9 Sw6

Describes the process of manufacture, and discusses the lecithin content, the water content of the butterfat, the difference between eingesottene and eingeschmolzene butter, and the cooling and preservation of the fat.

——— (236)
DAS EINSIEDEN DER BUTTER. XI. Milchw. Weltkong., Berlin, 1937, Wiss. Ber. 2: 156–161. 1937. 44.9 In8211

The method of making eingesottene butter is given, including information on the keeping quality, crystallization, water content, lecithin content, and bacteriological, physical, and chemical defects.

SCHACH, P. (237)
EIN NEUES BUTTER-KONSERVIERUNGS-VERFAHREN VON SCHACH UND BACKHAUS. Milch Ztg. 25: 174–175. 1896. 44.8 M59

A reply to statements (published in Milch Ztg. 24: 849. 1895; and 25: 138. 1896) concerning a process of preserving butter by salt (German Patent No. 84, 907, issued Apr. 30, 1895) and its effect on the butter supply, markets, prices, etc.

SCHROTT-FIECHTL, H. (238)
UEBER EIN NEUES VERFAHREN, ABFALLENDE BUTTER MITTELST DES THERMOPHORS ZU VERBESSERN. Molk. Ztg. [Berlin] 11: 397–398, 409–411. 1901. 44.8 M732

The quality and cost of butterschmalz made by the thermophor method (thermos kettle), in which the butterfat is held at 45° C. to 55° C. from 12 to 24 hours, are briefly stated and compared with the open fire method. The advantages of restoring poor butter or making renovated butter by this method are discussed at some length.

——— (239)
UEBER EINE VERBESSERUNG IN DER SCHMALZBUTTERBEREITUNG. Separatabdruck aus der Österr. Molk. Ztg. Nos. 10 and 11, 1899, 24 pp. Wien. 1899. 44 Sch7

The thermophor (thermos kettle) method of making butterschmalz is described at length and compared with the old method of heating butter over a wood fire.

*SHUVALOV, S. (240)
PROIZVODSTVO TOPLENOVO MASLA [MANUFACTURE OF RENDERED BUTTERFAT]. Molochno-Maslodel'naia Promysh. 6(2): 15–16. 1939.

The process of making "Russian" rendered butterfat from low-grade and faulty butter is described.—Based on abstract *in* Dairy Sci. Abs. 2: 277. 1941.

SOXHLET, [F], RITTER VON (241)
UEBER MARGARINE. 198 pp. München, J. S. Lehmann. 1895. 44 So9

A method is briefly described (p. 65) for preparing butter from butterschmalz, in which 85 parts of butterschmalz and 15 parts of skim milk are mixed and poured very quickly into ice water.

ST. (242)
HERSTELLUNG VON BUTTERSCHMALZ. Deut. Molk. Ztg. 56: 1509. 1935. 44.8 Su2

Reply to a request for information on the cause and correction of certain defects in the manufacture of butterschmalz, such as heating, kinds of vessels to use, etc.

STAFFE, A. (243)
EINIGES ÜBER DIE MILCHWIRTSCHAFT IRANS (PERSIENS). Molk. Ztg. (Sonderausgabe) [Hildesheim] 51 (66): 176–178. 1937. 44.8 M73

The most important dairy product in Iran is roghan, made from ewes' butter. The butter is first washed and then heated—not as long as in Europe, but just sufficient for liquefaction. During the heating the scum is removed two or three times. When still warm it is poured into goatskin bottles. It constitutes a very common article of trade throughout Iran.

STEVENSON, A. F. (244)
MANUFACTURE OF MILK-FAT. (U. S. Patent No. 1,397,664. U. S. Patent Office, Off. Gaz. 292(4): 698. Nov. 22, 1921. 156.65 Of2

In recovering pure milk fat from sour cream, the latter is diluted with water acidulated to such an extent that the resulting mixture has a *p*H of 3.0, which will effect redissolving of the precipitated casein, and the milk fat is separated centrifugally.

——— (245)
TREATMENT OF BUTTER-FATS. (U. S. Patent No. 1,397,663). U. S. Patent Office, Off. Gaz. 292 (4): 698. Nov. 22, 1921. 156.65 Of2

In the manufacture of pure anhydrous butterfat from milk, cream, or butter, the process of removing any objectionable flavor consists in washing the fat with an alkaline solution—such as a dilute solution of sodium hydroxide or of caustic soda—and then rewashing with an acidulated solution.

STOHMANN, F. (246)
SCHMELZBUTTER, BUTTERSCHMALZ, SCHMALZ. *In his* Die Milch- und Molkereiprodukte, pp. 678–679. Braunschweig, Friederich Vieweg und Sohn. 1898. 44 St62

The method of manufacture and quality are briefly discussed.

T. (247)
HERSTELLUNG VON BUTTERSCHMALZ. Süddeut. Molk Ztg. 51: 1022–1023. 1930. 44.8 Su2

A reply to an inquiry for method of making butterschmalz.

TEICHERT, K. (248)
BUTTERSCHMALZ. *In his* Methoden zur Untersuchung von Milch und Milcherzeugnissen (Die Chemische Analyse, von B. M. Margosches. Ed. 2, v. 8–9), pp. 374–375. Stuttgart, Ferdinand Enke. 1927. 387 M33

The composition and method of manufacture of butterschmalz are discussed.

*——— (249)
DAS BUTTERSCHMALZ. Milchw. Mitt. Tschechoslowakei Hft. 10. 1937.

Butterschmalz prepared with the use of a centrifugal separator is practically water-free. In its manufacture, from 80 percent to 85 percent of the fat from high-fat butter is recovered. From low-fat butter the recovery is 75 percent or less.—Based on statement *in* Deut. Fettwirtsch. 16: 699. 1939.

——— (250)
DAS BUTTERSCHMALZ, BIETRÄGE ZU SEINER GESCHICHTE, HERSTELLUNG UND BEURTEILUNG. Molk. Ztg. [Hildesheim] 48: 650–651, 690a–690b. 1934. 44.8 M73

Discusses the purpose of butterschmalz production, methods and problems in the process of manufacture, and conditions necessary for quality and scoring. A historical review presents some previous methods of manufacture.

——— (251)
VORRATSHALTUNG UND VORRATSPFLEGE VON BUTTERFETT. Molk. Ztg. [Hildesheim] 54: 314. 1940. 44.8 M73.

Problems in the storage of cream and butter are pointed out, and the advantage of making butterschmalz for storage is discussed, with brief information on the method of manufacture, yield, flavor and odor, defects, keeping quality, etc.

UNITED STATES DEPARTMENT OF AGRICULTURE. (252)
BUTTER COULD BE MADE IN TROPICS FROM BUTTEROIL AND DRY SKIM MILK. U. S. Dept. Agr. Inform. for the Press 240, 3 pp. [August 1942. Processed.] 1.9 In31Inf

Reprinted with title, Answer to War-Time Need for a Dehydrated Product, *in* Amer. Butter Rev. 4: 278, 280. 1942. 44.8 Am37

Reprinted with title, Butteroil for Export, *in* Natl. Butter and Cheese Jour. 33(9): 10–11. 1942. 286.85 B98Bu

In an announcement of a recently perfected method of preparing butter oil and packaging it so that it will keep indefinitely under extreme conditions, a brief description of the method is given, with information on the history and uses.

VOELCKER, J. A. (253)
[NATIVE METHOD OF MAKING GHEE.] *In his* Report on the Improvement of Indian Agriculture, pp. 208–209. London, Eyre and Spottiswoode. [1893.] 34.2 V85I

The method is described, and an account is briefly given of a test of the yield and quality of butter and ghee when a centrifugal separator was used, as compared with the native method.

WASHBURN, R. M. (254)
IMPROVING BUTTER-OIL FOR USE IN ICE CREAM PRODUCTION. Ice Cream Rev. 17 (4): 34, 38. 1933. 389.9 Ic22

The gravity and centrifugal force methods of separating oil from butter are described.

Weissmann, O. (255)
ÜBER DEN WERT VON BUTTERSCHMALZ. Molk. Ztg. [Hildesheim] 54: 1161–1162. 1940. 44.8 M73

The method of making butterschmalz is briefly described, and its uses and value are discussed.

Wilsmann, W. (256)
DIE ANWENDUNG VON SEPARATOREN BEI DER HERSTELLUNG VON BUTTERSCHMALZ. Deut. Fettwirtsch. 16: 699–701, illus. 1939. 44.8 N11

Describes methods of making butterschmalz in large quantities, in which one and two separators are used.

Wright, N. C. (257)
THE MANUFACTURE OF BUTTER AND GHEE. *In his* Report on the Development of the Cattle and Dairy Industries of India, pp. 30–42. Delhi, Manager of Publications. 1937. (At head of title: ICAR. 18. 1600.) 281.344 W93

Contents: Relative Importance of Butter and Ghee; Production of 'Country' Butter; Production of Ghee; The Out-turn and Quality of Ghee; Factors Affecting Quality; The Adulteration of Ghee; Detection of Adulteration; Sale of Banaspatine; The Marketing of Ghee; The Export Market for Ghee; The Production and Marketing of 'Creamery' Butter; Standards for Butter.

NUTRITIVE VALUE

Bacharach, A. L. (258)
THE VITAMIN A CONTENT OF GHEE. Brit. Med. Jour. 1930, 2: 141–142. 448.8 B77

Four samples of ghee sent from India to England were tested and found to have an extremely low vitamin A content.

Banerjee, B. N. (259)
VITAMIN-A ASSAY OF GHEE. III. STORAGE OF GHEE AND VITAMINS. Agr. and Livestock in India 6: 274–283. 1936. 22 Ag83A

Vitamin A is stable for one month only in ghee, as judged by the blue value. Loss of ethereal odor follows loss of blue color. The vitameter value is not very reliable nor specific in ghee. Tallowy odor follows destruction of vitamin A.

——— (260)
VITAMIN–A STUDY OF GHEE. VII. PRO- AND ANTI-BODIES. Agr. and Livestock in India 8: 153–157. 1938. 22 Ag83A

The effect of a number of pro- and anti-oxidants upon the stability of vitamin A in heated ghee was studied. Acidity in ghee is highly pro-oxidant and destroys vitamin A rapidly.

——— and Dastur, N. N. (261)
VITAMIN-A STUDY OF GHEE. IV. ACTION OF LIGHT ON GHEE. Agr. and Livestock in India 6: 433–440. 1936. 22 Ag83A

Since destruction of vitamin A in direct sunlight is great the exposure of ghee to light should be avoided. The destructive effect of light is little affected if ultraviolet and heat rays are screened out.

——— and Dastur, N. N. (262)
VITAMIN-A STUDY OF GHEE. V. EFFECT OF HEAT AND AIR ON VITAMIN A. Agr. and Livestock in India 7: 24–34. 1937. 22 Ag83A

Cow ghee is superior to buffalo ghee in regard to the stability of vitamin A toward heat. Vitamin A is fairly stable to 125° C. but is rapidly destroyed at higher temperatures.

——— and Dastur, N. N. (263)
VITAMIN-A STUDY OF GHEE. VI. ACTION OF SUNLIGHT AND A NEW TEST FOR DETECTING THE DEVELOPMENT OF RANCIDITY. Agr. and Livestock in India 7: 697–701. 1937. 22 Ag83A

A characteristic pink color with antimony trichloride in absolute chloroform increases in intensity with the progress of rancidity of fats. The stability of ghee vitamin A to light depends to a large extent on other natural colors accompanying it.

BANERJEE, B. N. and DOCTOR, N. S. (264)
VITAMIN-A STUDY OF GHEE. VIII. ACIDITY. Agr. and Livestock in India 8: 158–164. 1938. 22 Ag83A

While acidity is undersirable in butter and ghee, a good quality and rich aroma require proper souring of milk and cream. An acidity of 0.44 is desirable. A ghee which when melted gives an acidity value of 0.3 will keep well.

——— and SUNAWALA, S. D. (265)
VITAMIN-A ASSAY OF GHEE. [I]. Agr. and Livestock in India 5: 382–388. 1935. 22 Ag83A

Summary: "Vitamin A in ghee can be estimated in a number of ways and should be used in all assays of ghee which is the principal source of vitamin A for Indians."

——— and SUNAWALA, S. D. (266)
VITAMIN–A ASSAY OF GHEE. II. Agr. and Livestock in India 6: 154–156. 1936. 22 Ag83A

Summary: "Direct blue value on *ghee* is a quick and ready method of assaying *ghee*. Blue value *via* unsaponifiable matter is a more accurate method of determining vitamin potency. The ultra-violet absorption value rises higher on storage, while, the blue value goes down."

BASU, R. K. (267)
A CASE OF NEURASTHENIA APPARENTLY CURED BY A DIET OF GHEE. Indian Med. Gaz. 68: 213–214. 1933. U. S. Army Med. Libr.

The endocrine and mental balance of a patient, aged 70, was restored to normal by a high fat diet containing from 3 to 4 ounces of ghee with each meal.

BRAHMACHARI, B. B. (268)
THE VITAMINE VALUE OF THE FOOD FATS OF BENGAL. (A PRELIMINARY STUDY.) Indian Med. Gaz. 67: 377–380, graph. 1932. U. S. Army Med. Libr.

Mustard oil and ghee were studied in an experiment with rats. Butterfat was used as control, and lard was used for depletion of the vitamin A as a preparation of the test. The method of procedure is explained, and the results are discussed and presented in tabular form.

DAS GUPTA, S. M. (269)
THE NUTRITIONAL VALUE OF GHEE AND ITS INDUSTRIAL POSSIBILITIES IN BENGAL. Sci. and Cult. 4: 461–464. 1939. 475 Sci24

Contents: Nutritional Value of Ghee; Vitamin-A Content of Butter; Daily Requirement of Ghee; Consumption of Butter; Green Vegetables and Ghee; Green Fodder and Vitamin-A Content of Butter; Industrial Possibilities of Ghee in Bengal; Experimental Dairy Farms.

DASTUR, N. N. (270)
STABILITY OF VITAMIN A IN 'GHEE.' XI. Milchw. Weltkong., Berlin, 1937, Wiss. Ber. 1: 495–496. 1937. 44.9 In8211

The effect of heat and light on the vitamin A content was studied.

——— and GIRI, K. V. (271)
RELATIVE DIGESTIBILITIES OF EDIBLE FATS BY CASTOR-SEED AND PANCREATIC LIPASES. Indian Jour. Med. Res. 25: 427–442. 1937. 448.8 In22

The rate of digestion of ghee and other oils was studied under various conditions of temperature, hydrogen-ion concentration, and fat emulsion; results show that ghee and coconut oil are more rapidly digested than sesame and groundnut oils by both lipases.

DATTA, N. C., and BANERJEE, B. N. (272)
STUDIES ON THE NUTRITIVE VALUE OF MILK AND MILK PRODUCTS. PART I. Indian Jour. Med. Res. 22: 341–351. 1934. 448.8 In22

Tests of whole milk, butter, and ghee were made by means of the growth response of young rats on a vitamin-A-deficient diet, and it was found that the nutritive value of ghee is the same as that of the original butter and that the nutritive value of milk is greater than that of butter or ghee.

De, N. K. (273)
THE SPECTROPHOTOMETRIC METHOD OF ASSAYING VITAMIN A AND CAROTENE WITH FURTHER DATA ON THE VITAMIN-A ACTIVITY OF INDIAN FOODSTUFFS. Indian Jour. Med. Res. 24: 737–749. 1937. 448.8 In22

A discussion of method, with tabulated results of the determination of vitamin A potency of 70 different foodstuffs. Ghee was included. The carotene content was shown to be negligible, and the vitamin A content was 10 to 40 micrograms per gram.

——— and Majumdar, B. N. (274)
FURTHER STUDIES ON FACTORS AFFECTING THE VITAMIN-A ACTIVITY OF ANIMAL AND VEGETABLE PRODUCTS. Indian Jour. Med. Res. 25: 857–862. 1938. 448.8 In22

In the course of some work upon the possible destruction in foodstuffs of vitamin A by various processes, it was shown that loss of A occurs in the preparation of ghee and that aeration and hydrogenation are destructive to A in butter and ghee.

Doctor, N. S., and Banerjee, B. N. (275)
EFFECT OF ANTI-OXIDANTS ON THE STABILITY OF VITAMIN-A IN GHEE EXPOSED TO SUNLIGHT. Current Sci. [India] 8: 513. 1939. 475 Sci23

A study of the use of hydroquinone, sodium citrate, and sodium tartrate to retard the rate of auto-oxidation in ghee, and of their relation to the detrimental effect of light on vitamin potency.

Drummond, J. C. (276)
RESEARCHES ON THE FAT-SOLUBLE ACCESSORY SUBSTANCE. I. OBSERVATIONS UPON ITS NATURE AND PROPERTIES. Biochem. Jour. 13: 81–94. 1919. 382 B52

A study to determine whether the fat-soluble accessory factor A, present in butterfat and whale oil, is destroyed when exposed to temperatures ranging from 50° C. to 100° C.

——— and Coward, K. H. (277)
RESEARCHES ON THE FAT-SOLUBLE ACCESSORY FACTOR (VITAMIN A). VI. EFFECT OF HEAT AND OXYGEN ON THE NUTRITIVE VALUE OF BITTER. Biochem. Jour. 14: 734–739, illus. 1920. 382 B52

At high temperatures the destruction of the growth factor A takes place with ease in butterfat provided facilities for oxidation are present, and considerable loss of nutritive value may take place at temperatures as low as 37° C. if the exposure to air is extensive.

Ghose, S. N. (278)
THE EXAMINATION OF SOME INDIAN FOODSTUFFS FOR THEIR VITAMIN CONTENT. Biochem. Jour. 16: 35–41. 1922. 382 B52

Rat-growth experiments indicated that ghee may be considered as good as European butters with regard to vitamin A content. Remelted ghee failed to restore growth.

Godbole, N. N. and Sadgopal. (279)
A COMPARATIVE STUDY OF THE UTILITY OF THE MILKS & GHEES, OF THE INDIAN COW & BUFFALO, AS HUMAN FOOD MATERIALS. Benares Hindu Univ. [Pub.] 1992, 24 pp. [1935.] 389.1 G54C

Cow butterfat is richer than buffalo butterfat in the total assimilable and digestible part, and is known to contain iodine. Both contain vitamins A and D. Cow milk is more easily digested by the human system.

Govindarajan, S. V., and Banerjee, B. N. (280)
VITAMIN A STUDY OF GHEE. IX. RECOVERY OF REVERSIBLY OXIDIZED VITAMIN A BY TREATMENT WITH HYDROGEN UNDER PRESSURE. Indian Jour. Vet. Sci. and Anim. Husb. 10: 335–345. 1940. 41.8 In22

Vitamin A lost from ghee as the result of storage and exposure to heat and air can be regenerated by passage of hydrogen under pressure through the heated ghee. The optimum conditions for this treatment have been worked out.

GREWAL, K. S. (281)
THE VITAMIN A CONTENT OF GHEE. Quart. Jour. Pharm. and Pharmacol. 6: 650–654. 1933. 396.8 Q2

When ghee was prepared from centrifuged butter it contained a large amount of vitamin A, and when prepared by the Indian method of slow heating, curdling, and primitive churning it contained less vitamin A. When prepared in the spring it was more active than when prepared in the fall. During the summer under laboratory conditions the vitamin A content does not diminish.

——— and KOCHHAR, B. D. (282)
VITAMIN-A CONTENTS OF GHEE. Indian Jour. Med. Res. 25: 623–631. 1938. 448.8 In22

The Carr-Price blue value of a number of samples of butter and ghee was determined and tabulated, with data indicating the purity of each sample. Results were variable, but many samples contained fairly large amounts of vitamin A.

*MAJUMDAR, B. N. (283)
THE VITAMIN A CONTENT OF COW'S BUTTER AND GHEE AND OF BUFFALO GHEE. Indian Jour. Vet. Sci. and Anim. Husb. 11: 329–333. 1941.

The moisture content of a butter from which ghee was prepared was 16.6 percent, its vitamin A content per gram 17.7 I. u., and carotene 8.4 I. u. The ghee had no moisture, 14.7 I. u. of vitamin A, and 6.8 I. u. of carotene. Buffalo ghee had a vitamin A content of 1.9 I. u., and carotene was present only in traces.—Based on abstract *in* Imp. Bur. Dairy Sci. Dairy Sci. Abs. 4: 147. 1942.

MUTHANNA, M. C., and SESHAN, P. K. (284)
STUDIES ON VITAMIN-A CONTENT. Indian Med. Gaz. 76: 487–489. 1941. U. S. Army Med. Libr.

Samples of ghee from Bengal and Sind Provinces were studied and the Sind ghee contained an average of 12 micrograms of vitamin A per gram while Bengal ghee contained about 8. There is no relationship between the vitamin A content of ghee and the Reichert-Wollny value or its fluorescence. In heating ghee the vitamin A loss begins at a temperature higher than 100° C. Considerable loss is due to exposure to sunlight.

OSBORNE, T. B., MENDEL, L. B., FERRY, E. L., and WAKEMAN, A. J. (285)
FURTHER OBSERVATIONS OF THE INFLUENCE OF NATURAL FATS UPON GROWTH. Jour. Biol. Chem. 20: 379–390. 1915. 381 J824

The growth-promoting efficiency of butterfat heated with live steam was studied, and the process of concentration of the effective substance, butter oil, contained in it is described. Beef fat was also studied.

——— MENDEL, L. B., FERRY, E. L., and WAKEMAN, A. J. (286)
THE STABILITY OF THE GROWTH-PROMOTING SUBSTANCE IN BUTTER FAT. Jour. Biol. Chem. 24: 37–39. 1916. 381 J824

Both butterfat heated with live steam and butter oil produced from it were used in this feeding experiment, and the potency of each is reported.

PACKAGING

DAVIES, W. L. (287)
DAIRY PRODUCTS AS STORED FOODS IN WARTIME. Food Mfr. 12: 415–417. 1937. 389.8 F736

The possibilities of dairy products, including butter, as a reserve supply of food are discussed. A tabular statement of storage data of dairy products, including ghee, is presented, in which the weight, dry matter, and calories per cubic foot and the method of packaging are given.

G. (288)
ZWECKMÄSSIGE AUFBEWAHRUNGSGEFÄSSE FÜR BUTTERSCHMALZ. Deut. Molk. Ztg. 55: 1529. 1934. 44.8 Su2

In reply to an inquiry concerning the proper type of container for storage of butterschmalz, glazed earthenware, white metal, and hardwood containers are recommended. Softwood containers are not recommended.

*Müller, J., Saumweber, A., and Saumweber, J. (289)
EINFLUSS DES PERGAMENTPAPIERS AUF DIE HALTBARKEIT VON BUTTERSCHMALZ BEIM LAGERN IM KELLER UND KÜHLHAUS. Deut. Molk. Ztg. 64: 31–32. 1943.

Parchment papers containing 20 percent copper are useless for protecting butterschmalz at low temperatures of storage. Iron is not dissolved in parchment paper. The fat is not influenced by contact with wooden boxes.—Based on abstract in Chem. Zentbl. 114: 1627. 1943.

*Rieder, A. (290)
PACKUNG ZUM ABFÜLLEN VON BUTTERSCHMALZ. German Gebrauchsmuster (short term) Patent No. 1,371,873. Klasse 81c. R20,246. Feb. 3, 1936.

UTILIZATION

Anonymous. (291)
BUTTERSCHMALZ KEIN BROTAUFSTRICHMITTEL. Molk.-Ztg. [Hildesheim] 54: 1408. 1940. 44.8 M73

Explains that butterschmalz is a pure product, not mixed with other fats, and it is used particularly for baking and cooking, and not as a spread for bread. Reasons for the flavor and color are briefly stated.

*French, E. M., and French, M. H. (292)
THE USE OF GHEE AS A SUBSTITUTE FOR BUTTER FOR COOKING PURPOSES. Planter 4: 16. 1935.

"The extent to which ghee (clarified butter) can replace butter in the making of cakes, pastry, scones, puddings and biscuits was investigated. When used in the proportion of ⅘ the normal quantity of butter, ghee made an excellent and very cheap substitute for butter."—Nutr. Abs. and Rev. 5: 1062. 1936.

Schloemer, A. (293)
BEWERTUNGSGRUNDSÄTZE FÜR BUTTERSCHMALZ UND SEINE BEURTEILUNG BEZÜGLICH SEINER VERWENDBARKEIT ZU BACK-, BRAT- UND KOCHZWECKEN. Ztschr. f. Untersuch. der Lebensmtl. 80: 512–515. 1940. 384 Z39

The odor, taste, appearance, and texture of butterschmalz are discussed in relation to its value in baking and cooking.

——— (294)
VERWENDUNGSMÖGLICHKEITEN DER BEI DER BUTTERSCHMALZHERSTELLUNG ANFALLENDEN "EMULSION" IN DER BÄCKEREI. Ztschr. f. Untersuch. der Lebensmtl. 81: 309–312. 1941. 384 Z39

A report of the use in the baking industry of an emulsion made as a by-product of butterschmalz, which may contain from 25 to 40 percent fat, 5 percent nonfat solids, largely protein, and 55 to 70 percent water. Results with bread and cake doughs and with pan greasing are given, and the value of the emulsion as an ingredient in margarine and in several varieties of cheese is stated.

AUTHOR INDEX

SUBJECT INDEX