

ABSTRACTS AND REVIEWS

BACTERIOLOGY

GENERAL

R. BURRI. **Les cultures en stries pour remplacer les cultures sur plaques.** (Streak cultures to replace plate cultures.) *Le Lait*, 9, xc, 1028-31, December 1929.

Plate cultures have the following disadvantages: (1) bacteria are fixed at different depths in the medium, hence the same organism may produce apparently different colonies; (2) the medium dries rapidly; (3) the risk of contamination is always present.

The author describes a simplified method in which a calibrated platinum loop is used to withdraw a sample of milk and then to spread it over the surface of an agar slope. The slope is incubated and the colonies counted in the usual way. Among the advantages claimed are: (1) simplicity; (2) a higher count than by the plate method; (3) economy of time and material; (4) removal of risk of air infection; (5) greater viability of colonies; (6) availability for qualitative as well as quantitative examination.

[Since in withdrawing the five samples of milk the loop is drawn along the surface of the milk, the likelihood of obtaining a true sample would appear to be small. In addition it has been shown that calibrated platinum loops have a maximum deviation of 35 per cent: (Breed and Brew, *New York Agr. Exp. Sta. Tech. Bull.* 49) and 55 per cent. (Peskest, private communication). Sufficient comparative work has not yet been done with this method to enable one to report upon it satisfactorily (Mattick, *J. Dairy Res.* 1, 132).]

J. G. DAVIS

J. T. BUCHHOLZ and I. M. LEWIS. **A method for preparing photographs of petri dish cultures by direct contact printing on photographic paper.** *J. Bact.* 19, ii, 105-11, February 1930.

This paper describes a method of securing prints of colonies growing on agar plates without the use of a camera. Exposure times and developer formulae are given. Judging from the plate given the method seems to be highly satisfactory.

A. T. R. MATTICK

B. L. HERRINGTON and G. KNAYSI. **A simple method of growing anaerobes in petri dish cultures.** *J. Bact.* 19, ii, 101-3, February 1930.

High efficiency is claimed for this simple method. Water at about 45° C. is placed in the bottom of a warm vacuum desiccator which, after receiving the petri dish cultures, is slowly evacuated over a period of 30 minutes. At the reduced pressure the water boils and the vapour sweeps out the last traces of air. The thickness of the medium in the plates is of importance and the authors recommend that not more than 8 c.c. be used.

A. T. R. MATTICK

R. C. AVERY. **Sensitivity to methylene blue and final acidity of non-hemolytic streptococci.** *J. Exp. Med.* 50, vi, 787-92, December 1929.

The author has classified haemolytic streptococci by their reaction to methylene blue and the final pH of the medium as: (1) human strains pH 5, non-reducing; (2) bovine pH 4.5 to 4.2, non-reducing; (3) saprophytic pH 4.5 to 4.2, reducing.

An investigation of 55 strains of non-haemolytic streptococci has shown that these tests will not indicate the source of the strain as in the case of the haemolytic organisms. The saprophytes, however, exhibit a greater tolerance for methylene blue than the strains of parasitic origin.

J. G. DAVIS

M. GRIMES. A study of two new species of bacteria belonging to the genus *Chromobacterium*. *Sci. Proc. Royal Dublin Soc.* **19**, xxxi, 381–4, February 1930.

This paper describes two organisms, named by the author *Chromobacterium hibernicum* and *C. cohaerens*, isolated from water samples.

A. T. R. MATTICK

C. DUKES. The heat resistance curve. A new bacteriological test for pasteurised food. *Analyst*, **55**, 646, pp. 14–19, January 1930.

The heat resistance curve test is designed to answer the question: Has a sample of food been pasteurised and, if so, at what temperature?

The test is based on the idea that if food has been pasteurised, at say 60° C., then reheating the food to any temperature less than 60° C. will not greatly reduce the number of bacteria, whereas heating above the pasteurising temperature of 60° C. will progressively reduce the number of bacteria per g. or per c.c.

The technique of the test and some results obtained are given in the paper.

A. H. BLISSETT

E. G. YOUNG. Endocellular enzymes of *Bacillus coli communis*. *Biochem. J.* **23**, v, 831–9, 1929.

Emulsions of *B. coli communis* were prepared and the cells destroyed by repeated freezing and thawing over a period of several hours, most of the cells being killed by the first few freezings. The process should insure the liberation of the endocellular enzymes, if they be soluble, whilst the low temperature has no chemical effect on them. Cellular debris was centrifuged off, and the extract passed through a Berkefeld candle. The resulting liquid hydrolyses peptone anaerobically at pH 7–8 but does not decompose glucose in the presence or absence of phosphate.

From rates of methylene blue decoloration the conclusion is drawn that dehydrogenase activity on succinic and formic acids is independent of living cell concentration, but associated with cell stroma; and on acetic acid, lactic acid, alcohol and glucose it is temporarily independent of living cell concentration, but rapidly destroyed by freezing. Glucose and its fermentation products may be dehydrogenated by "dead" organisms—judged by their reproductive powers—as well as by living.

S. J. ROWLAND

L. H. STICKLAND. The bacterial decomposition of formic acid. *Biochem. J.* **23**, vi, 1187–98, 1929.

A cell-free preparation of formic dehydrogenase, made from the product of tryptic digestion of a suspension of *B. coli* cells, was found to be capable of actively dehydrogenating formic acid, but could no longer decompose it into hydrogen and carbon dioxide anaerobically. A suspension of *B. typhosus* resembled the digested cells of *B. coli*. The mechanism of the two modes of decomposition of formic acid is discussed.

S. J. ROWLAND

- T. ROSEBURY, R. W. LINTON and L. BUCHBINDER. **A comparative study of dental aciduric organisms and *Lactobacillus acidophilus*.** *J. Bact.* 18, vi, 395–412, December 1929.

In a study to establish the identity of dental strains of lactobacilli with those from the intestine (*L. acidophilus*), the authors, on morphological, biochemical and serological grounds, reach the tentative conclusion that there are no significant differences in the organisms from the two sources.

A. T. R. MATTICK

- C. EGG and A. JUNG. **Sterilising action of silver and copper on bacteria.** *Mikrochem.* 1929, Pregl Fest. pp. 46–60. (*Brit. Chem. Abst.* A, p. 1494, December 1929.)

0.04 mg. of silver per litre sufficed to sterilise cultures of *B. coli* within 24 hours and a marked effect was produced with concentrations as low as 0.001 mg. The active principle is the silver ion; slightly dissociated silver salts such as the sulphide having no sterilising action. Colloidal solutions of silver and solutions containing complex silver ions may also in certain cases act as sterilisers, but this action is due to the liberation of silver ions through secondary reactions. The sterilising effect of copper compounds is also due to copper ions, but in this case a minimum concentration of 0.6 mg. per litre is necessary for complete sterilisation. No other metals have been found with sterilising power equal to the above.

- F. W. TILLEY and R. M. CHAPIN. **Germicidal efficiency of chlorine and the N-Chloro derivatives of NH_3 , NH_2 , COOH against anthrax spores.** *J. Bact.* 19, iv, 295–302, April 1930.

The authors working on the survival time of anthrax spores in solutions of various strengths of compounds of the above type obtained the following results:

Nitrogen trichloride, chlorine (neutral solution) and chlorine plus *N*/50 HCl killed the spores in 15 minutes at a concentration giving 10 p.p.m. available Cl or less: NH_2Cl and NHCl_2 only killed the spores in 45 and 30 minutes respectively when present in concentrations yielding 80 p.p.m. available Cl. CH_3NCl_2 and $\text{NCl}_2\text{CH}_2\text{COOH}$ in solutions yielding 50 p.p.m. available Cl, required 30 and 45 minutes respectively to kill the spores. NH_2Cl and $\text{NHCl}\cdot\text{CH}_3\text{COOH}$ were quite ineffective.

A. T. R. MATTICK

- H. H. BARBER. **The production of fat from carbohydrate and similar media by a species of *Penicillium*.** *Biochem. J.* 23, vi, 1158–64, 1929.

To test the general theory of fatty acid synthesis by condensation of hexose molecules which, after oxidation or reduction, give higher fatty acids directly (and predominantly C_{18} acids)—a species of *Penicillium* was grown on sucrose, glucose, xylose and glycerol. The same mixture of fats was produced in every case, containing palmitic, stearic, oleic and α - and β -linoleic acids. The constancy of the analytical values for the fats from both hexose and pentose would appear to indicate that the mechanism of fatty acid synthesis is complex, involving a common intermediate substance.

S. J. ROWLAND

- W. KÜSSNER. **Physiologische Untersuchungen über die Ernährung von *Penicillium glaucum* durch Fette.** (Physiological investigations of the nutrition of *P. glaucum* by fats.) *Bot. Archiv*, 23, pp. 197–237, 1928. (*Milchw. Forsch.* 9, i–ii, Ref. p. 18, November 1929.)

The breakdown of triolein, tripalmitin and sesame oil by *Penicillium glaucum* was studied by determining, at various stages of the growth of the organism on the above

fats, the saponification numbers and the acid, iodine, and acetyl values of the fats. Glycerine, a primary product of fat splitting, could not be detected in the free state as it was quickly utilised by the organism. In all cases, the breakdown of the higher fatty acids resulted in the formation of acids of lower molecular weight. Evidence from the variation in iodine and acetyl values proved that the double bonds of the unsaturated acids played an important part in the mechanism of fat splitting, a lowering of the iodine value being accompanied by a rise in acetyl value. The formation of hydroxyl groups at the double bonds was a step in the breakdown of unsaturated fatty acids.

W. L. DAVIES

C. K. MORTON. *Cycle de développement du bacille tuberculeux.* (Developmental cycle of the tubercle bacillus.) *Ann. Inst. Pasteur*, **44**, iii, 259–69, March 1930.

The author has used a single cell hanging drop technique to investigate the alleged granular non acid-fast stage of the tubercle bacillus. 200 single cell preparations in droplets of Long's synthetic medium stiffened with gelatine were observed over periods of several days. After incubation at 37.5° C. for some hours, central, sub-terminal and terminal dark zones appeared, usually two or three in number. After 24–72 hours lines of separation appeared (independently of the dark zones) and the process of division ended with the production of three or four oval corpuscles. In this stage the coccoid bodies were acid fast and resembled Spengler's "splitters." Many of these divided by simple fission 24 or 48 hours later and so resembled minute diplococci, some forming short chains. At this stage the cells were not acid fast (cf. Much). Later a tendency to agglutinate was shown and the individual particles became smaller and smaller. These dust-like masses rested unchanged for 24–48 hours when very delicate rods could be seen growing from the periphery of the masses. These rods finally became "adult acid-fast" bacilli.

The author remarks that the changes described may be due to the artificial method of culture. No photographs or drawings are given.

J. G. DAVIS

H. E. HASSELTINE. *Recent progress in studies of undulant fever.* *Publ. Health Rep.* **45**, xxix, 1660–7, July 18, 1930.

The author has collected statistics concerning 333 cases of undulant fever, and to these he has added 109 cases which had been gathered together by Hardy, making a total of 442 cases. These cases divided themselves into three groups:

Group I: the milk group, had 198 cases (103 males, 95 females).

Group II: the farm group, had 200 cases (191 males, 9 females).

Group III: the meat group, had 44 cases (43 males, 1 female).

It is interesting to note the ages at which the persons concerned were affected. Thirteen cases were in children under 10 years of age; all in this age group had no contact with livestock. The decade from 35 to 44 had the greatest number of cases, 118; the age groups between 20 and 50 furnished 296 cases (67 per cent.).

R. STENHOUSE WILLIAMS

M. F. CARRIEU. *De la numération des germes du lait par la méthode de Skar.* (The counting of bacteria in milk by Skar's method.) *Le Lait*, **9**, xc, 1047–50, December 1929.

The author gives a detailed description of Skar's method for the direct counting of bacteria in milk. His experience leads him to the conclusion that it has a value in measuring the amount of contamination in milk, in spite of the facts that it does not

differentiate between living and dead organisms, and that the average number of organisms in each field has to be multiplied by the factor in order to determine the number of bacteria in 1 ml.

E. R. HISCOX

DAIRY BACTERIOLOGY

J. P. FOOY. **Value and results of the quantitative bacteriological examination of milk in the Dutch East Indies.** *Nederl. Indische Bladen v. Diergebeesk*, **41**, 25–38, 1929. (*Bull. Hyg.* **4**, xii, 1012, December 1929.)

K. J. DEMETER. **Bacteriological control of bottled milk pasteurised by the holding method.** *Milchw. Zbl.* **58**, 367–72, 1929. (*Brit. Chem. Abst. B*, p. 119, February 7, 1930.)

A bibliographical review is given of investigations on the thermophilic, heat-resistant, spore forming, and non-spore forming bacteria which are to be found in milk after pasteurisation. The best method of determining the efficiency of pasteurisation is the *B. coli* test, in which 0.1 c.c. samples are taken from five different parts of the milk, and examined by the gentian-violet-lactose-peptone-bile method or the indole reaction. Not more than one sample should give a positive reaction. Pasteurised milk of good quality should contain not more than 30,000 living germs per c.c., and no milk should be offered to consumers if it contains more than 100,000 germs per c.c.

F. M. MUSKOTEU. **Einfluss des Natriumchlorides auf die Bakterien der Milch. I.** (Influence of sodium chloride on the bacteria of milk.) *Milchw. Forsch.* **9**, i–ii, 51–87, November 1929.

This paper gives bacterial counts obtained with well defined bacterial types in various concentrations of sodium chloride. Gram-negative bacteria are most readily inhibited, spore forming bacilli, lactic acid bacteria and cocci less readily. It is important to note that even 25 per cent. sodium chloride in no case prevented the growth of all the bacteria of any one species (cf. Hill and White, *J. Bact.* **18**, 43). Held in 20 per cent. sodium chloride bouillon, Gram-negative bacteria and *Ordium lactis* died out while bacilli and cocci appeared to reach an equilibrium point. Data showing the effect of 18 per cent. sodium chloride on the bacterial population of cheese are given. Gas development by *coli* and *aerogenes* bacteria is inhibited by 5 to 8 per cent. sodium chloride. The concentration of the salt also influences the formation of eyes in the cheese.

J. G. DAVIS

F. STEINFATT. **Über Bacterium linens und seine Beziehungen zu einiger seiner Begleitorganismen in der Käserotschmiere beim Eiweissabbau in Milch.** (*B. linens* and its relation with some of its associate organisms in the outer red slime of certain cheese, formed by protein degradation in milk.) *Milchw. Forsch.* **9**, i–ii, 1–50, November 1929.

This paper describes a comprehensive investigation of the part played by *B. linens* and other associated bacteria in the reddish surface masses of some cheese, upon the course of protein degradation in the cheese. *B. linens* produces most soluble nitrogen when associated with a coccus and with *Sbm. casei*. Symbiotic phenomena and their importance from the point of view of cheese ripening are described and discussed.

J. G. DAVIS

M. KLIMMER, H. HAUPT and F. BORCHERS. **Über das Vorkommen und die Bestimmung der Coli- und Aerogenesbakterien in der Milch.** (Occurrence and estimation of coli and aerogenes bacteria in milk.) *Milchw. Forsch.* 9, i-ii, 236-48, November 1929.

In an investigation of the occurrence and estimation of bacteria of the coli-aerogenes group in milk, the authors found that the addition of tryptaflavin to give a concentration of 1:20,000 in solid and 1:100,000 in liquid media containing lactose, inhibited the growth of Gram-positive organisms, such as *S. lactis*, staphylococci, lactobacilli and *B. subtilis*, but allowed the growth, with acid and gas production of *B. coli* and *B. aerogenes*.

They found that tryptaflavin lactose bouillon could be used for the estimation by dilution of these organisms in milk, gas formation being evidence of their presence.

For the accurate estimation of numbers of the coli-aerogenes group, measured quantities of milk are streaked evenly upon poured and dried plates of brom thymol blue tryptaflavin lactose agar, *B. coli* and *aerogenes* giving yellow, whilst the paratyphoids give blue colonies.

The authors consider that a coli-aerogenes content of 1000 per c.c. is evidence of unhygienic production and in milk of special quality a content of 10 such organisms per c.c. would be objected to.

A. T. R. MATTIOK

A. VAN RAALTE and M. M. LERNER. **Reductase time and bacterial count of milk.** *Chem. Weekblad.* 26, 613, 1929. (*Brit. Chem. Abst.* B, p. 164, February 21, 1930.)

The reductase time and number of bacteria show no absolute parallelism, but examination of 186 samples showed that a milk with a shorter time than 3½ hours has a count of more than 1,000,000 per c.c.

H. R. CARNE. **Sur le streptocoque de la mammite de la vache.** (On the streptococci of mammitis of the cow.) *Ann. Inst. Pasteur*, 44, ii, 208-41, February 1930.

A review of previous theories of mastitis is followed by an account of an investigation of 49 strains of streptococci isolated from typical mastitis cases in Denmark, Switzerland, England and France. The properties investigated were (1) pathogenicity for laboratory animals, (2) cultural characteristics and haemolytic powers, and (3) ability to produce antibodies.

The strains investigated had only little pathogenicity for the mouse but produced lesions in the rabbit.

Lactic acid previously inoculated increases the pathogenicity of a culture injected subsequently.

In lactose media higher acidities were produced than those by strains from equine and human sources.

Wide differences in the properties of different strains suggested that they did not arise from one specific streptococcus. The correlation of the presence of a lytic power with streptococci in 22 samples of mastitis milk was not established.

Vaccines prepared according to the technique of Besredka did not protect rabbits against mammary inoculations of homologous streptococci.

J. G. DAVIS

M. KLIMMER and H. HAUPT. **Zur Frage der Übertragung der Streptokokkenmastitis durch die Melkmaschinen Alfa und Westfalia.** (The transmission of streptococcus mastitis by Alfa and Westfalia milking machines.) *Milchw. Forsch.* 9, v-vi, 511-15, March 1930.

In an experiment with the Westfalia and Alfa milking machines to discover whether or not chronic infection with mastitis streptococci (present in 20-25 per cent.

of the experimental animals) could be carried by the machines to sound animals, it was found that over a period of 28 days no such transmission occurred. Further work is required to determine the transmission or non-transmission of acute infections from cow to cow by milking machines.

A. T. R. MATTICK

F. S. JONES. **Bactericidal property of milk.** *Certified Milk*, 4, xlv, 4-9, 26 December, 1929.

After discussing the views of other workers and describing a number of experiments of his own, the author concludes that milk has the property of inhibiting the growth of some bacteria, notably and in a marked degree, the scarlet fever streptococcus. The inhibiting substance is regarded as occurring naturally in milk, although its efficacy varies from cow to cow, and even from quarter to quarter. It is not adsorbed to kaolin, kieselguhr or bolus alba, but animal charcoal removes a portion. The substance is therefore not identical with alexin which is adsorbed to kaolin and kieselguhr. It cannot be said to be truly bactericidal, as bacteria are not killed, but prevented from proliferating.

A. T. R. MATTICK

G. C. SUPPLEE and E. M. BIXBY. **The bacteriology of dry milk, with particular reference to that made by the Just process.** *Amer. J. Dis. Children*, 5, xxxvii, 1016-26, 1929. (*Bull. Hyg.* 4, xii, 1014, December 1929.)

The bacterial content of milk after drying in two commercially operated plants, using the Just double roller process, was studied. In one plant the average of 20 samples was 133 bacteria per c.c. of reconstructed milk, in the other the average of 31 samples was 564 bacteria. While a certain number of haemolysing colonies were present none were haemolytic streptococci. The first group was collected directly from the drying cylinders, the second was from composite samples taken daily from the commercial production; this shows an increase in bacterial content after the product leaves the drying cylinders.

Cultures of haemolytic streptococci of several kinds, and Morgan's dysentery bacillus were added in very large numbers to milk and were destroyed by conversion into dried milk by this process.

For comparison eight samples of spray milk were purchased in the open market and showed an average count of 75,800 bacteria per c.c.

(No experiments upon the ability of this method to destroy tubercle bacilli are given.)

A. T. R. MATTICK. **Phenols in sterilised milk.** *Analyst*, 55, 646, pp. 37-8, January 1930.

Phenol was found to be present in numerous samples of commercial sterilised milk and this is shown to be due to the presence of slender granulated spore-forming bacilli, which cause the bacterial degradation of tyrosine, which can yield either *p*-cresol or phenol. The presence of phenols in milk in sufficient quantity to make it unfit for human consumption is not therefore necessarily an indication of fraudulent additions.

A. H. BLISSETT

- R. V. HUSSONG and B. W. HAMMER. **Anaerobic bacteria in dairy products. I. Numbers of spores of anaerobic bacteria in milk and cream. II. Relationship of anaerobic bacteria to certain abnormal fermentations.** *J. Bact.* 19, ii, 89–94, 95–9, February 1930.

The first paper shows that spores of bacteria of the genus *Clostridium* occur in milk, cream, and condensed sour milk, but the numbers were small in all cases. The second paper cites cases of faults in various dairy products due to the growth of anaerobes. Gassy fermentations due to *C. welchii* occurred in two preparations of acidophilus milk. In samples of pasteurised milk an abnormal gassy fermentation was tentatively ascribed to *C. butyricum*. Rancidity in pasteurised cream was also found to be due to butyric acid formers. No cases of faults due to non-saccharolytic anaerobes are described.

A. T. R. MATTICK

- C. L. SCAMMAN. **Milk-borne septic sore throat and scarlet fever.** *Amer. J. Pub. Health*, 19, xii, 1339–46, December 1929. (*Bull. Hyg.* 5, iv, 289, April 1930.)

The author states that 87 milk-borne outbreaks of scarlet fever have been recorded in U.S.A. between 1893 and 1928, and 45 milk-borne outbreaks of septic sore throat between 1908 and 1928. The fatality rates were respectively 0.5 and 0.8. The probable source of infection is given for the scarlet fever outbreaks as 82 per cent. due to a milk-handler, with 2 per cent. to a diseased cow and a milk-handler. For the sore throat outbreak 55 per cent. were due to a milk-handler, and 30 per cent. to a diseased cow and a milk-handler.

- B. W. HAMMER. **Variations in *Streptococcus lactis*.** *J. Dairy Sci.* 13, i, 64–8, January 1930.

Certain butter starters have been observed to develop from the top downwards in litmus milk tubes. The author has attempted to isolate strains possessing this characteristic by subculturing from the surface and the depth of such cultures. Those cultures from the surface continued to exhibit this phenomenon while those from the depth reverted after subculture to their original method of surface development. Those strains growing from the bottom upwards grew more slowly than those growing from the top downwards. No difference in morphology could be detected.

J. G. DAVIS

- B. W. HAMMER. **Observations on ropiness in butter cultures.** *J. Dairy Sci.* 13, i, 69–77, January 1930.

The paper deals with the study of a butter culture which, after several years of very satisfactory service, showed a tendency to produce ropiness. The original culture was a mixture of *Streptococcus lactis* and *S. citrovorus*, and the ropiness was traced to the presence of *S. lactis* var. *hollandicus* which may have entered as a contamination or, as was considered more probable, as the result of changes in the organisms already present. Isolation of the ropy strains by means of plating showed that these were far less numerous than the non-ropy. Ropy strains could be obtained from non-ropy cultures by means of repeated transfers through litmus milk, the inoculating material being taken from the surface of the culture in each case. Eventually ropiness became evident in the cultures and continued for several generations. About the same time reduction of the litmus during the growth of the organisms was observed to begin at the top of the tube instead of at the bottom as for non-ropy strains of *S. lactis*, indicating that in this instance at least the character of ropiness was intimately connected with the air requirements of the organism.

E. R. HISCOX

G. MAJER. **Untersuchungen über Bakteriophagen und Käseblähung.** (Bacteriophage and the "blowing" of cheese.) *Milchw. Forsch.* 9, i-ii, 179-85, November 1929.

The experiments described indicate that the addition of bacteriophage to milk had a definite influence on the subsequent bacterial growth. The lactic acid bacteria appeared to suffer no harmful effects, but undesirable bacteria such as those of the *coli-aerogenes* group were definitely suppressed. These results suggest that further investigations along these lines may lead to modifications in cheese making processes whereby a cause of "blowing" in cheese may be eliminated.

E. R. HISCOX

A. I. VIRTANEN. **Fermentation taste of butter.** *Valion Lab. Julkaisuja*, 1929, 12 pp.; *Chem. Z.* 2, 361, 1929. (*Brit. Chem. Abst.* B, p. 165, February 21, 1930.)

The bacterial causes of fruity and putrefactive taste of unsalted or slightly salted butter were investigated.

E. G. HOOD. **Some factors relating to injurious flavours in cheese.** *Butter and Cheese J.* 20, lii, 18, December 25, 1929.

Data are presented showing the mould and yeast content of starters, cheese, milk, whey, and factory utensils. These figures are correlated with undesirable flavours such as fruitiness and rancidity which occur in cheese.

A. T. R. MATTICK

E. G. HOOD and A. H. WHITE. **A colour defect of Cheddar cheese.** *Canada Dept. Agric. Bull.* 128 (N.S.), 1929.

This paper describes an investigation of a serious pink-brown discoloration in Cheddar cheese. Only cheese to which saltpetre had been added showed this defect. Large numbers of nitrate reducing organisms were isolated from the defective cheese.

Lower temperatures of curing (50-55° F.) induced a pink discoloration, while higher temperatures (60-65° F.) favoured a dirty muddy colour.

Similarly discoloured cheese could be produced experimentally by adding to the curd saltpetre and cultures of organisms isolated from the discoloured cheese. It is recommended that the use of saltpetre be discontinued. (Cp. Harrison, *Can. J. Research*, 1, 3, 256.)

J. G. DAVIS

G. L. A. RUEHLE. **The keeping qualities of butter. VI. Experiments on the production of metallic flavour in butter and milk. VII. The microbic flora of off-flavoured butter.** *Michigan Exp. Sta. Tech. Bull.* 102, January 1930.

VI. Metallic flavour may be imparted to milk and butter by the presence of iron and copper lactate and by the presence of the decomposition products of proteins when added as such to butter or when produced by micro-organisms or enzymes. Metallic flavour from metallic salts is succeeded by tallowy and other undesirable flavours, but the metallic flavour from bacteria persists indefinitely. The presence of metallic salts is the more serious cause of trouble, since the flavours succeeding metallic flavour are more disagreeable than the metallic flavour itself.

VII. A study of a considerable number of strains of bacteria obtained from "off flavoured" butter failed to reveal that they were the cause of the "off-flavour."

W. L. DAVIES

CHEMISTRY (ORGANIC, INORGANIC AND PHYSICAL)

GENERAL

R. W. BELL. **Free water necessary to change beta anhydrous lactose to alpha hydrous lactose.** *Ind. and Eng. Chem.* **22**, iv, 379–80, April 1930.

It is concluded from rather meagre data given that “pure crystalline beta anhydrous lactose is sufficiently stable under ordinary humidity and temperature conditions not to affect seriously its commercial possibilities.”

W. J. WILEY

K. H. TALLERMAN. **Observations regarding alterations in the permeability of colloid membranes.** *Brit. J. Exp. Path.* **10**, vi, 360–4, December 1929.

The author has confirmed previous findings that colloid membranes immersed in serum increase in permeability for proteins. Evidence is produced that the serum proteins and not the lipoids (as previously suggested) are responsible for this phenomenon.

J. G. DAVIS

H. SCHMALFUSS and H. BARTHMEYER. **Diacetyl als Aromabestandteil von Lebens- und Genussmitteln.** (Diacetyl as an aromatic component of food stuffs and condiments.) *Biochem. Z.* **216**, 330–5, 1929.

Diacetyl is the constituent responsible for the aroma of tobacco smoke, roasted coffee and butter. An α -diketo derivative, probably diacetyl, gives to honey and beer their odour. The diacetyl is derived from methyl acetyl carbinol by oxidation.

W. L. DAVIES

DAIRY CHEMISTRY

E. R. LING. **A Text-book of Dairy Chemistry.** London: Chapman and Hall, 1930. pp. vii + 213. Price 6s.

This concise treatise on dairy chemistry has been prepared largely from the subject matter of lectures delivered to dairy students of diploma standard. It is assumed that the student already possesses a working knowledge of the principles of elementary chemistry and physics. The scope of treatment of the subject, nevertheless, makes the book a valuable nucleus of study for students above diploma standard. The book may also be recommended as a useful reference to those engaged in the handling and processing of milk and its products, to public health officials and to analysts and biochemists.

The subject matter is divided into two parts—theoretical and practical. The composition of milk and the chemistry of the main constituents of milk and of milk products are treated in detail. Variation in the composition of milk is discussed as well as the legal considerations of this point. The action of heat on milk and the action of metals are treated fully. Each chapter is followed by a few references to published work, some of which the student is advised to consult. The practical section is arranged in a sequence following that of the theoretical section and is supported by numerous diagrams and illustrations of the methods involved. Examples of calculations are given. A list of examination questions and an index are appended.

W. L. DAVIES

- J. KRENN. **Studien über die elektrische Leitfähigkeit der Milch. II. Die Ergebnisse praktisch durchgeführter Messungen an Milch von Kühen verschiedener Herden.** (The results of practical measurements of the electric conductivity of milk from cows of different herds.) *Z. Unters. Lebensm.* **59**, i, 32–62, January 1930.

Following on a previous paper (*Z. Unters. Lebensm.* **57**, 147–77, 1929) on the use of the conductivity method for the detection of milk from cows suffering from mastitis, the present paper describes work on normal milks with a view to collecting data as to the variations in conductivity with variation in composition of the milk. The conductivity of normal milk did not exceed 46×10^{-4} ohms, and udder troubles could be traced in almost all the samples giving a higher conductivity. Abnormal udder quarters could be detected by this method and a number of cases are quoted. The refractivity of the calcium chloride serum fell well below the standard in cases of high conductivity. The tabulated data are supported by full analyses of the milk samples studied.

W. L. DAVIES

- SZELINSKI. **Detection of adulteration in milk.** *Chem. Ztg.* **54**, 173–4, 1930. (*Brit. Chem. Abst. B*, p. 346, April 18, 1930.)

The determination of the freezing-point is the most reliable physical test for ascertaining if milk has been watered. The freezing-point of milk taken from diseased cows is identical with that of normal pure milk, hence the view that this method does not afford a distinction between the watered milk and that from diseased cows is incorrect.

- A. SCHNECK and B. GORGEL. **Beitrag zur Alkalizahl in der Kumilchasche unter Berücksichtigung von Fütterung und Laktation.** (The alkali number of the ash of cow's milk, with reference to feeding and lactation.) *Milchw. Zbl.* **59**, vi, 81–5, March 31, 1930; vii, 97–101, April 15, 1930.
- C. PORCHER. **Le lait au point de vue colloïdal. Recherches sur la mécanique de l'action de la présure.** (Milk from a colloidal point of view. Mechanism of the action of rennet.) *Le Lait*, **9**, xc, 1032–46, December 1929; **10**, xci, 47–68, January 1930; **10**, xcii, 146–75, February 1930.

- K. E. WRIGHT. **The quinhydrone electrode in the dairy laboratory.** *Massachusetts Bull.* **247**, p. 316, 1929. (*Exp. Sta. Record*, **61**, ix, 867, December Abst. 1929.)

The quinhydrone electrode determination of pH has not proved practical in determining the keeping qualities of milk. The results so far obtained do not show that the pH of milk is indicative of its keeping qualities.

- G. KOESTLER, C. L. ROADHOUSE and W. LÖRTSCHER. **Zur Kenntnis der Sekretion lipolytisch aktiver sogenannter "ranziger" Milch.** (Secretion of lipolytically active, so-called "rancid" milk.) *Landw. Jahrb. d. Schweiz*, 937–66, 1928. (*Zbl. Bakt.* II, **79**, xv–xxii, 447, November 19, 1929.)

A milk fault which is not yet fully elucidated is that due to the presence of a lipase which splits the fats into free fatty acids and glycerol. The authors believe that this lipase is either an animal one secreted with the milk or is associated with certain udder bacteria like *Bs. abortus*. If the lipase is of animal origin fat splitting may be profound but if it is bacterial, it is only slight. Lipase milk is in general bacteriostatic especially against pure cultures of *S. lactis*.

A. T. R. MATTICK

R. HOCK. **Detection of milk pasteurised by the holding method.** *Milchw. Zbl.* **58**, 309–11, 1929. (*Brit. Chem. Abst. B*, p. 995, December 6, 1929.)

Milk which has been pasteurised by heating at 60–65° C. for $\frac{1}{2}$ hr. can be detected by the volume of serum which separates when the milk is treated with rennet. A 50 c.c. sample is brought to a Soxhlet-Henkel acidity of 5 by addition of 0.25 *N*-caustic soda. To the milk warmed to 35–40° C. is added $\frac{1}{2}$ c.c. of dilute rennet essence (1:10), and, after shaking, the mixture is incubated in petri dishes at 37° C. for 14 hours. With unpasteurised milk the volume of serum is more than 40 c.c., but if the milk has been heated to 60–65° C. the volume is less than 40 c.c. The maximum found for pasteurised milk was 36 c.c., and the minimum for fresh milk 41 c.c. The nature of the precipitated casein affords further evidence of the heat-treatment the milk has undergone. Milk which has been heated to 70° C. or over gives a voluminous white curd with slight bubble formation due to aerogenic bacteria, whereas fresh milk or milk which has not been heated above 65° C. gives a thin, dense, fissured coagulum which adheres firmly to the bottom of the dish. The curds from milk heated to 65° C. or over can be readily poured off with the serum.

A. SCHNECK. **Change in the refractive index (of the serum) during the souring of milk.** *Milchw. Zbl.* **59**, 1–8, 1930. (*Brit. Chem. Abst. B*, p. 214, March 7, 1930.)

According to Elsdon and Stubbs (cf. B, p. 346, 1928) determination of the refractive index of the calcium chloride serum for the detection of added water is of little value unless the milk be fresh, but it is now shown that the initial refraction of sour milk can be calculated with a fair degree of accuracy. The acidity of the serum (y) follows regularly that of the milk (x) and is expressed by $y = 0.8x - 2$. The author has also shown (cf. B, p. 942, 1928) that an increase of 0.026 in the serum solids corresponds to an increase of 1.0 in the serum acidity, and since from Wiegner's tables a change of 0.026 in the serum solids represents a change in refraction of 0.113°, it is deduced that an increase in the "degree of acidity" of milk of 1.0 causes an average rise in the refraction of 0.09°. This deduction has been confirmed on a number of milk samples, the acidities of which were between 15 and 30. The corresponding increase in refraction per degree of acidity for milk acidities down to 7.0 have been calculated from Grimmer and Benduski's results (cf. B, p. 735, 1929), the value for acidities of 7–8 being 0.27. By applying these corrections in the case of over 100 samples of milk of various acidities, the refractions of the fresh milk have been calculated and the results show fair agreement with the observed values, the accuracy for acidities below 15 being far greater than for higher acidities.

L. M. BAMPERT. **Cholesterol as a measure of egg yolk in milk products.** *Ind. and Eng. Chem.* (anal. ed.), **2**, ii, 159–61, April 1930.

This method is offered as an alternative to the lipid-phosphorus method for determining the amount of egg solids in dairy products. It consists of the determination of cholesterol in the material by the colorimetric method of Liebermann and Burchard. The cholesterol is isolated in chloroform solution from the unsaponifiable fraction of the fat. A formula for calculating the percentage of egg yolk is then worked out, the three variants being (a) the total per cent. cholesterol found, (b) the total per cent. fat found, and (c) a factor for determining the cholesterol content of the butterfat in ice cream (graph given). The method, tested by the "recovery" principle is claimed to give good results. The original paper should be consulted for details of procedure.

W. L. DAVIES

R. J. MCKAY, O. B. J. FRASER and H. E. SEARLE. **Resistance of nickel and monel metal to corrosion by milk.** *Amer. Min. Met. Eng. Tech. Pub.* 192, 47 pp., 1929. (*Brit. Chem. Abst.* B, p. 79, January 24, 1930.)

The maximal amount of nickel dissolved by milk was 12 in 10^6 ; monel metal was rather less soluble. Agitation raised the solubility at the pasteurising, but not at the ordinary, temperature; the solubility in buttermilk was increased by aeration or by rise of temperature. At low temperatures winter milk was more corrosive than summer milk. Lactic acid dissolved more nickel than did milk of equivalent acidity. The effect of milk constituents was examined. In tests with technical apparatus milk dissolved 1.3 parts of nickel in 10^6 .

L. S. PALMER. **Some recent advances in the chemistry of milk.** *Ind. and Eng. Chem.* 22, i, 39–42, January 1930.

This paper is a good review of work on dairy chemistry published in 1928 and 1929.

W. J. WILEY

J. H. NAIR. **Lipase in raw, heated and desiccated milk.** *Ind. and Eng. Chem.* 22, i, 42–5, January 1930.

The lipase in milk is measured by the increase in titratable acidity of cream to which the milk is added, bacterial action being prevented by sucrose. Details are given of the destruction of the enzyme by pasteurisation at different temperatures and for varying times. Pasteurisation as usually done destroys the enzyme. No lipase could be detected in powdered whole or skim milk prepared from milk which had been pasteurised at $63\text{--}64.5^\circ\text{C}$. for 30 minutes before drying. The author concludes that rancid odours and flavours may be expected to develop in manufactured milk products if the fluid milk is not subjected to sufficient heat treatment for inactivation of the lipase.

W. J. WILEY

M. HENRICH. **The phosphorus content of cow's and human milk.** *Schweiz. Med. Wschr.* pp. 521–2, May 18, 1929. (*Bull. Hyg.* 4, xii, 1009, December 1929.)

It is well known that the total phosphorus in cow's milk is much higher than in human milk. Human milk was found to contain only traces of inorganic phosphorus (less than 1 mg. per 100 c.c.), while cow's milk contained from 6 to 7 mg. per 100 c.c. There was ten times as much acid soluble phosphorus in cow's milk as in human milk.

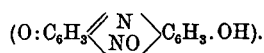
G. PIGNEUR. **A study of the milk derived from the native cattle of Ruanda.** *Ann. Soc. Belge de Méd. Trop.* 9, 9–12, 1929. (*Bull. Hyg.* 4, xii, 1009, December 1929.)

The native cow in this part of Africa yields a milk very rich in protein, fat and lactose. The mean of 200 analyses gave the following figures: lactose 10 per cent., fat 6.5 to 7 per cent., and protein 6.9 per cent. It was not uncommon to find 10 per cent. of fat in individual samples. In view of the richness of this milk, Europeans who bring up infants on cow's milk in this district are advised to modify the usual formula and to add more water and less sugar than they would in Europe. It may sometimes be necessary to remove part of the fat before the mixture is made. For the first three months of life a mixture of three parts of this milk to two parts of water has been found satisfactory.

K. L. PESCH and H. SIMMERT. **Eine neue Resazurin-reduktionsprobe für Milchuntersuchung.** (A new resazurin-reduction test for milk.) *Sudd. Milk.* **38**, iv, 1928. (*Zbl. f. ges. Hyg.* **20**, i, 17, June 10, 1929.)

The "cleanliness" and hence keeping quality of milk is dependent not only on the bacterial content and the species involved, but primarily on the activity of the milk bacteria.

These authors have proposed as a simple and adequate method for the estimation of the freshness of milk the "resazurin"-reduction test



The new test requires but little apparatus and no technical skill. Resazurin is not only an rH, but also a pH indicator, hence the rate of disappearance of colour is proportional to the acidity of the milk. For convenience in using the test a scale for a reduction period of 8 hours is given.

J. G. DAVIS

C. A. ELVEHJEM. **A note on the determination of iron in milk and other biological material.** *J. Biol. Chem.* **86**, ii, 463-7, April 1930.

During the ashing of organic material rich in phosphate, pyrophosphates, which prevent the quantitative formation of iron thiocyanate, are formed. This difficulty is overcome by boiling the ash in dilute alkaline (NaOH) solution for one hour. After acidifying, the colorimetric procedure is carried out using amyl alcohol as an organic solvent to dissolve out the ferric thiocyanate completely from the aqueous phase.

W. L. DAVIES

CITY OF SALFORD. **Annual report of the city analyst for the year 1928.** *Analyst*, **54**, 645, pp. 740-2, December 1929.

A number of samples of milk were tested in which the percentage of solids-not-fat fell below the legal standard though it was evident that it was not so much a question of adulteration as of natural variation.

The question of standard for cheese other than Cheshire cheese is raised.

A. H. BLISSETT

CITY OF LEEDS. **Report of the city analyst for the second and third quarters 1929.** *Analyst*, **54**, 645, pp. 739-40, December 1929.

Out of 724 samples of milk tested 137 were found to be adulterated or below standard. It is suggested that where bottling is carried out on the farm and the milk of the whole herd is not mixed but may be the product of a single cow, then certain bottles are liable to contain milk below standard.

A. H. BLISSETT

I. PRIEGER. **Über die Hüllen der MilCHFETTKÜGELCHEN. I.** (The hulls of milk fat globules.) *Biochem. Z.* **217**, iv-vi, 331-6, January 1930.

The problem of the film on milk fat globules has been studied by cataphoretic methods. The isoelectric point of an artificial protein-free fat emulsion is more on the acid side than that of the natural fat globules. This difference in the hydrogen-ion concentration at which the change of charge occurs leads to the conclusion that natural fat globules are surrounded by protein-like films, while the protein-free artificial fat emulsion displays the true charge on the fat globule.

W. L. DAVIES

M. RÜDIGER and K. WURSTER. **Die Bindungsverhältnisse des Milchkalkes und ihre Bedeutung für die Labgerinnung.** (The combining powers of milk and their importance in rennin coagulation.) *Biochem. Z.* **216**, iv-vi, 367-99, 1929.

The addition of calcium chloride to milk up to 0.142 per cent. calcium concentration has a favourable effect on rennin activity, larger concentrations having a depressing effect. The addition of calcium chloride to milk and whey increases the acidity to a certain maximum and it then remains constant. The hydrogen-ion concentration rises but diminishes in rate with successive additions of calcium salt. This change of acidity alone does not account for the accelerating effect on rennin coagulation. By studying the buffering effects of milk and whey it is shown that casein acts as a strong buffer, the other proteins being of less importance.

The change in the acid-base equilibrium by adding CaCl_2 is due to change in the phosphates, a change which cannot be followed stoichiometrically. Such a change could be brought about by adding CaCl_2 to a phosphate buffer, a mixture of secondary and tertiary calcium phosphates being precipitated. The systems milk— CaCl_2 and phosphate— CaCl_2 behave in a similar manner.

It was concluded that calcium and phosphate ions cannot form a stable combination in milk under normal conditions, but that precipitation is prevented by the casein. The buffer qualities of milk are attributed to the system $\text{Ca}_3(\text{PO}_4)_2$ —casein—citric acid. The relation of rennin coagulation to the colloidal calcium suggests the colloidal nature of the process.

W. L. DAVIES

A. G. HOLBOROW. **Examination of goats' milk for unboiled milk.** *Analyst*, **54**, 644, pp. 658-9, November 1929.

Tests for determining whether milk has been boiled or not and the approximate quantity of unboiled milk present are described. Ortol was found to be the most sensitive reagent for this purpose and the presence of as little as 2.5 per cent. of unboiled milk in a sample can be detected with this reagent. Paradiaminobenzene was also capable of being used for detecting the presence of small quantities of unboiled milk. Guaiacol was found to be an unsuitable reagent unless there was 30 per cent. or more of unboiled milk present.

A. H. BLISSETT

F. L. MICKLE. **The sediment test for visible dirt in milk. Its history.** *Int. Assoc. Dairy and Milk Insp. 18th Rep.* pp. 93-108, 1929.

The author reviews the history of the sediment test and discusses the method of utilising it as a standard of cleanliness. He considers that the present procedure of reporting the dirt which is found on the pads in terms of "milligrams per pint" is inaccurate and cumbersome, and suggests that it would be more satisfactory to mark by comparison with standard filters. (This is the method which is adopted in Great Britain, *Man. Agric. Misc. Pub.* **43**, 3rd ed., 1928.)

R. STENHOUSE WILLIAMS

A. W. STABLEFORTH. **Studies on bovine mastitis. II. Diagnosis by means of the reaction of the milk to brom-cresol-purple.** *J. Comp. Path. and Therap.* **18**, 22-39, March 1930.

In discussing the diagnostic value of the reaction test, the author considers the changes which are correlated with the alkaline development, if not its cause, and also the outside factors which may affect its practical application.

The indicators used were solutions of brom-cresol-purple (0.9 g. per litre) which with normal milk, pH 6.5-6.6, gives a pale dove-grey becoming more and more purple as alkalinity increases. 3 drops were used to 3 c.c. of milk.

Brom-thymol-blue (0.5 per cent. solution in 10 per cent. alcohol) is claimed to have a definite advantage over brom-cresol-purple in that the change of colour is from greenish yellow with normal milk through yellowish green at about pH 7 to a definite bluish green, one drop (0.025 c.c.) being also used per 1 c.c. of milk.

In order to obtain accurate results with the tube form of the test it was found necessary to centrifuge the samples. Moreover, it has been made clear that even when reactions are obtained with tubes it is only the samples of definitely decreased acidity that are to be taken as indicative of mastitis.

Long experience has practically removed any error in reading such samples by the *paper* form of the test.

In the latter diagnostic work, dealt with in these researches, brom-cresol-purple papers were therefore used with satisfactory results. On the farm also the tube form of the test is impracticable.

The test is of value from a positive standpoint, a single abnormal reaction or, in a greater degree, a series of abnormal or doubtful reactions, points to the probability of disease. Normal reactions may however be shown by samples from quarters which are constantly excreting streptococci or have recently shown clinical symptoms.

The cause of alkalinity is discussed; the reaction of the milk shows no constant relation to its antigenic titre in serum precipitin tests.

J. GOLDING

H. H. SOMMER. Salts in milk and their importance in dairy work. IV. The feathering of cream in coffee. *Milk Dealer*, 19, ii, 76-8, November 1929.

By feathering of cream in coffee is meant the formation of a curd which floats to the surface when cream is added to hot coffee. This is due to coagulation of the proteins. Hard water owing to its calcium content tends to cause feathering, and the neutralisation of cream with calcium compounds may be a contributory factor. The addition of sodium citrate or disodium phosphate to the cream prevents coagulation and this is recommended in districts where the trouble is prevalent.

W. J. WILEY

F. E. RICE. Evaporated and condensed milk from the chemical and nutritional points of view. *Ind. and Eng. Chem.* 22, i, 45-8, January 1930.

This paper gives a good account of the manufacture of evaporated and condensed milk and gives numerous references to the literature on the chemistry of the subject. The nutritive value of these products is briefly discussed.

W. J. WILEY

B. H. WEBB and G. E. HOLM. Colour of evaporated milk. *J. Dairy Sci.* 13, i, 25-39, January 1930.

The author compares the colour of evaporated (condensed) milk throughout its manufacture with permanent standards made by colouring aqueous suspensions of precipitated chalk with solutions of ferric chloride and potassium dichromate. These standards were evaluated quantitatively in terms of "hue," "brilliance" and "chroma" on the Munsell system, which is briefly described. It was found that increase in temperature or time of sterilisation increases the colour; while at the same time the pH is lowered. On the Munsell system this colour increase is a change in "hue," "brilliance" and "chroma." Homogenisation diminishes the colour of the sterilised product. Previous neutralisation by sodium bicarbonate deepens the colour proportionally to the quantity used; the addition of phosphates, citrates, lime water, or of sodium bicarbonate solution, adjusted by lactic acid to the pH of milk,

does not affect the colour of the sterilised product. There is a progressive darkening of sterilised evaporated milk with the increase of time and temperature of storage which is due to a change in "chroma."

From the quantitative data given the authors conclude that the change in colour caused by heat upon evaporated milk is catalytic, and during storage due to causes other than caramelisation.

J. D. GARRARD

A. DÜRING. **Comparative sucrose determinations in sweetened condensed milk.** *Pharm. Zbl.* **71**, 49–51, 1930. (*Brit. Chem. Abst.* B, p. 437, May 16, 1930.)

Comparison of the official method (Röttger, 5th ed., 1, 407, 1926) with the modified method described below showed the latter to be the more rapid, convenient and accurate. The condensed milk (10 g.) is mixed with 60 c.c. of hot water and treated with a suspension of 1 g. of calcium oxide in a little water. The mixture is shaken, heated on the water bath at 80° for 1 hour, cooled, and treated successively with 10 c.c. of dilute sulphuric acid (1:4) 5 c.c. of lead acetate, and 5 c.c. of saturated sodium phosphate solution. After the precipitate has settled, the liquid is filtered by suction through a porcelain funnel, covered with cloth and a thin layer of asbestos, and the residue on the filter is washed until free from acid. The filtrate is made up to 200 c.c. treated with 0.5 g. of ignited charcoal powder, and again filtered. The rotation of the solution in a 200 mm. tube at 20° (measured in the Laurent polarimeter) multiplied by 15 gives the weight of sucrose in 100 g. of sample.

W. L. DAVIES. **Fishiness in dairy products.** *Proc. Assoc. Econ. Biol., Ann. Appl. Biol.* **17**, i, 167–9, February 1930.

The mechanism of fat breakdown by auto-oxidation is discussed together with a description of the agencies capable of shortening the induction period and accelerating the breakdown after oxidation has commenced. The behaviour of the fat in dairy products under the same conditions is described with special reference to the initial breakdown of the active lipoid, lecithin, to yield trimethylamine, which confers a fishy taint to the product. Other factors governing fat deterioration, namely, moisture content, acidity and growth of micro-organisms are discussed.

W. L. DAVIES

E. HANKE and F. DEUTSCHMANN. **Die Xylolzahl und ihre Bedeutung für die Feststellungen von Butterverfälschungen.** (The xylol number and its importance in the detection of butter adulterations.) *Milchw. Forsch.* **8**, v–vi, 525–32 (October), 1929.

The xylol (xylene) number (the number of c.c. *N*/10 alkali required to neutralise the volatile fatty acids from 5 g. fat, after the 110 c.c. distillate (R.-M.) has been shaken with 22 c.c. acid-free xylene) is applied to detect the presence of foreign fats in butter. (The xylene dissolves the higher volatile acids from the aqueous phase leaving the butyric acid in aqueous solution.) The xylol number of butterfat ranges from 19.3 to 25.8, being 68–74 per cent. of the R.-M. value. The xylol number of coconut oil, palm oil and margarine fat is 16–19 per cent. of the R.-M. value. Using the lowest xylol number for butter fat (19.3) in the equation:

$$\text{Percentage margarine present} = \frac{100 (\text{xylol no. of butterfat} - \text{xylol no. of butter mixture})}{\text{xylol no. of butterfat}}$$

it is contended that in such mixtures at least that amount of margarine resulting from the equation is present.

The xylene must be used fresh from standing over quicklime.

W. L. DAVIES

A. MORE. **Sterols in butter.** *Analyst*, **54**, 645, pp. 735–6, December 1929.

A process for separating the sterols from butter and similar fats is described.

A. H. BLISSETT

P. ARUP. **The fall in Reichert-Meissl values on keeping butter samples.** *Analyst*, **54**, 645, p. 736, December 1929.

Five butter samples were kept for nearly 6 years and a fall in the R.-M. value was noted in each case. A parallel is drawn between the amounts of free fatty acids formed and the extent of the fall in R.-M. value.

A. H. BLISSETT

K. PFITZENMAIER. **Eine Neuerung bei Wasserbestimmung der Butter.** (An innovation in the estimation of moisture in butter.) *Molkereiztg. (Hildesheim)*, **43**, 1648, 1929. (*Milchw. Forsch.* **9**, i–ii, Ref. p. 51, November 1929.)

For quick determination of moisture in butter, the authors advocate the use of a special balance designed so that the tare of each dish is quickly allowed for by moving a weight along the beam. An indicator working on a semicircular dial registers the weight of the butter before and after heating. The balance is manufactured by Paul Funke, Berlin, and is claimed to be accurate, convenient, and quick in use.

W. L. DAVIES

N. KING. **Über die Grenzfläche Wasser-Fett in der Butter.** (The water-fat interface in butter.) *Milchw. Forsch.* **9**, v–vi, 501–5, March 1930.

The actual area of the water-fat interface in butter has been calculated from microscopic counts of the number and size of the water droplets. 98 per cent. of the interfacial area is accounted for by the "butter milk droplets," and 2 per cent. by the wash water droplets. The entry into cream of foreign metallic salts, which are capable of catalysing oxidative deterioration in butter, is discussed in the light of the above findings.

W. L. DAVIES

C. KEMPINSKI. **Über die Bestimmung des Wasserungsgrades von Buttermilch.** (The estimation of the degree of watering of buttermilk.) *Milchw. Forsch.* **9**, v–vi, 506–10, March 1930.

Analytical data connected with highly acid milk products are tabulated. Acidity, lactose content, density of serum from the naturally soured product and the ash content of the serum, have been determined. With increasing acidity the serum density diminishes at a greater rate than would be expected from the lactic acid produced owing to the loss of appreciable soluble organic matter as carbon dioxide. The ash content of the serum is constant and its constancy is the only reliable index of no water having been added. The study has yielded comparative results only when the original buttermilk, which may vary appreciably in composition, is the basis of all the calculations.

W. L. DAVIES

P. S. ARUP. **Value of the common tests for purity as applied to Irish winter-made butter.** *J. Dept. Agric. Irish Free State*, **29**, ii, 236–58, 1930.

Detailed analyses of Irish winter-made butter summarised in a paper previously published by the author are given (*v. abst. J. Dairy Res.* **1**, 209, 1930). The R.-M., Polenske, Kirschner and the refractive index (Zeiss °) of 310 samples of butter collected in the period November 1927–March 1928 are supplied. Further data such

as the Avé-Lallemant, saponification, etc., values are tabulated for samples having a R.-M. above and below 24 (standard minimum). The tables clearly show that during the period November to January, a large number of samples fall below 24 in their R.-M. value. The Avé-Lallemant value cannot be taken as a criterion for distinguishing between butter of low R.-M. values and adulterated butter of high R.-M. value. For genuine butter fat the value R.-M. + 200—saponification value should lie between + 4 and - 4, and although this criterion is not infallible, it is more reliable than the A.-L. value.

W. L. DAVIES

W. VAN DAM. The effect of pasteurising cheese milk on the breaking down of albumin in Edam cheese. (Trans. title.) *Dept. Binnenland. Zaken en Landb. (Netherlands), Versl. Landbouwk. Onderzoek. Rijkslandbouwproefsta.*, 33, 187-200, 1928. (*Exp. Sta. Record*, 62, ii, 166, February 1930.)

In this study it was found that the higher the temperature of pasteurising, the smaller were the amounts of disintegration products from the proteins. When the pasteurising temperature was high the flavour of the cheese developed slowly, an excellent body was obtained without difficulty, and the character of the flavour remained unchanged. The differences found increased according to the degree to which the milk was heated and to the age of the cheese.

WOHLGEMUTH. Über die Schafkäseerei in Bosnien und Herzegowina. (Sheep's milk cheese manufacture in Bosnia and Herzegovina.) *Süddeuts. Landw. Tierarz.* 49, 599, 1929. (*Milchw. Zbl.* 58, 24, 427, December 31, 1929.)

F. H. McDOWALL. Estimation of moisture in cheese—N.Z. Dairy Sci. Assoc. *New Zealand J. Agric.* 40, iii, 197-8, March 1930.

The introduction of the manufacture of standardised cheese necessitates the consideration of standard methods of cheese sampling and analysis. Sampling of the cheese is carried out by taking one plug in a position on the circumference one-third of the distance from one end. The sample is immediately transferred to an airtight container. The sample is ground to a paste in a mortar and cut into small pieces which are immediately stored in an airtight bottle. The estimation of moisture is carried out in a flat metal dish. Alternative methods of desiccation are: (a) heating in a water oven at 100° C. for 1½ hours followed by 4 to 5 hours at 115° C., or (b) heating in an electric oven at 103° C. for 15 hours. For details the original paper should be consulted.

W. L. DAVIES

E. SANDBERG, E. HAGLUND and C. BARTHEL. Examination of press whey for the analytical estimation of the degree of ripening of cheese. (Trans. title.) *Swedish Cent. Exp. Sta. Medd.* 361, 1929.

By grinding cheese with sand and pressing in a hydraulic press, up to 15 per cent. of the weight of the cheese was extracted as an aqueous fluid. Analysis of this fluid for data connected with the ripening process gave results which are claimed to be more reliable than the water extraction process. With cheese, dry salted in the curd, the salt was found to decrease the number of lactic acid bacteria and the amount of soluble nitrogen in the extracted fluid. This points to a direct relation between the proteolysis of the curd and the number of lactic acid bacteria. Brine salted cheese in a similar manner showed that the diffusion of the salt into the centre of the cheese exerted a retarding influence on ripening owing to the attendant higher ionic concentration.

W. L. DAVIES

F. H. McDOWALL. **Standardised cheese, and cheese analysis.** *New Zealand Dept. Sci. and Ind. Res. Bull.* **21**, 1930.

This paper contains a discussion of the errors which may occur in the sampling and analysis of cheese by factory methods, the Werner-Schmidt method for fat and vacuum drying for moisture being taken as a standard. It is concluded that, in the extreme case, two estimations on different samples of the make of cheese from one vat could show a divergence of 3.0 in the fat in water-free solids percentage due to errors in analysis and 1.5 due to errors in sampling, making a total divergence of 4.5. In practice such a divergence would be seldom met, and experience bears this out.

W. J. WILEY

E. G. HOOD and A. H. WHITE. **A case of metallic discoloration of Cheddar cheese.** *Sci. Agric.* **10**, viii, 520-2, April 1930.

Several cheese were affected with discoloured areas varying in size from that of a pin head to about half an inch in diameter. The colour varied from light brown to yellowish brown and in some instances presented the appearance of early stages of iron rust. A microscopical examination revealed small fragments of steel wire in many of the discoloured areas. "Steel wool" was used in the factory for cleaning the vats and it is concluded that small pieces broken off from this were the cause of the trouble.

W. J. WILEY

E. OHLSSON and H. FREDHOLM. **Determination of nitrates and nitrites in whey.** *J. Assoc. Off. Agric. Chem.* **12**, 429-34, 1929. (*Brit. Chem. Abst.* B, p. 164, February 21, 1930.)

In the absence of nitrites, nitrates in whey may be determined by extraction with ether for 60-70 hours in Widmark's rocking apparatus (cf. A, **96**, 1064, 1928), and after removal of residual ether, reducing the nitric acid with a zinc-copper couple in the presence of magnesia, distilling the ammonia into boric acid, and titrating with hydrochloric acid against bromophenol-blue (cf. Scales and Harrison, A, ii, 41, 1917; ii, 386, 1920; ii, 345, 1921). If nitrite be present in addition to nitrate, nitric acid is determined by extraction as before, firstly, after removal of the nitrite by precipitation with 2:4-diamino-6-hydroxypyrimidine sulphate (cf. Hahn, A, ii, 382, 1917) and, secondly, after oxidation of the nitrite with potassium permanganate, the difference in the determinations being the nitrate originally present as nitrite. The errors in check analyses did not exceed 1.4 per cent.

A. LEIGHTON. **Application of physical chemistry to ice cream.** *Ind. and Eng. Chem.* **22**, i, 48-51, January 1930.

This paper is a review of the work done on the complex physical chemistry of ice cream and suggests how physico-chemical methods may be applied to obtain a better understanding of the processes for manufacturing ice cream.

W. J. WILEY

F. P. NABENHAUER. **Manufacture of casein and lactose from skim milk.** *Ind. and Eng. Chem.* **22**, i, 54-6, January 1930.

This paper is a description of the methods of manufacture of casein by the rennet curd, self sour and acid methods. The production of lactose from the whey is described.

W. J. WILEY

T. SVEDBERG, L. M. CARPENTER and D. C. CARPENTER. **The molecular weight of casein. I.** *J. Amer. Chem. Soc.* **52**, i, 241–54, January 1930.

Casein prepared by the Hammarsten method, when dissolved in phosphate buffer solution at pH 6.8 and examined by T. Svedberg's centrifugal sedimentation velocity method, was found to behave as a mixture of protein molecules of different weights. Hammarsten casein when extracted with hot acidified alcohol yielded about 33 per cent. of soluble protein which was precipitated with dilute sodium hydroxide. This protein, when examined at pH 6.8 by the authors' methods, appeared to be a chemical individual. Its molecular weight was found to be $375,000 \pm 11,000$. The molecule was not spherical and deviated from the spherical shape by about the same amount that has been found by Svedberg for several other proteins.

W. J. WILEY

T. SVEDBERG, L. M. CARPENTER and D. C. CARPENTER. **The molecular weight of casein. II.** *J. Amer. Chem. Soc.* **52**, ii, 701–10, February 1930.

Casein prepared by the method of Van Slyke and Baker, when examined by the authors' methods (see previous abstract), behaved as a mixture of protein substances and was not of constant composition. However, the greater part of the casein had a molecular weight between 75,000 and 100,000, but if it were heated to 40° during the time of discolouring in phosphate buffer at pH 6.8 (30 minutes) it had a molecular weight of 188,000 and no protein could be detected of molecular weight 75–100,000.

W. J. WILEY

F. H. WILEY and H. B. LEWIS. **The action of nitrous acid on casein. II.** *J. Biol. Chem.* **86**, ii, 511–28, April 1930.

Casein was deaminised by the action of sodium nitrite and acetic acid at various temperatures. By comparing the amounts of certain amino acids in unheated casein it was deduced that, by the action of nitrous acid, there was no change in arginine content, half the histidine and all the lysine were destroyed. Tryptophane was unaffected but partial destruction of tyrosine took place. The Van Slyke method for determining the nitrogen distribution in deaminised casein was found to be inaccurate.

W. L. DAVIES

BIOCHEMISTRY

E. J. SHEEHY and B. J. SENIOR. **The effect of cod-liver oil feeding on the calcium and phosphorus content of cows' milk.** *Biochem. J.* **23**, v, 898–901, 1929.

Three crossbred Shorthorn cows were kept continually housed, under constant conditions, throughout an experiment lasting 2 months, divided into six successive periods; for two of which they received a normal winter ration of hay, roots and concentrates; for three periods additions to it of olive oil, and for one period addition of cod-liver oil (6–8 oz. daily). The percentages and the total amounts of CaO and P₂O₅ in the milk of each cow are recorded graphically. Day-to-day variations occurred in these percentages, but there are no indications that the addition of either cod-liver oil or olive oil made any change in the calcium or phosphorus content of the milk. The cod-liver oil seriously reduced the percentage of fat.

S. J. ROWLAND

O. GRATZ. **Die Wirkung der Milch bei Schulkindern auf Wachstum und Gewichtszunahme.** (Effect of milk on weight and growth increase of school children.) *Milchw. Zbl.* **59**, viii, 121–3, April 30, 1930.

- P. GLET. **Ueber die Einwirkung von roher, dauer- und hochpasteurisierter Milch auf den tierischen Organismus.** (Action of raw, holder and flash pasteurised milk on the animal organism.) *Milchw. Forsch.* **8**, iii-iv, 328-66, August 1929.

The author describes some very interesting experiments which he has carried out on the food values of different types of milk, when fed to guinea-pigs, piglets and calves. He comes to the conclusion that raw milk gives the best results, though some of the difficulties found between this and other types lay within the "physiological limits of error." He is therefore of the opinion that in order to get a true measure of the feeding values of the different types, experiments over successive generations should be conducted.

R. STENHOUSE WILLIAMS

- H. E. HONEYWELL, R. A. DUTCHER and C. D. DAHLE. **Vitamin Studies. XVII. Ossifying potency of raw and evaporated milks.** *J. Nutrition*, **2**, iii, 251-6, January 1930.

In prophylactic experiments, evaporated milk made by vacuum and aeration methods was fed to rats at different levels in comparison with the original raw milk. The ossifying potency of treated milk was less than that of the raw; vacuum evaporation, aeration and sterilisation decrease the potency. Feeding milk ash equivalent to the volume of raw milk showed again a smaller ossifying potency indicating that part of the calcifying properties of the various milk samples must have been due to vitamin D. Slight seasonal variations in vitamin D content was observed in the raw and treated milk.

W. L. DAVIES

- G. C. SUPPLEE, O. D. DOW, G. E. FLANIGAN and O. J. KAHLBERG. **A comparative study of liquid and dry milk as anaemia-producing diet.** *J. Nutrition*, **2**, v, 451-69, May 1930.

The production of nutritional anaemia in rats by feeding with raw milk and reconstituted dried milk of normal copper and iron content has been confirmed. Reconstituted dried milk containing increased iron content, resulting from contact with the drying plant, prevented the development of anaemia and cured anaemia in rats. Complete recovery from anaemia occurred when the dried milk contained four times as much iron as normal milk but the recovery was only partial when twice the amount of iron only was present. Supplementing the milk by inorganic addition of iron and copper did not furnish an appreciative degree of protection against anaemia. The results are not conclusive in showing that the copper content of milk is an important factor concerned in the development of anaemia in the rat.

W. L. DAVIES

- B. SURE. **Dietary requirements for fertility and lactation. XXII. Further studies of the rôle of milk fat in fertility and lactation.** *J. Nutrition*, **2**, v, 485-9, May 1930.

The effect of the increase of small amounts of butterfat to a ration satisfactory for growth on fertility and lactation in the rat, was studied by estimating the percentage of the young weaned in the fifth generation. A minimum of 9 per cent. butterfat added to a ration of two parts whole wheat and one part skim milk powder produced optimum results in both fertility and lactation. One of the limiting factors in all the milk diets studied from the lactation standpoint was vitamin B.

W. L. DAVIES

T. OYA. **Über das pH optimum der Milchaldehydrase und die Beeinflussung dieses Fermentes durch Licht.** (The optimum pH of milk aldehydrase (Schardinger enzyme) and the influence of irradiation on the enzyme.) *Biochem. Z.* **215**, iv-vi, 398-401.

Determination by the methylene blue (Thunberg) and the nitrate (Sbarsky) method, the optimum pH of the aldehydrase of milk was found to be 7.35. Irradiation of milk in the presence of atmospheric oxygen greatly reduced the action of the enzyme.

W. L. DAVIES

K. H. COWARD. **The value of irradiated milk compared with cod-liver oil as a source of vitamin D.** *Lancet*, p. 1090, November 23, 1929.

Samples of irradiated milk examined by the "line test" on rats and compared with a standard preparation of irradiated ergosterol varied enormously in anti-rachitic potency. Ordinary milk examined by this method showed almost no anti-rachitic potency.

Irradiated milk is compared with equivalent doses of cod-liver oil.

J. GOLDING

Z. WALLEN-LAWRENCE and F. C. KOCH. **The relative digestibility of unsweetened evaporated milk, boiled milk and raw milk by trypsin in vitro.** *Amer. J. Dis. Children*, **39**, 18-33, 1930. (*Bull. Hyg.* **5**, v, 377, May 1930.)

When raw milk is pasteurised, boiled or evaporated it undergoes changes which make it more readily digested by trypsin than is the raw milk. This has been shown to be due to some heat-labile tryptic inhibitor present in the whey. Although not yet proved, it is anticipated that the inhibitory substance will be found in the albumin fraction of the whey and that probably neither calcium nor phosphorus will be involved.

A. SALMONY. **The influence of ultraviolet rays on liquids in an atmosphere of carbon dioxide.** *Ind. Chem.* **5**, liii, 237-8, June 1929.

A description of Scholl's "Vitamilk" cell for the irradiation of milk in an atmosphere of CO₂.

R. STENHOUSE WILLIAMS

D. NABARRO and J. O. HICKMAN. **Irradiation of milk for increasing its antirachitic potency.** *Lancet*, pp. 127-9, January 18, 1930.

The short time exposure of milk to the direct action of rays from a quartz mercury-vapour lamp hung at a distance of 1 foot from a 21 in. × 22 in. milk cooler, over which the milk flowed at the rate of 1 gallon in 15 minutes, resulted in an increase in the antirachitic potency of the milk. The vitamin A content of the milk was not reduced; but a decrease in the bacterial flora was effected.

The vitamin D content was assayed by the "line test" on rats. The vitamin A was compared by growth of rats on both untreated and irradiated milk in which there was no appreciable difference.

The milk was also fed to three children and the increase in growth and weight is recorded. Observations were also made and good results claimed when the milk was given to children with severe rickets, marasmus, and malnutrition, etc.

J. GOLDING

K. H. COWARD, K. M. KEY, B. G. MORGAN and M. CAMBEN. **The influence of different samples of "casein" on vitamin tests.** *Biochem. J.* **23**, v, 913-20, 1929.

A direct comparison was made of two forms of casein—"vitamin-free casein" (Glaxo) and "light-white casein" (B.D.H.)—as the source of protein in the basal diet of rats. Their growth response when given cod-liver oil varied widely with the sample of casein so fed, indicating that vitamin A tests by different workers would not be comparative. "Light-white casein," even after extraction with alcohol and ether, apparently contains some growth-promoting factor. For vitamin B testing "light-white casein" gave more uniform results than the "vitamin-free casein."

S. J. ROWLAND

H. C. ECKSTEIN. **Influence of ingestion of butterfat on body fat of the white rat.** *Proc. Soc. Exp. Biol.* **27**, v, 419-21, February 1930.

White rats were fed on a fat-free diet, and on diets containing tricaproin and butterfat for 8 weeks, and the constants of their body fats determined. A similarity was exhibited in the saponification number, R.-M. and Polenske values, but the fat from the tricaproin-fed rats had an appreciably lower iodine value. Similar results were obtained on examination of the phosphatides isolated from the three types of fat. Fatty acids of low molecular weight are used to some extent to build up saturated fatty acids of high molecular weight.

W. L. DAVIES

O. H. CADY and J. M. LUCK. **Effect of sulphur-dioxide on vitamin A activity of cod-liver oil, butter and alfalfa.** *Proc. Soc. Exp. Biol.* **27**, iv, 288-9, January 1930.

Treatment of cod-liver oil for as short a time as 15 minutes at room temperature with SO₂ caused complete loss of the growth-promoting, anti-xerophthalmic factor, but under similar conditions destruction of vitamin A did not occur in alfalfa extracts. Butter showed marked vitamin A activity after 2 hours' treatment at 60° C. and even after 22 hours' treatment much of the activity remained when fed at the 5 per cent. level, but partial destruction of the vitamin became evident when the butter was fed at the 2 per cent. level.

W. L. DAVIES

S. I. BECHDEL. **The deposition of minerals in the bones of calves fed rachitic and anti-rachitic rations.** *Pennsylvania Bull.* **243**, p. 17, July 1929.

At this date (May 1928), seventeen calves representing 5 different rations, including the irradiation of feeds and the use of vitamin carrying supplements, are on experiment. These animals will be slaughtered for bone ash determinations when 8 to 11 months of age. Calcium and phosphorus determinations of the blood are progressing. The difficulties previously encountered in getting the calves to thrive on the experimental ration have been overcome and the present subjects should give valuable information on the importance of vitamin D, anti-rachitic factor, in the nutrition of calves.

AUTHOR'S ABSTRACT

P. REYHER. **Vitamin B content of cow's milk.** *Arch. Kinderheilk.* **84**, 55-87, 1928; *Chem. Zbl.* ii, 1813, 1929. (*Brit. Chem. Abst.* B, p. 346, April 18, 1930.)

Winter milk contains less vitamin B than summer milk. Human milk in two cases where the children showed signs of spasmophilia caused polyneuritis in pigeons.

- B. SURE. **Cow's milk as a source of vitamin B for lactation.** *Science*, **70**, 583-4, 1929. (*Physiol. Abst.* **15**, ii, 100, May 1930.)

A ration containing 50 per cent. skimmed milk powder as the only source of vitamin B is inadequate for rearing of young when lactating rats are allowed litters of 6 young to nurse. This defect may be remedied by the addition of yeast. The vitamin B requirements for lactation are at least three times as great as those necessary for normal growth. This is due to the fact that the lactating mother dissipates more than 60 per cent. of the vitamin in the metabolism of transfer to the milk. Much of the paper is polemical.

- J. MALCOLM and E. A. POPE. **Seasonal variation in the vitamin content of New Zealand butter.** *New Zealand J. Sci. Tech.* **11**, 228-30, 1929. (*Brit. Chem. Abst.* **B**, p. 346, April 18, 1930.)

New Zealand butter from mixed and Jersey herds was relatively high in vitamin D, but there was a sharp falling-off at the latter end of the lactation period, May, June and July. In the case of vitamin A, the later butters were frequently richer than the earlier ones.

- E. B. HART, H. STEENBOCK, O. L. KLINE and G. C. HUMPHREY. **Dietary factors influencing calcium assimilation. XIII. The influence of irradiated yeast on the calcium and phosphorus metabolism of milking cows.** *J. Biol. Chem.* **86**, i, 145-55, March 1930.

Cows yielding 4-5 gallons per day were fed irradiated yeast (200 g. per day, equivalent to 4 kg. of cod-liver oil in vitamin D potency) along with a ration of lucerne hay, maize silage, maize and its by-products. No positive influence in improving calcium assimilation was observed; although vitamin D, as shown by the enrichment of the milk in that factor, must have been absorbed into the blood. Feeding with irradiated yeast did not change the composition of blood or milk with respect to calcium and phosphorus and did not cause a disturbance of physiological functioning during the feeding period.

W. L. DAVIES

- E. B. HART, C. A. ELVEHJEM and H. STEENBOCK. **A study of the anaemia of young pigs and its prevention.** *J. Nutrition*, **2**, iii, 277-94, January 1930.

This paper describes experiments in supplementing the minerals of milk so as to avoid the development of anaemia in suckling pigs. The litters of sows, fed on a maize skim milk diet, invariably developed anaemia when 3 to 4 weeks old, the onset of which could not be checked or delayed by feeding considerable amounts of iron and copper to the sow. But the administration of iron and copper salts to the young pigs rapidly cured anaemia. The changing to a diet of cow's milk did not stop the onset of anaemia, but the addition of pure (copper-free) ferric chloride to the milk restored the pigs to normal condition. Exposure to ultra-violet light and sunlight does not stimulate haemoglobin synthesis.

Severe anaemia prevalent in suckling pigs kept indoors can readily be cured or prevented by administering soluble iron salts (equivalent to 25 mg. Fe per day).

W. L. DAVIES

E. W. SCHWARTZE, F. L. MURPHY and R. M. HANN. **Studies on the destruction of vitamin C in the boiling of milk.** *J. Nutrition*, **2**, iv, 325-52, March 1930.

Light boiling of milk for 5 minutes in glass or aluminium vessels destroyed roughly 20 per cent. of the antiscorbutic vitamin of the milk. Winter milk from cows fed on maize silage was found to be as potent with respect to the antiscorbutic factor as that of best summer milk from cows on pasture. This points to the high potential value of milk as a carrier of vitamin C.

This paper contains much constructive criticism on the methods of vitamin C assay and the interpretation of clinical and post-mortem data. W. L. DAVIES

C. P. BERG, W. C. ROSE and C. S. MARVEL. **Tryptophane and growth. II. Growth on a tryptophane deficient basal diet supplemented by tryptophane derivatives.** *J. Biol. Chem.* **85**, i, 207-18, December 1929.

The introduction of the substituent groups, methylene- and benzoyl-, into tryptophane renders the products useless from the nutritive standpoint. On the other hand tryptophane ethyl ester hydrochloride and acetyl tryptophane are utilised for growth purposes as satisfactorily as tryptophane itself.

C. P. BERG, W. C. ROSE and C. S. MARVEL. **III. 3-indole propionic acid and 3-indole pyruvic acid as supplementing agents in diets deficient in tryptophane.** *J. Biol. Chem.* **85**, i, 219-32, December 1929.

3-indole propionic acid is unable to replace the tryptophane, but 3-indole pyruvic acid can replace the amino acid for purposes of growth. The experiments provide proof of the replacement of an "indispensable" amino acid by a synthetic compound.

W. L. DAVIES

C. BARTHEL. **Biochemistry of cheese ripening.** *Svensk Kem. Tidskr.* **42**, 28-40, 1930. (*Brit. Chem. Abst. B*, p. 437, May 16, 1930.)

The biochemical processes which take place in cheese during its ripening are discussed. An improved method has been devised in connection with the nitrogen determinations used in following the changes. The cheese is mixed with quartz sand of grain size 0.3-0.1 mm. in the proportion of 1:2, and the mass pressed to expel the liquid portion; the nitrogen content of the expressed fluid is determined, and the result given as a percentage of the total nitrogen present in the cheese. The figures obtained give a more satisfactory series in experimental work than those resulting from the usual determination of nitrogen in an aqueous extract of the cheese. Using the above method, the effect of the salt content of cheese has been investigated, and the results are tabulated. Even small amounts of salt exert a marked influence on the hydrolysis of the paracasein; furthermore, the hydrolysis of the cheese constituents and the content of lactic acid bacteria appear to bear a direct relationship to one another.

H. J. CHANNON and G. A. COLLINSON. **Blood fat. II. The acetone-ether-soluble fraction.** *Biochem. J.* **23**, vi, 1212-21, 1929.

Hydrolysis of the acetone-ether-soluble fraction of the fat of ox blood at fasting level produced arachidonic, linoleic, oleic, stearic and palmitic acids; 55 per cent.

were present as the cholesteryl ester and about one-half of the remainder as neutral fat. These acids were considerably more unsaturated than those from the phosphatide fraction (precipitated from ether solution by acetone). The bearing of the results on the question of the transport of unsaturated acids from the liver to the tissues is discussed.

S. J. ROWLAND

PHYSIOLOGY

O. L. MOHR and C. WRIEDT. **Short spine, a new recessive lethal in cattle; with a comparison of the skeletal deformities in short spine and in amputated calves.** *J. Gen.* 22, ii, 277-97, 1930.

Mohr and Wriedt have formed an exceedingly useful combination in describing both the anatomy and the inheritance of defects which crop up in cattle. In a homozygous condition the gene for "short spine" produces an extreme shortening of the vertebral column and of the thorax. The calves are carried the full time and except for the shortening are of normal size, but parturition is difficult. The writers conclude that from the fact of a bull which, in fifty-five matings to twenty-seven of his own daughters, gave eleven defective calves, this character is therefore inherited in a simple recessive manner.

There is a review of the anatomy of various kinds of defects in calves and comparison is made between short-spine and amputated (Wriedt and Mohr, 1928). Two different recessive sub-lethal genes produce these two skeletal abnormalities. They are essentially of the same order.

The writers refer to the system already enunciated by them and by Wriedt in his book, that bulls should be tested by twenty matings to their own daughters. (In theory this is doubtless an ideal thing to do but how seldom can it be put into effect!)

A. D. BUCHANAN SMITH

A. MADER. **Experimentelle Untersuchungen zum Bildungsmechanismus der Eiweisskörper in der Kuh- und Frauenmilch.** (Experimental investigations into the mechanism of protein formation in cow's and human milk.) *Milchw. Forsch.* 8, i-ii, 39-64, June 1929.

From a consideration of the evidence obtained by other workers it is concluded that the differences between the milk of different species are mainly those of a qualitative biological nature, and that the specificity of milk is practically confined to the protein substances.

As the available evidence goes to show that the milk is actually synthesised in the mammary gland, the ultrafiltrate (by dialysis) of milk was investigated to find out whether differences occurring in it formed the basis of species differences in the milk proteins themselves.

The effect of intramuscular injection of the ultrafiltrate of both cow's and human milk on the leucocyte content of the blood was investigated. Apart from the leucocytosis associated with a rise in the temperature curve, there was no marked difference between the effect of the filtrates from the two species. It was therefore concluded that it was not the ultrafilterable material which was the cause of the species-specific character of the milk. A comparison of NH_3 nitrogen was then made, and it was found that human milk had about three times the amount that exists in cow's milk.

Measurements with Traube's stalagmometer showed no difference between the

ultrafiltrate of cow's and human milk in surface tension other than a slightly higher value for human milk. Data are also presented on the lactosuria usually associated with parturition.

After a consideration of the evidence also obtained by other workers, it is concluded that, just as in each species a number of different modifications of the protein molecule are formed from the amino acids, so the mammary gland in the synthesis of its proteins builds them up by an elective selection and grouping of the amino acids, and so produces the species-specific differences in milk.

J. HAMMOND

W. E. PETERSEN, L. S. PALMER and C. H. ECKLES. **The synthesis and secretion of milk fat. I. The time of milk and fat secretion.** *Amer. J. Physiol.* **90**, iii, 573-81, November 1929.

Experiments were carried out to determine whether all the milk drawn from a high-yielding cow is contained in the udder at milking, or whether part of the milk is secreted during milking. For this purpose comparisons were made between the amounts of milk drawn (a) from each quarter for several days before slaughter, (b) from two quarters immediately prior to slaughter, and (c) from the two remaining quarters after removal of the complete udder from the slaughtered animal. The latter figure was obtained by excising the gland after slaughter, attaching it to a suitable frame, and hand-milking the two un milked quarters. Owing to the slow drainage of the milk remaining after the emptying of the milk cisterns, milk was drawn from these two quarters up to 20 hours after slaughter. The actual amounts drawn at intervals during this period are not given, the figures being limited to the total amounts drawn for the complete 20-hour period.

Under these conditions, the post-mortem milk yield from the two un milked quarters was found to be at least as high as that from the two quarters milked immediately before slaughter, and this again approximated the yield obtained at normal milkings during the days preceding slaughter. It is concluded that the udder not only can, but does, contain practically all the milk produced at a milking; and it is pointed out that, in all probability, milk is secreted at a more or less constant rate during the intervals between milking.

Analyses of the milk obtained before and after slaughter demonstrated a lower fat percentage in the milk drawn from the excised gland. Further, while the fat percentage of samples taken throughout milking rises under normal conditions, it first rises and then falls in the post-mortem milkings. The solids-not-fat fall slightly as post-mortem milking proceeds, but the authors suggest that this may be due to a dilution effect consequent on the dehydration of the tissue cells.

N. C. WRIGHT

W. E. PETERSEN, L. S. PALMER and C. H. ECKLES. **The synthesis and secretion of milk fat. II. An analytical study of the fat of the bovine mammary gland.** *Amer. J. Physiol.* **90**, iii, 582-91, November 1929.

In order to elucidate the factors concerned in the secretion of milk fat, investigations were undertaken to determine the quantity and constants of the tissue fat of the mammary gland in different stages of gland development.

It was found that the fat constituted, on an average, 40 per cent. of the total dry matter of the gland of a lactating animal. When lactation ceased, there was a progressive atrophy of the gland, and this atrophy was accompanied by a decrease in both percentage and total quantity of fat. There was, however, an increase in the amount of fat deposited in other parts of the body. It was concluded that the con-

ditions responsible for fat deposition in the mammary gland differed from those responsible for fat deposition in other parts of the body. There were also indications that the ratio of fat to total dry matter in the gland determined the ratio of fat to total dry matter in the milk produced.

The nature of the fat of the lactating gland was found to differ widely from that of the non-lactating gland, being intermediate between butterfat and body fat, as judged by iodine number, Reichert-Wollny number, and saponification value. It was fully demonstrated that this difference could not be attributed to retention of a portion of the milk contained in the lactating gland.

It is concluded that the tissue fat of the mammary gland is concerned in the synthesis of the milk fat.

N. C. WRIGHT

W. E. PETERSEN, L. S. PALMER and C. H. ECKLES. **The synthesis and secretion of milk fat. III. A study of the activity of the perfused surviving gland, with special reference to the fat.** *Amer. J. Physiol.* **90**, 592-9, November 1929.

It was shown in the first paper of this series that post-mortem milking from an excised mammary gland was accompanied by a lowered percentage of fat. Perfusion experiments on the excised glands of five animals, using "Locke-Rosenhein saline," failed to cause the secretion of the fat calculated to be present in the gland. Perfusion with saline containing an emulsion of corn oil caused no increase in the fat percentage. Corn oil emulsion stained with Sudan III failed to impart any colour to the milk fat, but the fat cells of the gland were found, on microscopic examination, to be stained. The earlier work of Foá is therefore not substantiated.

N. C. WRIGHT

C. WRIEDT. **The inheritance of butterfat in crosses of Jersey with Red Danes.** *J. Gen.* **22**, i, 45-63, 1930.

This paper describes the cross breeding experiments of Jersey by Red Danish cattle commenced by Count Ahlefeldt Laurviggen at Langeland. The records run from the year 1906 and the investigations comprise a total of 1175 cows. After describing the method of taking the butterfat percentages and correcting for various factors other than hereditary, the author states that the 108 Red Danish cows used had an average butterfat percentage of 3.4, varying from 2.8 to 4.4. A similar figure was not obtainable for the Jerseys since only bulls of this breed were used. However, the author obtains a figure by taking the average of the butterfat percentage of the Jersey daughters of the four Jersey bulls having the greatest number of F_1 daughters. Thus the average percentage for 66 Jersey cows was found to be 5.57, varying from 4.7 to 6.6. The first cross generation had an average butterfat percentage of 4.39, varying from 3.4 to 5.5. The back-cross of the F_1 females by Red Danish bulls shows an average percentage of 4.4. There were 42 cows in this group the variation being from 3.3 to 5.0. 49 F_1 cows were back-crossed to the Jersey, giving an average butterfat percentage of 4.82, varying from 4.0 to 5.9. The writer concludes that there is thus a very clear segregation of the factor for high percentage butterfat content in milk. He attributes this to a single factor difference. There are some interesting correlations as well as some additional figures on other matings.

[The writer forgets to point out that butterfat percentage is a ratio of total butterfat yield compared to total milk yield, that Gowen and others have stated that butterfat and milk yield are inherited to a great extent independently of each other, that both butterfat and milk yield are probably dependent on more than a single factor and that it is, therefore, improbable that one genetic factor can account for the difference in butterfat percentage between two breeds of cattle.]

A. D. BUCHANAN SMITH

DAIRY HUSBANDRY

T. RIGG and H. O. ASKEW. **Mineral contents of some typical pastures in Waimea County.** *New Zealand J. Agric.* **38**, v, 304–16, May 1929.

The authors describe an examination of certain hill pastures in Waimea County, the basis of selection being a soil map of the county, pastures typical of various soil types being chosen.

Method. Pasture samples were collected in April 1928 from six soil types which had widely different soil characteristics, and had not been treated for many years.

The soils were analysed chemically as well as the pasture grasses and the latter were examined botanically.

Complete tables of analyses are given.

Two pastures (Pikikiru and Orinoco) are high in CaO and P₂O₅ for untreated hill pasture. Their soluble ash and nitrogen figures approach those for top-dressed pastures on alluvial flats. On the whole these hill pastures have a higher mineral content than British hill pastures and the N and Cl content is much higher. There is no close correlation between chemical criteria of the soils and the mineral content of the pastures. It is true that soil types abnormally low in phosphate are associated with pastures having a low percentage of P₂O₅, but when the P₂O₅ rises above a certain figure comparatively little difference is shown in the phosphate content of the pastures.

The poorer pastures show low Fe and high Mn content and also have a high silica content.

Pasture on alluvial flats. The analyses of the Nelson pastures on alluvial flats considered satisfactory by stockmen show many differences from our averages for British cultivated pastures.

	CaO	P ₂ O ₅	K ₂ O	Na ₂ O	Cl	N	T Ash	Soluble Ash
Nelson samples average of 8	0.83	1.06	3.96	0.49	1.45	5.34	11.69	9.10
Average British cultivated	1.00	0.74	3.18	0.25	0.95	2.83	9.79	6.64

It will be noted that the CaO:P₂O₅ ratio in these New Zealand pastures is the reverse of that of the British pastures.

The protein content of these grasses is much higher than in Woodman's figure for his weekly cuts.

Tables of analyses of pastures giving poor or indifferent results with stock are given.

In the Hope and Skerry Rivers district there are definite symptoms of bush sickness and this is confirmed by analysis of pasture samples, the autumn samples being particularly low in iron.

J. A. CRICHTON

F. HONCAMP, P. MALKOMESIUS and A. PETERMANN. **Studies of the composition, digestibility and feeding value of linseed cake and extracted linseed meal.** *Z. Tierzücht. Züchtungsbiol. Tierernähr.* **15**, 277–88, 1929. (*Chem. Abst.* **23**, xxii, 5518, November 20, 1929.)

In feeding trials with dairy cows, linseed cake and extracted linseed meal proved of substantially equal value as determined by the quality and fat content of the milk produced. The two products were included in rations which were kept identical as regards intake of digestible protein and starch value per 1000 kg. live weight. The two products were substantially alike as regards digestibility.

G. J. LEVY. Possibilities of certified milk in Memphis.

C. I. CORBIN. Progress in the control of the production of certified milk.

A. R. B. RICHMOND. Report of the Committee on Bovine Diseases. Their relation to the milk supply and the public health. *Int. Assoc. Dairy and Milk Insp. 18th Rept.* pp. 187-93, 193-6, 205-17, 1929.

These papers are all concerned with the importance of maintaining adequate control of milk which is to be sold in the fresh state. R. STENHOUSE WILLIAMS

M. FOUASSIER. L'hygiène laitière. (The hygiene of milk.) *Rev. d'Hyg. et de Méd. Prév.* 51, 5-32, 1929. (*Bull. Hyg.* 4, xii, 1006, December 1929.)

Experiments with dairy cattle at the Iowa Station. *Iowa Station Report*, pp. 21-3, 1927. (*Exp. Sta. Record*, 59, i, 72-3, July 1928.)

Milking machines. A three years' study of milking machines has brought out the following points:

The machine does not influence the amount of milk produced, but does increase the tendency to udder troubles when not properly handled. From 91 to 96 per cent. of the milk is obtained in the first 5 minutes, and to prevent trouble the remaining milk should be stripped by hand. Great care must be used in handling the machines to keep the bacterial count low. The amount of sediment is usually less in the machine-drawn milk. An average saving of 54 per cent. in time required for milking (exclusive of care of equipment) is effected by the use of machines, and the greatest economy in milking is obtained where a large number of cows are milked.

J. F. MALCOLM. Pure milk production. *Scot. J. Agric.* 13, ii, 153-63, April 1930.

Z. R. KOTHAVALA, *et al.* An investigation into the variation of fat and solids-not-fat in cow's milk drawn at different times during the process of milking. *J. Cent. Bur. Animal Husb. Dairying, India*, 3, iv, 122-31, January 1930.

REIMUND. Günstige Ergebnisse der Gesundheits- und Milchkontrolle bei etwa 8000 Milchkühen. (Favourable results of health and milk control with some 8000 dairy cows.) *Molkereiztg.* ii, 2133-7, 2149-52, 1929. (*Zbl. ges. Hyg.* 21, xiv-xv, 664, March 10, 1930.)

P. F. KRUEGER. Chicago's programme for securing a satisfactory quality of raw milk for pasteurisation. *Int. Assoc. Dairy and Milk Insp. 18th Rept.* pp. 63-8, 1929.

H. SEELEMANN and O. BISCHOFF. Die praktische Durchführung der Milchkontrolle zur Erzeugung einer gesunden Trinkmilch auf Grund eigener Erfahrungen. (The practical exercise of milk control with the object of establishing a healthy milk supply for human consumption.) *Molkereiztg.* ii, 2367-9, 1929. (*Zbl. ges. Hyg.* 21, xiv-xv, 664, March 10, 1930.)

F. BREITFELD. Die Entwicklung der Milchleistungsprüfungen im Zuchtgebiet der Herdbuchgesellschaft Mittelweser. (The development of milking capacity tests by Middle Weser Herd Book Society.) *Deuts. Landw. Tierärztl.* No. 51, 989, 1929. (*Milchw. Zbl.* 59, i, 8, January 15, 1930.)

H. H. MITCHELL. **Minimum protein requirements of cattle.** *Bull. Nat. Research Council (U.S.A.)*, 67, 84, 1929. (*Chem. Abst.* 23, xxii, 5491-2, November 20, 1929.)

A bibliography and a review of the literature are given. Sherman's value of 0.6 g. of N per kg. of body weight as the minimum protein requirement for maintenance of N equilibrium and the values of others, ranging from 0.4 to 0.7 g., seem to be too high, even if allowance is made for a large margin of safety. Low values of 0.2 g. of N have been published along with evidence that shows that the animal adjusts itself to a low N intake. A value of 0.3 g. per kg., or 0.19 lb. of protein per 1000 lb. of body weight, is a safe minimum for pigs, sheep, cattle and men. The protein requirement for growth is measured by the rate of deposition of protein in the tissues of growing animals and must be differentiated from the protein requirement of fattening. The only reliable evidence from which the N requirement of growing cattle can be estimated is that of Massachusetts Agric. Experimental Station.

N retention is from 1/3 to 1/2 that predicted from the Armsby equation. It seems improbable that there is any such generalised relation between gain in protein and age of the animal, as assumed by Armsby. The "equivalent age" of Brody rather than the "absolute age" of Armsby may prove more useful in calculating rate of growth. The protein requirements for fattening, pregnancy and milk production are discussed. The problems of nutrient requirement of animals will be solved satisfactorily only when it is factored into its ultimate and independent terms of size, stage of gestation or rate of milk production.

O. E. REED, C. F. HUFFMAN and L. H. ADDINGTON. **Cotton-seed meal as a feed for dairy calves.** *J. Dairy Sci.* 11, vi, 488-517, November 1929.

When the calves were fed excessive cotton-seed meal they showed effects of nutritional deficiency similar to that obtained by feeding excessive concentrates. The deficiency which occurred could be controlled by reducing the amount of cotton-seed meal and giving larger quantities of roughage. The authors conclude that at least 2 lb. of cotton-seed meal daily can be fed to calves, 5 months old or more, which are receiving all the silage and hay of good quality that they will eat.

S. BARTLETT

J. B. ORR, A. CRICHTON and W. MIDDLETON. **A note on the toleration of farm animals for high doses of iodine.** *Vet. Record*, 9, xlviii, 1055-6, November 30, 1929.

Increasing doses of iodine were given to 3 calves, 2 pigs, 2 sheep, and 4 poultry, the age or weights of which are not given. A similar number of controls were kept. It was found that calves would tolerate 3.5 g. per day, pigs 5.75 g. per day, sheep 0.3 g. per day and poultry 0.3 g. per day.

When these doses were exceeded symptoms of iodism were produced, which passed off when the iodine was discontinued. There appears to be, therefore, a wide margin of safety for feeding iodine in practice.

W. L. LITTLE

DAIRY INDUSTRY

A. F. EAGLE. **San Francisco's milk supply and its problems.** *Int. Assoc. Dairy and Milk Insp.* 18th Rept. pp. 218-26, 1929.

The author gives an account of the methods adopted in San Francisco for the control of its milk supply. He states that San Francisco receives about 50,000 gallons of milk daily, of which 97.38 per cent. is pasteurised. This milk is standardised at 4 per cent. butterfat, and its quality is steadily improving.

He mentions a typhoid epidemic in 1928 which was due to a carrier who was employed at the bottling and capping machine of a pasteurising plant.

R. STENHOUSE WILLIAMS

H. GIESE and M. MORTENSEN. **Creamery organisation and construction.** *Iowa Bull.* 267, February 1930.

S. CLEMMESSEN. **Investigations on sterilisation by steam. A new principle for the sterilisation by vaporable disinfectants.** *J. Hyg.* 29, iii, 282-300, December 1929.

The author concludes that steam sterilisation of such materials as earth, surgeons' smocks, etc., can be materially hastened either by "sucking out steam by means of a vacuum" or better still by "sucking it out assisted by a simultaneous blowing in of the steam."

R. STENHOUSE WILLIAMS

W. M. MITCHELL. **Stainless alloys and their importance in dairy industries.** *Milk Plant Mo.* 18, xii, 18-21, December 1929.

Stainless steel alloys with a minimum content of 16 per cent. chromium are suitable for dairy plant construction and utensils for the manufacture of all dairy products except highly acid acidophilus milk. Chrome nickel alloys are also satisfactory from the corrosion standpoint. Certain difficulties in working the alloys are encountered. Seaming operations will present some difficulty. Size ranges are limited owing to the toughness of the alloy. Polishing is difficult and costly, but a satisfactory cold roll finish can be obtained. Castings are made with the same ease as with other metals. At present the production of these alloys is low.

W. L. DAVIES

H. E. SEARLE. **Selecting materials of construction for dairy machinery, with special reference to the properties of nickel.** *Milk Plant Mo.* 19, iii, 17-21, March 1930.

The numerous requirements of a material of construction for dairy machinery are outlined. Nickel, in that it is an easily worked metal of good mechanical properties, resistant to the action of brine, caustic soda and abrasive materials, and not conferring a flavour on milk and its products, is claimed to meet these requirements satisfactorily. Chlorinated caustic soda attacks nickel but dilute acids do not affect it. Milk under certain conditions will tarnish the metal.

W. L. DAVIES

H. ZELLER. **Recent experiments concerning the efficiency of low-temperature pasteurisation of milk in modern plants.** *Reichs-Gesundheitsblatt*, 4, 219-22, 1929. (*Bull. Hyg.* 4, xii, 1012, December 1929.)

J. ALQUIER. **Mechanical milking and the employment of cold in the milk industry.** *Bull. Soc. Sci. d'Hyg. Alimentaire*, 17, 1-43, 1929. (*Bull. Hyg.* 4, xii, 1009, December 1929.)

Traitement du lait par le chaleur. (Heat treatment of milk. Stassanisation.) *Le Lait*, 10, xciv, 382-91, April 1930; xciv, 493-508, May 1930.

HEINE. **Neue Molkereiapparate.** (New dairy apparatus. Instantaneous milk heater.) *Dtsch. tierärztl. Wschr.* 37, 641, 1929. *Milchw. Forsch.* 9, v-vi, Ref. p. 133 (March) 1930.

F. H. McDOWALL. **Metals for dairy machinery. Report to Dairy Research Committee.** *New Zealand J. Sci. Tech.* 11, 14-25, 1929. (*Chem. Abst.* 23, xxii, 5512, November 20, 1929.)

Tinned Cu is used most for dairy apparatus. As the Sn wears, Cu is in contact with milk or cream. Cu alloys like monel and silveroid are not substitutes for tinned Cu. Al is suitable for vats and tubes only if pure. Fabricated Al is better than cast. Al is too soft for cheese vats or milk cans, but experiments are being made with Al-Mn alloys. Al apparatus must not be cleaned with NaOH or Na₂CO₃, but by a Na₂CO₃-Na₂SiO₃ mixture. Ni can be used for milk apparatus. It dissolves to some extent but does not affect taste. Experience with stainless steels has been variable, because of difference in manufacture. Cr-Ni steels are satisfactory in all respects.

S. V. SANDMAN. **Cream quality.** *Tasmanian J. Agric.* 1, ii, 70-2, February 1930.

This is a brief article indicating that the quality of Tasmanian dairy produce is dependent on the sanitary conditions under which the milk is produced. Suggestions are made whereby suitable conditions for the production of good quality cream may be obtained.

D. V. DEARDEN

A. C. DAHLBERG and J. C. MARQUARDT. **The creaming of raw and pasteurised milk.** *New York State Agric. Exp. Sta. Tech. Bull.* 157, October 1929.

This bulletin describes a very complete series of experiments on the creaming of milk, in which numerous previous experiments are repeated and extended. A theory of the clustering of the fat globules in milk is proposed whereby the calcium ions are considered to be responsible for fat clumping. The conditions found necessary for obtaining the maximum cream layer volume on pasteurised milk are: (1) The fat globules should be retained in their normal condition by prevention of excessive churning, agitation, freezing or oiling off. (2) Pasteurisation should be slightly less than 145° F. for a holding period of 30 minutes. (3) Milk should be cooled by a surface tubular cooler to 40° F. or below and bottled immediately. (4) The milk should be sold 2 to 6 hours after bottling, as the cream layer volume shrinks on standing. (5) The milk should be held at 40° F. or below, for the cream shrinks in volume very markedly at 50° F. or above.

W. J. WILEY

R. T. MACKENZIE. **The care of cream.** *J. Dept. Agric. Victoria*, 28, ii, 94-7, February 1930. (Including description of taints and their causes.)

Attention is drawn to the production of off-flavours in cream through the use of imperfectly sterilised utensils, and directions for the cleaning of milking machines and utensils are given.

W. L. DAVIES

H. B. ELLENBERGER and H. L. WHITE. **The keeping quality of stored dairy products.**
I. Metallic flavour in frozen cream. *Vermont Sta. Bull.* 299, 1929. (*Exp. Sta. Record*, 62, iii, 259, February 1930.)

Cream of best quality only should be stored. Owing to the effect of heavy metals it is advisable that such cream should not come in contact with bare iron or copper

surfaces or corroded iron surfaces before freezing, and storage should take place in well-tinned receptacles or lacquered cans. High quality cream may be stored for at least six months in the frozen state without deterioration of flavour.

W. L. DAVIES

J. A. NEWLANDER and H. B. ELLENBERGER. **The keeping quality of stored dairy products. II. Comparative keeping quality of cream, butter and butter oil.** *Vermont Sta. Bull.* **299**, 1929. (*Exp. Sta. Record*, **62**, iii, 259, February 1930.)

This section describes a study of the effect of temperature on the keeping quality of cream, butter and butter oil. Cream of high quality kept for 4 to 6 months when held at 0° F. Butter did not keep well at temperatures above 0° F. While some butter oils remained in good condition for short periods at temperatures as high as 50° F., it is recommended that butter oil be stored at 0° F. Butter oil from average quality cream kept better at 0° F. than the cream itself or butter made from it.

W. L. DAVIES

W. H. UDY. **Butterfat losses in buttermilk.** *New Zealand J. Sci. Tech.* **11**, iv, 249-54, December 1929.

Tables are given indicating the butterfat losses in buttermilk from fourteen different butter factories, operating under different conditions of manufacturing and cream supply. 320 samples of buttermilk showed a fat content of 0.48 to 1.41 per cent., representing 0.70 to 1.75 per cent. of the fat received being lost in the buttermilk. The economic significance of such losses is stressed.

W. L. DAVIES

W. WHITE, C. S. TRIMBLE and H. L. WILSON. **Keeping quality of butter made from cream of various acidities.** *U.S. Dept. Agric. Tech. Bull.* **159**, October 1929.

Butter made from cream of 0.15 to 0.31 per cent. acidity kept well for 8 months at 0° F. In 12 months slight deterioration of the butter from the high cream had occurred. Butter, held at 30°-50° F. for 4 months, showed that deterioration was greatest for butter from cream of greater acidity (0.31 per cent.). The same was observed for a storage temperature of 0-20° F., storing for 8 to 11 months.

Commercial butter from creams up to 0.3 per cent. acidity stored at 0° F. for 5 months, kept its quality irrespective of cream acidity. Butter from cream of acidity higher than 0.3 per cent. deteriorated slightly under the above storage conditions. Cream ripened with a lactic culture improves butter when fresh, but the improvement is lost during storage.

W. L. DAVIES

Les nouveaux appareils en laiterie. X. Machine pour le moulage et l'empâquetage combinés du beurre. (New dairy apparatus and butter packer.) *Le Lait*, **10**, xciv, 596-8, May 1930.

F. CHEMNITIUS. **The technique of rennet manufacture.** *Chem. Ztg.* **53**, 705-6, 1929. (*Chem. Abst.* **24**, i, 169, January 10, 1930.)

Choice calves' stomachs, cut into pieces 1 × 5 cm., are extracted with a solution of NaCl and H₃BO₃ at 28°, with constant stirring for 84 hours. The layer of fat is removed, the mucin allowed to separate, pressing with admixed cellulose follows. To the extract CaCl₂ is then added an equivalent amount of Na₂SO₄, with long-continued stirring at 28°; filter-pressing yields a solution which is treated with NaCl and H₃BO₃ and which has finally a specific gravity of 1.10 to 1.16. To make rennet powder NaCl is again added, stirring continued 1.5-2 days at 28°, the precipitate filtered on paper, the precipitate then mixed with NaCl, the product dried at 30°

and ground in a ball mill. It has then a value of 1:250,000 to 1:300,000. If the product must be free from H_3BO_3 , EtOH is used as a preservative. To test the coagulating power of the enzyme 1 g. samples of the powder or 10 g. of the extract are made up to 100 c.c., 5 c.c. portions pipetted out and added to 50 c.c. of milk at 42°; the coagulation point is checked with a stop-watch, using a standard powder (1:100,000) for comparison.

J. F. BLACKSHAW. **The grading of home-produced cheese.** *J. Roy. Agric. Soc. England*, **90**, 90–102, 1929.

Particulars are given of the formation of the Cheshire Cheese Producers' Federation and the English Cheddar Cheese Producers' Federation and of the scheme by which the improvement and safeguarding of the respective industries was attempted. The author states that it is too soon to discuss seriously the practical results but that there are indications of an improvement in the standard of production and a broadening of the market, and that prices have been influenced in favour of the producer.

D. V. DEARDEN

J. HAWESSON. **Influence of rennet ferment on the ripening of cheese. Experiments with Russian Backstein.** *Le Lait*, **9**, lxxxii, lxxxiii, lxxxiv, lxxxv, 2–12, 148–61, 358–79, 500–17, January, February, April and May 1929.

In 1871 Curtis pointed out in reference to Cheddar cheese that it ripened quickly or slowly according to the quantity of rennet added. In 1878 Manetti and Musso stated that the rate of ripening of Parmesan cheese did not depend entirely upon the amount of rennet, but that there were other factors in the process. Later writers did not agree with Manetti and Musso.

Orla Jensen in 1901 found that in whole milk cheese and cream cheese (*fromage gras*) there was no increase in the quantity of soluble nitrogen present when pepsin was added. On the other hand in skim milk cheese (*fromage maigre*) there was an increase.

In 1905 Spallanzani and Bertozzi found an increase in the amount of soluble nitrogen when pepsin was added in the making of Parmesan cheese.

Manetti and Musso in their article stated that since the addition of higher quantities of rennet gave rise to a curd of greater compactness and less humidity, it should follow that the ripening process would be delayed, and that if in practice the hastening of the ripening occurred then the excess of rennet must either be capable of neutralising or even assisting the delaying influence which should result from the lesser quantity of water contained in the curd.

In 1893 Van Slyke studied the influence of various factors upon the ripening of Cheddar cheese. He made six cheese: (1) whole milk plus cream, (2) whole milk from which a part of the cream had been removed, (3) whole milk which had been exposed to a harmful atmospheric condition, (4) cheese made under conditions which favoured the presence of an excess of water, (5) with 3 oz. of rennet for each thousand pounds of milk, (6) with 9 oz. of rennet for each thousand pounds of milk.

The results obtained were comparable with those of previous workers, namely, that the greatest quantity of soluble nitrogen was found in the cheese prepared with the greatest quantity of rennet.

Babcock and Russell (1900) made an even more careful study of a similar character with results which once more agreed with those of Van Slyke, etc. They explained the phenomena of the presence in the rennet of a proteolytic enzyme in association with a coagulating enzyme, but they also thought that there was a third ferment, galactase, which produced "amines and ammonia," while the enzyme in the rennet did

not break down the nitrogenous constituents of the milk beyond pure peptones and albumoses. Therefore, in their opinion, increasing the quantity of rennet in the making of cheese did not affect the amount of soluble nitrogen in the form of peptones which can be precipitated by phosphotungstic, that is to say, the amine and ammoniacal, forms. Only the albumose and the peptones which could be precipitated by tannin were increased. They attributed the increased decomposition of the products to pepsin present in rennet.

The authors carried out experiments in which they added pure pepsin to ordinary rennet and found that it resulted in an increased quantity of soluble nitrogen. The addition to the pepsin of hydrochloric acid did not produce a more marked degradation.

Finally they noted the analogy between the action of pepsin and that of rennet in that either increases the quantities of soluble nitrogen of the order of albumose and peptones which are precipitated by tannin. They concluded once more that the increase of soluble nitrogen produced by rennet was due to its pepsin content. The views of Babcock and Russell have not been contradicted, although the presence of galactase has not been established, since it is quite possible to obtain normal ripening of cheese made from pasteurised milk to which cultures made from lactic acid bacteria have been added. Van Dam pointed out that there is a considerable amount of degradation of cheese in the early days of ripening and that, therefore, if galactase was of importance in the proteolytic degradation of cheese there should be rapid disintegration of the casein of milk without the addition of any other treatment. This is not the case, and he concludes that if galactase plays any part in the action, its share must be insignificant.

Gorini 1927 thought that galactase could be identified with the weak proteolytic enzymes produced by micro-organisms which are common in the udder. It is to be noted that Babcock and Russell make no mention of micro-organisms in the process of ripening.

In 1903 Van Slyke, Harding and Hart studied the question of the identity of the action of pepsin and that of rennet by their capacity to peptonise casein, and adopted various devices to try and exclude the influence of bacteria as, for example, the heating of the milk to temperatures which varied between 85 and 98° C. and then rapidly cooling, and in treating the rennet with chloroform. In some cases 0.2 per cent. lactic acid was added before coagulation took place.

They found that in some cheese made from pasteurised milk and rennet, which had been treated with chloroform, there was no marked increase in the amount of soluble nitrogen at the end of 16 months. The cheese made from milk with lactic acid contained much more soluble nitrogen than that made from milk to which acid had not been added. They calculated that the proteolytic increase was due to pepsin in the rennet which preferred an acid medium. They then proceeded to study the influence of the addition of lactic acid culture with the addition of a small quantity of peptonising bacteria. They also studied the influence of hydrochloric acid and of increasing quantities of pepsin and found that, at the end of 9 months, cheese made with lactic acid culture contained 22 to 28 per cent. of soluble nitrogen in comparison with the whole nitrogen present. The cheese treated with hydrochloric acid contained 28 per cent. at the end of 6 months, that treated with pepsin contained 46 per cent. at the end of 3 months.

Lastly the authors carried out further studies which led them to believe that there was present in fresh rennet an enzyme which differs from pepsin and is capable of acting on albumose in a neutral medium. They thought that this enzyme played a small rôle in the ripening of cheese. They were the first to demonstrate the presence in rennet of an enzyme capable of acting in a neutral medium, and they identified it

with the pseudopepsin of Glaessner 1901, which he considered had the following properties: (1) it could act in feebly alkaline medium in which pepsin is destroyed, (2) it produces tryptophane, (3) its activity is not destroyed by acids as trypsin is, or the proteolytic ferments of the liver.

Indeed it can act even in the presence of 0.3 per cent. free hydrochloric acid like true pepsin. Pekelharing thought that Glaessner's pseudopepsin was an autolytic ferment derived from the mucous membrane of the stomach, and not the product of the secretion of the glands of the stomach. It would appear, however, that the experiments of Van Slyke, Harding and Hart showed that the amount of enzyme causing proteolysis in the neutral medium was much greater than Pekelharing would lead one to believe, and that therefore his explanation did not meet the case.

In 1903 Van Slyke and Hart carried out further work and found that the addition of large quantities of rennet was harmful to the quality of the cheese. Their results were very similar to those of Babcock and Russell, but they attributed the formation of amines and aromatic substances, not to galactase, but to the predominating bacteria. Further they gave an exact interpretation of the influence of humidity on the peptonisation of nitrogenous material present in the cheese, which agreed with the results of Van Dam, who has most carefully studied this problem.

In 1904 Orla-Jensen published work on the influence of pepsin added to rennet on paracasein. This he did both separately and in combination with the two most important bacteria for the ripening of Limburg cheese, *Bacterium lactis acidi* and *Bacillus casei limburgensis*. The result showed that the pepsin added to the rennet, which had been sterilised by filtration through a Pasteur-Chamberland filter, greatly increased the proteolytic activity of the micro-organisms.

Orla-Jensen explained this by the activation of the pepsin by the lactic acid which was present, but, in fact, increase in the proteolytic changes took place in the presence of *B. casei limburgensis*, which gave rise to a culture that is alkaline to phenolphthalein.

Orla-Jensen offers no satisfactory explanation of this phenomenon except to say that this organism produces primary albumoses, that is to say, acts in a fashion similar to that of rennet.

R. STENHOUSE WILLIAMS

R. WHITAKER. **The influence of the use of butter on the freezing properties of ice-cream mix.** *J. Dairy Sci.* 13, i, 1-7, January 1930.

The object of these experiments was to determine whether ice-cream mixes containing unsalted butter possessed as good freezing properties as mixes of identical composition containing cream. In these experiments the same batches of fresh cream were used to supply the cream required, and also for the manufacture of the butter and buttermilk used. Skim milk powder was employed to raise the milk solids-not-fat content to the required percentage, and also to balance in the "butter" mixes the milk solids-not-fat of the cream. All mixes contained 0.5 per cent. gelatine, were pasteurised, homogenised, cooled, and aged at 35° F. for 24 hours.

It was found that the mixes made with butter did not whip as rapidly nor to as high a maximum as the mixes made with cream. Consequently a further trial was made using three mixes, namely, one made with cream, one with butter and its (sweet) buttermilk, and one with butter and skim milk powder; the basic viscosity of the last mix was much higher than that of the other two mixes; it also took longer to freeze the "butter and skim milk powder mix," and the percentage overrun was lower for the desired consistency. Microscopic examination of the mixes showed that in those mixes containing the buttermilk portion of the cream the fat globules did not

gather in such large aggregations during homogenisation, and Whitaker suggests that this phenomenon may be due to the fat emulsion being stabilised by lecithin, which is present in larger quantities in cream and buttermilk than in milk, butter, etc. Whitaker also suggests that the value of egg yolk as an emulsifying agent may be due in part to the high content of lecithin.

F. PROCTER

H. DAMM. **Kefir, yoghurt and acidophilus milk.** *Apoth. Ztg.* **44**, 1127-30, 1929. (*Chem. Abst.* **24**, i, 201, January 10, 1930.)

A discussion of the methods for preparing these products and their relative value for human consumption.

Established standards of quality in dry milk industry. New grading system in effect November 1. *Milk Dealer*, **19**, ii, 122-6, November 1929.

The American Dry Milk Institute adopted a new grading system of dry skim milk to take effect from November 1, 1929. They have also published an important leaflet on "The Grading of Dry Skim Milk," a free copy of which may be obtained from the American Dry Milk Institute, 160 N La Salle St, Chicago, Ill. The grades are described and standard methods of testing set down.

There are three grades. Extra Grade is the best quality which can be produced. Standard Grade comes next, and Third Grade is milk powder which is not sold for human food.

A testing service is also arranged for. Details of the analysis to which the extra and standard grades must conform are given for spray dried, vacuum drum dried, and roller dried milks.

J. GOLDING

P. ROSSI. **Le sérum de caséinerie et quelques sousproduits de l'industrie laitière, leurs propriétés et leur valeur alimentaire.** (Whey and some by-products of the dairy industry, their properties and feeding value.) *Le Lait*, **10**, xcii, 136-41, February 1930; xciii, 278-91, March 1930.

The author describes the preparation and physical and chemical properties of whey. He discusses in great detail its use as a food more especially for pigs, and in particular the value of its more important constituents. He mentions dried whey, skim milk and butter milk and ends with an extensive bibliography of which the paper is a review.

J. D. GARRARD

E. P. PARTRIDGE. **Improved system for spray drying and recovery of product.** *Ind. and Eng. Chem.* **22**, vi, 601-3, June 1930.

A description of the plant used for drying a milk product, adjusted to the composition of human milk, is given. The capacity is 1700 to 1800 lb. of water evaporated per hour.

W. J. WILEY

E. F. ELDRIDGE. **Studies on the treatment of milk-products waste. Progress Rept. No. I.** *Michigan State Coll. Eng. Exp. Sta. Bull.* **24**, 3-26, 1929. (*Chem. Abst.* **24**, i, 188, January 10, 1930.)

The use of FeSO_4 and lime for chemical precipitation, if properly carried out, gives a constantly clarified effluent, and one which is in good condition for secondary treatment on a biological filter. 4 lb. of copperas per 1000 gallons is the minimum quantity of this chemical for proper and efficient treatment. Lime or NaOH in sufficient quantities to give a phenolphthalein alkaline, is necessary for good floc

formation. By adding the copperas first less lime is needed for floc formation provided the waste is fresh. If the waste is sour, the reverse order of application is necessary. Complete removal of O-consuming materials does not seem to be possible. The sludge does not dry readily or completely on sludge beds. The problem of sludge disposal can be simplified by the use of a concentrating tank. In biological treatment, the indications are that between 70 and 80 per cent. of the oxidation takes place in the upper 4 ft. of filter. The reduction depends largely upon the strength of the raw waste. The oxidation of the milk sugars is quite complete as shown by the absence of acid-producing materials in the effluents. The oxidation of the N compounds does not take place as rapidly as that of the sugars. The NO_3 increase follows the oxidation of the carbohydrates. The rate of application of the waste to the filter depends upon the stability of the effluent desired. Indications are that each square foot of filter will handle daily a quantity of waste requiring approximately 43 g. of O per day based on the O-consumed determinations. Photographs and drawings of the plants used are given as well as numerous charts and tables of data obtained.

M. LEVINE. **Biological purification of creamery wastes.** *Ind. and Eng. Chem.* **21**, xii, 1223-5, December 1929.

The acidity developed by the anaerobic decomposition of lactose interferes with protein digestion in septic and Imhoff tanks. This paper describes experiments on the oxidation of lactose by trickling over a bath filter. Effluents which remained neutral or alkaline on anaerobic storage could readily be obtained from solutions typical of creamery wastes.

W. J. WILEY

C. E. SLAUGHTER. **Disposal of creamery wastes.** *Mich. State Coll. Eng. Exp. Sta. Bull.* **18**, 1928. (*Chem. Abst.* **24**, i, 169, January 10, 1930.)

High acidity inhibits reduction of wastes. The acidity increases as the O_2 consumed is reduced. The acidity in a septic tank with 1-day retention ranges about 400 p.p.m. and with 3-day retention about 6000 p.p.m. The corresponding O_2 consumed is 400 and 250 p.p.m. respectively. Sludge does not form readily but a heavy offensive scum rises. Large numbers of gelatin liquefiers are present, but casein liquefiers are in the minority. Even with 3-day retention the effluent is extremely offensive and contains large amounts of organic matter. A contact bed reduced the O_2 consumed and increased the acidity about 7 per cent. Septic action is much facilitated by addition of CaO to pH 7.6. The effluent so obtained, low in acidity and suspended solids, is suitable for sand filtration. The method is applicable to any septic tank, increasing its efficiency and reducing sludge, scum and odour. Chemical precipitation at 0.5 g. $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ per l., followed by adjustment to pH 7.8 with CaO , resulted in settlement in 10 min. and removal of most of the bacteria and solids. The effluent is clear, relative stability 60 per cent., is inoffensive and may be further purified by secondary storage or oxidation on a sand filter. Such treatment at 3-4 per 1000 gallons is feasible for small creameries, the waste being treated in as concentrated a form as possible.

STATISTICS

NUMBER OF DAIRY AND OTHER CATTLE

THE following table shows comparative figures of the dairy herd, and of other cattle, in the principal countries within the British Empire in which dairying is of major importance. The figures are in each case the latest available, and are generally of a preliminary nature, but it should be noted that the estimates of livestock relate to different dates in the various countries. It should also be noted that classification of cattle into the dairy herd and other cattle is not a matter of uniform practice throughout the Empire, but the figures give a fairly accurate indication of the extent of the dairy herd and of any change in comparison with the preceding census.

Countries	Year*	Cows and heifers in milk or in calf 000 head	Other cattle 000 head	Total cattle 000 head
England and Wales .	1930	2670	3176	5,846
	1929	2713	3245	5,958
Scotland ...	1930	452	781	1,233
	1929	454	779	1,233
Northern Ireland ...	1930	256	417	673
	1929	264	436	700
Irish Free State ..	1930	1311	2727	4,038
	1929	1307	2830	4,137
Canada .	1929	3778	5153	8,931
	1928	3792	5001	8,793
Australia . . .	1928-29	2467	8834	11,301
	1927-28	2422	9195	11,617
New Zealand .	1930	1424	2297	3,721
	1929	1371	2075	3,446
Union of South Africa	1929	Not available		10,518†
	1928	Not available		10,478
Kenya	1929	Not available		218‡
	1928	Not available		217

* Estimates relate to June 1 except New Zealand (January 1), South Africa (August 31), for Australian States estimates refer to December 31 except New South Wales (June 30 following).

† Including 6,773,000 cattle on farms owned by Europeans.

‡ Including 115,777 breeding stock.

TRADE IN DAIRY PRODUCE

The following tables give details of the trade in butter and cheese of the principal countries handling these products during the first six months of 1930, with comparative figures for 1929. The particulars are based on information published by the International Institute of Agriculture, Rome, revised and brought up to date, where necessary, from official sources.

Imports and exports of butter. Six months (January to June)

Countries	Exports		Imports	
	1930	1929	1930	1929
<i>Exporting countries</i>	000 lb.	000 lb.	000 lb.	000 lb.
Austria	1,786	853	293	838
Czecho-Slovakia ...	448	90	293	631
Denmark	187,294	176,291	822	862
Estonia	11,378	8,849	—	—
Irish Free State ...	19,655	18,126	2,754	3,795
Finland	22,051	20,682	—	—
Hungary	1,561	148	—	71
Italy	1,422	1,155	1,283	1,340
Latvia	17,158	11,450	26*	24*
Lithuania	5,432	2,542	—	—
Netherlands	47,792	53,339	1,636	1,702
Poland	10,278	12,207	11	66
Sweden	30,931	24,851	13	15
U.S.S.R.	7,663	24,732	—	—
Argentine	25,023	23,944	—	—
India	309	238	132	97
Syria and Lebanon	1,270*	875*	42*	150*
Australia	57,368	54,994	—	—
New Zealand	114,083	105,022	—	—
<i>Importing countries</i>				
Belgium	1,213	1,376	10,029	3,752
France	5,137	7,363	9,279	6,720
Germany	348	150	129,890	138,204
Greece	—	—	584	575
Norway	229	1,153	267	134
Switzerland	26	86	9,264	8,748
United Kingdom	7,449	10,534	404,248	396,787
Canada	463	580	32,710	23,779
U.S. America	1,841	2,132	1,872	1,795
Ceylon	—	—	401	399
Java and Madura	—	—	4,325	4,131
Japan	—	—	441*	238*
Algeria	46	35	1,830	1,237
Egypt	7†	18†	1,012†	664†
Tunis	2	9	493	370

* Data to July 31.

† Data to May 31.

Imports and exports of cheese. Six months (January to June)

Countries	Exports		Imports	
	1930	1929	1930	1929
	000 lb.	000 lb.	000 lb.	000 lb.
<i>Exporting countries</i>				
Czecho-Slovakia ...	3,241	3,164	1,365	1,579
Denmark ...	5,862	6,874	346	309
Finland ...	1,995	2,751	15	15
Italy ...	42,192	34,106	6,012	6,627
Lithuania...	701	408	4	4
Netherlands ...	97,072	99,663	679	597
Norway ...	611	560	346	406
Poland ...	1,045	1,748	538	690
Switzerland ...	32,847	33,965	2,275	1,638
Yugo-Slavia ...	1,023	800	152	168
Canada ...	10,538	13,838	946	939
Australia ...	1,911	3,944	137	320
New Zealand ...	109,098	125,999	2	2
<i>Importing countries</i>				
Austria ...	1,219	1,631	3,124	3,243
Belgium ...	397	452	23,325	20,369
France ...	21,409	19,632	27,902	25,089
Germany ...	2,471	2,511	61,688	68,260
Greece ...	139	315	1,537	1,016
Hungary ...	33	24	227	311
Irish Free State ...	71*	73*	1,114	1,126
Sweden ...	—	—	624	642
United Kingdom	4,383	4,497	169,186	177,925
U.S. America ...	1,149	1,647	40,583	38,702
India ...	2	4	470	514
Java and Madura	—	—	752	886
Syria and Lebanon	106*	176*	353*	403*
Algeria ...	112	97	5,871	4,332
Egypt ...	33†	49†	2,881†	2,729†
Tunis ...	9	7	871	871

* Data to July 31.

† Data to May 31.

REVIEWS

THE HANNAH DAIRY RESEARCH INSTITUTE. *Annual Report for the year ending March 31, 1930.*

We welcome the first *Annual Report of the Hannah Dairy Research Institute*, which has been founded in Scotland in association with the University of Glasgow and the West of Scotland Agricultural College.

The *Report* contains an account of the foundation of the Institute and of the progress which has been made in the provision of land, buildings and equipment. It also shows that that staff are already engaged in very active research work on a variety of different problems, such as the protein requirements of dairy cows, the inheritance of milk yield, the utilisation of milk residues, the elimination of tuberculosis from our dairy herds and certain investigations upon milk fever.

All those who are engaged in research work must welcome the foundation of a new research institute and wish it all success in its career.

R. STENHOUSE WILLIAMS

A. BARTOLUCCI, *Produzione, Approvvigionamento e Controllo Igienico del Latte.* (Production, Supply and Hygienic Control of Milk.) Pp. xx + 543, il. Rome: Istituto sieroterapico Milanese, 1929. (*Bull. Hyg.* 5, ix, 747, September 1930.)

This book, written by the late Inspector General of the Veterinary Section of the Public Health Service, is a comprehensive survey of the present position of the milk industry in Italy. The clean milk movement in Italy is the counterpart of those movements which have already taken place in the United States and the northern European countries, but progress is slow in Italy largely owing to the unequal geographical distribution of milk production.

The work is divided into four parts. The first part deals with the production and supply of milk, and includes statistics of production and consumption, a brief review of the dairy cattle industry in Italy, and descriptions of methods of handling and treating milk for the purpose of preserving it.

The second part is concerned with the hygienic control exercised over the production and sale of milk, the construction and maintenance of the cow sheds and the selection and care of the cows, and the process of milking both by hand and by machine. There is also a description of measures adopted for the control of milk from the time it leaves the dairy until it reaches the consumer, with an account of the central milk depots which have been established in various places.

The third part is devoted to the direct control of milk by analysis and examination by chemical and bacteriological methods.

The fourth part treats of milk as a foodstuff, and discusses the relative merits of raw and heated milk, skim milk, milk for infants and various kinds of fermented milk. The milk of animals other than the cow is also dealt with and the text of recent legislation in Italy concerning the hygiene of milk is given.

A three-page bibliography is appended in addition to the references cited in the text itself.

D. KNIGHT

PATENTS

- J. SIEDEL. **Procédé et dispositif pour la confection du beurre.** (Process and device for buttermaking.) Fr. 663,114, August 16, 1929. *Le Lait*, **10**, xciv, 445, April 1930.
- W. H. SHEFFIELD. **Procédé de fabrication de caséin.** (Manufacture of casein.) U.S. 1,716,799, June 16, 1929. *Le Lait*, **10**, xcv, 591, May 1930.
- L. A. THOMPSON. **Cheese.** U.S. 1,745,962, February 4, 1930. *Chem. Abst.* **24**, vii, 1682, April 10, 1930.
- T. VINK. **Manufacture of cheese.** (Addition of small quantities of alum to the curd.) Dutch 15,844, August 12, 1925. *Brit. Chem. Abst. B*, May 30, 1930.
- J. and A. PERSOONS. **Écrémeuse centrifuge.** (Centrifugal cream separator.) Fr. 662,512, August 8, 1929. *Le Lait*, **10**, xciv, 444, April 1930.
- N. M. KRONBERG. **Traitement par la chaleur du lait condensé en boîtes.** (Heat treatment of condensed milk in tins.) U.S. 1,721,751, July 23, 1929. *Le Lait*, **10**, xcv, 592, May 1930.
- E. HOFER and F. EGLE. **Appareil à traire.** (Milking apparatus.) Fr. 661,415, July 25, 1929. *Le Lait*, **10**, xciv, 444, April 1930.
- SEPARATOR (AKTIEBOLAGET). **Pulsateur pour trayeuses mécaniques. Dispositif relatif aux trayeuses mécaniques.** (Pulsator for mechanical milkers. Device for mechanical milkers.) Fr. 662,898, August 13, 1929; 665,951, September 25, 1929; 665,952, September 25, 1929. *Le Lait*, **10**, xciv, 445, April 1930.
- C. FREDERIKSEN. **Instrument pour déboucher les trayons des vaches.** (Instrument for removal of obstructions in cows' teats.) Fr. 666,104, September 27, 1929. *Le Lait*, **10**, xciv, 445, April 1930.
- J. O. HICKMAN and N. V. HICKMAN. **Treatment of milk by ultra-violet light.** Brit. 325,470, September 12, 1928 and February 12, 1929. *Brit. Chem. Abst. B*, p. 484, May 30, 1930.
- G. FRINGS and W. NITZ. **Machine à diviser le beurre par portions de grosseurs variées.** (Machine for dividing butter into portions of varying sizes.) Fr. 659,058, June 24, 1929. *Le Lait*, **10**, xciii, 342, March, 1930.
- E. BAKER. **Concentrating milk.** U.S. 1,738,275, December 3, 1929. *Chem. Abst.* **24**, ii, 900, February 20, 1930.
- F. SEIDEL and E. LA ROCHE. **Procédé et appareil applicables à la conservation des aliments liquides tels que le lait et les aliments similaires.** (Method and apparatus for preserving liquid foods, such as milk.) Fr. 658,383, June 4, 1929. *Le Lait*, **10**, xciii, 341, March 1930.
- C. W. A. KLEINE. **Homogenising milk and cream products.** Brit. 309,836, April 25, 1928. *Chem. Abst.* **24**, iii, 667, February 10, 1930.
- AROHA DAIRY Co., LTD. **Apparatus and method for pasteurising cream and other liquids in bulk.** Brit. 314,022, June 21, 1928. *Chem. Abst.* **24**, v, 1163, March 10, 1930.
- J. R. PROULX. **Feeding chart. A grain mixture calculator to facilitate the preparation of dairy rations.** Can. 296,334, January 1930.
- A. L. RUSHTON, M. M. SIMPSON and H. C. BECKMAN. **Treating sour cream for butter-making.** U.S. 1,731,858, October 15, 1929. *Chem. Abst.* **24**, i, 173, January 10, 1930.

- A. BOEHRINGER. **Improvement of keeping quality and aroma of butter and margarine by adding purified alkali lactates.** Brit. 308,405, January 26, 1928. *Chem. Abst.* 24, i, 173, January 10, 1930.
- S. C. NYGOOD. **Cheese of predetermined flavour.** U.S. 1,732,375. October 22, 1929. *Chem. Abst.* 24, i, 173, January 10, 1930.
- Z. KORANI. **Procédé de préparation de crème fouettée par traitement à froid.** (Process of preparing whipped cream by treatment with cold.) Fr. 656,201, April 30, 1929. *Le Lait*, 10, xci, 88, January 1930.
- A. J. SQUIRE and J. J. LINDVART. **Perfectionnements aux séparateurs de crème.** (Improvements in cream separators.) Fr. 651,856, February 28, 1929. *Le Lait*, 10, xci, 87, January 1930.
- K. MEYER. **Dispositif pour le refroidissement du lait et d'autres liquides.** (Apparatus for cooling milk and other liquids.) Fr. 652,123, March 5, 1929. *Le Lait*, 10, xci, 87, January 1930.
- S. B. CHAMBERS. **Treatment of dairy products.** (Raw cream plus malt diatase for giving butter of superior keeping qualities.) U.S. 1,735,313, November 12, 1929. *Brit. Chem. Abst.* B, p. 81, January 24, 1930.
- SEPARATOR (AKTIEBOLAGET). **Dispositif pour trayeuses mécaniques.** (Invention for mechanical milkers.) Fr. 655,060, April 15, 1929. *Le Lait*, 10, xci, 88, January 1930.
- SALENIUS. **Perfectionnements aux machines à traire.** (Improvements in milking machines.) Fr. 650,167, January 5, 1929. *Le Lait*, 10, xci, 87, January 1930.
- SEPARATOR (AKTIEBOLAGET). **Appareil pour insérer les gaines en caoutchouc dans les trayeuses mécaniques.** (Apparatus for inserting rubber teat cup liners into mechanical milkers.) Fr. 650,616, January 11, 1929. *Le Lait*, 10, xci, 87, January 1930.
- H. and A. H. KAUFMANN. **Procédé de fabrication de fromage.** (Method of cheesemaking.) U.S. 1,694,921, December 11, 1928. *Le Lait*, 10, xcii, 205, February 1930.
- E. A. SNOW. **Appareil pour l'homogénéisation de la crème et la réduction de sa viscosité.** (Apparatus for homogenising cream and reducing its viscosity.) U.S. 1,690,799, November 6, 1928. *Le Lait*, 10, xcii, 204, February 1930.
- W. FISHER and GENERA. **Crème glacée concentrée.** (Concentrated ice cream.) U.S. 1,699,526, January 22, 1929. *Le Lait*, 10, xcii, 205, February 1930.
- F. J. ANDRESS. **Procédé de préservation du lait et de toute autre boisson.** (Method for the preservation of milk and all other beverages.) U.S. 1,691,538, November 13, 1928. *Le Lait*, 10, xcii, 204, February 1930.
- W. D. RICHARDSON. **Procédé de fabrication de fromage.** (Method of cheesemaking.) U.S. 1,711,032, April 30, 1929. *Le Lait*, 10, xcii, 206, February 1930.
- ELECTROPURE CORPORATION. **Appareil pour la pasteurisation électrique du lait.** (Apparatus for the pasteurisation of milk by electricity.) U.S. 1,692,874, November 27, 1928. *Le Lait*, 10, xcii, 204, February 1930.