ABSTRACTS OF LITERATURE

BACTERIOLOGY


Among micro-organisms the power to reproduce is commonly accepted as the single criterion of life or death. Death of micro-organisms is usually caused by some interference with one or more of the three basic chemical equilibria on which life depends. These are the oxidation reduction equilibrium from which the energy for life processes is derived; the hydrolytic-polymerization equilibrium which is responsible for the building up and tearing apart of certain complex constituents of the cell; and the acid-base equilibrium which serves as a regulator responsible for the building up and tearing apart of certain complex constituents of the cell.

It seems probable that the lethal action of increased acidity or alkalinity upon bacteria is largely due to an increase in the rate of hydrolysis with consequent destruction of protoplasmic constituents. The action of chlorine and hypochlorites is due partially to oxidizing action and partially to their tendency to unite with protoplasmic constituents of the bacterial cell. Destructive forces are the removal of water by drying or the addition of sugar or salt. The lethal action of heat is more effective if moist or if the medium is acid or alkaline and the effect seems to be due to a combination of hydrolysis and coagulation.

E.F.G.


A new bacterium for which the name Bacterium lipidis is proposed exhibits powerful fat splitting action, weak action on protein, and none on sugars growing rapidly at refrigeration temperatures. A sharp throat irritation results from swallowing cream containing the organism and this is thought to be due to liberation of caproic, iso-caproic, and caprylic acids from the milk fat. Spoilage of cream at low temperature is due mainly to hydrolysis of fat and protein which accounts for the rancid and bitter flavors.

E.F.G.

Tables show that standard agar at 32° F. gives more uniform results between plants than tryptone agar at either 37° C. or 32° C. Grade A pasteurized milk seemed to be one of the few exceptions to this. There was greater variation in the results from different laboratories on the same sample of milk with the same medium than there was between the results in the same laboratory using different media and temperatures. It would seem that laboratory procedure needs to be standardized and that greater care to control conditions be exercised if satisfactory results are to be obtained.

E.F.G.


Dr. Hammer has brought this book up to date by including in the second edition the main facts which have been brought out by research workers during the 10 years since the first edition was published. The book is broad in scope as evidenced by the following list of headings of the 15 chapters:

Bacterial counts of milk; milk fermentations; contamination of milk and cream and its control; growth of organisms in milk and cream; body cells in milk; spread of diseases through milk and its derivatives; preservation of milk and cream; milk enzymes; bacteriology of evaporated, sweetened condensed and dry milk; bacteriology of ice cream; bacteriology of butter cultures; bacteriology of fermented milk preparations; bacteriology of butter; bacteriology of cheese; tests for the general quality of milk and cream.

Dr. Hammer's broad experience in practically all lines of dairy bacteriology and his ability to write clearly on difficult subjects has resulted in a book which is outstanding.

M.W.Y.


The problem was to reveal which were the principal representatives of the Bacterium coli aerogenes group in raw market milk. The enrichments from the different media were plated on Endofuchsin agar and analyzed primarily after the technique used in German medical laboratories. Furthermore, the behavior in litmus milk, the gas formation in skimmilk at

<table>
<thead>
<tr>
<th></th>
<th>Indol</th>
<th>Meth. Red</th>
<th>V. - P.</th>
<th>Citr.</th>
<th>Nr. of strains</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>
30° C., the ability to use citric acid as a sole source of carbon have been determined. The so-called reaction combinations with the known four differential tests gave results as shown in the accompanying table: Some of the combinations found by Ruchhoft et al. and Demeter and Sauer could not be detected. There was a remarkable constancy of the Indol and the citrate test and a more or less noticeable variability of the M. R. and V.-P. test. The gas test in skimmilk proved to be a valuable means for differentiation: typical *B. coli* strains produce only a few cc., typical *B. aerogenes* and very many intermediates, however, relatively high amounts of gas. All tests made have been summarized and there were found 25 combinations of theoretically 128 possibilities with 164 strains. Finally the author tried to put the 164 strains into the system of Bergey with the result that he got 12 subgroups. He did not encounter the 7 Escherichia species and 4 Aerobacter species of Bergey. *E. Aerogenes* does not belong to the E. A. group at all and the species *E. acidi lactici* and *E. anindolica* are to be discarded.

K.J.D.

BUTTER


Creameries need a simple test to indicate the quality which butter will have after it has passed through the regular trade channels. A test was developed which has been use for practically five years on thousands of samples of butter. This test consists of holding wrapped, printed butter which has been judged for quality for fourteen days at a temperature of 60° F. At the end of this period of time this butter is again judged for quality. The difference in score indicates the deterioration which the butter has undergone during the test. The butter is always tempered at 45 to 50° F. before judging. Careful control of temperatures of incubation is necessary. Incubation temperatures of 68 to 70° F. for a period of eight days gives approximately the same result as holding for fourteen days at 60° F. Oiling-off of the product may occur at the higher temperatures. If this occurs the test is practically valueless.

W.V.P.


Cream of No. 1 grade or better was divided into three lots and subjected to different treatments. Lot 1 was neutralized to .25 per cent acidity and pasteurized at 145° F. for 30 minutes, cooled and held in the cream vat for 4 to 15 hours before churning. Holding temperatures were 47 to 56° F. Lot No. 2 received essentially the same treatment except that it was stored
in cans for 40 to 44 hours at temperatures varying between 35 to 45°F. Lot No. 3 was held in cans for 40 to 44 hours at temperatures of 35 to 45°F. and was then neutralized and pasteurized in the manner described. Cream from Lot 1 produced butter of lower quality. The decline in scores of butter from this lot was quite noticeable during the last three months of storage. There seemed to be a slight advantage in holding cream raw under the conditions of these experiments. It is suggested that the effects of neutralizer, metallic salts and heat may be responsible for changes in the flavor of the butterfat in cream held for long periods; or that low acidity in neutralized and pasteurized cream during the holding period might favor the development of proteolytic and lipolytic bacteria.

W.V.P.

Other abstracts of interest are numbers 373, 432, 447 and 459.

**BUTTERMILK**


The author presents the details of the Vogt method of making flake buttermilk by spraying liquid fat into cultured buttermilk. A comparative body and flavor study of (a) churned-cream buttermilk, (b) churned-flake buttermilk, and (c) Vogt-method buttermilk showed that the body of the churned-cream buttermilk was free from lumps and poured like sweet milk. The other two buttermilks possessed rather heavy bodies. The churned-cream buttermilk flavor was preferred by those accustomed to the "old-fashioned" buttermilk but the flavors of all three types were maintained splendidly for five days.

G.M.T.

**CHEESE**


Two relatively inexpensive types of pasteurizing equipment which are suitable for use in cheese factories receiving less than 10,000 pounds of milk per day are described. The bacterial destruction efficiency of these two types of equipment were tested by the plate count method. Scores are shown for cheese made from raw milk and from identical milk pasteurized by one or the other of these two types of equipment. Both methods of pasteurizing were sufficiently effective bacteriologically to improve the quality of the cheese.

W.V.P.

When brick cheese was made from pasteurized milk inoculated with commercial type *S. lactis* starter it was found that the amount of starter, the ripening period before adding the rennet, the temperature of heating, and the time of dipping the curd must be carefully controlled to produce sweet cheese of desirable quality. A development of .02 per cent titratable acidity in the whey before dipping when dipping occurred 2½ hours after setting seemed to provide a correct rate of acid development for the remainder of the process. Heating temperatures of 104°F. in conjunction with this acid development produced a pH at three days after making of approximately 5.1 with a moisture content of 38 per cent at the time of paraffining. Cheese which satisfied these characteristics was sweet and of desirable quality.

W.V.P.


Steps in the curd-making process are described. The ripening of the cheese by mold and the use of homogenization for the milk for making blue cheese are discussed briefly. The development of commercial manufacture of the blue cheese in the United States is reviewed and the prediction is made that the demand for this domestic product should increase materially during the next few years if high quality standards are maintained.

W.V.P.


From an economic standpoint the ripening process is one of the most important phases of cheddar cheese production. This is especially true in obtaining the desired flavor in the cheese at the time it reaches the consumer. Also, by reducing the time required to ripen cheese, the cost may be reduced.

A study was made of seventeen lots of milk which were divided into moisture, acid, Rennin, Pepsin and Trypsin Series. Each lot from the different series was divided into two equal portions and the cheese made in separate vats. One cheese from each vat was ripened at approximately 45°F. and the other at approximately 63°F.

Analysis included bacterial content and type, pH, moisture content, amino nitrogen content and flavor score, except that the nine lots in the enzyme series were not subjected to the bacterial analysis.

It is concluded that:

The rate of proteolysis in cheddar cheese during ripening is directly related to the numbers of bacteria initially found in the cheese, as deter-
mined by the total count made on lactose and skimmilk agars and by the proteolytic count made on skimmilk agar.

There is no relationship between numbers of bacteria initially found in cheese and the development of flavor in the same cheese.

Changing the moisture content of the cheese through slight modifications in the curd-making process cannot be expected to influence materially the rate of ripening in the cheese.

The rate of proteolysis in cheddar cheese ripening can be increased 40 to 100 per cent by raising the ripening temperature from 45° to 63° F.

The maximum flavor score is reached more quickly when the cheese is ripened at 63° F. than when it is ripened at 45° F.

Cheese ripened at 63° F. will attain as high a maximum flavor score as that ripened at 45° F.

Low initial acidity in the cheese is conducive to more rapid proteolysis but has no significant effect on the rate of flavor development.

The quality of the aged cheese, as judged by flavor score, is slightly inferior in the low-acid cheese.

The occurrence of bitter flavor during aging is favored by a high ripening temperature.

Bitter flavor in cheese appears to be due to the presence of one or more of the substances resulting from the breaking down of casein.

Additional amounts of pure rennin increase the rate of proteolysis in cheddar cheese ripening, increase slightly the rate at which the flavor develops, and produce an aged product with slightly higher flavor score.

Added pepsin increases the rate of proteolysis during cheddar cheese ripening particularly at the beginning of the ripening period and at the lower ripening temperature, does not accelerate the development of flavor, but produces an aged product with appreciably higher flavor score.

Trypsin increases markedly the rate of proteolysis during the early part of the ripening period, after which its effect is greatly reduced. This enzyme also increases slightly the rate at which flavor develops, but reduced the maximum flavor score attained.

Other abstracts of interest are numbers 432 and 459.

CHEMISTRY


The response by the line test technique for vitamin D was not influenced by giving, at the same time, excessive doses of vitamins A, B or C (40 μ
carotene, 10–15 I.U. B, and 0.15 mg. ascorbic acid, respectively, daily per test animal. The weight response to a small dose of vitamin A was not influenced by giving a graded series of excessive doses of vitamin D (8–100 I.U. per animal per week). It is concluded by the authors that when assaying vitamin A or vitamin D, it is unnecessary to consider the possible presence of another vitamin in the substance under test, provided the basal diet is adequate.

K.G.W.


"Equations describing the buffer action of calcium citrate have been derived and curves based on these equations compared with curves constructed from potentiometric titrations of calcium citrate solutions. Support is given the Hastings-McLeon idea of the mechanism of ionization of calcium citrate in solution."

"Application of the results of milk equilibria indicates that the buffer action of citrates in milk is exerted principally in the range in which phosphates and casein buffer most intensely and is of slight moment compared with the effects of these other buffer substances."

K.G.W.


In 1934 it was reported that cocoa shell is rich in vitamin D, and in 1935 that the feeding of 2 pounds of shell daily for a month during the winter raised the vitamin D content of the milk of stall-fed cattle to the normal summer level, while in 1937 it was found that the fat content of these milks was increased during the period of shell feeding.

Cocoa shell contains approximately 3 per cent of theobromine, and a cow receiving 2 pounds daily of the shell would receive approximately 9 grams of the alkaloid. Theobromine was fed in 9 gram quantities daily to a small group of cows for 3 weeks and on the last day samples of milk were analyzed for theobromine content. It was observed that in the milk of three cows the average daily milk yield of which was approximately 35, 19 and 18 pounds, the "theobromine" was respectively 4.71, 2.05 and 4.72 mg. per liter. In blank tests upon the method, yields of approximately 70 per cent of added theobromine were obtained. The maximum content of theobromine transmitted to the milk of the above three cows is, therefore, approximately 7 mg. per liter. According to a supplementary publication of the British Pharmacopoeia, the medicinal dose of theobromine is 0.3–0.6
gram. For a child under 12 months, for whom the dose would be $\frac{1}{2}$ of that prescribed for an adult, the minimum dose is contained in $6\frac{1}{4}$ pints of the milk. Plain eating chocolate contains approximately .3 per cent theobromine, and it is not uncommon for $\frac{1}{4}$ pound of this chocolate (containing 0.3 of theobromine) to be eaten by an adult at one time. K.G.W.


The protein of cow's milk and woman's milk was concurrently analyzed for amino acid content. To compare the nutritive value of the protein of cow's milk with woman's milk, the cow's milk was generally diluted with an equal volume of water.

Except for cystine, which is the same in amount in cow's and woman's milks, cow's milk contains $\frac{3}{4}$ times the amounts of the other amino acids. Cow's milk diluted with an equal volume of water will contain half the amount of cystine present in woman's milk. If diluted with two volumes of water then tryptophane and possibly arginine will be below the amounts in woman's milk. Cow's milk diluted with an equal volume of water will have an equal amount of the sum of the sulphur bearing amino acids, cystine and methionine. K.G.W.


It has been previously shown by these authors that the acidity of milk is of distinct importance in determining the dialysability of certain constituents, particularly salts. The results of this study show that acidification with either diluted or concentrated acids had the same effect on the amount of dialysable constituents.

Neutralization of acidified, raw, separated milk results in an almost complete recovery of the original amounts of dialysable Ca, Mg and inorganic P, although the figure for Ca remains slightly above normal.

The effect of extended agitation (14 days) on the dialysable constituents was studied. It is suggested that the salt equilibrium of milk is normally unstable and may be shifted by agitation. Treatment of the milk in its preparation for milk powder appears to stabilize the salt equilibrium.

The following ranges of analytical figures are presented for raw, pasteurized and dried, separated, "average" milk.
DISEASE

<table>
<thead>
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<th>Inorganic P</th>
<th>Total</th>
<th>Dialysable (as % of total present)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>33-44</td>
</tr>
<tr>
<td>Organic P</td>
<td>0.31-0.38</td>
<td>7-15</td>
</tr>
<tr>
<td>Ca</td>
<td>1.27-1.44</td>
<td>25-42</td>
</tr>
<tr>
<td>Mg</td>
<td>0.10-0.15</td>
<td>62-83</td>
</tr>
</tbody>
</table>


The milk clotting component of papain appears to possess activity in agreement with the conception for papain proteinase. The component is activated by H₂S, cysteine, phenylhydrazine, and cyanide, and has a high temperature optimum.

The time required for clotting was shown to be a straight line function of the enzyme concentration; a quantity of the enzyme, constant for any condition, is inactivated by the milk.


The hexadecenoic acid present in goat milk fat, egg yolk glycerides, and the depot fat of the white rat is chiefly the 9-, 10-hexadecenoic acid.

DISEASE


Sterility in cattle is not a specific disease, but symptom of a large number of different diseases. Appropriate treatment can be applied only after intelligent diagnosis by a competent veterinarian.


This article summarizes the results up to date of a field experiment in calfhood vaccination for Bang's disease which was started in January 1934. The results of the research work done show that when calves are vaccinated between the ages of four and eight months with an appropriate vaccine, the agglutination titre disappears in a relatively short time, leaving the animal immunized to some degree.

Another abstract of interest is 401.
FOOD VALUE OF DAIRY PRODUCTS


The title of this book is not sufficiently broad to include the full text, for the author really presents the dairy industry of India with special reference to improvement of the Hindu diet through increased consumption of dairy products. For American readers this style is particularly interesting for the literature on the food value of milk has not been materially increased by researches in India while knowledge of dietary conditions in India is not too general.

The promotion of the vegetarian diet is uppermost in the thoughts of the author which is essential in India for both religious and health reasons. India has neither supervision of the slaughter and handling of meats nor refrigeration in a country where summer temperatures are usually above the temperature of the human body. Fortunately, for the nutrition of the people, milk is accepted in the vegetarian diet for life need not be destroyed to secure it. Milk is served fresh in fluid form, or as ghee, butter, and fermented drinks. The total per capita yearly milk consumption is only about 85 pounds, caused principally by the very low production of the cattle. It is estimated that India has 52,500,000 milk cows and 20,500,000 she-buffaloes, the former producing 100 pounds and the latter 1200 pounds of milk per year in excess of that required by the calves.

The material in this book is presented in a very elementary manner for general public reading. Some printing errors are obvious, and exception may be taken to some of the ideas expressed by the author. Nevertheless, the book is both interesting and informative.

A.C.D.


A discussion on the following questions:
1. Is the protein of cows’ milk a cause of infantile eczema?
2. Does a high temperature have a favorable or unfavorable effect upon the protein in cows’ milk?
3. What is the nutritional physiologic significance of milk protein?
4. What is the comparative economic status of milk protein as found in the various forms of milk: whole milk, evaporated milk, etc.?

W.S.M.

This paper discusses the relationship between the feed of the cow and the composition of the milk, emphasizing the vitamin content.

W.S.M.


The pH of the stomach contents of a healthy infant seldom falls below 5.0. The iso-electric point of casein is 4.7 while the optimum pH for action of pepsin is 2.8. Acidity in the stomach of the infant is not favorable for action of pepsin, but in the young adult stomach a pH of between 3.0 and 1.4 is reached so active digestion by pepsin is obtained.

An artificial digestion device in which milk and milk formulae were subjected to the chemical action of synthetic gastric juice made from hydrochloric acid and pepsin is described. The production of fine soft curds by the addition of banana powder and banana pulp is described. Commercial methods of producing soft curd milk are briefly discussed. Clinical evidence shows that the milk preparations which yield soft curds are well tolerated and well utilized by infants, children and older persons, and that soft curds mean fine curds. Better control and standards are needed for these products.

E.F.G.


The role of calcium and phosphorus in nutrition is discussed. Dr. Sherman in recommending a quart of milk per day for growing children bases this upon the fact that the child needs about 1 gram of calcium per day for body maintenance and growth and this is contained in the quart of milk. Milk is a better source of calcium than vegetables. Utilization of calcium and phosphorus is dependent upon vitamin D. A more acid condition in the digestive tract favors solubility of calcium. The parathyroid gland has a specific effect upon calcium assimilation. An outline is given of a procedure to check satisfactory calcium and phosphorus assimilation.

E.F.G.


Six grade Holsteins were used to study the effect of the season of the year and of the feeds consumed by dairy cows on the vitamin D content
of the milk produced. A marked seasonal effect was found. Summer milk contained 32 International Units of vitamin D per quart which was about four times the amount of vitamin D contained in the winter milk produced under the conditions of this experiment.

The vitamin D in the feed eaten by the cow also had an important influence on the amount in the milk produced. When the vitamin D intake was increased the milk became proportionately richer in this important food factor. The alfalfa hay used in this experiment contained 500 International Units of vitamin D, and the Prairie hay 250 International Units of vitamin D per pound. The hay was fed at the rate of 20 pounds per day so the cows getting alfalfa hay received 10,000 International Units of vitamin D daily, and the cows getting prairie hay received 5,000 units. This difference in intake was reflected in the higher vitamin D content of the milk produced by the cows receiving alfalfa hay. However, only a small proportion (between 1 and 2 per cent in this case) of the vitamin D in the feed consumed was recovered in the milk.

Because of the importance of milk as one of the few food sources of vitamin D, advantage should be taken of all factors which will contribute towards increasing the antirachitic value of milk. Some of these factors have been indicated in this bulletin while others will require further study.

C.C.T.

399. What If There Were No Milk? Nina Simmons, College of Dentistry, Univ. of California. Milk Plant Mo. 27, 2, p. 32, Feb., 1938.

Milk is discussed chiefly from the standpoint of its calcium content, the role of which in dentition is emphasized.

G.M.T.


The vitamin D content of the colostral fats of a Guernsey cow on pasture was 1.2 I.U. per gram for the O and first day post partum, 0.56 I.U. per gram for the second, third, and first half of the fourth days, and 0.36 I.U. per gram for the last half of the fourth and first half of the fifth days. Normal control butterfat from a cow on the same ration contained 0.41 I.U. per gram. Compared with later milk, colostrum contains relatively more vitamin A and carotene than vitamin D.

K.G.W.


Rats placed on a mineralized whole milk diet made very efficient utilization of all the milk sugar. This has also been found to be true for a pig
and a calf. When the animals were placed on a mineralized skim milk diet, sugar was readily detected in the urine after a few days of feeding. The sugar was identified as galactose and accounted for all of the reducing material in the urine. In the case of the rat, as high as 35 per cent of the ingested galactose was recovered in the urine. Fats such as butterfat, lard, corn oil, coconut oil, linseed oil, and palmitic and oleic acids, when added to mineralized skim milk at levels of 3 to 4 per cent, prevented this loss in the urine. Glycerol or butyric, β-hydroxybutyric, caproic, and lactic acids did not prevent the loss. On mineralized skim milk the sugar of the blood rose to about 200 mg. per cent, while on whole milk it seldom rose higher than 140 mg. per cent after feeding.

K.G.W.

Other abstracts of interest are numbers 384, 386, 387, 428, 444 and 454.

HERD MANAGEMENT


Many calf disorders may have nutritional origin, chiefly because of lack of certain minerals and vitamins. Lack of vitamin A and iodine are cited particularly.

W.E.K.


It is pointed out that it is seldom economical to attempt to compensate for all the deficiencies of poor pasture by means of grain only. The use of silage, hay, or a cultivated pasture crop, such as Sudan grass, in connection with a low rate of grain feeding, is recommended.

W.E.K.


The marked decline in milk production often experienced after the first flush from pasture is probably due to an actual shortage of palatable grass. To prevent this drop the practice of rotating pastures is suggested.

W.E.K.

ICE CREAM

During the past year the activities of the Ice Cream Merchandising Institute were increased. One important phase of the work was a series of 14 two-day regional merchandising conferences, so planned that they fairly covered the country geographically.

The monthly publication of the institute, "The Spinning Wheel," was continued for the benefit of sales and advertising managers of ice cream companies. Another monthly publication, "Ice Cream Currents," is planned primarily for the retail dealer. Ice cream manufacturers can purchase copies at 4 cents per copy for distribution to their dealers. Two talking slide films have been prepared for use by ice cream merchandisers; the one is intended for showing to retail dealers, the other is of interest to consumers.

The Ice Cream Merchandising Institute also offers personal information service to manufacturers with specific ice cream merchandising problems.

M.J.M.


The importance of a constructive selling program is stressed by the author. Merchandising of ice cream at the soda fountain is then discussed from the standpoint of profitable operation. The home delivery of ice cream was also found to be a profitable way of selling the product.

M.J.M.


The author discusses the elements which he feels are essential in successful salesmanship and gives numerous illustrations of how these elements have been successfully employed.

M.J.M.


Although bulk ice cream is the mainstay of the ice cream industry, it is true that a greater number of flavors and specialties will increase the gallons of ice cream sold in any store. Specialties which are properly packaged, stored and handled will add to the profits of an account. The ice cream salesman is urged to determine the relative amount of profit for bulk ice cream and specialties and properly instruct the retail dealer along these lines.

The ice cream maker is urged to handle only such specialties or novelties
which offer the basis of size and price control. Oversized and underpriced novelties have been the source of a considerable amount of trouble. Legal size and price control have protected numerous markets from difficulty with specialties.

M.J.M.


The author has found that 23.9 per cent of the manufacturers sell ice cream through retail stores, but the ice cream sold in this manner represents only 11.5 per cent of the total sales. Only 15 per cent of the ice cream manufacturers operate more than one retail store.

The types of stores operated, the kind of merchandise featured, the average selling prices, and the kinds of cones sold are tabulated for the ice cream stores studied. A considerable amount of data are presented and many problems arising in retail selling are discussed. A manufacturer who is considering the sale of ice cream through retail stores should find this information very helpful.

M.J.M.


(1) Lloyd D. Witter, Snowhite Creameries, Inc., San Angelo, Texas.

With the advent of new developments, the ice cream industry has been changed from time to time. The retail store is a present day trend which may mean another transition point in the industry. The retail store came into existence in the depression years as a result of intense competition and decreased gallonage of sales through the regular outlets. The place of the retail store in the industry is questioned by some and upheld by others.

Retail stores will continue to be successful so long as the public is offered: Products of quality; A variety of flavors; Attractive surroundings; Convenience and service; And, most important, values.

(2) D. H. Dorman, Protected Milk Products, Kansas City, Missouri.

Our company has operated a few retail stores over a period of four years. Until the past year the stores were not equipped for Fountain service. The addition of the fountain stores proved very successful. The retail store also proved to be very helpful in promoting specialties.

(3) E. B. Darrow, Darrow Ice Cream Co., Albuquerque, New Mexico.

Our experience with a retail store has been over only a five months' period. Nothing but package goods is sold—brick ice cream and five-cent items in package. No attempt was made to call attention to the retail store, by advertising. Yet through the store as much brick ice cream has been sold as by the ten best dealers handling our ice cream. We have found that packaged ice cream can be sold successfully through the retail store.

(4) Carl A. Steel, Steel De Soto Ice Cream Co., Minneapolis, Minn.
A retail store was opened by our company in a town where the company operated two ice cream routes. After a few months it was found that more ice cream was being sold through the store than through the two routes.

It is believed that operating both a retail and wholesale ice cream business on a large scale is not practical. However, by operating a few retail stores it might be possible to show the dealer how to merchandise ice cream successfully by operating his store as an ice cream store during the short busy season.

(5) G. D. Turnbow, Protected Milk Products Co., Oakland, California.

The retail store spread is only one of several fundamentals in successful operation of this type of business. Such elements as the traffic count, location of store, construction of store, products to be sold, and many other details, must be decided on before retail store spread becomes a factor.

We have found it difficult to find properly trained personnel and managers for the ice cream stores. Volume is also essential. A successful store must handle in excess of 5,000 gallons a year.

With ice milk, a gross spread of 47 per cent should be realized. Our aim for an average spread on all products is 42.5 per cent.

The proper training of new employees is paramount. They are first trained in a manner similar to that used in the classroom. Following this they work for a period of time under a trained supervisor.

The store manager is given a bonus for obtaining sales quotas on certain products and on the entire quota for the set up for the month. In addition, a special bonus is given to the managers who maintain the required store spread for the month.

M.J.M.


The authors compared the stabilizing properties of sodium alginate (Dariloid) with those of gelatin of the following Bloom strengths 150, 175, 200, 225 and 250. The mixes were prepared in accordance with commercial practice except that they were processed in much smaller batches. The ice cream was frozen using a 2½ gallon vertical brine freezer.

The authors report that the addition of 0.2 per cent "Dariloid" caused an increase of 0.08 to 0.10 in the pH of the mix whereas 0.3 per cent "Dariloid" resulted in an increase of 0.13 to 0.17 pH. These additions caused a decrease in titratable acidity of 0.10 and 0.015 per cent respectively.

In contrast with the above, the various gelatins caused no appreciable change in either the pH or titratable acidity when added to the mix.

Mixes containing gelatin were found to have the same color as the control mix without any stabilizer, while the sodium alginate mixes showed slightly more color.
Measurements of viscosity showed the sodium alginate mixes to be more viscous than gelatin mixes when freshly prepared, whereas after aging this difference did not necessarily persist. They report that agitation of the sodium alginate mix caused a considerable decrease in viscosity which was not regained by subsequent aging.

No tendency to whey off occurred with the sodium alginate or gelatin mixes.

When sodium alginate mix was cooled to 60° F., aging seemed to improve its whipping ability whereas if cooled to 40° F. immediately after homogenization, aging did not improve the whipping property. The authors state "The difference in whipping ability between gelatin and sodium alginate seems to depend to a large extent upon the condition of the freezer and the amount and strength of the gelatin used—Excessive amounts of sodium alginate seemed to have the same deterrent effect on the whipping ability as excessive amounts of gelatin."

According to the authors there was practically no difference in body and texture of ice creams made with sodium alginate and gelatin when the correct amount of each was used.

The authors claim "As a stabilizer for ice cream, sodium alginate shows all the desirable properties of the other ice cream stabilizers and in addition shows some distinct advantages." In this connection they emphasize particularly the advantage of uniform viscosity during the aging of sodium alginate mixes.


Viennese ice cream, according to Sidney Freier, an ice cream manufacturer of Vienna, is made with egg yolks (10 to 20 yolks for 1 quart of ice cream), milk, cream, butter and 18 per cent sugar. He claims the flavor must be very pronounced, e.g., 30 to 40 per cent crushed fruit is used in Viennese fruit ice cream; the taste is never doubtful.

Coffee is the most popular flavor in Vienna followed by nougat or hazelnut. Strawberry is also a popular flavor, but vanilla and chocolate are in little demand.

Mr. Freier feels that more emphasis should be placed upon flavor in this country, but he is impressed with the magnitude speed and efficiency of American machines.

W.C.C.


"In general, venders of ice cream take poor sanitary care of dippers and scoops" according to the authors. They claim further that small
retailer manufacturers are, as a group, least familiar with sanitary principles.

They state further, "the greatest need for improvement in sanitation appears to be in the dispensing of bulk ice cream in a cleaner and more sanitary manner. However, this need is no greater than that for improvement in the handling of many other foods and beverages; and it is doubtful whether ice cream should be singled out for action. The whole question of sanitation in respect to food handling is receiving and should receive much attention at the present time."

W.C.C.


Dipping chocolate bars ordinarily results in the incorporation of some moisture in the coating which increases its viscosity and decreases the amount of surface coverage. The addition of 0.2 to 0.4 per cent lecithin tends to reduce the increase in viscosity due to water dilution.

W.C.C.


The author points out that since 1920 the commercial use of egg products for ice cream manufacture has increased materially. Egg yolk improves the whipping properties of ice cream mixes especially those made with butter or frozen cream as the sources of fat. Often beneficial results are also obtained from its use in chocolate ice cream.

The various types of egg products available for use in ice cream are considered and a brief discussion presented as to the possible constituents of egg yolk which may be responsible for the improved whipping qualities of the mix.

W.C.C.

416. Use of Anti-Oxidants in Ice Cream. A. C. Mack and P. H. Tracy, Dept. Dairy Industry, Univ. of Ill., Urbana, Ill. Ice Cream Rev. 21, 6, p. 82, Jan., 1938.

Oat flour was added to ice cream mixes containing three p.p.m. of added copper. The amount of oat flour added ranged from 0.1 to 0.5 per cent. In order to be assured of ample anti-oxidative protection in vanilla ice cream it is recommended that 0.5 per cent oat flour be added. Various methods of adding oat flour to the mix were studied. The most satisfactory methods were to add the oat flour to the mix with the sugar or to add it in dry form at the freezer. It was found more difficult to control the development of stale metallic flavor in strawberry ice cream by the addition of oat flour than in vanilla ice cream. Oat flour added at the rate of 0.5 per cent delayed the oxidized flavor development.

J.H.E.

In order to give the consumer a better quality and more fairly priced package the overrun should be controlled, and a price should be set on the package which would allow a fair margin of profit, to the manufacturer and the dealer. It is suggested that the price be set on a unit basis so the dealer will know a certain profit will be made on each individual unit sale.

J.H.E.


Analytical and bacteriological results compiled on 570 samples of commercial ice cream at Purdue University are tabulated and discussed.

J.H.E.

419. Controlling Stale Flavors in Ice Cream. K. G. WECKEL, Dept. of Dairy Industry, Univ. of Wis., Madison, Wis. Ice Cream Rev. 21, 9, p. 35, April, 1938.

State flavors in ice cream originate through the use of inferior ingredients, inadvertent equipment effects, and slow turnover of the product. Contributing factors to each of the above are discussed and precautions and remedies suggested.

J.H.E.


The consumer of ice cream and other dairy products is entitled to the same health protection as the consumer of a bottle of fluid milk. Factors discussed are the regulation of the raw products going into ice cream, the control problems arising since the development of counter freezers, the question of requiring pasteurizing of mix and manufacture of ice cream to be a continuous process, and the sanitary conditions of the retail outlet.

J.H.E.


The most common cause of inefficient refrigeration plant performance can be credited to high condensing pressures. An illustration is given showing the increased cost of operation due to excessive head pressure. The most common causes of high pressures are non-condensable gases in the system, dirty condensers, lack of condensing water or condensing water not cool enough, and lack of sufficient condensing surface.

J.H.E.

Frosted malted milk is not ice cream, instead it is a sherbet with low butter-fat content. It has been characterized as the "drink you eat with a spoon," actually it is a semi-frozen product that is eaten with a spoon.

Special mixers are used for making this product which are illustrated.

Under the caption "How it's done" is given a formula for the manufacturer and one for the retailer. - W.C.C.

**Editor's Note.** "This product is what is generally known as 'Ice Milk.'"


A large wholesale ice cream manufacturer introduced a Frosted Malted ice milk and secured highly satisfactory results by adding milk to the product and mixing it on a fountain mixer. It is a product low in fat content and high in total solids making it an ideal hot weather drink. A formula is given for its manufacture.

J.H.E.

424. Large Scale Production of Fancy Ice Cream, Chocolate-Coated Bars and Specialties. **Charles Weinreich, Cherry-Burrell Corp., Chicago, Ill.** Ice Cream Rev. 21, 10, p. 88, May, 1938.

Consumption of ice cream novelties has increased until today about 25 per cent of all ice cream manufactured is in this form. Several methods are outlined for the production of chocolate-coated ice cream bars.

J.H.E.

425. Routine Calculation of Ice Cream Mixes. **Carl Duncan.** Ice Cream Rev. 21, 8, p. 41, March, 1938.

Instruction, using sample mixes for demonstration, is given for standardizing the ice cream mix.

J.H.E.

426. The "Big Ten" in Ice Cream Merchandising. **R. F. Gilbert, Hydrox Corp., Chicago, Ill.** Ice Cream Rev. 21, 9, p. 96, April, 1938.

Ten specific points are suggested for successful ice cream merchandising at the soda fountain.

J.H.E.

427. Making Ice Milk Mix from Ice Cream Mix. **H. A. Collins, San Jose, California.** Ice Cream Rev. 21, 10, p. 38, May, 1938.

Calculations are explained for standardizing ice milk from regular ice cream mix.

J.H.E.

The author justifies the existence of ice milk, a product similar to ice cream, but containing only 4 per cent milk fat. He states it merits development and regulation because it is a tasteful confection, it has exceptional food value, and is important in the economic structure of the dairy industry. The author states that in 1936 California produced 15,664,734 gallons of ice cream and 7,190,587 gallons of ice milk.


Two formulas for ice cream suitable for people afflicted with diabetes are given. Saccharin is the sweetener in place of sugar.


Several recipes are given for small ice cream manufacturers who are not equipped to homogenize their mixes.


The author attempts to describe some of the elementary principles of microbiology in very simple terminology. Different types of organisms are illustrated, some of the sources of contamination discussed and desirable practices indicated.

Other abstracts of interest are numbers 372, 373, 375, 447, 449, 450, 452, 455, 459, 463 and 464.


There is a wide variation in the amount of milk produced during the different seasons of the year. In many cases there is twice as much shipped in June as there is during the month of November. Records of milk shipments indicate a trend toward more variable production in the Philadelphia and Pittsburgh milk sheds following the abandonment of the base-surplus plans a few years ago. Seasonal sales of milk from farms have always
varied widely in the New York milk sheds, where no plan for the specific purpose of leveling production has ever been in general use.

The report deals with the seasonal production, distribution of sales and prices for the three large markets, New York, Pittsburgh, and Philadelphia, drawing supplies from the state of Pennsylvania.

The average per cent of milk received by these three markets during the month of November was 78.3 per cent while in June it was 131 per cent, using 100 per cent as the average for the year. In the Philadelphia market during the month of November 87.6 per cent of the milk received was used for fluid milk purposes, while in June only 58 per cent of the milk received was used for fluid milk purposes.

Because fluid milk distributors must have an adequate supply of milk during the low periods of production, they have a supply in excess of their fluid requirements during the remainder of the year as a result of fluctuating production.

The average price paid producers depends largely on the percentage of the total supply sold for fluid uses. Therefore, prices are higher in the fall and winter months than during the spring and early summer months. Production is more varied in both the Pennsylvania section of the New York milk shed and in the Pittsburgh milk shed than in the Philadelphia milk shed. Seasonal fluctuation in production in the Pittsburgh and Philadelphia sheds have increased since the discontinuance of the "basic-superplus" plans during 1933 and 1934. For all groups of producers seasonal fluctuations in production have widened since 1933.

A trend toward uneven milk production tends to widen a milk shed; to increase the cost of marketing by requiring additional investments in plants, equipment and trucking facilities necessary to handle peak summer milk supplies; and to increase seasonal fluctuations in average prices paid to producers for milk.

The present price system in Pennsylvania favors uneven production. For this reason many producers have been demanding a change in price policies which would favor even production.

W.D.S.


Judges preferred those starters containing either citric acid or sodium citrate. The addition of citric acid or sodium citrate to the starter culture or to the cream to be used for butter-making, or both, seems to give a butter with a more pronounced flavor and aroma. The addition of two to six ounces of sodium citrate per thousand pounds of cream is effective for preventing feathering of cream because it counteracts the effect of calcium salts in either the water or the cream. The use of limited amounts of sodium citrate in
cream tends to minimize the cream plug defect and although large amounts completely eliminate cream plug, the flavor of the cream is affected adversely. Experiments with whipping cream show the addition of sodium citrate decreases the whipping time when the fat content of the cream is less than 35%. Other factors influencing the whipping of cream, such as fat content, temperature of pasteurization and the like were studied experimentally. Brief comments indicate the possible application of sodium citrate for stabilizing condensed milk, for aiding the ripening of natural cheese and for the production of soft-curd milk. Citric acid may be used advantageously in milk for infant feeding under a doctor's direction.

W.V.P.


Base and surplus plans in four Ohio markets have been an influence in leveling out the yearly supply of milk. In some instances the difference between the flush and shortage months was 10 pounds less per day than before the plan was in operation.

W.E.K.


The value of comparison of laboratory and commercial pasteurization, line testing, line bottle testing and coliform content is discussed and some figures given showing how each criterion is used. The author states the coliform content is one of the best.

E.F.G.


The authors' theory is that the oxidized, rancid, flat and insipid flavors which develop in milk of low bacterial content have their origin in a carotene deficiency in the ration. This effects the milk directly by reducing its carotene content and what appears to be more important causes a vitamin A deficiency in the cow which results in an abnormal distribution of enzymes in blood and milk. This accounts for excessive amounts of lipase found in milk which develops a rancid flavor.

E.F.G.

Several treatments which have at times been suggested for preventing the flavor are mentioned. Factors on the production side which cause milk to be susceptible are listed. In the plant metallic contamination, cleaning and sterilizing and the effect of light at all points in processing and delivery is stressed. Discarding the first milk through the equipment is recommended.

E.F.G.


It is known that winter milk is higher in acidity and also more readily develops oxidized flavor than summer milk. Results on seven trials of .19% acidity milk compared with 7 trials of this milk reduced in acidity to .15% with Na₂CO₃·5H₂O gave strong oxidized flavor in 4 of the former and only 2 of the latter samples at the end of 72 hours. Milk from different sources seems to vary in the reduction of acidity needed to inhibit oxidized flavor. The theory is advanced that the change in pH upon reduction in acidity has an effect upon enzymes secreted by the cow; that the cause and prevention of oxidized flavor is intimately associated with the nutrition of the animal.

E.F.G.


The flavors of 920 cans of raw milk on a hot August day are reported as follows:

<table>
<thead>
<tr>
<th>Flavor</th>
<th>No. of cans</th>
<th>% distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean and pleasant</td>
<td>413</td>
<td>44.89</td>
</tr>
<tr>
<td>Feed</td>
<td>219</td>
<td>23.80</td>
</tr>
<tr>
<td>Musty</td>
<td>101</td>
<td>10.97</td>
</tr>
<tr>
<td>High acid</td>
<td>73</td>
<td>7.93</td>
</tr>
<tr>
<td>Unclean</td>
<td>58</td>
<td>6.30</td>
</tr>
<tr>
<td>Barny</td>
<td>13</td>
<td>1.41</td>
</tr>
<tr>
<td>Cowy</td>
<td>12</td>
<td>1.30</td>
</tr>
<tr>
<td>Oily</td>
<td>13</td>
<td>1.41</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>18</td>
<td>1.95</td>
</tr>
<tr>
<td>Total</td>
<td>920</td>
<td>99.96</td>
</tr>
</tbody>
</table>

Flavors in the pasteurized milk of 22 dealers during September and October are given as follows:
Flavor  
Clean, pleasant: 13.3% 12.0%
Cooked or heated: 65.5% 30.9%
Oxidized: 5.5% 20.7%
Barny: 4.4%
Cow: 3.3%
Metallie: 1.1% 5.2%
Unclean: 1.1% 9.6%
High acid: 1.1% 10.3%
Stale: 10.3%
Flat: 10.3%
Sour: 1.7%
Total: 99.7% 99.7%

Some flavors in raw bottled milk, homogenized and irradiated milk are mentioned.

E.F.G.


The author suggests the following classification of milks from the standpoint of oxidized flavor:

1. Spontaneous milk: Milk which is capable of developing oxidized flavor spontaneously, i.e., without the presence of iron or copper as a contaminant.
2. Susceptible milk: Milk which does not develop oxidized flavor spontaneously, but is susceptible in that contamination with copper or iron will cause development of the flavor.
3. Non-susceptible milk: Milk in which oxidized flavor cannot be produced by the addition of copper or iron.

The theory of an oxidizing enzyme in "spontaneous milk" of the catalytic effect of Fe and Cu in susceptible milk and the presence of increasing proportions of reducing substances in non-susceptible milk is discussed. Vitamin C is important in the latter instance.

Attention is called to the results obtained by various investigators to indicate the possibility of lecithin being the material oxidized in the case of "susceptible" milk, whereas in spontaneous milk it is both butterfat and lecithin-cephalin. The most likely present theory to explain the non-appearance of oxidized flavor in homogenized milk is the increased adsorption of protective protein on the surface of the fat globule.

Some reduction of the development of the flavor in milk agitated or frozen may possibly be explained by a reduced fat surface. "Spontaneous" milk heated to 165 to 168° F. probably results in destruction of the enzyme. Sun-
light alone is an oxidizing agent and the flavor produced differs from the so-called oxidized flavor found in "spontaneous milk" or caused by copper in susceptible milk.

E.F.G.


The resazurin test is found to be more rapid than the methylene blue test, and to be more sensitive to the reducing influences of pathological milks and physiologically abnormal milks. With the short incubation period of one hour the flora approximates more closely the initial flora than when longer incubation periods are used. The rate of change of color from blue to pink over several hours of incubation gives considerable information relative to the types of flora existing in the milk.

E.F.G.


The details of the procedure and reagents used for the phosphatase test are described. Variation in incubation time from 24 hours to 18 hours had no significant effect upon the accuracy of the results. Reagents prepared commercially and buffer substrate tablets were found satisfactory. The phenol concentrations corresponding to various degrees of treatment have been established. Variations of 5 minutes or greater in heating time were readily distinguished and the addition of .1% or more of raw milk gave results indicating incomplete pasteurization. Variations in temperature were also easily detected. High temperature process pasteurization could also be checked. Application of the technique to 780 samples collected from delivery trucks and labeled pasteurized, detected the treatment of the milk correctly in 96% of the samples.

E.F.G.


After a fairly comprehensive review of the literature with reference to the phosphatase test including an explanation of the principles involved the author suggests several aspects of the test which require further study. The Scharer modification of the phosphatase test devised by Kay and Graham is described in detail and was used in the work reported in securing the following results. The authors report attempts to improve Scharer's method by the application of the photoelectric cell in determining the degree of the
phenol color formed, thus making it possible to make more accurate determinations of the amount of phenol present. The principle and construction of the photoelectric cell is given in detail. The photoelectric cell made possible the detection of as low as .1% raw milk. Differences in holding time were more difficult to detect at 145° F. than at 142° F. In either case a raw sample which could be pasteurized under controlled conditions is needed as a reference sample. Corrosive sublimate tablets were found to be usable for preserving milk to be examined by the phosphatase test.

E.F.G.


Examinations of the milk sent into Columbus by 10 dairymen showed that during February and March there was a progressive increase in the temperature of the milk and in the bacterial count. This experience points to the necessity for careful cooling at all seasons of the year.

W.E.K.


Because the trucking operation represents approximately 10 per cent of all the costs of marketing fluid milk, more economic control of this process is indicated.

W.E.K.


A survey of 28,966 families in 59 cities revealed that the average weekly consumption of milk was 2.44 quarts; that less than 1 quart per person weekly was purchased by 4,126 families; that 529 of these families bought no milk.

W.E.K.


This comprehensive study was undertaken at the direction of Comalac, reported to be the largest purchaser of milk bottles in this country, to discover the causes of so much chippage on the tip and bead of Comalac bottles. Some of the results are:

1. 2.9 per cent of new quarts received from the factory were defective.
2. Differences in chipping were observed in ware from different plants. “Over pressed” cap seats were a contributing factor.
3. Two wire cases are a definite cause of bead chippage and their use should be discontinued.

4. Bottle washing operations cause extreme damage to bead and cap seat. Comparisons of washers are given and suggestions for operation to reduce injury to bottles.

5. Corrosive bottle washing materials cause spalled glass and is the forerunner of etching and chipping. The solubility of glass in various washing materials is given. The least solubility, .878 per cent, was obtained with a mixture of flake caustic 50 per cent and sodium metasilicate 50 per cent.

6. Capping machines do not damage the cap seat.

7. Significant damage to the bead or finish resulted when filled bottles were cased 4 at a time but not when cased 2 at a time.

8. Only 1.6 per cent of bottles were damaged on the bead when in the hands of retail customers.

9. Investigation of handling and transporting of cased bottles deserves to reduce damage. Specific recommendations are given. E.F.G.


A description of the milk industry in the Argentine, especially as carried on by the farm-ranch Estancia Tatay. This farm-ranch has approximately 15,000 head of cattle and the milk is pasteurized on the farm where it is produced.

C.J.B.


A report of experimental work with oxidized flavor in milk. The author draws the following conclusions: 1. There are numerous means for delaying or preventing the onset of flavors in dairy products that are of an oxidative nature. 2. In milk, in which the flavor develops spontaneously, high temperature (170° F.), homogenization, nitrogen replacement of the free oxygen, increasing bacterial population, feed and anti-oxidants are effective. 3. Certain anti-oxidants in other fats are pro-oxidants in milk fat. 4. An anti-oxidant contained in oat flour proved to be particularly efficient.

C.J.B.

449. The Phosphatase Test for Determining Efficiency of Pasteurization. E. H. PARFITT. Milk Plant Mo. 27, 1, p. 34, Jan. 1938.

The author gives a comprehensive summary of the phosphatase test, the principles involved, the methods used, applications and precautions.

G.M.T.

Methods of sterilizing dairy equipment are given with special reference to the selection and use of chlorine, pointing out the differences in the corrosive action of chlorine sterilizers.

G.M.T.

451. Now is the Time and Here is the Way to Tackle the Fly and Insect Problem. E. M. Searls, Fred M. Snyder, and C. L. Fluke. Milk Plant Mo. 27, 4, p. 32, April 1938.

Precautions to observe in the selection and use of sprays are given as well as types of sprayers to use and methods for testing them. Life cycles of some insects are presented. A number of control measures are discussed.

G.M.T.


A discussion of the possible changes in systems of milk delivery giving the advantages and disadvantages of the daylight delivery system.

G.M.T.


The composition of milk stone is dependent somewhat upon the product, ice cream mix, cream, skim milk, or whole milk, from which it is precipitated. Generally formed by the precipitation of calcium, sodium, and magnesium phosphate by heat, it contains also some entrapped fat. Analysis of milk stone from a vat coil used for pasteurizing ice cream mix at 160°F showed the milk stone to contain 43.54 per cent protein, 42.03 per cent ash and 12.44 per cent ether extract (fat); whereas holder pasteurized whole milk stone contained 31.19 per cent protein, 5.62 per cent ash and 42.65 per cent ether extract; and 180°F. skim milk stone had 37.82 per cent protein, 52.6 per cent ash and 6.08 per cent ether extract. Prevention of milk stone formation may be accomplished (1) by proper adjustment of the heating medium during pasteurization (2) by use of non-film-forming washing compounds with hard water and (3) by rinsing with cold water rather than hot when the water is hard. Equipment may be freed from milk stone deposits by use of \( \frac{1}{10} \) of 1 per cent tartaric acid or by use of commercial compounds especially prepared for that purpose.

G.M.T.


The influence of various factors responsible for the reduction of methylene blue in milk exposed to sunlight has been reviewed experimentally, and certain phenomena distinguished.

Two effects are noted:
(1) Oxidation of unsaturated fat. This phenomenon is independent of the decoloration of methylene blue. The reduction of methylene blue is, however, aided by this oxidation of the unsaturated fat, which produces anaerobic conditions in the milk by using up the dissolved oxygen and thus allows the second phenomenon to appear.

(2) Oxidation by catalytic dehydrogenation of the ascorbic acid present in the milk. This dehydrogenation is responsible for the decoloration of the methylene blue, which serves as hydrogen acceptor. When all the ascorbic acid has been oxidized, the color of the methylene blue is restored if air or oxygen be admitted. The determination of the substances oxidizable by iodine before and after exposure to sunlight can be used to evaluate the vitamin C content of milk. The results of this method agree well with those obtained by direct titration with 2:6-dichlorphenolindophenol by the Schlemmer method. The rate of reduction of methylene blue on exposure of milk to sunlight does not give quantitative information of the content of ascorbic acid because this rate depends on the amount of unsaturated fat present, which plays a part described above as oxygen absorption. With the exception of mare's milk, the milks examined did not contain reduced glutathione.

K.G.W.


A study was made of factors affecting the efficiency of commercial irradiating equipment in the photochemical synthesis of vitamin D in fluid and evaporated milk exposed in flowing films. A high-pressure, air-cooled quartz mercury-vapor arc provided the radiation, the intensity of which was measured, recorded and maintained automatically. The rate of flow of the milk and the width of film on a vertical, stainless steel surface was controlled while the elevation and distance of the arc from the milk film was adjustable. The variations in radiant energy impinging on the film depend on the solid angle of radiation intercepted by the surface. This is conceived as a rectangular pyramid with apex at the center of the arc and base delineated by the limits of the rectangular surface. To determine the most suitable solid angle, the film travel distance, length of vertical angle, and film width of horizontal angle, were independently varied. The effectiveness of the irradiation was measured by bioassay methods.

Distances of the arc of 4, 6, 8 and 10 inches from the center of the film were used with emission rates producing intensities in wave lengths of less than 3000 Å of 1000, 2000, 4000 and 6000 microwatts measured at a distance of 8 inches horizontally opposite the center of the arc. The plan permitted the variation of radiation intensity while applying a constant amount of energy within the fixed solid angle of radiation. Experiments
were conducted with four rates of milk flow with each of four rates of energy emission at each of four distances from the arc. Both fresh milk and homogenized evaporated milk were studied.

The effect of varying the horizontal and vertical angles was found to be an increase of vitamin D potency with an increase in vertical angle of radiation up to 100° and a decrease in potency as the horizontal angle is widened beyond 60°. Hence, the effective solid angle of radiation for these experiments was defined as one having 90° vertical and horizontal angles. Limiting the applied radiations in this manner, 6 inches proved to be the optimum distance between arc and film for maximum potency, independent of intensity and film capacity. It is assumed that other little-known factors are involved in determining the effectiveness of this 6 inch distance.

The vitamin D potency bears a parabolic relationship to the amount of radiant energy applied. Analyses of the data reveal that, for any given distance between arc and film, identical variations in the amount of applied energy, however produced, have identical effects measured in terms of vitamin D potency of the milk. This holds true even for successive exposures of the milk. This leads to the generalization that irradiation of flowing films of milk with a given radiation source at a given distance from the film produces an antirachitic potency dependent upon the number of successive exposures, the film capacity, and the radiation intensity, only insofar as these affect the amount of applied energy.

From their data the authors derive a mathematical expression for the potency-energy relations as follows:

\[ P = \frac{KA^{1/n}}{Q^{1/n}} \]

where

- \( I \) = intensity
- \( A \) = area of milk film
- \( Q \) = quantity discharge per unit time
- \( K \) = a constant
- \( 1/n \) = decimal exponent in equivalent fraction, ranging between 0.5 and 0.6

Allowing for maximum deviations of 10 per cent in \( I \) and \( Q \), the variations in potency of the milk will lie within the limits of accuracy of the bioassay method.

Since the film capacity-potency relation is hyperbolic and the intensity-potency relation is parabolic, it is desirable to employ sufficiently high intensities and film capacities to avoid excessive variations in potencies. Present commercial equipment satisfies the limitations developed by these investigators.

J.H.N.

Other abstracts of interest are numbers 372, 374, 375, 376, 379, 393, 394, 395, 396, 397, 398, 399, 401, 403, 459, 463 and 464.
ABSTRACTS OF LITERATURE

MISCELLANEOUS


Article I. About 90 per cent of approximately 2,000 cold storage locker plants have been built since 1936. They are operating in northern and western states chiefly, but are reported in at least twenty-one states. Some provide cold storage space only; others furnish a butchering service which includes butchering, chilling, cutting, wrapping, grinding, smoking, curing, and the like. The modern plant provides rooms for chilling, ageing, cutting, sharp freezing and lockers. Investment in refrigerating machines, insulation, lockers and equipment fully installed, and for land and building total approximately $25.00 to $35.00 per locker in plants with 200 to 500 lockers. Limited information on cost of operation makes it possible to estimate an approximate cost per year of $11.46 and $10.62 per locker in complete service plants of 300 and 500 locker capacities, respectively. This cost is exclusive of interest on investment. Earning capacities of locker plants are discussed and estimates are shown that suggest a net return on the investment approximately 10 per cent.

Article II. Locker plants may be licensed by the state in which they operate. Plants may be operated in conjunction with some other enterprise, such as cheese factories, creameries, ice plants, meat markets and grocery stores. Locker plants may be either privately or cooperatively owned and operated. An ideal location is a thriving small town up to 5,000 population which is surrounded by a thickly populated farming area. Successfully operated city plants indicate that operations are not restricted to rural communities. Existing plants draw 75 to 85 per cent of their patronage from farmers. The permanency of the locker system can be assured if it provides an economical, attractive service that fits in with the modern household economy.

W.V.P.


Second cutting alfalfa was put up in temporary silos of the snow fence type. The material in one silo was untreated; molasses at the rate of 2 per cent was added to that of a second; and the A. I. V. treatment was applied to the alfalfa put into a third silo. Much spoilage occurred in all three silos, particularly at the top and around the edges. Carotene preservation was best in the molasses-treated material. In a palatability trial cows preferred corn silage to alfalfa silage. The carotene content of the milk pro-
duced varied in accordance with the carotene content of the silage. Suggestions and precautions concerning the use of temporary silos are given, chief of which is that temporary silos are probably best adapted to storing a late crop for feeding in the fall or early winter to supplement and extend the use of a permanent silo.

W.E.K.


A 3-year rotation of corn, small grain, and hay (red clover, mammoth clover, alsike clover, sweet clover, alfalfa, soybeans, or timothy) was followed on soil limed to the neutral point and on unlimed soil with a pH of 5.0. On an average, liming to the neutral point increased the yield of dry matter 77 per cent and the protein 112 per cent.

W.E.K.


This paper deals largely with a review of recent investigations as to values found in A.I.V. silage. The following subjects are discussed in connection with A.I.V. silage: Grass juice factor, use of different acids in the manufacture of carotenoids, and proteins and nitrogen compounds.

W.S.M.


The author reports an attendance of 3,760 from 53 countries of which slightly less than half were from Germany, the congress meeting in Berlin. Seventy-two registered from U. S. A brief digest is given of many of the noteworthy papers, particularly those which dealt with milk from the standpoint of sanitation, disease control, composition and flavor, quality control, nutritive value and methods of processing. It was noted that the reports dealt largely with problems under European conditions.

E.F.G.


This is a progress report of results obtained from 1931 through 1937 in experiments with fertilizers on pasture situated at many points throughout Ohio. Best yields of both total and desirable herbage were obtained when combinations of superphosphate and sulfate of ammonia, or superphosphate, muriate of potash, or sulfate of ammonia were used. Equivalent production and returns also favored these treatments.

The relative amount of white clover in the pasture was found to influence
herbage yield and possible returns. Phosphate alone lowers the cost and greatly increases the returns where a high clover content can be maintained. Nitrogen in addition has little effect on returns and greatly increases the cost. when clover can not be grown the addition of nitrogen is effective.

These tests are cited as evidence to justify the general improvement of adapted permanent pasture lands.


Experiments in which different heights and frequency of clipping were practiced showed that short, frequent clipping affected adversely the yield and character of the herbage. Controlled grazing, mowing, or both, are suggested for keeping the growth of herbage under control.


Good silage can be made from such hay crops as alfalfa, clover, and soybeans, or mixtures of these with grasses or corn. The use of molasses for legumes is recommended.


The effects of the National Labor Relations Act in prevention of strikes which is stated as one of its objects, can be judged by the fact that in the four years, 1933-1936 inclusive, the number of workers involved in strikes was 299 per cent greater than in the four years, 1929-1933 inclusive, and the number of man-days lost was 152.5 per cent greater in the latter period. Ignorance of the National Labor Relations Act and disregard of its provisions has resulted in confusion. Every employer should know what the act requires and what it does not. The writer proceeds to explain many of the more important provisions of the Act as they specify employer-employee relations and what each can and cannot do. No single piece of legislation heretofore proposed, has had such far-reaching potential consequences as that to fix wages and hours of labor in American industry.

The author states that he believes such a law is undesirable because it is impossible of accomplishment. He then outlines the basis of such a law if it is granted that it is inevitable. He recommends first that labor problems be a major subject for study by the Association and second, that a better understanding between employer and employee be developed. The milk industry cannot indiscriminately increase the cost of its product in order to
meet wage scales which are out of line with the earnings of the average customer of this industry.  

E.F.G.


Some of the factors which affect efficiency in refrigerating machinery and which any operator can remedy are given.  

J.H.E.


It is pointed out that many cold storage plants now provide rented lockers in which tradesmen and others may store perishables.

The opportunity of supplying this service in smaller towns is open to many ice cream manufacturers, milk dealers, creamery men and cheese factory operators equipped with cold storage facilities.  

W.C.C.

PHYSIOLOGY


Observations are reported on gestation, parturition and lactation in totally and partially sympathectomized cats shortly after completion of the surgical procedures and a year later.  The incidence of abortions is high in animals that become pregnant shortly after sympathetic denervation of the internal genitalia.  The incidence of stillbirths is high in animals that become pregnant long after sympathectomy.  Sympathetic denervation of the mammary glands caused definite variation from normal functioning activity, recognizable histologically, in only 1 out of 7 pregnancies that went to term.  

D.L.E.


Thyroxin substitution therapy in hypophysectomized rats can restore the rate of absorption of glucose from the intestine completely to normal.  The dose of crystalline thyroxin necessary for this action is less than that required to restore the metabolic rate.  This treatment does not improve the maintenance of carbohydrate stores during the fasting or change the proportionate disposition of absorbed glucose in hypophysectomized rats.  

D.L.E.

Four young goats were depancreatized. Following pancreatectomy, the goat has a mild type of diabetes as measured by the extremely low glycosuria and low, although increased, nitrogen excretion. Unlike the cat, dog and pig, ketonuria is slight or absent.

Explanations are offered to explain why depancreatized goats manifest a certain ability to utilize carbohydrate, as shown by two animals in which glucose was given intravenously, and only 25 to 50 per cent excreted. Even when the sugar was given by stomach tube, no sugar could be aspirated a few hours later. The assumption is made that glucose is fermented or otherwise transformed in the herbivorous stomach and absorbed in some non-reducing form. D.L.E.


The voluntary water intake of normal animals and humans was found to be a function of surface area rather than of body weight, and hence must be a function of metabolism. The average daily intake per square meter body surface varied from 1,050 cc. to 1,238 cc. in rats, cats, dogs, monkeys, and humans, averaging 1,142 cc.

The maximum voluntary water intake in animals with diabetes insipidus was found to be a function of body weight rather than of body surface. The regulatory action of the posterior lobe secretion on the maintenance of the water balance is described. It was suggested that the level of the maximum intake with diabetes insipidus might be determined by the maximum capacity of the kidney or by the maximum capacity of all the cellular spaces of the body, both of which would be functions of body weight. D.L.E.


Normal well-nourished cats when placed on an inadequate diet react normally to cold until the weight loss considerably exceeds 30 per cent. The rectal temperature of cats, which have lost considerably more than 30 per cent of their original weight as a result of an inadequate diet, drops to extremely low levels upon exposure to cold.

The responses to heat are not interfered with by weight losses which cause abnormal responses to cold. D.L.E.

A diagrammatic discussion of the instrument is presented. K.G.W.

473. **The Utilization of Lactic Acid by the Lactating Mammary Gland.**


The experiments show that considerably more lactose was being secreted than could be accounted for by the removal of glucose from the blood and that other carbohydrate-forming compounds must be taken up by the gland. Glucose, lactic acid, and amino nitrogen are removed from the blood in substantial amounts. Eighty-five per cent of the lactose formed during the experimental period could be accounted for theoretically from glucose and lactic acid from the blood, the remaining 15 per cent may be accounted for if the amino nitrogen removed from the blood is calculated as a 3-carbon amino acid, which may be converted into lactic acid. Because experiments indicate lactic acid is produced rather than absorbed by the gland, this acid may be an important precursor of lactose of milk. K.G.W.