JULY, 1968
Vol. 31 P. 197-230 No. 7

Journal of

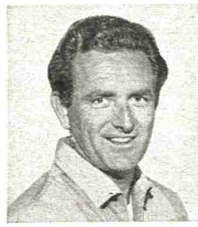
MILK and FOOD TECHNOLOGY

55TH ANNUAL MEETING
August 19, 20, 21, 22, 1968
Chase-Park Plaza Hotel
St. Louis, Missouri
SEE RESERVATION FORM PAGE I, II

Official Publication

International Association of Milk, Food and
Environmental Sanitarians, Inc.

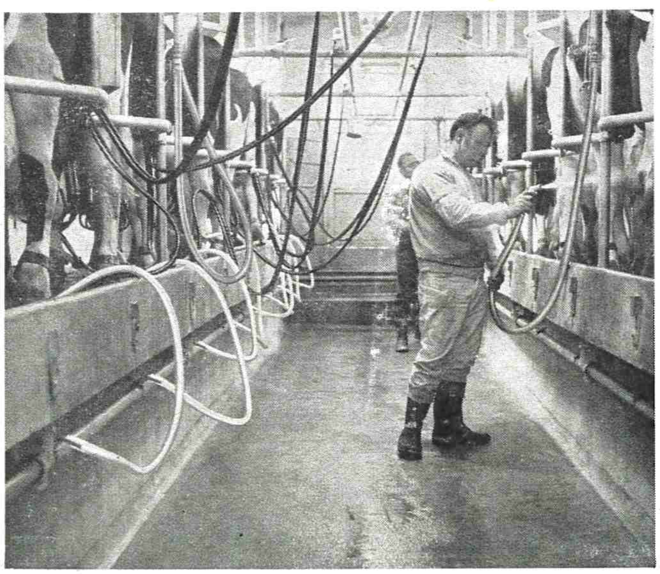
"We've converted 100% to Transflow M-34R plastic milk hose and vacuum lines"



says Harold Tollerup,
Corona, California,
dairyman

"We'll never use rubber again"

adds John Mann,
Tollerup's foreman



Above. A portion of the pit in Tollerup's herringbone barn. (The dairy also has a conventional barn.) Note TRANSFLOW connected along left side. "With TRANSFLOW's clearness you can see the cow's milk flow. I'm sold on TRANSFLOW," says foreman John Mann.

Alert, successful, businesslike . . . Tollerup Dairy milks 862 Holsteins every day. Its milking machines are all equipped with clear, flexible TRANSFLOW M-34R Milk Hose and TRANSFLOW Vacuum Tubing.

"It's lots cheaper than rubber because it lasts a lot longer," Tollerup says of his TRANSFLOW. "It's less trouble, too."

Foreman John Mann agrees. "It doesn't crack, and when you accidentally bend the hose during milking it doesn't pinch like rubber will. Also, it doesn't crack, and no black rubs off as happens with rubber. It's easy to handle, too. I'm sold on TRANSFLOW®"

Isn't it time that **you** started changing over to TRANSFLOW? It'll pay for itself over and over saving time, money and trouble.

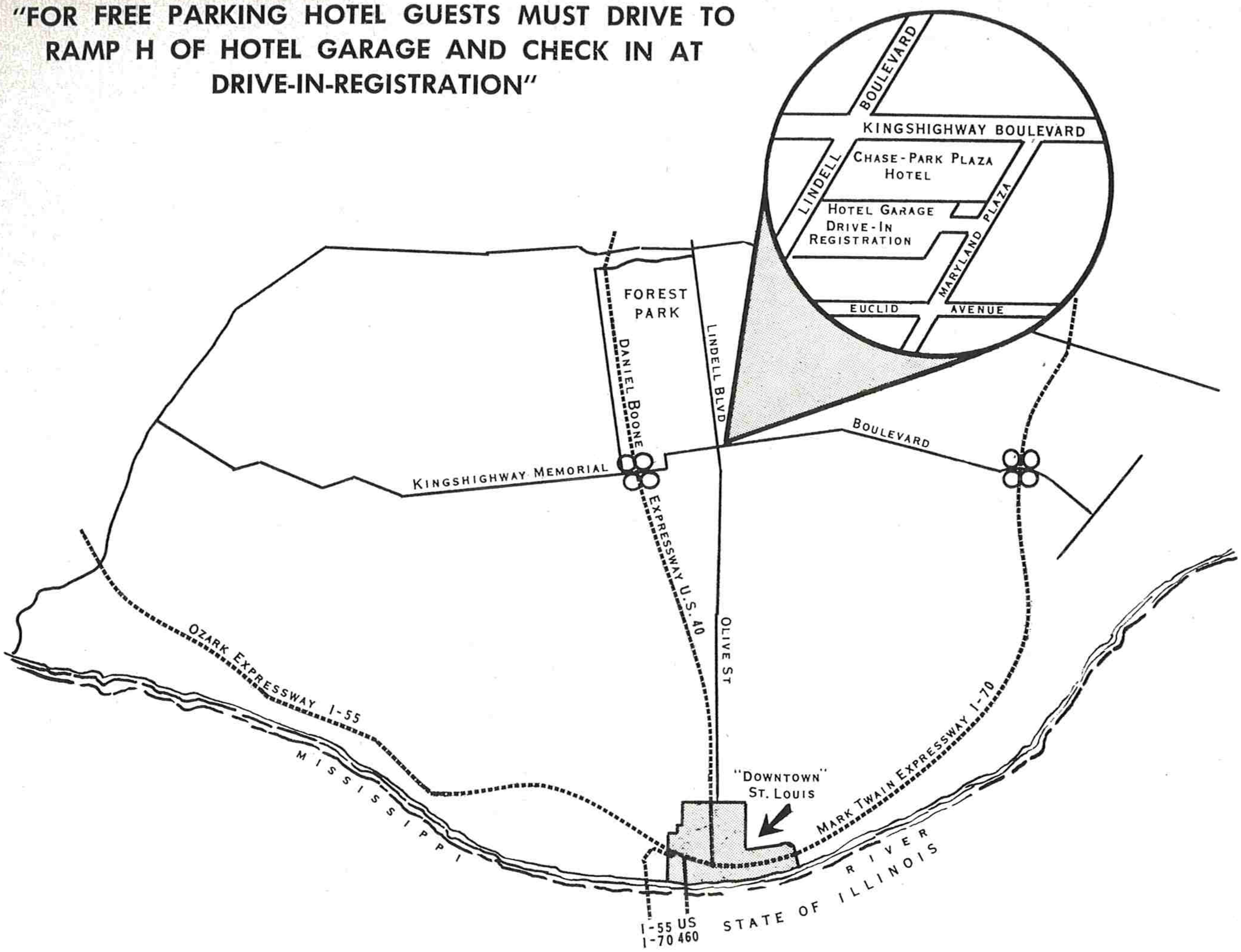
But . . . be sure you get genuine TRANSFLOW! Look for the name branded on every foot. You can also tell TRANSFLOW Milk Hose by its blue stripe and, of course, TRANSFLOW Vacuum Tubing is the "sparkling black hose with the clean white stripe."

Get all the facts! Write today for complete information on TRANSFLOW Milk Hose and Vacuum Tubing.

NORTON U.S. STONEWARE INC.
CHAMBERLAIN ENGINEERING DIVISION · AKRON, OHIO 44309

1910-B

"FOR FREE PARKING HOTEL GUESTS MUST DRIVE TO RAMP H OF HOTEL GARAGE AND CHECK IN AT DRIVE-IN-REGISTRATION"



BEFORE AND AFTER ST. LOUIS MEETING

ST. LOUIS CARDINAL BASEBALL

"WORLD CHAMPION EL BIRDOS"

In beautiful new Busch Memorial Stadium

$2.50 per reserved seat

Indicate desired date(s) and number of tickets

Atlanta Braves	Saturday night	August 17	________
	Sunday afternoon	August 18	________
Pittsburgh Pirates	Friday night	August 23	________
	Saturday afternoon	August 24	________
	Sunday afternoon	August 25	________

AT ST. LOUIS MEETING

ST. LOUIS MUNICIPAL OPERA

"ALONE . . . . IN ITS GREATNESS"

In nearby Forest Park—5 minutes from Chase-Park Plaza Hotel

Indicate desired night and number of tickets—$3.50 per seat

THE WIZARD OF OZ

Sat., August 17 ________

Sun., August 18 ________

SOUND OF MUSIC

Mon., August 19 ________

Tue., August 20 ________

Thur., August 21 ________

Fri., August 22 ________

Sat., August 24 ________

Make check payable to:
IAMFES ST. LOUIS FUND
and mail to:
William McCown
St. Louis County Health Department
801 S. Brentwood Boulevard
St. Louis, Missouri 63105

The Journal of Milk and Food Technology is issued monthly beginning with the January number. Each volume comprises 12 numbers. Published by the International Association of Milk, Food and Environmental Sanitarians, Inc. with executive offices of the Association, Blue Ridge Rd., P. O. Box 437, Shelbyville, Ind.

Entered as second class matters at the Post Office at Shelbyville, Ind., March 1952, under the Act of March 3, 1879.

EDITORIAL OFFICES: Dr. Elmer H. Marth, Dept. of Food Science and Industries, University of Wisconsin, Madison, Wis. 53706. H. L. Thomasson, Managing Editor, P. O. Box 437, Shelbyville, Indiana 46176.

Manuscripts: Correspondence regarding manuscripts and other reading material should be addressed to Dr. Elmer H. Marth, Dept. of Food Science and Industries, University of Wisconsin, Madison, Wis. 53706.

"Instruction to Contributors" can be obtained from the editor for the use of contributors of papers.

Journal of

MILK and FOOD TECHNOLOGY

INCLUDING MILK AND FOOD SANITATION

Official Publication
International Association of Milk, Food and Environmental Sanitarians, Inc.
Reg. U. S. Pat. Off.

Vol. 31 July, 1968 No. 7

Business Matters: Correspondence regarding business matters, advertising, subscriptions, orders for single copies, etc., should be addressed to H. L. Thomasson (address above).

Subscription Rates: One volume per year. Individual non-members, Governmental and Commercial Organization subscription.

1 yr. $10.00
Public and Educational Institution Libraries, 1 yr. ....$ 8.00
Single Copies ....$ 1.00

Orders for Reprint: All orders for reprints should be sent to the executive office of the Association. P. O. Box 437, Shelbyville, Ind.

Membership Dues: Membership in the International Association of Milk, Food and Environmental Sanitarians, Inc., is $10.00 per year, which includes annual subscription to the **Journal of Milk and Food Technology.** All Correspondence regarding membership, remittances for dues, failure to receive copies of the **Journal,** changes in address and other such matters should be addressed to the Executive Secretary of the Association, H. L. Thomasson, Box 437, Shelbyville, Indiana 46176.

Editorial:

PROTECT THE FORTUNE YOU WILL EARN

Every four minutes it happens . . . with solemn, clocklike regularity . . . someone loses a fortune.

Every four minutes someone is disabled for life . . . unable to work, unable to earn a regular paycheck. If this happens to you, you will lose a fortune, too—the fortune you would have earned if you had lived and kept your health. Let's say for example you are 30 years old and earn approximately $500.00 a month. With normal life expectancy, you can expect to earn a fortune amounting to more than $240,000.00 during your lifetime.

When you convert this wealth into the things it will buy for you and your family, the importance of your paycheck is overwhelming. Just count its treasures: your home and the security and comfort it gives you . . . the breakfast, lunch and dinner you eat every day of every week of every year . . . your children's clothes . . . their education . . . the stove your wife cooks on, the new hat she delights in. Your whole material world and all the contentment and joy it offers you come from your paycheck.

Sooner or later, every man or woman who works for a living must answer this question . . . "If sickness or accident cuts off my ability to earn a paycheck, how will I care for myself and my loved ones?" One answer might be to put away a few dollars every month in a special fund earmarked for emergency. But this is easier said than done. There just never seem to be enough dollars left at the end of the month to put away. Besides, how long would it take you to save six month's salary—let alone enough to last you one year, five years or a lifetime?

Fortunately, now as a member of the International Association of Milk, Food and Environmental Sanitarians, Inc. you have a practical, low-cost solution to this vital problem.

It's your Association's Paycheck Protection Plan that can pay you up to $500.00 a month when you're sick or hurt and can't work. We urge that you give serious consideration to the purchase of this fine plan for you and your family. Buying this protection could be the most important decision you will ever make. It could mean the difference between a future free from financial worries and one of uncertainties and financial hardships.

GROWTH OF FOOD POISONING BACTERIA ON BARBECUED CHICKEN

HILLIARD PIVNICK, ILMAR E. ERDMAN, STEPHANIE MANZATIUK,
AND EUGENE POMMIER

Division of Microbiology, Research Laboratories
Food and Drug Directorate, Tunney's Pasture
Ottawa, Canada

(Received for publication April 15, 1968)

ABSTRACT

Staphylococcus aureus, Salmonella typhimurium, and *Clostridium perfringens* have been associated with food poisoning following consumption of barbecued chicken. These species grew readily in barbecued chicken incubated at about 40 C and increased approximately 100,000-fold within 8 hr.

Barbecued chicken and other barbecued meats cooked and sold by grocery retailers are almost universally kept warm or hot while awaiting sale. Reports of poisoning following consumption of such foods *(1, 6, 12, 13, 14)* and a survey of retail practices of barbecued foods in Canada (authors' unpublished data) indicate that, in many instances, the temperatures at which the cooked meat is held may allow growth of food poisoning bacteria. To test this hypothesis we have inoculated barbecued chickens with *Staphylococcus aureus, Salmonella typhimurium,* and *Clostridium perfringens.* In addition we have inoculated raw chicken with spores of *C. perfringens* and cooked it under conditions which simulate those obtained in commercial practice. Our observations indicate that barbecued chicken is an excellent substrate for growth of these food-poisoning bacteria.

MATERIALS AND METHODS

Cultures for inoculation. Nine strains of coagulase-positive *S. aureus,* one strain of *S. typhimurium,* and one of *C. perfringens,* all isolated from foods suspected of causing food poisoning, were used as inocula. Of the 9 strains of *S. aureus,* 3 produced enterotoxin A, one produced A and B, and the remaining 5 produced neither A nor B when tested by the methods described by Casman *(7,* and personal communication). Reference toxins and antitoxins were a gift of Dr. E. Casman, Washington, D. C.

Barbecued chickens. Most of the chickens were barbecued by, and purchased from, two retail stores. During preliminary investigations we found that material purchased from warm holding cabinets of these stores was unsuitable for controlled bacteriological studies because some barbecued products were partially raw while others had standard plate counts up to 1 x 10^6 per g. Thereafter we purchased fully cooked birds at pre-arranged times which coincided with their removal from the barbecue oven.

Barbecued chickens were held overnight at 4 C and, prior to inoculation they were reheated in an oven at 150 C until the temperature of the breast muscle was within 2-3 degrees of the temperature at which they were to be incubated. After inoculation, they were wrapped in Saran, replaced in the laminated bags supplied by the vendor, and held in the incubator. When more exact temperatures were required, e.g., temperatures approaching the limiting temperature for growth, the cooked, wrapped birds were preheated in an incubator until the temperature of the breast muscle had reached the temperature of the incubator. They were then inoculated, rewrapped, and returned to the incubator within two minutes. Even with this rapid procedure, the temperature of the breast muscle decreased by 1.5 C.

Inoculation. Cultures were grown 24 hr at 35.5 C and diluted suitably in order that 2 ml of inoculum would provide approximately 10^4 viable cells per g of chicken. Barbecued chickens were inoculated by spreading 1.4 ml of suspension over the surface and 0.6 ml in the body cavity.

For some experiments, raw chickens were inoculated with spores of *C. perfringens,* and subsequently barbecued in the laboratory. Two ml of suitably diluted spore suspension was used to inoculate the body cavity, the skewers, and the surfaces between wings and body, and between thighs and body. Tying the limbs prior to barbecuing, as in commercial practice, would afford some protection during cooking to the spores on the skin in these areas.

Enumeration of microorganisms. Meat was removed aseptically from one-half of each bird and ground in a Waring blendor with 2 weights of water. Thereafter, suitable dilutions were made and viable cells enumerated using trypticase soy agar for the standard plate count, phenol red mannitol salt agar (PRMS) for *S. aureus (8),* and sulfite-polymyxin-sulfadiazine agar (SPS) for *C. perfringens (4). S. typhimurium* was enumerated by the MPN method *(5)* using selenite-cystine broth as an enrichment, and McConkey agar for isolation of colonies. Colonies suspected to be *S. aureus, C. perfringens,* and *S. typhimurium* were subjected to suitable tests for confirmation.

RESULTS

S. aureus. Fig. 1 shows that growth of *S. aureus* inoculated on the surface of barbecued chicken increased 10,000-fold within 8 hr; maximal populations were reached in 16 hr. Although numerous temperatures of incubation from 35.5 - 42.5 C were investigated, this figure shows that temperatures in this range did not appreciably affect growth rate or maximum population. At 44.5 $\pm$ 1.0 C, as measured by a YSI telethermometer (Yellow Springs Instrument Co., Model 42, Yellow Springs, Ohio) with a

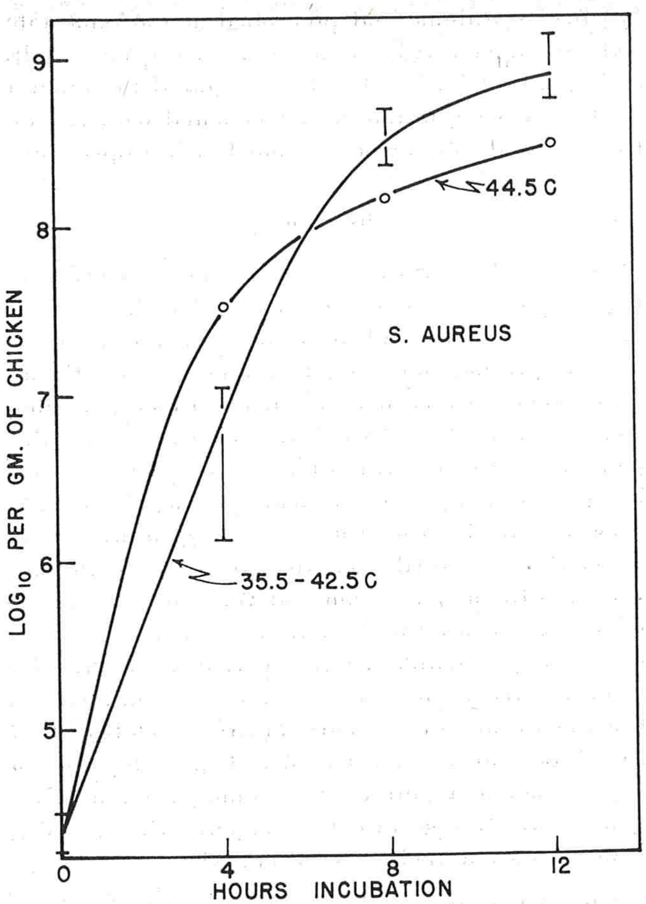


Figure 1. Growth of *Staphylococcus aureus* on whole barbecued chicken.

probe inserted about 2 cm into the breast muscle, growth was slightly more rapid, but the final population was smaller.

The limiting temperature for growth of S. *aureus* is about 45 C *(2)*. We did not attempt to incubate whole inoculated barbecued chickens at 45 C or higher because of the difficulty of maintaining exact temperatures. In order to test the ability of our inoculum to grow on barbecued chicken at 45 C and 47 C, we cut barbecued chicken into small pieces, preheated 50 g quantities in glass containers immersed in water baths, inoculated them, and at intervals determined the bacterial population. At 45 C, the S. *aureus* population increased 1000-fold within 8 hr; at 47 C, S. *aureus* did not grow.

In all experiments except one, the inoculum of S. *aureus* comprised over 90% of the total bacterial population at the beginning of incubation, probably because the barbecued chickens used in these experiments had been purchased at the time they were taken from the spit. This high percentage of S. *aureus* was maintained during growth, and frequently samples examined after 24 hr at temperatures between 35.5 and 42.5 C contained over 99% S. *aureus*. The single exception occurred during preliminary experiments when we purchased barbecued chickens which had been held for an undetermined time by the vendor. At the beginning of incubation in this experiment, the inoculum of S. *aureus* comprised 10% of the total population. This percentage increased to 22% and 50% by the twelfth and twentieth hours, respectively. In this instance, S. *aureus* appeared to compete successfully with the indigenous microflora.

Production of enterotoxin in barbecued chicken. Barbecued chicken cut in small pieces and sterilized in the autoclave was inoculated with S. *aureus* and incubated 2.5 days at 35 C. The meat was then ground in a Waring blendor with 2 volumes of 0.02 M phosphate buffer, pH 6.2, containing 1:10,000 merthiolate, and heated at 100 C for 30 min. Supernatants (3 ml) of centrifuged samples from both inoculated and non-inoculated chicken were introduced intraperitoneally into pairs of cats. The cats did not experience emesis. However, when the supernatant fluid was concentrated to one-eighth of the original volume by dialysis in the cold against 30% polyvinylpyrrolidone and 3 ml injected, both cats receiving supernatant fluid from the inoculated samples gave a response typical for enterotoxin while the 2 controls remained well. The concentrated supernatant from the inoculated chicken, when tested by the immuno-diffusion slide technique of Crowle *(9)* as modified by Casman (personal communication), gave a

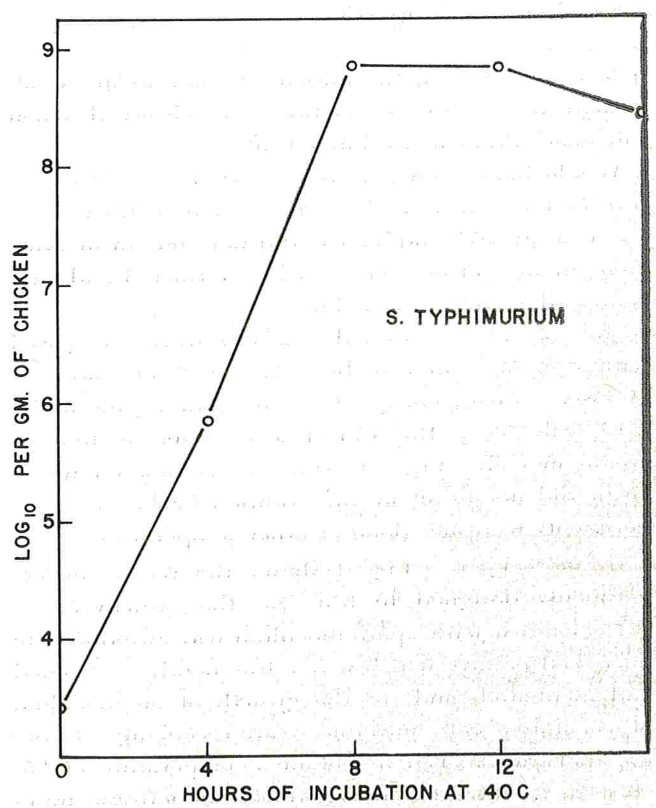


Figure 2. Growth of *Salmonella typhimurium* on whole barbecued chicken.

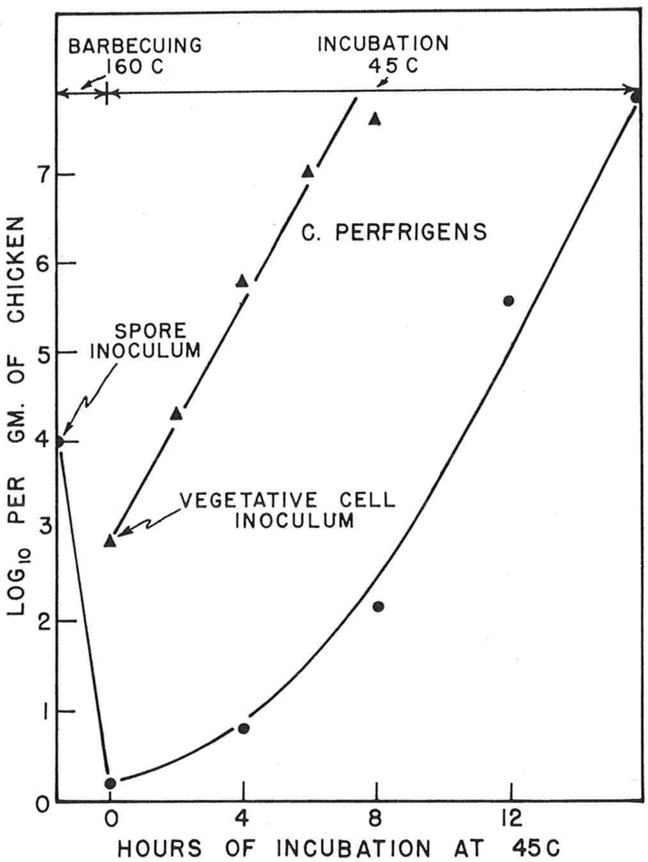


Figure 3. Destruction of spores of *C. perfringens* during barbecuing of chicken, and outgrowth of survivors. Growth of inoculum of vegetative cells.

line of identity with authentic enterotoxin A although no precipitin reaction was observed when this concentrate was diluted 1:10.

Whole barbecued chickens inoculated with a mixture of the 9 strains of *S. aureus* and incubated for 24 hr at 40, 42.5 and 44.5 C did not contain measurable amounts of enterotoxin when extracted and concentrated in the same manner.

Salmonella. Barbecued chickens were inoculated with *S. typhimurium* to obtain an initial concentration of 2.8 x 10^3 cells per g. This population grew to 7.2 x 10^8 cells per g after 8 hr at 40 C, a 260,000-fold increase in cells (Fig. 2). Further incubation up to 16 hr did not result in any additional increase. Experiments were not done at other temperatures.

C. perfringens. Fig. 3 shows the results of experiments designed to test: *(a)* the growth of *C. perfringens* when a spore inoculum was introduced to uncooked poultry which was subsequently barbecued and incubated; and *(b)* the growth of an inoculum of vegetative cells introduced after cooking. Cooking the raw chicken to obtain a temperature of 85-90 C in the breast muscle reduced a spore inoculum of 1 x 10^4 spores per g to 1.5 per g. However, after a lag period of approximately 4 hr at 45 C growth became logarithmic and proceeded at the same rate as that obtained with the inoculum of vegetative cells on precooked birds. The time required to obtain 1 x 10^7 cells per g in the birds inoculated with vegetative cells and spores were 6.3 and 14.7 hr respectively.

DISCUSSION

Barbecued chickens, like other cooked meats lacking the preservative activity of salt, dehydration, and nitrite, are excellent substrates for growth of bacteria. It is surprising, therefore, that there is so little information concerned with outbreaks of food poisoning from this material. Perhaps the main reason for this paucity of literature is the failure to report such outbreaks unless they involve many people, or they are caused by readily transmitted microorganisms such as *Salmonella.* Nevertheless, they do occur with considerable frequency. Senn and Williams *(14)* reported 17 cases caused by *S. aureus, Salmonella* sp., and *C. perfringens* within a 2-year period in Los Angeles County. We have become aware of 2 outbreaks in Canada during the period January - October, 1967 *(6, 13)* despite the fact that there is no obligation for a physician to report food poisoning from such organisms as *S. aureus* or *C. perfringens.* Undoubtedly, many more outbreaks have occurred.

Our own work has shown that although *S. aureus* grew abundantly on whole barbecued chicken, detectable levels of enterotoxin were not found after 24 hr of growth. The failure to find enterotoxin after this period may have resulted from one or more of the following: *(a)* insufficient incubation (we did obtain toxin in cut, autoclaved chicken incubated 2.5 days); *(b)* a low oxidation-reduction potential *(10, 11);* and *(c)* competition from some of the strains of *S. aureus* in the inoculum which did not produce either enterotoxin A or B. Of these 3 possibilities, it is probable that a combination of insufficient incubation and a state of anaerobiosis may be most pertinent. Although *S. aureus* grows under anaerobic conditions, enterotoxinogenesis is delayed *(10, 11).* Anaerobiosis may be presumed to exist between the skin of the chicken and the oxygen-impermeable Saran wrapping because barbecued chickens, inoculated only on the surface with *C. perfringens,* and wrapped in Saran, developed large populations of this organism within a few hours.

The growth of food-poisoning bacteria does not necessarily result in spoilage of the product. Indeed, if spoilage occurred readily, there would be less food poisoning. Although we did no controlled organoleptic analysis, it was obvious that inoculated birds incubated 8-12 hr would not be offensive to a nondiscriminating consumer. Occasionally, we have purchased barbecued chickens from retail outlets and found that they had more offensive odors than the chickens we had inoculated and incubated 8-12 hr. Some of these purchased chickens had bacterial populations between 10^5 and 10^7 per g, indicating storage at improper temperatures. Had the bacteria been capable of causing food poisoning, and the barbecued chicken been purchased by a susceptible, non-discriminating consumer, another outbreak might have occurred.

There is a simple, effective method of decreasing food poisoning outbreaks from this type of food. The retailer should hold barbecued products in holding facilities at 60 C or above. This temperature would rapidly destroy post-cooking contaminants such as *S. aureus* and *Salmonella* sp. *(3)*, and prevent the outgrowth of spores of *C. perfringens.*

REFERENCES

1. Ager, E. A., J. Allard, S. B. Werner, H. H. Trayner, and R. Olson. 1966. Salmonella contamination of barbecued chickens-Spokane, Washington. Salmonella Surveillance Report 53:6, USDHEW/PHS.

2. Angelotti, R., M. J. Foter, and K. H. Lewis. 1961. Time-temperature effects on salmonellae and staphylococci in foods. II. Behavior at warm holding temperatures. Am. J. Pub. Health 51:83.

3. Angelotti, R., M. J. Foter, and K. H. Lewis. 1961. Time-temperature effects on salmonellae and staphylococci in foods. III. Thermal death time studies. Appl. Microbiol. 9:308.

4. Angelotti, R., H. E. Hall, M. J. Foter, and K. H. Lewis. 1962. Quantitation of *Clostridium perfringens* in foods. Appl. Microbiol. 10:193.

5. APHA. Standard Methods for the Examination of Dairy Products. 11 Ed., 1960.

6. Bent, W. I. 1967. Salmonellosis. Epidemiol. Bull. 11:83, Dept. Nat. Health and Welfare, Ottawa, Canada.

7. Casman, E. P., and R. W. Bennett. 1963. Culture medium for the production of staphylococcal enterotoxin A. J. Bacteriol. 86:18.

8. Chapman, G. H. 1945. The significance of sodium chloride in studies of staphylococci. J. Bacteriol. 50:201.

9. Crowle, A. J. 1958. A simplified double-diffusion agar precipitin technique. J. Lab. Clin. Med. 52:984.

10. Genigeorgis, C., H. Riemann, and W. W. Sadler. 1967. Food toxins. I. Staphylococcal enterotoxigenesis in cured meats. XVIIIth World Veterinary Congress, Paris, p. 178.

11. Greenberg, R. A. 1964. The influence of packaging methods on the growth of food poisoning microorganisms. Proc. Res. Conf. Res. Advisory Council, Amer. Meat Inst. Found., Univ. Chicago 16:5.

12. Luther, M., R. Fenold, V. C. Tipton, V. Zalma, B. Aserkoff, and S. Schroeder. 1967. *Salmonella javiana* infections in Harris County, Texas. Salmonella Surveillance Report 65:2, USDHEW/PHS.

13. Pivnick, H., T. R. B. Barr, I. E. Erdman, and J. I. Pataki. 1968. Staphylococcus food poisoning from barbecued chicken. Can. J. Pub. Health 59:32.

14. Senn, C. L., and P. A. Williams. 1967. Public health aspects of rotisseries in markets. J. Milk Food Technol. 30:116.

REVERSE OSMOSIS MAY SOLVE WHEY DISPOSAL PROBLEM

USDA researchers suggest in the May issue of *Agricultural Research* that reverse osmosis, best known as a method of obtaining fresh water from sea water, may help small-volume cheese plants solve the problem of disposing of whey. Here are some excerpts:

"Fourteen billion pounds of whey—almost two-thirds of the whey produced each year in this country as a waste product of cheese-making—are thrown out annually. Many states have outlawed dumping of this pollutant into waterways. The alternative is concentrating and then drying whey, but existing commercial methods are too expensive for small-volume plants.

"An economically feasible solution, ARS research indicates, is to remove 75 to 80 percent of the whey water by reverse osmosis and ship the concentrate to larger plants for drying. . ."

"Besides eliminating a serious disposal and pollution problem, there is the possibility of separating whey into usable constituents through reverse osmosis. It might be possible, for example, to separate lactose—the only sugar produced by mammals. It is used in dietary foods and pharmaceutical products.

"The U. S. cheese industry has the potential for producing 1.4 billion pounds of dried whey a year, with a value of about $140 million.

"Whey contains half the solids of milk and is rich in vitamins, amino acids, lactose, and soluble proteins. Dried whey mixed with soybean powder is being tested in India as a baby food. Dried whey has a growing market in bakery products, candy, ice popsicles, and cheese and cream sauces.

"Cheese plants now concentrate whey in costly vacuum evaporators. Reverse osmosis, unlike evaporation, does not require heating which often affects the flavor of the whey."

THE EFFECT OF DIELDRIN ON ACID DEVELOPMENT DURING MANUFACTURE OF CHEDDAR CHEESE[a, b]

R. L. BRADLEY, JR. AND C. F. LI

Department of Food Science and Industries
University of Wisconsin, Madison

(Received for publication March 15, 1968)

ABSTRACT

Dieldrin as a natural contaminant or as artificial contaminant in milks used for Cheddar cheese manufacture reduced acid development when both a commercial mixed strain culture and cultures of *Streptococcus lactis* II, *Streptococcus cremoris* and *Streptococcus lactis* var. *diacetilactis* were used. This reduction in acid development in the two lots of cheese made with a mixed strain culture was still evident when the pH values were determined ater aging for 10 weeks.

Insecticides are being used widely in our environment for agricultural, industrial and domestic purposes. Misuse could result in contamination of a food supply.

Johnson *(3)* showed that lindane residues on cucumbers did not interfere with subsequent lactic fermentations. Moreover, lindane was effective in controlling yeast growth in these fermentations, thereby reducing the competition for nutrients needed by the fastidious lactic acid producing bacteria. Kim and Harmon *(4)* stated that methoxychlor had no noticeable effect on the growth and fermentation ability of *Lactobacillus casei* and *Streptococcus lactis*.

Some chlorinated hydrocarbon pesticides exhibit bactericidal or bacteriostatic activity. Several researchers have shown that benzene hexachloride (BHC), used alone or in combination with DDT at high concentrations, reduced the populations of nitrate- and nitrite-forming bacteria in soil *(2, 5, 6, 7)*. Smith and Wenzel *(6)* indicated that chlordane possessed less toxicity than BHC to nitrifying organisms.

One would not expect chlorinated hydrocarbons to affect bacteria since these pesticides are neural toxicants. However, during the manufacture of Cheddar cheese, using milk contaminated with dieldrin, considerable evidence was collected to show the occurrence of at least retardation of acid production. This study considers the effect of a chlorinated hydrocarbon pesticide, dieldrin, in milk on acid development by some *Streptococcus* species.

[a]Published with the approval of the Director of the Wisconsin Agricultural Experiment Station.

[b]Supported by the Department of Health, Education, and Welfare, Food and Drug Administration Contract 67-41. The views expressed herein are those of the authors and do not necessarily reflect the official viewpoint of the Food and Drug Administration.

METHODS AND MATERIALS

Manufacture of Cheddar cheese

Milk from 2 dairy cows in the University of Wisconsin herd that were fed dieldrin was examined for pesticide concentration according to the methods recommended by the Food and Drug Administration *(1)*. Lots of 130 lb of milk were used to manufacture Cheddar cheese using accepted commercial practices and a mixed strain commercial starter culture. Lot 1 of milk contained 2.37 ppm dieldrin/g milkfat; lot 2, 2.20 ppm; and lot 3, 2.15 ppm.

Titratable acidity determinations were made at appropriate intervals during manufacture. After manufacture, the cheeses were wrapped in pliofilm, wax-coated and stored at 4.4 C.

The presence of bacteriophage infection in the cheese making trials was contraindicated when litmus milk, containing serially diluted whey, changed color at the same approximate time following inoculation with starter.

Experiments with individual cultures

Single strain cultures, composed of S. *lactis* II, S. *cremoris* and S. *lactis* var. *diacetilactis*, were selected for evaluation since these are representative of the organisms that normally make up mixed strain starter cultures. The commercial mixed strain starter culture used in the University of Wisconsin Dairy Plant and the single strain starter cultures, were inoculated into duplicate 500 ml quantities of milk containing no added pesticide (control), 2.15 ppm dieldrin as a natural contaminant, and 0.04 ppm added dieldrin. Ethanol was used to dissolve the dieldrin prior to addition, and no abnormal effect on the fermentation was observed from its use. Naturally contaminated milk was obtained from cows that had been fed dieldrin in their diet. Titratable acidity values were determined at intervals throughout this small scale Cheddar cheese manufacture until the time to drain the whey. The trials were terminated at this point. These tests were intended to ascertain which of the commonly used organisms in lactic cultures were affected by dieldrin.

RESULTS AND DISCUSSION

In 3 trials involving the manufacture of Cheddar cheese from milk naturally contaminated with dieldrin, the titratable acidity at curd cutting was normal (0.10%), at draining was not greater than 0.11%, and at milling was not greater than 0.31%. Control Cheddar cheese, made with the same starter, produced normal titratable acidities of 0.10, 0.16 and 0.40% at curd cutting, draining and milling, respectively. The cheese made in the third trial was discarded prior to hooping, since this trial was used only to check for the presence of bacteriophage. After aging for 10 weeks, the 2 remaining contaminated Cheddar cheeses

TABLE 1. THE EFFECT OF DIELDRIN IN MILK ON ACID DEVELOPMENT DURING SIMULATED MANUFACTURE OF CHEDDAR CHEESE

	Titratable acidity of milk, %		Titratable acidity at draining, %	
Organism	Control	Contaminated	Control	Contaminated
	natural contamination (2.15 ppm/g fat)			
S. lactis II	0.160	0.150	0.175	0.155
S. cremoris	0.160	0.150	0.133	0.110
S. lactis var. *diacetilactis*	0.160	0.150	0.120	0.110
Commercial starter	0.160	0.150	0.140	0.120
	artificial contamination (0.004 ppm/g fat)			
S. lactis II	0.165	0.155	0.145	0.130
S. cremoris	0.170	0.160	0.150	0.133
S. lactis var. *diacetilactis*	0.165	0.155	0.130	0.120
Commercial starter	0.165	0.150	0.160	0.143

had pH values of 5.23 and 5.35, whereas the control Cheddar cheeses had pH values of 5.09-5.13.

Comparisons of the amount of acid produced during simulated cheese manufacture using non-, naturally, and artificially contaminated milks are shown in Table 1. These data indicate that the 3 *Streptococcus* species produced less acid in the presence of dieldrin than in milk free of the insecticide. The apparent acidity of 0.160% in the control milk is slightly higher than that of the contaminated milks which was 0.150% prior to inoculation. However, the difference between the developed acidities in all of the samples is equal to or greater than the differences in the apparent acidity values prior to inoculation. One explanation for this difference and the variation between the titratable acidity values in the control lots of cheese is that these single strain cultures were selected from a culture collection and do not necessarily represent balanced or otherwise acceptable cultures. A greater difference in the developed acidity at draining is shown in the samples that were inoculated with the mixed strain commercial starter. All data represent an average of duplicate trials.

Since milks that were artificially and naturally contaminated with dieldrin showed some reduction in acid development during cheese manufacture and since the cultures were free from bacteriophage contamination, this chlorinated hydrocarbon pesticide apparently interfered with the normal metabolism of the lactic bacteria. Little difference was observed in the acid development between the samples that were artificially and naturally contaminated. However, a great difference existed in the amount of dieldrin between the samples that were artificially contaminated and those that were naturally contaminated. Therefore, little antibacterial activity apparently is associated with the pesticide dissolved in the fat, while considerable activity is attributed to the trace amounts dissolved in the aqueous phase of these samples.

Work is presently underway to elucidate the mechanism of this interference and to determine the effect of other chlorinated hydrocarbon pesticides on acid production.

REFERENCES

1. Barry, H. C., J. C. Hundley and L. Y. Johnson. 1965. Pesticide analytical manual. Vol. 1. Methods which detect more than one pesticide residue. U. S. Department of Health, Education, and Welfare, Washington, D. C.

2. Bollen, W. B., H. E. Morrison and H. H. Crowell. 1954. Effect of BHC and DDT on soil reactions. J. Econ. Entomol. 47:307-312.

3. Johnston, M. R. 1957. Lindane residue in cucumber fermentation. Food Research 22:331-341.

4. Kim, S. C. and L. G. Harmon. 1967. Effect of pesticide residues on growth and fermentation ability of *Streptococcus lactis* and *Lactobacillus casei*. J. Dairy Sci. 50:939.

5. Smart, A. B. 1947. Soil sterilization on a field scale. Nature 159:102.

6. Smith, N. R. and M. E. Wenzel. 1947. Soil micro-organisms are affected by some of the new insecticides. Soil Sci. Soc. Proc. 12:227-233.

7. Wilson, J. K. 1948. The effect of benzene hexachloride on soil organisms. J. Agr. Research 77:25-32.

STANDARDS FOR THE MANUFACTURE OF FROZEN DESSERTS RECOMMENDED BY THE U. S. DEPARTMENT OF AGRICULTURE FOR ADOPTION BY STATE REGULATORY AGENCIES[1]

F. E. Fenton

Dairy Division, Consumer & Marketing Service, USDA,
Washington, D. C.

Abstract

In preparing the recommended standards for frozen desserts, the various State laws and regulations were reviewed. Confidence in the uniform quality of products between regulatory agencies and between industry and regulatory agencies is strengthened as well as greatly simplified when uniform standards are well known and uniformly applied. It was on this premise that the Dairy Division, Consumer and Marketing Service, undertook to develop and recommend for State adoption the standards for the manufacture of frozen desserts. The standards do not carry any new or startling requirements. The same types of sanitary requirements applicable to any good food operation are applicable here.

The milk quality requirements follow closely the program recommended in the Minimum Standards for Milk for Manufacturing Purposes published by the Dairy Division in 1963. Draft copies of the standards were distributed for review and comment prior to publication in the *Federal Register,* February 16, 1967, under Public Notice. Many comments were received from the soft-serve industry and the National Restaurant Association requesting exemption from the requirements of the standards and requesting coverage under existing laws and regulations covering food service establishments. An amendment was subsequently published on April 13, 1967, recommending these businesses be covered by the USPHS Code. This was not completely satisfactory either. Much depends on application and enforcement. Comments that will be constructive are welcome at any time and the Dairy Division solicits the help of all regulatory agencies and sanitarians as to the best solution of the problems.

Ice cream has long been considered the "glamour girl" of the dairy industry. It truly is glamorous when one considers the wide variety of flavors, colors, and forms in which ice cream and related products can be served and the wide appeal it has to young and old alike, at any time of day or season of the year. In addition to the wide appeal, unlike some other competitive products, it *is* a substantial food product. With all these things going for it, it should be glamorous.

For these reasons and the fact that it is a vital part of the dairy industry, it may be argued that separate laws and regulations pertaining to the frozen desserts industry are justified. This assumption is the beginning of a controversy for there are those who say that all manufactured dairy products should be covered under one set of laws and regulations. Why set out any one segment of the industry for special consideration? There are many good arguments to support both positions, but the matter will not be debated here.

Preparation of Standards

Separate State level legislation was chosen to cover the frozen desserts industry, because it seemed to warrant more complete coverage than was being given it under the general food laws of many States. In preparing the recommended standards for frozen desserts, the various state laws and regulations were reviewed. Some were very sketchy, while others had specific requirements, especially applicable to frozen desserts. The USPHS Recommended Frozen Dessert Ordinance of 1940 and recommendations of the International Association of Ice Cream Manufacturers were also reviewed. The increased size of plants and distribution of product over much wider areas in recent years has focused the need on more uniformity of product and quality requirements between states. The same situation, as is well known, has developed with all dairy products. A free and unrestricted movement of products to any area or market is important in our modern system of marketing.

Confidence in the uniform quality of products between regulatory agencies and between industry and the regulatory agency is strengthened as well as greatly simplified when uniform standards are well known and uniformly applied. It was on this premise that the Dairy Division, Consumer and Marketing Service, undertook to develop and recommend for state adoption the standards for the manufacture of frozen desserts.

A decision had to be made early in the preparation as to the scope of coverage; whether to develop standards to cover only dairy manufacturing plants or to include soft-serve and drive-in units or, to put it another way, whether the standards should be developed along commodity lines or along functional lines.

The standards do not carry any new or startling re-

[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc., Miami Beach, Florida, August 14-17, 1967.

quirements. The same type of sanitary requirements applicable to any good food operation are applicable here. Where sanitation is involved there is little room for deviation. The principle advantage of the standards is their specificity to the particular operation.

The standards cover the usual gamut of requirements for suitable premises, adequate facilities and equipment, personal cleanliness, and the various operations of production. Also included are requirements covering vehicles, plant records, quality of raw material, test procedures, and quality of finished product. Provision was made also for plant licensing and supervision by the regulatory agency.

MILK QUALITY

In regard to milk quality, the requirements follow closely the program recommended in the Minimum Standards for Milk for Manufacturing Purposes published by the Dairy Division in 1963. The principle difference is that the milk supply used for frozen desserts should be restricted to milk with a maximum bacteria count of 500,000 per ml. Although the manufacturing milk requirements permit accepting milk with up to 3,000,000 bacteria per ml on a regular basis and even higher for a short probationary period, this by no means sanctions the use of this milk in frozen desserts. It was felt that a program of quality control and enforcement covering manufacturing milk as outlined would result in substantial quantities of a milk supply well within the acceptable limits. On this basis, one could expect a blended plant supply of milk below the 500,000 maximum count.

No set of standards will do the job of improved quality without adequate enforcement. To this end, we must look to regulatory officials and industry to complete the cycle.

Approximately 30° of the total milk supply is manufacturing grade milk not produced for fluid purposes. This is an important segment of the industry. Much of this milk is being utilized in the manufacture of frozen desserts, although in some areas surplus Grade A milk is utilized along with manufacturing milk. There are those who would restrict the frozen desserts industry to the same quality of milk intended for fluid purposes. However, we should remember that historically the industry has been developed on manufacturing grade milk with good success and could continue to do so if reasonable care and normal precautions are taken in manufacture and distribution.

SANITATION

It was mentioned earlier that when dealing with sanitation there is not much room for variation. Equipment is clean and sanitary or it is not. So it is with construction of equipment. In this area, 3-A Sanitary Standards were referenced, where applicable, although many pieces of equipment are not specifically covered. However, it was felt that the principles embodied in 3-A Standards covering material, fabrication, and accessability for cleaning are equally applicable to all equipment even though a specific standard may not be immediately available. These conditions are implied in the standards though not specifically mentioned. This does not preclude the applicability of other equipment standards such as those of the National Sanitation Foundation who have standards covering certain pieces of food service equipment. Certainly, these standards embody the same principles as 3-A and should therefore be acceptable in their respective places of use.

We might have made the standards more extensive by including more information as to the necessary controls for adequate pasteurization but such information is already well known from the recommendations of the U. S. Public Health Service for fluid milk and the 3-A Accepted Practices for the Sanitary Construction, Installation, Testing, and Operation of HTST Pasteurizers. Any further coverage in the standards would have been repetitious.

REVIEW OF STANDARDS

Drafts of the standards were sent to the State regulatory agencies who have jurisdiction for frozen desserts, and to industry including the technical committee of the International Association of Ice Cream Manufacturers for their review and comment.

After reviewing comments that were received the Recommended Standards were published under Public Notice in the *Federal Register*, February 16, 1967. This publication was misunderstood by some as being a new Federal regulation being imposed upon an already over-regulated industry. Instead, the Register was used only as an economical means of obtaining wide distribution on standards being recommended for adoption by the individual States. Instead of additional regulations, it was hoped that the standards would serve to unify the various State requirements and in that way minimize or eliminate the multiple inspections.

Comments were received from the soft-serve industry and restaurant operations who misunderstood the intent and use of the standards. It was realized then, that the standards were not sufficiently specific as to what would be applicable to these operations compared to a manufacturing plant making hard frozen products. It was believed obvious that every soft-serve operator would not be expected to have a laboratory and exercise the same controls as large manufacturers, but many interpreted it so. The standards it was felt, followed closely the patterns of what was already in effect in many of the State laws and regulations and, therefore, interpretations as to what was applicable to particular operations could be left to the inspectors as is now the practice under present regulations. To deal with each separate type of operation in detail would require a document much more complex than what was proposed.

Considering the nature of changes taking place in the soft-serve industry in which more and more units are serving hamburgers, french fries, and other food items in addition to frozen desserts, it seemed reasonable to consider the request made by the National Restaurant Association and others that their operations be covered by the laws and regulations applicable to all food service establishments rather than by those applied on a commodity basis.

Therefore, on April 13, 1967 the USDA published an amendment to the Recommended Standards to the effect that requirements governing the sanitation and operation of soft-serve establishments and restaurants handling frozen desserts, should be those of the U. S. Public Health Service's Recommended Food Service Sanitation Ordinance and Code, contained in the Public Health Service Publication 934. Comments received on the amendment indicates that some are not happy with this solution either.

It is recognized that certain deficiencies exist in all codes and ordinances and that it is impossible to cover every situation sufficiently well. As was mentioned earlier, much depends on application and enforcement. Even sketchy standards properly interpreted and rigidly enforced can be effective. Conversely, the most comprehensive standards are meaningless without proper application.

Therefore, it remains to be seen what use will be made of these recommendations and what revisions will be beneficial to make them more acceptable and workable. Comments are welcomed at anytime that will be constructive and the help of all regulatory agencies and sanitarians is solicited to determine the best solution to some of the problems mentioned.

Standards will be updated as the need arises and the industry progresses. We need to move forward in providing the consumer with an acceptable wholesome product without stifling the industry with a multiplicity of laws and regulations which may look good on paper but cannot be applied.

Copies of the recommended ordinance may be obtained from: U. S. Department of Agriculture, Consumer and Marketing Service, Dairy Division, Standardization Branch, Washington, D. C. 20250.

GLASS BOTTLE DISPOSAL PROBLEM

A university scientist is trying to do something about getting rid of the 26 billion bottles that are being discarded every year. He is undertaking basic research which, hopefully, will lead to the development of a glass container that can be disposed of by dissolving it in water.

A one-year $54,291 award to Dr. Samuel F. Hulbert, Assistant Professor of Ceramic and Metallurgical Engineering, Clemson University (South Carolina), was announced recently by Henry C. Steed, Jr., Chief of the Office of Grants Administration of the National Center for Urban and Industrial Health in Cincinnati.

Dr. Hulbert, in his grant application, said the container he is planning would be made of a special glass that would dissolve after it is broken. A water-resistant coating over the outer and inner surfaces of the bottles and containers would keep them from dissolving while in use.

Thus, a trash collector could pick up beverage bottles or food containers made of this glass, haul them to a central point, break them, and dissolve them by placing them in a vat of water.

WHAT THE SANITARIAN SHOULD KNOW ABOUT ULTRA-HIGH TEMPERATURE PASTEURIZATION[1]

H. L. MITTEN, JR.
CP Division, St. Regis
Chicago, Illinois

ABSTRACT

Sanitarians should know that ultra-high-temperature (UHT) pasteurization in the U. S. today has no legal definition, but the trend in practice is toward a sterilizing treatment of 275-295 F for 2 to 5 sec. The main advantage from UHT pasteurization is an almost complete destruction of microorganisms which results in a longer shelf life under adverse storage and transport conditions. The more intense cooked flavors which are characteristic of UHT processed milk products may be less objectionable in some products than in others. Equipment design has an influence on the intensity of cooked flavor developed in the product. The more rapid the time of heating to the final temperature and the cooling from that temperature, the better the flavor. This is especially true for the temperature progression from 175 to 275-295 F and down again to 175 F. Direct steam heating from 175 F minimizes the intensity of cooked flavor.

Although there are no specific regulations governing UHT pasteurizing equipment, its installation and operation, sanitarians should know that the same criteria governing pressure differences between raw and pasteurized product in regenerators in HTST pasteurizers apply to UHT regenerators at least in those sections where the "raw" product temperature is less than 200 F. Flow rate control devices or timing pumps are not as important where the final temperatures are above 200 F. Flow diversion valves should have a total reaction time within the holding time of the system. If the UHT is used as a sterilizer for aseptic packaging, it may also include automatic product shut-off, water rinse and sterilization equipment which is activated when product is diverted.

"We are in the UHT era. Which way it will take the industry is, at the moment, anyone's guess. Its possibilities are far reaching, its potentialities exciting, and one thing is certain: UHT is here to stay because it is utterly impossible to imagine that such a development, which the industry has been eagerly awaiting for many years, is not going to be exploited to the full." These are the words of Peter Hoare, Technical Director of the United Dairies Research Laboratories at Buckingham, England, as recorded on November 17, 1965 *(9)*.

In his view UHT milk could be marketed to replace sterilized milk as a long shelf life product, or as a super pasteurized milk, with the flavor of HTST milk, but with a longer keeping quality. It was reported that during 1961-1963 the amount of UHT milk did not increase appreciably, but that flavored milks, milk based desserts and cream showed a gradual increase. In a second study, in Sweden where milk is refrigerated and where 75% of the households had refrigerators, keeping quality of HTST milk was 7 to 10 days, and UHT had little advantage to offer except for week-end chalets not equipped with refrigerators.

It was pointed out that UHT with its possibilities for longer shelf life was of especial interest to the British because only about 34% of the households are equipped with refrigerators. Hoare emphasized that means should be found to permit industry to try UHT on a commercial basis, experimenting with both indirect heating and direct steam heating.

The British Government permitted indirect heating equipment to be used for UHT, and in 1966 defined UHT heat treatment as heating milk to not less than 270 F and holding it for not less than 1 sec.

DEFINITION OF UHT

In the U. S. there is no official definition for UHT pasteurization. Unofficial definitions have included heat treatments from 194 F to as high as 300 F and with holding times from no apparent hold to as long as 40 sec for some products. The usual holding time is listed as 2 to 5 sec.

Presently, the dairy industry is showing renewed interest in UHT and aseptic packaging. This interest is directed toward heat treatments which are at or near the sterile range—275-295 F for 2 to 5 sec of holding. This interest results from economic pressures which demand longer shelf life and less frequent delivery schedules.

Recently there have been a number of installations of ice cream mix and cream pasteurizers of the UHT types. In spite of the questionable legal status of UHT it appears that the trend toward UHT pasteurization is gathering momentum.

Sanitarians, in order to act wisely in their efforts to protect the public health, should be aware of the UHT processes, the types of equipment involved, the problems and the benefits of UHT to the industry and the public. It is the purpose of this paper to review some of the aspects of UHT pasteurization in a general way. The microbiology and the chemistry involved will not be discussed in any detail.

[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food, and Environmental Sanitarians, Miami Beach, Florida, August 13-16, 1967.

FLAVOR

The early literature, especially that of Switzerland, described UHT milk as having a flavor similar to that of raw milk. Lately, more realistic descriptions have been published. Ashton *(1)*, Express Dairy Company, London, in a lecture published during 1966 in the *Australian Journal of Dairy Technology,* stated, "The flavor of UHT processed milk can vary between extremes. If desired, it can have a similar carmelized flavor to that of sterilized milk; on the other hand, it can be comparable with pasteurized homogenized milk." He went on to give the progression of flavor changes when the UHT milk was aseptically packed in waxed paper with polythene laminate. Briefly this progression was given as follows:

Period 1. Immediately after processing. The milk may be mildly or markedly unpleasant to taste and smell—"at worst resembling boiled cabbage, smelling of sulphuretted hydrogen and/or carbon disulfide." After 24 hr the flavor and smell become acceptable but not really palatable.

Period 2. At 2-3 days. At storage temperatures between 40 and 70 F taste and smell become acceptable and more palatable when compared to pasteurized homogenized milk. The changes may be rapid or take up to 3 days. At storage temperatures of 80 to 100 F the initial taste and smell disappear rather quickly, but a residual cooked flavor appears in 2 to 3 days.

Period 3. At 5-12 days. Milk stored between 40 and 70 F is at its best for flavor, having a trace of the original taste and smell, but possessing a pleasant creamy taste similar to that of pasteurized homogenized milk.

Period 4. At 12-18 days. As initial taste and smell disappear a flat chalky or residual cooked flavor becomes detectable.

Period 5. About 19 days. At higher storage temperatures (70-100 F) residual cooked flavor is quite noticeable and may be unacceptable. An incipient oxidative rancidity or cardboardy flavor may develop which becomes progressively more obnoxious with age. At storage temperatures below 70 F a similar flavor change occurs, but may take considerably longer to become obnoxious.

All of this milk was processed on UHT equipment using indirect heating although 1 plant used a vacuum flash cooling step. With indirect heating, the heat-up time, especially through the critical 175-185 F range where whey proteins are destabilized and sulphur-derived flavors released, is relatively long.

If milk is heated by a plate or tubular regenerator to 170-180 F, then heated instantaneously by direct contact with steam to 275-295 F, held 1 to 5 sec, then cooled instantaneously by vaporizing under vacuum to its pre-steam treatment temperature, and finally cooled by regeneration and a water cooled section, the heated flavor may be of very low intensity as compared to the same milk treated by indirect heating to the same temperature and holding time.

Ashton concluded that UHT processed milk can be expected to remain wholesome and palatable for a length of time which more than fulfills the marketing needs for his country. He further stated that there was no reason why troubles should be expected if there were only once-a-week delivery.

UHT EQUIPMENT

There are many different types of UHT and/or sterilizing equipment available for milk and milk products. The major European makes and one American variety are described by Burton in a series of articles published in *Dairy Industries (2, 3, 4, 5, 6, 7, 8)* during 1965 and 1966. This series, updated, is currently appearing in the *American Dairy Review.*

In general, UHT equipment may be classed as to the final heaters as direct contact steam heaters and indirect heat exchangers. The latter separate the product from the heating medium by means of a heat exchange wall, and may use steam or pressurized hot water as the heating medium.

The direct steam heaters are of 2 general types: injectors and infusers. The injectors flow steam into the liquid milk. They may take the form of a modified Venturi, or they may be of special design such as the Uperization head. The infusers flow the liquid milk through a spray or dispersing device into an atmosphere of steam. The infusion heaters may be relatively small as is true of the CP Ultra-Therm Infusion Heater, or rather large as illustrated by the earliest of the infusers, the Vacreator.

The infusion heaters usually offer greater flexibility in their heating range and product throughput range than the injectors and they operate noiselessly. They are usually larger, however.

Indirect heaters used for UHT may be of the plate, tubular, shell and tube, or scraped surface types. The units having spiral tubes in a larger steam carrying tube are usually considered a special type of tubular heater. This is also true of the Roswell and Graves-Stambaugh heaters. Scraped surface heaters are especially useful for those products which have high viscosity, for they offer very little resistance to flow and mechanically remove the surface film, mixing it with the main body of the product.

Often UHT systems which have product-to-product and/or vapor-to-product regenerators and direct steam or indirect heat exchangers for final heaters are made up of combinations of the types of heat exchangers.

The answer to the question, which system should be used, is dependent upon many factors, and the most important, aside from product quality, is that of economics. Generally a straight plate UHT unit may operate with milk for only a short time, 0.5-4 hr, before the amount of solids deposited on the heat exchange surfaces necessitates stopping the operation the chemistry of product as well as the design of the plate equipment. If the product contains sugar or has had some prior high heat treatment, interfering for cleaning. The length of operation depends upon deposits may not accummulate for a longer period of operation.

Where cooked flavor is to be kept at a minimum, UHT units with infusion type, direct steam heaters offer definite advantages. Burton *(6)* pointed out that the advantages of milk-into-steam systems as compared to steam-into-milk systems is that the heating steam is never at a higher temperature than the final processing temperature, and therefore, there is no risk of overheating.

In Japan, nearly all the milk is pasteurized by UHT methods using temperatures of 275 to 285 F with holding times of 2 to 5 sec. Some manufacturers provide a specially designed holding tank to prevent heat induced deposition of the whey proteins. This tank is called a retarder vessel by APV and a stabilizing vessel by CP. With these UHT systems the milk is heated to 175-185 F by product-to-product regeneration; then held in the stabilizer vessel for 5 to 6 min; homogenized; then heated to 230-240 F by regeneration; finally heated by a plate heater section to 275-285 F; held 2 to 3 sec; then cooled by regeneration and a final, water cooled plate section. Diverted milk, being above atmospheric boiling temperature, must pass through a water cooled plate section to cool it below 212 F before releasing it to the raw product constant level tank (balance tank). Needless to say, after 6 min at about 180 F in the stabilizing or retarding vessel, the milk has a highly cooked flavor, but this is not only the accepted flavor, it is the desired flavor for milk in Japan. A properly designed plant of this type can operate all day long without fouling, even with raw milk of very poor quality, and it can be cleaned easily by circulation of common dairy detergent solutions at normal strengths and temperatures.

In straight plate units where a highly cooked flavor in milk is not tolerated, heat up time is reduced by using relatively little regeneration and greater temperature differences between milk and heating medium in the heater section. Engineering the plates for high flow velocities also aids in minimizing deposits of milk solids, although developed pressures may be higher than normal. A "crash" cooler may also be used to cool the hot milk rapidly through the critical temperature range. A "crash" cooler uses chilled water to cool the very hot milk rather than cooling by regeneration.

UHT units of the spiral tube type may not use a regenerator at all, especially when it is designed for small capacities such as used for cream and artificial coffee whiteners.

A typical UHT pasteurizer or sterilizer using a combination of plates for regeneration and cooling and a direct steam heater might contain the following major items: balance tank, product-to-product regenerator (heating milk to about 175-180 F), indirect heater (heating 3 to 5 F) to provide for radiation losses from vacuum equipment), infusion or injection heater (heating to 275-295 F), a holder section for a calculated 3 sec hold, a flow diversion valve, a product back pressure valve to maintain enough pressure on product to prevent flashing, a vacuum vessel which vaporizes from its milk the moisture which was added by the steam and which cools the product instantaneously to 175-180 F, a product removal pump (with aseptic seal if system is for sterilization), homogenizer (aseptic for sterile products), regenerator and cooler. A cooling section or separate vacuum flash vessel must be provided for diverted milk.

These were called typical units. Perhaps they should only have been called examples, for there are so many different systems that it is difficult to say which are typical.

Regular HTST pasteurizers with direct steam heaters and vacuum vessels down-stream as used for flavor standardizing treatment, may be used for UHT treatment if sized and engineered for the proper temperature ranges. These units have definite advantages to the processor, because they permit UHT treatment at the very high temperatures for those products in which a cooked flavor is accepted, yet allow normal pasteurization and flavor treatment with the same equipment for beverage milk. Since units of this type provide for HTST pasteurization prior to the UHT treatment, there is no question about their legal status. In some instances they may, with proper modification of controls and equipment downstream from the UHT heater, be made into sterilizer systems.

CRITERIA FOR ACCEPTANCE OF UHT EQUIPMENT

Sanitarians in the field have a difficult time deciding what is acceptable and what may constitute a hazard to the public health when they must deal with UHT. So far, there are no regulations which define what UHT really is and none which govern the operating conditions. Such regulations are badly needed even though they may be tentative and incomplete, for it appears that the dairy industry is going to adopt UHT processing for coffee cream, half-and-half, flavored drinks, and other by-products as soon as acceptable fillers and containers are made available. These will be marketed first as extended shelf-life products, and later, when equipment and the technology of aseptic packaging is more fully developed, as sterile products. There are presently a considerable number of the small UHT cream pasteurizers and larger UHT ice cream mix pasteurizers in use. Some of these do not meet the usual safeguards for pasteurizers such as proper pressure differential between pasteurized and raw products in the regenerator, and flow-rate controls.

It appears that calculated holding times of 2 to 5 sec with temperatures from 200 to 300 F produce some types of products that are acceptable to most consumers and which are safe for consumption. It is generally recognized that products pasteurized in the sterilization range may have a cooked flavor; that the intensity of the cooked flavor diminishes rapidly during the first 48 hr of storage; that microchemical changes producing staling continue throughout storage and proceed until the product has an unacceptable palatability; and that the flavor deterioration proceeds more rapidly with higher storage temperatures, and is very slow with refrigerated storage. Cooked flavor is not objectionable in coffee cream, half-and-half, and similar products which are seldom used as beverages. High temperature treatment may enhance palatability of some flavored milk drinks. Milk having a cooked flavor is not objectionable to all consumers, and it is believed that a gradual increase in the intensity of cooked flavor may educate a market to accept a relatively intense cooked flavor in beverage milk. The change in flavor of milk pasteurized at 275-295 F for 2 to 5 sec when compared to milk pasteurized at 170-180 F for 15 to 20 sec, as is common with HTST pasteurization today, may not be any greater than the difference observed 25 yr ago in HTST pasteurized milk compared to milk pasteurized at 143 F for 30 min.

References

1. Ashton, T. R. 1966. The processing and aseptic packaging of sterilized milk in the United Kingdom. Australian J. Dairy Technol. 21:23.
2. Burton, H. 1965. Ultra-high-temperature processing plants for the production of sterile milk. Part 1. The Uperisation process. Dairy Ind. 30:542.
3. Burton, H. 1965. Ultra-high-temperature processing plants for the production of sterile milk. Part 2. The APV Ultramatic plant. Dairy Ind. 30:611.
4. Burton, H. 1965. Ultra-high-temperature processing plants for the production of sterile milk. Part 3. Stork Sterideal process. Dairy Ind. 30:700.
5. Burton, H. 1965. Ultra-high-temperature processing plants for the production of sterile milk. Part 4. The Alfa-Laval sterilizers. Dairy Ind. 30:792.
6. Burton, H. 1965. Ultra-high-temperature processing plants for the production of sterile milk. Part 5. Laguidharre, Polarisator and Thermovac. Dairy Ind. 30:872.
7. Burton, H. 1965. Ultra-high-temperature processing plants for the production of sterile milk. Part 6. The Cherry-Burrell sterilizers. Dairy Ind. 30:956.
8. Burton, H. 1966. Ultra-high-temperature processing plants for the production of sterile milk. Part 7. Ahlborn and Sordi. Dairy Ind. 31:39.
9. What shall we do with UHT Milk? 1965. Dairy Ind. 30:953.

U. S. FARM TANKS TOTAL 229,334; CANADA HAS 26,260 AS OF 1/1/68

The thirteenth annual Farm Milk Tank Survey, conducted by the Bulk Tank Market Action Committee of Dairy and Food Industries Supply Association, shows 229,334 farm tanks installed and in use in the United States as of January 1, 1968. The U. S. figure represents an increase of 7,492 over the 221,842 which were installed as of the same date 1967.

Canadian figures indicate a total of 26,260 farm tanks installed and in use as of January 1, 1968. This figure represents an increase of 5,455 farm tanks over the 20,805 installed as of January 1, 1967.

The entire report which includes a size breakdown on tanks installed and in use as of January 1, 1968, may be obtained by writing the Marketing Department, Dairy and Food Industries Supply Association, 1145 19th Street, N. W., Washington, D. C. 20036.

Conducted annually, the Farm Milk Tank Survey is a service to the community and to the industry.

NORTHEAST MILKING EQUIPMENT STANDARDS[1]

SIDNEY E. BARNARD

The Pennsylvania State University
University Park, Pennsylvania

ABSTRACT

Minimum standards for milking equipment have been prepared for the northeastern United States. The purpose of these standards is to act as guidelines for the manufacturer, installer, dairy farmer and industry and regulatory sanitarian.

The objectives are to eliminate duplication of farm inspections as a result of common market requirements and to have good quality and flavor by having well designed equipment, properly installed, properly operated and cleaned after each use.

A committee of 50 persons representing industry, regulatory and university interests developed "Minimum Standards for the Design, Construction and Installation of Milking and Milk Handling Equipment." Major areas of concern were the design and construction of equipment which was cleanable in the hands of the average dairy farmer and did not contribute to flavor or quality problems.

Specific recommendations concern the installation of vacuum systems and pipeline milkers. A table of minimum vacuum pump capacities for conventional systems and a general rule of a 50% reserve for pipeline milker vacuum systems are included. Tips for installation include support, slope and diameter of vacuum lines and sanitary milk lines. Recommendations also concern filtration, cleaning and operation with the manufacturer being responsible for written as well as on the farm instruction for the dairy farmer. Service checks by an authorized milking machine dealer are suggested annually on conventional systems and semi-annually on pipeline systems.

These standards should help to assure good flavor and quality in milk as well as establish common requirements for various milk markets. Hopefully, quality standards covering flavor, bacteriological quality, sediment and leucocyte levels may be agreed upon in the near future.

Minimum standards for milking equipment have been prepared for the northeastern United States. A committee of 50 persons representing industry, regulatory and university interests has developed "Minimum Standards for the Design, Construction and Installation of Milking and Milk Handling Equipment."

Members of this association attempted to do this 20 years ago but were not successful at that time. The present opportunity arose at a meeting of the Dairy Division of the National Association of State Departments of Agriculture in 1964. Concern was expressed for the varying state requirements for milking equipment, so a motion was passed and a committee was appointed to draft standards. The committee members represented Connecticut, Minnesota, Florida and Pennsylvania. The committee being so widespread geographically made it impossible to meet and work together.

A group in Pennsylvania met in the fall of 1964 with the idea of developing similar standards. Varying requirements prevented producers from changing markets even when more milk was needed for fluid demands. Since the representatives from Connecticut and Pennsylvania were present, they suggested a group in the northeast attempt to develop standards which might then be acceptable to the entire country.

At the organizational meeting in November 1964, representatives from 11 northeastern states were asked to serve on the committee. These states were Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Maryland and Delaware.

The committee selected Dr. R. M. Parry, Dr. H. K. Johnston and Dr. J. W. Walker as co-chairmen with Mr. G. W. Davis as secretary. The committee was divided into 7 sub-committees which were to study the problem and develop standards for various phases including: (*a*) materials, (*b*) construction and design, (*c*) installation, (*d*) transfer systems, (*e*) filtration, (*f*) cleaning and sanitizing, and (*g*) criteria for new equipment.

Sub-committees representing these phases met and corresponded independently on numerous occasions prior to the first full committee meeting in April, 1965. Many changes were needed to achieve adequate coverage and eliminate duplication, so the individual reports were returned to the subcommittees. The sub-committee reports were accepted at the full committee meeting in July, 1965. Four persons then undertook the task of combining and editing these 7 sub-committee reports.

The first draft was presented to the committee members in December, 1965. Many comments were made at the March, 1966 meeting which necessitated editorial changes, reorganization, and an extensive rewriting job.

The second draft was mailed to committee members and equipment manufacturers in June, 1966. It was anticipated that problems and objections would arise, so an *ad hoc* committee was appointed to

[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food, and Environmental Sanitarians, Miami Beach, Florida, August 13-16, 1967. This paper covers highlights of the Northeast Milking Equipment Standards; single copies of the detailed standards are available.

meet with interested manufacturers. After 2 days of discussion, only 4 points were left to be resolved. Unexpected compliments and support were received from most of the manufacturers.

After observing manufacturing at 1 of the plants, 2 items were deleted and compromises reached on the other 2. Subsequent meetings in December, 1966 and June, 1967 have resulted in a final draft. Minor changes remain to be made, but it is in usable form.

Members of the 3A Standards Committee have already made much headway in adopting this for universal use. Their first draft was more brief and in more general terms than the Northeast Standards.

PURPOSE AND OBJECTIVES

The committee has accomplished what it set out to do—prepare a set of standards for milking equipment. The purpose of these standards is to act as guidelines for the manufacturer, installer, dairy farmer and industry and regulatory sanitarian. Present market requirements for milking equipment vary widely with the result that farmers often are limited to 1 market. For example, some markets require a glass pipeline rather than permitting stainless steel or plastic tubing. It is hoped these standards will be widely accepted and thus eliminate much duplication of farm inspection.

These standards should serve as a guideline for dairy farmers purchasing new milking systems, enabling them to consider the latest in engineering features and still meet the requirements of area markets. Many dairy farmers are confused about claims and counter-claims when purchasing a new milking system. Educators and advisors are all duty bound to discuss the principles and features of various equipment, but not to recommend any specific brand.

Problems of quality and flavor (rancidity) have resulted in considerable blame being placed on milking equipment. In many instances it has been a contributing cause, but in others, unjustly blamed. Ten month lactations, balanced feeding and proper operation of the milking machine are important in preventing rancidity. Of course, good engineering and proper installation are essential to minimize agitation and foaming.

Well designed milking systems which are properly installed, operated, and cleaned contribute to good quality and flavor. Likewise, a poorly designed milking system, which is improperly installed, operated and cleaned may cause flavor and quality problems. Lower milk production and mastitis may also be associated with these systems.

The interest of the regulatory agencies seems to lie in the quality and flavor of milk as affected by milking equipment and the acceptance of the product by the consumer. Everyone should be concerned about consumer acceptance and realize that a uniformly good flavor is the primary concern, and one that has long been overlooked.

The objective of these standards is well stated in the preamble: "In order to produce good milk, it is imperative to have well designed equipment, in good condition, properly operated and properly cleaned after each use. Bacteriological quality, physical cleanliness and a uniformly good flavor are of primary concern." In the past, stress has been placed on its bacteriological condition as the sole measure of milk quality. This is not the only criterion today. Cleanliness is an assurance that the equipment has been properly handled and is clean by every physical and sensory test that can be applied. Bacteriological evidence alone is not acceptable.

Consideration has been given to mastitis, milk production, milk flavor, cleaning and sanitizing, filtration (sediment), operation of the equipment, engineering and manufacturing possibilities, and cost of the milking equipment while developing these standards.

Nothing in the standards forbids the introduction of new materials, equipment, or methods providing these innovations are such that the new equipment will meet all criteria for quality in the hands of a producer who follows the methods of the installer. The manufacturer or his representative must demonstrate any newly installed system so that the operator can properly operate, clean and sanitize the equipment. The standard would apply only to new equipment and replacement items which were installed 1 year after date of adoption by the various states.

REVIEW OF MAJOR POINTS

Specific areas of interest include the following:

1. Definitions for materials conform to 3A Sanitary Standards and "Milk and Milk Product Contact Surfaces," a USPHS publication with the following additions:
   a. Excessive air entrainment within glass surfaces is not desirable, open blisters are unacceptable, surfaces which are not readily cleanable by normal cleaning procedures are unacceptable.
   b. Soldering may be used on non-product contact surfaces, but not as the bonding material.
2. Metal shall be of stainless steel of the AISI 300 series or corresponding ACI types or equally corrosion-resistant metal that is non-toxic and non-absorbent. It shall be free of pits and voids and finished to 150 grit or better, properly applied.

3. Product contact surfaces shall be of stainless steel, plastic, rubber or glass. This includes the pulsator and hose to the stall cock unless an approved check valve is used.
4. It is recommended that hoses used for milk contact surfaces be transparent so as to determine cleanliness and condition. Since there is no approved check valve, this would also include the vacuum hose to the stall cock on pail units.
5. All joints, including attachments such as bails, handles, chime or legs, shall be continuously welded or its equivalent and finshed to 150 grit or better, properly applied.
6. Air entrance at the claw for the purpose of moving the milk shall be located in the upper half of the claw when in milking position. This eliminates much bubbling of air through the milk.
7. Check valves should be constructed so as to incorporate a separation chamber which prevents contamination from the vacuum supply from entering the milker pail. A procedure for testing check valve performance is included. An approved check valve would permit classification of the pulsator and vacuum hose as non-product contact surfaces.
8. Milk pumps must be designed for CIP. The motors must be enclosed and be equipped with water-proof electrical connections on the motor and controls.
9. Dumping stations should have a carriage constructed of corrosion free material for easy cleaning and maintenance. Ball valves shall be of plastic or stainless steel, readily removed, and smooth for easy cleaning.
10. Plastic tubing used with dumping stations or pipeline milkers in lengths of more than 10 ft shall be equipped with air drying devices for use after each cleaning.
11. Pump type stations must be equipped with automatic stop and start mechanisms to prevent excessive agitation of milk. Vacuum operated stations must be equipped with check or ball valves for the same purpose.
12. Couplings shall be designed and of such material that they do not loosen and leak during normal use. The outside surfaces should be as free of depressions and recesses as practical. Gaskets should be self-positioning and fit flush with adjacent surfaces causing neither a depression nor protrusion in the milk flow line.
13. Milk port and manifold tee inlets shall be welded or fused securely to the main pipe. Inlet ports shall be self-draining into the sanitary pipe and installed in such a manner that the milk enters the top half of the sanitary line. All inlet ports shall be supplied with closures which are readily applied and of sanitary design.
14. Properly prepared plans for conventional milking systems, transfer systems and pipeline milkers, which are new or extensively altered, shall be submitted to the proper regulatory agency for approval before work is begun.
15. The electrical system should meet the National Electric Code and/or National Electrical Manufacturers and local code requirements. It is recommended that all motors of 0.5 h.p. or larger be supplied with 220 volt power.
16. Vacuum pump capacities for conventional systems shall conform to the minimum standards of Table 1 or the manufacturer's equivalent recommendations. Pipeline systems shall have sufficient vacuum pump capacity to operate all of the units simultaneously and all accessory equipment with a 50% total reserve. No additional equipment which depletes the vacuum reserve such as additional milking units or vacuum operated transfer stations shall be added to the vacuum system unless sufficient pumping capacity is present or will be provided.
17. The vacuum pump should be located as near as possible to the milking barn, stable, or parlor in a clean, dry atmosphere. It is recommended the vacuum pump be located in a utility room. The exhaust pipe should be as large as the exhaust port of the pump and discharge the air to the outside of the building. Use a minimum of elbows and tees and turn the exhaust pipe downward and away from the building.
18. The vacuum regulator shall have sufficient capacity to admit full pump capacity and be

TABLE 1. MINIMUM PUMP CAPACITIES FOR CONVENTIONAL MACHINES OPERATING AT 15 INCHES OF MERCURY

	Cubic feet of air per min[a]			
	ASME standard		New Zealand standard	
Number of units	Long tube machines[b]	Short tube machines[b]	Long tube machines	Short tube machines
1	4	3	8	6
2	8	6	16	12
3	11	8	22	16
4	13	10	26	20
5	16	12	32	24
6	18	14	36	28

[a]For every 2 in. reduction in the operating vacuum level, 0.5 cfm per unit can be subtracted from the above table on the ASME Standard (1 cfm on New Zealand Standard).
[b]Long tube machines refer to claw-type floor-type units. Short tube machines are suspended units.

installed as close to the pump as possible. Regulators located on horizontal vacuum lines should admit air into the top half of the line. More than 1 regulator may be necessary in high volume systems using more than 4 milker units.

19. A drop of more than 1.0 in. of mercury in the system with all equipment and accessories in simultaneous operation is considered excessive.
20. The reserve tank should be located as close as possible to the vacuum pump with fittings of full vacuum line size. The connection leading to the pump should be located in the top one-quarter of the tank.
21. Vacuum lines should be constructed of materials which will withstand 25 in. of mercury and the causticity of cleaning solutions. They should slope to drain and be supported at least every 10 ft. The minimum size line should be 1.25 in. The system should be looped to form a circuit if more than 4 units are used, or the length of the line exceeds 150 ft. Stall cocks should enter the top one-half of the vacuum line.
22. An automatic shut-off, self-draining moisture trap shall be provided and installed immediately adjacent to the receiver connected by sanitary piping. The connection shall slope away from the receiver at least 0.5 in. in the first 2 ft.
23. The receiver jar shall be mounted so that the milk enters the top one-half. Actuating probes must be used so the milk pump does not operate continuously.
24. Sanitary piping should slope (1.5 in./10 ft) from the high point to the receiver. There should be no risers. The milk line should be installed at a height not to exceed 7 ft above the cow platform when milk is moved by vacuum from the claw to the line. The milk hose should not exceed 9 ft in length. The installation of low lines is recommended where possible, but they are not required.
25. The number of units used in a pipeline milking system will vary with the type of installation and slope of the line. (Refer to Table 2)
26. The manufacturer shall furnish operational instructions and maintenance schedules for all milking systems. Instructions for automatic cleaning must be posted in the milkroom with all non-CIP items listed. It is the manufacturer's responsibility to show the farmer how to operate and clean the equipment. Actual operation and cleaning are the job of the dairy farmer. Complete cleaning must be done after each use so that all surfaces are bacteriologically and visually clean.
27. It is strongly recommended that a complete service check by an authorized milking machine dealer be performed annually on conventional systems and semi-annually on pipeline systems.
28. Gravity-type filtration is recommended. In-line vacuum filters may be used if they do not affect the vacuum level during milking. In-line pressure filters do not affect vacuum levels, but may not effectively retain sediment.

TABLE 2. MAXIMUM NUMBER OF MILKING UNITS ON SANITARY MILK LINE

Type of installation and size of line	Maximum number of units on one slope of line		
	1.5 in./10 ft	2 in./10 ft	2.5 in./10 ft
Milking parlor			
1.5 in. line, single slope	3	4	4
1.5 in. line, double slope	3	4	5
2 in. line, single slope	6	6	7
2 in. line, double slope	5	6	6
Barn installation			
1.5 in. line, single slope	4	4	5
1.5 in. line, double slope	3	4	5
2 in. line, single slope	7	8	8
2 in. line, double slope	7	8	8

Pipeline milking systems should be engineered and diagrammed on an individual basis. Rules of thumb are difficult to establish for items such as pipe size and cfm per milker unit without calculating requirements of the entire system.

These standards should help assure good quality and flavor as well as establish common requirements for many states and markets. The remaining step is to establish common quality standards for flavor, bacteriological quality, sediment, and leucocyte counts. Efforts will start this fall to achieve this goal.

CHALLENGES FACING SANITARIANS IN PAKISTAN AND INDIA[1]

E. O. ANDERSON

Department of Agriculture and Natural Resources
State of Connecticut
Hartford, Connecticut

There are great concentrations of people in the Pakistan-India subcontinent. The land mass is less than one-half the size of the United States but, it is populated with 2.5 times as many people. There are 450 million Indians and 100 million Pakistanis. Ethnically they range from Caucasian whites to Negroes and Mongols.

Languages split the people much more radically. India has no less than 14 officially "recognized" languages but, the total number of regional tongues is estimated at 850. Pakistan has 1 official language, Urdu, but many regional languages such as Punjabi, Pushto, Bengali, Sindi, etc. Less than one-half of the Indians speak either Hindi or Urdu. Until recently the business, professional and political language has been English, but Pakistan is trying to make Urdu the political language and India is hampered by those 14 official languages.

Culturally, the people run from the Western-educated business and professional men in the cities to the primitive tribes in the mountains.

Eighty-five per cent of the Indians are Hindus, whereas 88% of the Pakistanis are Moslems.

India has a caste system, whereas Pakistan, being Moslem, does not. All men are considered equal in the sight of Allah (God) in Pakistan. In a caste system everyone is assigned a category, which defines the work he can do, the people with whom he can associate, marry, etc. About one-fifth of the people are outside the castes—the so called "untouchables."

Islam (Moslem) is a comparatively new religion, about 1200 years old as compared to Hinduism, which is a very ancient native Indian creed. Therefore, the Moslems for about 700 years have been regarded as an alien minority. As long as the British ruled old India, when the 2 countries were one, both the Hindus and the Moslems worked together to rid themselves of the British. When independence was in sight leaders like Iqbal and Jinnah pushed for a division of India to allow the formation of a country called Pakistan, which would be ruled according to the Koran—the Bible of the Moslem religion.

When partition of India came in 1947, India fared much better than Pakistan. India took over the old administrative set-up in New Delhi and many British civil servants stayed on their jobs. Industry, such as iron, steel, cotton cloth and burlap manufacturing plants, was in India—about one-half of India or 1.26 million sq miles of land was suitable for cultivation.

Pakistan, on the other hand, had to build from the "bottom up." There was practically no industry in the Moslem areas—less than one-third of its 365,000 sq miles were tillable—national and province governing apparatus had to start from scratch. East Pakistan is separated from West Pakistan by over 1,000 miles of India. The Islamic religion is the only common bond between the 2 wings of Pakistan. East Pakistan is crowded—925 people per sq mile, whereas West Pakistan has only about 275 per sq mile. About three-fourths of the West Pakistanis speak Urdu, whereas most of the East Pakistanis speak Bengali. Their basic food habits differ—West Pakistanis are wheat eaters, whereas East Pakistanis are rice eaters.

In both countries, most of the people live in the country—82% of all Indians live in about 500,000 rural villages and 78% of the Pakistanis are outside of the cities. Seventy per cent of India's work force is in agriculture while 74% of Pakistan's work force is in agriculture. Most are in "subsistence farming"—that is scratching a bare survival from the soil, or working for someone else at scanty farm laborer's wages.

The illiteracy rate is high—76% of the Indians can not read or write, 82% of the West Pakistanis and 86% of the East Pakistanis can not read or write.

The per capita income in both countries is about $70.00 a year; in America it is about $2,600. Skilled workers in Pakistan get about 26¢ an hr, and unskilled workers about 8¢ an hr. The great masses of the people are poor—so incredibly poor that it is hard for us to believe. A very small minority are very rich—just as incredibly rich as the poor are poor—and, there is a very small middle class, as we know it.

The vicious circle of "underdevelopment" is still present in both countries with little money available to individuals to break the circle. Each country continues to produce more mouths to feed than agriculture can take care of without aid from America, Canada, etc.

India has cut its annual population increase to 2.3% and Pakistan to 2.1% by use of birth control methods. As a result of improved medical and public health

[1]Presented at the 54th Annual Meeting of the International Association of Milk, Food, and Environmental Sanitarians, Miami Beach, Florida, August 14-17, 1967.

TABLE 1. THE EFFECT OF 25 PER CENT ADDED WATER FROM VARIOUS SOURCES ON THE KEEPING QUALITY OF VILLAGE MILK

Water treatment of milk	Bacterial Count on arrival	Bacterial Count after 4 hr	Acidity on arrival	Acidity after 4 hr	MBR[1] Test Color reduced	Milk Curdled in
	(Thousands)	(Thousands)	(%)	(%)	(Hr)	(Hr)
		Source No. 1				
Not diluted	34,200	—	0.12	0.23	2.0	3.5
25% sterile distilled water	30,500	—	0.06	0.22	2.0	3.5
25% River water	55,200	—	0.08	0.23	0.5	3.5
25% Pond water	129,000	—	0.10	0.25	0.5	3.5
25% Well water	63,600	—	0.09	0.23	0.5	3.5
		Source No. 2				
Not diluted	181	68,600	0.10	0.12	5.0	6.45
25% sterile distilled water	189	47,400	0.06	0.08	5.0	7.00
25% River water	339	62,700	0.07	0.09	4.0	6.45
25% Pond water	510	77,600	0.09	0.12	3.0	6.30
25% Well water	480	71,200	0.07	0.09	4.0	6.45
		Source No. 3				
Not diluted	2,150	95,000	0.11	0.13	3.0	5.30
25% sterile distilled water	2,130	83,000	0.07	0.09	5.0	6.30
25% River water	2,570	141,000	0.07	0.11	2.0	5.00
25% Pond water	2,660	155,000	0.07	0.19	2.0	4.00
25% Well water	2,630	132,000	0.07	0.17	3.0	4.30
		Source No. 4				
Not diluted	3,160	151,000	0.12	0.14	2.0	5.30
25% sterile distilled water	3,000	135,000	0.08	0.10	4.0	7.00
25% River water	4,160	170,000	0.08	0.11	3.0	5.30
25% Pond water	3,520	104,000	0.09	0.20	2.0	4.00
25% Well water	3,470	167,000	0.08	0.18	3.0	5.00
		Source No. 5				
Not diluted	3,700	40,600	0.18	0.20	6.0	4.00
25% sterile distilled water	3,300	27,500	0.15	0.16	6.0	6.00
25% River water	9,500	42,000	0.15	0.17	5.0	5.00
25% Pond water	9,800	51,000	0.15	0.18	4.0	5.00
25% Well water	6,400	41,100	0.15	0.17	6.0	5.00
		Source No. 6				
Not diluted	6,600	98,000	0.15	0.19	3.0	4.00
25% sterile distilled water	5,700	89,000	0.11	0.14	5.0	6.00
25% River water	8,600	296,000	0.11	0.15	3.0	5.50
25% Pond water	10,600	285,000	0.12	0.17	2.0	5.00
25% Well water	10,400	452,000	0.12	0.16	2.0	5.00

[1]Methylene Blue Reductase Test.

measures, the life expectancy has been increased from 32 years in 1951 to 45 years in 1965, Hence, the number of mouths to feed grows faster than agricultural production. Therefore, famine is always just around the corner and consequently the need for outside aid. The countries of the world are contributing money to India at the rate of $1 billion per year. Pakistan gets one-half that amount. The United States pays one-half of each bill.

WHAT CAN THE SANITARIAN DO?

There is much for the milk, food, and environmental sanitarian to do in South Asia. However, to those of us who have worked there, progress is similar to going up the down escalator. Some of the problems that have to be overcome are discussed below.

1. Old traditions, taboos, fatalism, and ancient problems and new problems. Perhaps the biggest problems of South Asia stem from a very old and ingrown philosophy—the universal concern of each man for his own survival and that of his family. The tradition of kinfolk helping one another is deeply rooted because of the perennial need for security which the central governments fail to provide. The raising of children to take care of the parents when they get old is the "Social Security" of South Asia.

Food-producing areas ignore the pleas of central governments to sell their surpluses. Therefore, much of the available food winds up in the hands of private merchants and black marketeers who distribute it, not according to urgent priorities, but according to the fastest profits. Hence, food boards are needed so food not needed locally would go into central storage for sale as the governments determine.

Much food is wasted because of hoarding practices. In Madras, for example, which normally produces a surplus of grain, the province holds back shipment to other provinces in anticipation of its own possible emergencies. The grain is put into primitive granaries where an estimated 20% is eaten by rats and another 10% is lost through various means.

The rodent population in India is estimated to be 2 billion as compared to about 450 million people. Rats not only eat food designed for humans but are a health hazard. Recently our own Congress poked fun at appropriating funds to reduce the rat population in our cities. Official figures show that 14,000 cases of rat bites are reported annually in America. One 8 mo old boy was bitten to death by rats in Washington, D. C., recently. It is estimated that in the United States, our 90 million rats cause an average of $10 of damage per rat per year. America could well spend a billion dollars in rat extermination in foreign countries and save billions of dollars in food.

Anti-rat measures undertaken in Bombay at one time saved enough grain to feed 900,000 people—one-fifth of the city's population. Unless the world goes all out to control the rat, there could be explosive outbreaks of disease particularly in the underdeveloped countries like Pakistan and India.

A taboo is the Sacred Cow of India. Hindus are chiefly vegetable-eaters, whereas Moslems are allowed to eat all kinds of meat except pork—if they can afford it. Agricultural experts have calculated that by getting rid of tens of millions of sacred cows, who consume enormous quantities of food, and by introducing simple improvements in farming methods, the South Asian countries, particularly India, could meet not only their own food needs but have some left over to export. These countries are hungry for foreign exchange and therefore all their "Five Year Plans" encourage development of industry that can give them more and more foreign exchange.

Milk is boiled before consumption whether raw or pasteurized. It is well that this is the age-old custom because it is a common belief among milk producers that the addition of pond, river or canal water to milk improves its keeping quality. They believe that there is some mysterious substance in these waters that neutralizes the milk and hence keeps it sweet longer. Pond water is considered to be best because it is alkaline. Anderson, Vaid, Karim and Haque in 1961 proved that the addition of river, pond or well water hastened the souring of milk (see Table 1). One of the first problems for the milk sanitarian is keeping water out of milk. The second problem is to keep dirt out of milk.

Adulteration of milk with water is so common that when General Ayub Khan declared Martial Law control over Pakistan in 1958, he decreed that milk could no longer be watered. The supply of milk to cities promptly was reduced by about 50%.

Flies are another serious problem. There are so many that it seems a hopeless task to keep them under control. Even in our home our constant fight against flies was always tempered by our servants' attitude—"But Sahib, they eat so little."

The age old practice of cleaning after relieving themselves leaves much to be desired. It is not that washing of the elimination organs is a bad practice but it is the contamination of the hands with disease-producing organisms such as typhoid and dysentery bacilli as well as ameoba that is very serious. Servants in Pakistan and Indian homes are not provided with soap to wash their hands properly and have not been briefed in personal hygiene so utensils are contaminated and disease is spread. Westerners who worked in South Asia briefed their servants about personal hygiene and furnished them with toilet paper and soap. Servants were also vaccinated against typhoid, typhus, cholera and smallpox. That was fine for them, but what of the teeming millions who were not so fortunate?

2. Health. Medical doctors are desperately needed. There is only 1 doctor to about every 6,000 people. Many doctors are really good and dedicated, but many are not really qualified to do their job. Millions of children and adults die of a "fever." The family does not know of what disease they died because a doctor was never in attendance.

There is a high rate of tuberculosis, malaria, and bacillary and amebic dysentery. There are periodic epidemics of smallpox, cholera and typhus. The bulk of the people are undernourished and hence are very susceptible to many diseases. Occasionally a leper is seen on the streets. Rabies is quite common. No concerted attempt has been made to eradicate rabies from dogs. Thousands of people take the dreaded rabies shots each year.

On the bright side, the incidence of malaria has been reduced by an organized program of filling in or draining ponds in or near villages and cities, and by spraying ponds and houses in villages and cities. However, many ponds are necessary for the well being of the principal milk producer—the water buffalo—

they have to soak a number of hours every day in order to live.

In an area that is extremely short of proteins in the diet, the addition of an amino acid—lysine—to the daily ration would provide health-giving protein at a cost of about 28¢ a year per child. The big problem is to sell the use of a cheap and effective amino acid which is in competition with more expensive foods that many countries want to sell or give away in South Asia.

3. *Refrigeration.* Pakistan and India have a very hot climate, on the plains, where most of the food is produced. The temperature during the summer may attain 120 F. The summer is about 7 mo long.

Refrigeration on the farm or for a city consumer is beyond the means of most people. Therefore, materials like wheat and rice that do not spoil in the heat become the basic foods. Fish, meat, and milk that spoil rapidly without refrigeration are generally sold and consumed within 24 hr after they reach the bazaars. Into the bazaars in the morning and out by night. No carry over. Beverages such as Coca-cola, Pepsi-cola and 7-Up have appeared in the bazaars and are selling very well. They need no refrigeration in transit and are seldom cold when consumed.

4. *Slaughter of cattle.* In Pakistan there is a law that prohibits the slaughter of bullocks, milk cows, or buffaloes until they are 12 years old. Too much food that could be used for humans is wasted on animals that produce little milk and bullocks that are too feeble to pull a plow.

5. *Conditions for milk production.* Milk production in South Asia generally takes place under very disorganized conditions. Water buffalos and cows provide the major source of milk. Goats are numerous and widely distributed but fresh milk from this source is commercially unimportant. A few sheep, asses, and camels are milked but the quantity for sale from this source is negligible.

In West Pakistan, the major part of the milk is produced by cultivators (farmers) located in villages. In the Lahore area, an honest survey showed that each cultivator owned an average of 2.2 buffalos and 0.6 cow. There are hardly a dozen farms which maintain large herds of buffalos or cows for milk production. The government has 13 farms and there are 3 Grantee Farms that are operated mostly to produce breeding cows and buffalos. There are about 20 Military Dairy Farms which supply milk for the armed forces. The farm at Okara houses 4,000 milking buffalos and 1,000 dry buffalos.

Milk production of the Sindi and Sahiwal breeds ranges from 2,000 to 5,000 lb milk per cow per year. The milk production of buffalos is higher. Some Military Dairy buffalos have given 12,000 lb of milk per year. However, the cows of the cultivators average about 6 lb of milk per day and the buffalos about 12 lb per day.

6. *Milk consumption.* It is very difficult to give an accurate picture regarding the consumption of milk in South Asia because the keeping and reporting of pertinent data was and probably still is very poor. Consumption of milk in the country is higher than in the cities. The per capita consumption in the city of Lahore is about 2 oz per day. It is said that an East Pakistani consumes 1.9 oz and an Indian 4.3 oz of milk per day.

Thirty per cent of Pakistan's milk is consumed in its fluid form, which can spoil soon after its arrival in the home or bazaar unless it is immediately boiled. The rest of the milk production goes into butter oil (ghee), a type of evaporated milk called Khoa, and a form of buttermilk known as Lassi.

When the author left Pakistan a small quantity of milk was pasteurized and bottled by the Military Dairy Farms and 3 private dairies. There was 1 milk sterilization plant in operation in the Thal desert. The rest was sold as raw milk which was invariably boiled before consumption. Since then a few more private milk plants have been established, another plant for sterilizing milk is in operation in Lahore and UNICEF has built a milk plant in Karachi and another in Lahore.

7. *Disposal of garbage.* In cities like New Delhi, Karachi, and Lahore garbage disposal receives rather good attention. Elsewhere buzzards, kites and wild dogs constitute the sanitary squad.

8. *Chlorination of water.* Chlorination of water for human consumption is non-existent, to the best of the author's knowledge.

9. *Salary scale.* The rate of pay is low. In 1967 an assistant biochemist and microbiologist started at Rs 430 or about $20 a month.

10. *Laws.* The British left a legacy of good dairy and sanitary laws. All they need is enforcement of the laws.

11. *Sanitarians.* The activity of a Sanitarian brings him into contact with the leading people and the governing bodies of a community. It takes a considerable amount of courage and honesty to refrain from becoming entangled in political situations.

12. *Delays.* The red tape and administrative delays in getting even simple things done are enormous. Perhaps the low pay and lack of prestige of the work is responsible for the lack of dedicated people in the field of sanitation.

13. *Illiteracy.* The facts that most people cannot read or write, that many languages have to be used in order to propagandize those who can read, that people are too hungry, weak, or sick to listen to propaganda and that they live in grinding poverty,

makes the work of the sanitarian many-fold complicated.

14. Role of U. S. The United States spends a lot of money training South Asians in this country in all sorts of fields. If a South Asian trained in America returns to an overworked situation without proper facilities, support of his elders, honesty, freedom and scientific detachment to get the job done he will become seriously frustrated. Even worse, in the long run, he will live and work only upon the laurels he won while obtaining an advanced degree in a foreign country.

In conclusion, it should be pointed out that one must beware of easy solutions in all fields of sanitation in South Asia. Advice as to how to secure good sanitation practices may be unwanted. They have many good laws regarding sanitation. Respect from the population comes from results obtained. There may be no clear beginning and no clear end to the many problems but, in any event, the public must not be deluded. This would undo all the progress the sanitarians have so far accomplished. In South Asia there is no other place to go than up—and that is like "Going Up the Down Staircase."

ASSOCIATION AFFAIRS

IAMFES—LIST OF COMMITTEES 1968-1969

Committee on Dairy Farm Methods
(appointments expire 1969)

A. K. Saunders, *Chairman,* De Laval Separator Company, 5724 N. Pulaski Road, Chicago, Illinois 60646.

A. E. Parker, *Western Asst. Chairman,* Chief Milk Section, City of Portland Health Dept., Portland, Oregon 97204.

J. B. Smathers, *Eastern Asst. Chairman,* Maryland and Virginia Milk Producers Association, Inc., 1530 Wilson Boulevard, Arlington, Virginia 22209.

William L. Arledge, Director Quality Control, Southeast Milk Sales Assn., Inc., 283 Bonham Road, Bristol, Virginia.

Dr. Henry Atherton, Dairy Science Department, University of Vermont, Burlington, Vermont.

Glenn Cavin, ------------------ ------------------- Cedar Valley Coop. Milk Assn., 1936 Hawthorne, Waterloo, Iowa 50704.

Dr. Clifford J. Cosgrove, University of Rhode Island, Woodward Hall 212, Kingston, Rhode Island 02661.

Dr. J. C. Flake, Evaporated Milk Association, 910 17th Street, N.W., 11th Floor, Washington, D. C. 20006.

Clarence C. Gehrman, Field Supervisor, Dairy Inspection Section, Dairy and Food Division, Department of Agriculture, Olympia, Washington.

Dr. W. J. Harper, Department of Dairy Tech., Ohio State University, Columbus, Ohio 43200.

Kenneth Harrington, Babson Bros. Company, 2100 S. York Road, Oak Brook, Illinois.

M. W. Jefferson, Chief Dairy Products, Sanitation Section, 1308 Franklin Street, Richmond, Virginia 23219.

C. O. Johnson, 2831 Iron St., Bellingham, Washington 98225.

Elmer E. Kihlstrum, Johnson and Johnson, Dairy Division, 4949 West 65th Street, Chicago, Illinois 60638.

William McCorquodale, Ontario Milk Marketing Board, 31 Wellesley St. E, Toronto 5, Ontario, Canada.

Vernon Nickel, Milk Control Section, St. Louis Dept. of Public Health, 416 Tenth Street, Crystal City, Missouri.

William Pickavance, Universal Milk Machine Division, Albert Lea, Minnesota 56007.

D. G. Raffel, Wisconsin State Department of Agriculture, Dairy, Food and Trade Division, Hill Farms State Office Bldg., Madison, Wisconsin 53702.

Richard Rintelman, Manager Farm Department, Klenzade Products, Beloit, Wisconsin 53512.

Bernard Saffian, Chamberlain Laboratories, P. O. Box 624, Fishcreek Road, Stow, Ohio.

Stephen B. Spencer, Extension Dairyman, Pennsylvania State College, University Park, Pa. 16802.

Mr. D. K. Summers, Public Health Service, Regional VIII Office, Federal Office Building, 19th & Stout Streets, Denver, Colorado 80202.

Leon Townsend, 2205 Brent Drive, Madisonville, Kentucky.

Farm Methods Committee Consultants

C. G. Ashe, 215 Mott Road, Kendal-Fiber Products Division, Fayetteville, New York 13066.

Sydney E. Barnard, Extension Dairy Specialist, 213 Borland Laboratory, The Pa. State University, University Park, Pa. 16802.

Sydney H. Beale, Michigan Milk Producers Assn., 24270 West Seven Mile, Detroit, Michigan 48219.

Albert R. Pernice, 355 Benton Street, Stratford, Connecticut 06497.

William Trobaugh, Denver Milk Producers, Inc., 945 11th Street, Denver, Colorado 80204. c/o Field Department.

State Affiliates with Farm Methods Committee

Ray Carson, Washington Milk Sanitarians Assn., State Department of Agriculture, 2505 S. McClellan Street, Seattle, Washington 98144.

Verne Cavanaugh, Indiana Milk Sanitarians Assn., Public Health Sanitarian, Indiana State Board of Health, 205 Harrison Street, La Porte, Indiana 46350.

Dean Potter, Oregon Farm Methods Committee, Carnation Milk Company, 3342 S.E. Morrison, Portland, Oregon 97214.

Dr. Charles W. Livak, Pennsylvania Assn. of Sanitarians, Penn. Dairies, Inc., 1801 Hempstead Road, Lancaster, Pa. 17601.

David Monk, Supr. Environmental Health Service, Kansas Association of Sanitarians, Wichita-Sedgwick County, Public Health Department, 1900 East Ninth Street, Wichita, Kansas 67214.

Albert R. Pernice, Connecticut Assn. of Sanitarians, 355 Benton Street, Stratford, Connecticut 06497.

Don Race, New York State Association of Milk Sanitarians, Dairymen's League, 402 Park Street, Syracuse, New York 13208.

Emmett Fincher, Wisconsin Association of Milk and Food Sanitarians, 2614 Waunona Way, Madison, Wisconsin 53713.

James F. Kennedy, Missouri Association of Milk and Food Sanitarians, Missouri Division of Health, Poplar Bluff, Missouri.

William D. McCorquodale, Ontario Milk Sanitarians Assn., 31 Wellesley Street, East, Toronto 5, Ontario, Canada.

H. E. Hansen, Iowa Milk Sanitarians Assn., Milk Sanitation Department, State Office Building, Des Moines, Iowa 50319.

Committee on Sanitary Procedure

(appointments expire 1968)

Dick B. Whitehead, Chairman, 210 Casa Linda Plaza, Dallas, Texas 75218.

C. A. Abele, 2617 Hartzell Street, Evanston, Illinois 60201.

D. C. Cleveland, Dairy and Food Division, Room 505, Municipal Building, Oklahoma City, Oklahoma 73102.

Kenneth Carl, Chief, Dairy Consumer Service Division, Oregon Dept. of Agriculture, Salem, Oregon.

Dudly J. Conner, State Milk Inspector, Division of Environmental Health, 275 E. Main Street, Frankfort, Kentucky.

P. J. Dolan, Bureau of Dairy Service, State Building, Room 3051, 2550 Mariposa Street, Fresno, California 93712.

Harold Irvin, Omaha-Douglas Health Department, 1202 S. 42nd Street, Omaha, Nebraska.

W. K. Jordan, Associate Professor, Department Dairy and Food Service, Stocking Hall, Cornell University, Ithaca, N. Y.

Joseph J. Karsh, Alleghaney City Health Department, Pittsburg, Pennsylvania.

C. K. Luchterhand, 240 City-County Building, Madison, Wisconsin.

James A. Meany, 8949 S. Laflin Street, Chicago 20, Illinois 60620.

Sam O. Noles, State Board of Health, P. O. Box 210, Jacksonville, Florida.

O. M. Osten, Assistant Director, Food Inspection Division, Minnesota Dept. of Agriculture, State Office Building, St. Paul, Minnesota 55101.

Richard M. Parry, Chief, Dairy Division, State Dept. of Agriculture, State Office Building, Hartford, Connecticut.

H. L. Thomasson, P. O. Box 437, Shelbyville, Indiana.

F. E. Fenton, Chief, Standarization Branch, Dairy Division, Agricultural Marketing Service, U. S. Dept. of Agriculture, Federal Center Building, Hyattsville, Maryland 20781.

John C. Schilling, Chief, Milk Control, Division of Health Milk Control Section, St. Louis, Missouri 63103.

J. C. Olson, Jr., Director, Division of Microbiology, Bureau of Science, Food and Drug Administration, Washington, D. C. 20204 (F.D.A. observer on Committee).

Committee on Food Protection

(appointments expire 1969)

Objectives:

To provide international leadership in the prevention and control of foodborne diseases through:

1. Identification and evaluation of microbial, chemical, radiological and physical hazards associated with the processing, transportation, storage, handling and service of foods and animal feeds;

2. Encourage the conduct of research to provide data needed to develop effective, practical control measures;

3. Promote improved reporting of foodborne disease outbreaks;

4. Encourage development of improved methodology for detection of foodborne pathogens and hazardous chemicals in market foods;

5. Encourage the development of model laws and regulations for the control of food hazards, and promote their uniform adoption and application by State and local regulatory agencies.

6. Promote the development of regional and/or national certification programs designed to assure the safety of foods moving in interjurisdictional shipments;

7. Study existing and new processing and serving practices and techniques to assure the incorporation of new and improved food protection measures;

8. Lend support to agencies and groups concerned with the training of industry and regulatory agency personnel;

9. Assist any agency or group engaged in the eradication of foodborne hazards from market foods; i.e. Salmonellae in eggs, dry milk, cake mixes, etc.;

10. Provide technical and consultative assistance to any segment of the food industry and to regulatory agencies in matters of food protection.

David Kronick, Chairman, Chief, Milk and Food Section, Division of Environmental Health, Philadelphia Department of Public Health, Philadelphia, Pennsylvania 19146.

William V. Hickey, Vice Chairman, Public Health Committee, Paper Cup and Container Institute, New York, New York 10017.

W. A. Fountain, Chief Food Technologist, General Engineering-Sanitation Service, Georgia Department of Public Health, Atlanta, Georgia 30334.

A. E. Abrahamson, Acting Assistant Commissioner, Environmental Health Services, New York City Department of Health, New York, New York 10013.

Dr. James C. White, Department of Food Science, Cornell University, Ithaca, New York 14850.

Dr. K. G. Weckel, Department of Food Science and Industries, University of Wisconsin, Madison, Wisconsin 53706.

Elmer D. McGlasson, Milk and Food Branch EEFP, Public Health Service, Washington, D. C. 20201.

Robert Beck, Chief Food Technology Division, District of Columbia Department of Health, Washington, D. C.

Baking Industry Committee

(appointments expire 1968)

Objectives:

The objectives of the Baking Industry Equipment Committee are to cooperate with and provide consultative assistance to the baking industry in the development of standards for bakery equipment.

Vincent T. Foley, Chairman, City Health Dept., 21st Floor, City Hall, Kansas City, Missouri 64106.

A. E. Abrahamson, City Health Dept., 125 Worth Street, New York 13, N. Y.

Louis A. King, Jr., Director of Sanitation Education, American Institute of Baking, 400 E. Ontario Street, Chicago, Ill. 60611.

Fred R. Vitale, Continental Baking Co., Inc., P. O. Box 731, Rye, New York 10580.

Harold Wainess, Wainess & Associates, 510 N. Dearborn Street, Chicago 10, Ill. 60610.

Committee on Environmental Health
(appointments expire 1969)

Paris, B. Boles, R. S., Co-Chairman, Wayne County Health Department, Monticello, Kentucky 42633.

R. L. Cooper, A. A., Co-Chairman, Calloway County Health Department, 701 Olive Street, Murray, Kentucky.

Richard Clapp, Community Services Training Section, Training Branch, Communicable Disease Center, Atlanta 22, Georgia 30333.

Cameron Adams, Department of Agriculture, Dairy and Food Division, P. O. Box 120, Olympia, Washington.

James Barringer, 1703 Oneida Street, Joliet, Illinois.

Maxwell Wilcomb, Professor of Sanitary Science, University of Oklahoma, Norman, Oklahoma.

David S. Reid, Department of Environmental Sanitation Control, The Clinical Center, Room 1S-230, National Institutes of Health, Rockville Pike, Bethesda, Maryland 20014.

R. A. Belknap, 118 Robinwood Drive, Terrace Park, Ohio 45174.

Committee on Frozen Food Sanitation
(appointments expire 1968)

Objectives:

1. Stimulate both industry and governmental agencies to establish bacteriological standards for frozen foods.
2. Stimulate and encourage additional study of the freeze dry processes.
3. Encourage the adoption of Equipment Standards for the frozen food industry.
4. Compile a list of reference materials and publications related to Frozen Food Sanitation.
5. Provide an exchange of information between state regulatory agencies concerned with frozen food legislation and strive for uniformity between all agencies.

Eugene C. Viets, Chairman, Chief, Food Sanitation, Division of Health of Missouri, Bureau of Veterinary Public Health and Welfare, Jefferson City, Missouri 65101.

Stephen J. Palmer, National Association of Frozen Food Practices, 919 18th Street, Washington D. C. 20006.

Charles P. Orr T 12-2, Associate Environmental Health Consultant, General Foods Corporation, White Plains, New York 10602.

Frank E. Fisher, Director, Division of Food and Drugs, Indiana State Board of Health, 1330 West Michigan Street, Indianapolis, Indiana 46207.

Eaton E. Smith, Food Division, Department of Consumer Protection, Hartford, Connecticut.

Committee on Communicable Diseases Affecting Man
(appointments expire 1969)

E. R. Price, D.V.M., Chairman, Director, Bureau of Veterinary Public Health, Division of Public Health of Missouri, Dept. of Public Health and Welfare, Jefferson City, Missouri 65101.

Stanley L. Hendricks, D.V.M., State Department of Health, Des Moines, Iowa 50319.

John Andrews, State Board of Health, Raleigh, North Carolina 27602.

Robert K. Anderson, School of Veterinary Medicine, University of Minnesota, St. Paul, Minnesota 55101.

Frank L. Bryan, Chief, Food-Borne Disease Unit, Community Services Training Section, NCDC Atlanta, Georgia 30333.

P. N. Travis, Jefferson County Health Dept., Birmingham, Alabama 35302.

Charles A. Hunter, 121 Fairfield Oaks, 3820 Fairfield Avenue, Shreveport, Louisiana 71104.

John H. Fritz, 1612 Rockhurst Lane, Cinn., Ohio 45230.

Committee on Food Equipment Sanitary Standards
(appointments expire 1968)

Objectives:

The objectives of the IAMFES Committee on Food Equipment Sanitary Standards are to participate with other health organizations and industries in the formulation of sanitary standards for food equipment, including preparation of related educational material. Specifically, the functions of this Committee include:

1. Cooperation with other health agencies and industry, under the auspices of the National Sanitation Foundation, in the joint development of NSF Standards for Food Equipment.
2. Cooperation with other health agencies and industry, under the auspices of the Automatic Merchandising Health Industry Council, in the joint development of an Evaluation Manual for Food and Beverage Vending Machines.
3. When directed by the Executive Board, to cooperate with other health groups and industry in the development of sanitary standards for food equipment.
4. To present to the membership at the annual meeting those equipment guidelines and educational materials which the Committee recommends be endorsed by the Association.

Karl K. Jones, Chairman, Environmental Health Officer, Student Health Center, Purdue University, Lafayette, Indiana 47907.

Irving L. Bell, Assistant Director, Environmental Services Program, Division of Environmental Health, State Department of Health, 275 East Main Street, Frankfort, Kentucky 40601.

Carl Henderson, Director, Milk and Food Sanitation Section, New Mexico Department of Public Health, 408 Galisteo Street, Santa Fe, New Mexico 87501.

Lloyd W. Regier, Associate Professor, Environmental Chemistry, School of Public Health, University of North Carolina, Chapel Hill, North Carolina 27515.

A. T. Rhoads, Head, Sanitation Section, National Canners Association, 1133 20th Street, N. W., Washington, D. C. 20036.

Jerome Schoenberger, Supervisor, Equipment Section, Wholesale Division, City Department of Health, 125 Worth Street, New York, New York 10013.

Harold Wainess, Harold Wainess and Associates, 510 North Dearborn Street, Chicago, Illinois 60610.

Committee on Applied Laboratory Methods
(appointments expire 1968)

A. Richard Brazis, Chairman, Senior Scientist, Milk Sanitaiton Research, Department of Health, Education and Welfare, USPHS, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio 45226.

Donald I. Thompson, Wisconsin State Laboratory of Hygiene, Madison, Wisconsin.

J. C. McCaffrey, Chief, Bureau of Sanitary Bacteriology, Illinois Department of Public Health, 1800 West Fillmore Street, Chicago 12, Illinois.

F. E. Nelson, Department of Dairy Science, University of Arizona, Tucson, Arizona.

Laurence G. Harmon, Department of Food Science, Michigan State University, East Lansing, Michigan.

J. J. Jezeski, Department of Food Science and Dairy Industries, University of Minnesota, St. Paul, Minnesota 55101.

Earl W. Cook, Quality Control Laboratory, Pine Road, Philadelphia, Pennsylvania.

Robert Angelotti, Deputy Chief, Milk and Food Research, Department of Health, Education and Welfare, USPHS, Robert A. Taft Sanitary Engineering Center, 4676, Columbia Parkway, Cincinnati, Ohio 45226.

Herbert E. Hall, Chief, Food Microbiology, Department of Health, Education, and Welfare, USPHS, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio 45226.

William L. Arledge, Southeast Milk Sales Association, P. O. Box 1099, 283 Bonham Road, Bristol, Virginia.

E. H. Marth, Department of Food Science and Industries, University of Wisconsin, Madison, Wisconsin 53706.

E. A. Zottola, Department of Food Science and Industries, University of Minnesota, St. Paul, Minnesota 55101.

Charles Huhtanen, Eastern Regional Laboratories, U. S. Department of Agriculture, Philadelphia, Penns. 19118.

Roy E. Ginn, Director, Quality Control Laboratory, Quality Control Committee, 2274 Como Ave. W., St. Paul, Minnesota 55108.

D. Q. Anderson, Utah State Department of Health, 44 Medical Drive, Salt Lake City, Utah 84113.

H. E. Randolph, Dept. of Animal Science, Texas A & M University, College Station, Texas 77843.

PROFESSIONAL AND EDUCATIONAL DEVELOPMENT COMMITTEE

(appointments expire 1968)

John R. Patillo, Chairman, Division of Housing and Environmental Sanitation, Department of Public Health, Richmond, Virginia 23219.

Harold S. Adams, Professor, Department of Public Health, Indiana University Medical Center, Indianapolis 7, Indiana.

E. M. Causey, Jr., South Carolina State Department of Health Columbia, South Carolina.

Francis M. Crowder, Sanitation Consultant, South Carolina State Board of Health, J. Marian Sims Bldg., Columbia, South Carolina 29201.

Carrol E. Despain, State Sanitarian Supervisor, Engineering and Sanitation Division, Idaho Department of Health, Boise, Idaho.

Ernest S. Kopecki, American Iron & Steel Institute, 633-3rd Ave., New York, N. Y. 10017.

Roger L. Stephens, 176 West 6th St., North, Logan, Utah 84321.

I.A.M.F.E.S. REPRESENTATIVES TO SANITARIANS' JOINT COUNCIL

William C. Hickey, Plate, Cup and Container Institute, Inc., 250 Park Avenue, New York, N. Y. 10017 (app't. expires 12-31-69).

John D. Faulkner, 333 Dover Road, R. F. D. 4 Charlottesville, Virginia 22901 (app't. expires 12-31-68).

John H. Fritz, 1612 Rockhurst Lane, Cinn., Ohio 45230 (app't. expires 12-31-68).

Ray A. Belknap, 118 Robinwood Drive, Terrace Park, Ohio 45174 (app't. expires 12-31-70).

REPRESENTATIVE TO NATIONAL MASTITIS COUNCIL

A. E. Parker, City Health Department, Portland, Oregon.

JOURNAL MANAGEMENT COMMITTEE

F. W. Barber, Chairman, Director of Regulatory Compliance, Research and Development Division, National Dairy Products Corporation, Glenview, Illinois.

J. C. Olson Jr., Director, Division of Microbiology, Bureau of Science, Food and Drug Administration (HEW), Washington, D. C. 20204.

E. H. Marth, Department of Food Science and Industries, University of Wisconsin, Madison, Wisconsin 53706.

K. G. Weckel, Department of Food Science and Industries, Babcock Hall, University of Wisconsin, Madison, Wisconsin 53706.

C. K. Johns, 2284 Braeside Ave., Ottawa 8, Ontario, Canada.

ANNOUNCING THE JOHN J. SHEURING MEMORIAL FUND

Dr. John J. Sheuring joined the Dairy Science Department staff at the University of Georgia in 1948. He devoted the remainder of his life to service to the dairy and food industries of Georgia and the nation until his untimely death on November 5, 1965.

Dr. Sheuring made many contributions during this 17 year period. He was widely recognized as one of the most capable teachers at the University. His research in dairy product quality improvement will be of lasting value to the dairy industry. His willingness to help his fellow man made many lasting friendships. Through his efforts the Atlanta Dairy Technology Society was organized, and is today one of the strongest such groups in the nation. Likewise, he provided leadership in forming the Georgia Society of Registered Professional Sanitarians. He served as President of the International Association of Milk and Food Sanitarians, and also, as chairman of the State Examining Board for Registered Professional Sanitarians.

Because of the valuable service rendered by Dr. Sheuring, the Georgia Society of Registered Professional Sanitarians has seen fit to provide a memorial in his behalf. This memorial will be in the form of a Graduate Fellowship for selected students working toward an advanced degree at the University of Georgia in the field of dairy, food and environmental sanitation.

Consequently, a fund has been established at the

University of Georgia to be known as "THE JOHN J. SHEURING MEMORIAL FUND." Contributions to this fund will be deposited with the Comptroller of the University and will be administered by the University of Georgia and should be forwarded to Prof. H. B. Henderson, Head of the Dairy Science Department.

ENTERTAINMENT TREAT AT ANNUAL MEET

Members and guests at the annual meeting banquet are assured of some wonderful entertainment. "Smiling Joe" Schirmer, King of the Banjo will be there. Internationally famous, Joe Schirmer has been a top banjo artist for 35 of his 49 years. He has appeared at the Fontainebleau Hotel, Miami Beach; Castle Harbour, Bermuda; St. Louis Municipal Opera; Arthur Godfrey's Radio and T.V. shows; Johnny Carson's Tonight Show; the New York World's Fair and London, Paris, Munich, Naples and Madrid. You just won't want to miss this—it'll be worth the cost of the banquet just to hear him.

WISCONSIN STATE UNIVERSITY-EAU CLAIRE OFFERS NEW TRAINING OPPORTUNITY FOR SANITARIANS

Wisconsin State University-Eau Claire has recently inaugurated a program leading to the Bachelor of Science Degree in Environmental and Public Health. The program will begin in September of 1968. Because of its strong biology, bacteriology, and chemistry departments and its related programs in nursing and in medical technology, Wisconsin State University-Eau Claire is well suited to education in this specialized field. It maintains close liaison with state and local health departments, Department of Natural Resources, Department of Agriculture, and other state agencies. One summer session during the four years will be devoted to practical experience on the job in cooperation with these agencies.

Figure 1. Members of the Joint Committee on Education, The Wisconsin Association of Sanitarians, and the Wisconsin Milk and Food Sanitarians Association who assisted in the development of the four-year course leading to the Bachelor of Science Degree in Environmental and Public Health at Wisconsin State University, Eau Claire. Left to right, Prof. Evert Wallenfeldt, W. A. S.; Stanley B. Wittwer, W. M. F. S.; Roy Clary, W. A. S.; C. K. Luchterhand, Chairman; Edward R. Friday, W. M. F. S.; Harold Wittig, President, W. A. S.; Dr. K. G. Weckel, W. M. F. S.; Robert Anderson, President, W. M. F. S.; and Rod Kalling, W. A. S. Absent were Harold Elder, W. A. S. and Don Raffel, W. M. F. S.

Figure 2. Staff members at Wisconsin State University-Eau Claire who will supervise the new program in Environmental and Public Health. Left to right: Dr. Richard Hibbard, Vice-President of Academic Affairs; Dr. John Morris, Dean of School of Arts and Science; and Dr. John B. Gerberich, Professor of Biology and Director of Allied Health Professions.

The Course of Study

The curriculum for the four-year course, listed, includes basic courses in chemistry, bacteriology, biology, physics, mathematics, humanities, and other requirements of the Bachelor of Science Degree. The senior year must be taken on campus and includes parasitology, food and water sanitation, epidemiology, occupational health, and public health regulations and administration. There will be sufficient opportunities for electives of the student's choice. The four-year degree program includes 128 academic credit hr and 6 hr of credit earned in field study; a total of 134 hr. A student will be required to take the following course of study.

Freshman Year

First Semester		*Second Semester*	
Biology 4	4	Biology 5	4
Chemistry 10a	5	Chemistry 10b	5
English 1a	3	English 1b	3
Social Science	3	Math 25	4
Physical Education	(1)	Physical Education	(1)
	15		16

Sophomore Year

First Semester		*Second Semester*	
Biology 6	4	Chemistry 65	5
Biology 151	4	Humanities	3
Biology 152	4	Math 53	3
Social Studies	3	Philosophy (any)	3
		Social Studies	3
	15		17

Junior Year

First Semester		*Second Semester*	
Chemistry 100a	5	Chemistry 180	4
Engineering Graphics	3	Humanities	3
Physics 50a	4	Physics 50b	4
Biology 153	3	Social Studies	3
		Electives	2
	15		16

Summer Session

Field Practice in Sanitation ____________________6 credits
(after completion of 90 Semester credits)

Senior Year

First Semester		*Second Semester*	
Biology 111	4	Business 125	3
Epidemology & Occupational Health	4	Humanities	3
Food & Water Sanitation	3	Public Health Regulations	3
Humanities	3	Social Sciences	3
Electives	3	Electives	5
	17		17

Achieving Professional Registration

A number of states provide for registration of persons qualified in the field of Environmental and Public Health; for example, in Wisconsin the Sanitarian Registration Law (Section 140.45) Wisconsin Statutes. There, a person who holds a baccalaureate degree in Environmental and Public Health and has completed one year of acceptable employment as a specialist in sanitation may become registered upon successful completion of an examination administered by the Wisconsin Division of Health.

This degree program was initiated and developed with the assistance of the Joint Committee on Education of the Wisconsin Association of Sanitarians and the Wisconsin Association of Milk and Food Sanitarians. Dr. John Gerberich, Director of Allied Health Professions, Wisconsin State University-Eau Claire, Eau Claire, Wisconsin, 54701, will administer the program. All inquiries should be directed to him.

AMENDMENT TO HTST PASTEURIZATION PRACTICES PROPOSED AT MAY MEETING OF 3-A SANITARY STANDARDS COMMITTEE

Guidelines for concentrated milk pasteurization in a spray drying system have been proposed to amend the 3-A Accepted Practices for HTST Pasteurization, published January 1967.

Discussion of the amendment took place at the regular meeting of the 3-A Sanitary Standards Committees in St. Paul, Minn.

The amendment was not adopted as final by the 3-A group due to certain unresolved points which, according to Committees secretary D. H. Williams, "should be clarified soon, permitting publication of the guidelines later this year."

"Users will be interested in the amendment's criteria which locate the timing pump downstream from the flow diversion device," William stated. "This is particularly significant to the dry milk industry, where feeder condenseries supply central drying plants with concentrate." Under the published practices, an upstream timing pump location has been required.

Some 90 persons attended the 3-A sessions, representing makers of dairy equipment, dairy processors, and sanitarians and regulatory personnel. The meeting was chaired by Dean Stambaugh, Hawthorne-Mellody Farms Dairy, Inc., in his capacity as chairman of the Sanitary Standards Subcommittee of Dairy Industry Committee.

The 3-A delegates also considered tentative standards for meters, a proposed new accepted practice for driers, and several amendments and revisions to published 3-A Standards for transportation tanks, storage tanks, fittings and heat exchangers. All proposals have been referred to appropriate action groups for further revision.

RESTAURANT ASSOCIATION AND PUBLIC HEALTH ORGANIZATION MEETING

Participants in a recent meeting held at the Knickerbocker Hotel, Chicago, were, clockwise: Lester Johnson, Chairman, NRA Public Health and Safety Committee; Ward Duel, President, National Association of Sanitarians; John H. Fritz, International Association of Milk, Food and Environmental Sanitarians; Arthur McIntyre, U. S. Public Health Service; John Andrews, Conference of State Sanitary Engineers; Richard F. Clapp, American Public Health Association; Dr. Roy Upham, Association of State & Territorial Health Officers; Frances Saunders, U. S. Office of Education; Vernon Cordell, NRA; Cyril Kegler, NRA Director; O. L. Meyer, Conference of Municipal Public Health Engineers; Theodore Cooney, NRA Director; Dr. James G. Telfer, American Medical Association; Charles Heinze, NRA Director; L. E. Starr, NRA Director; Tom S. Gable, National Sanitation Foundation. Present but not shown in picture, Dr. Chester Hall, NRA Director of Education, and Charles Sandler, NRA Director of Communications. The NRA met with representatives of the nation's leading public health organizations for the purpose of discussing the effective education and training of individuals who are preparing for careers in the food service industry and the motivation and training of those already in the industry.

NEWS AND EVENTS

NATIONAL CONFERENCE ON INTERSTATE MILK SHIPMENTS

The Executive Board held an interim meeting at the Kentucky Hotel, Louisville, Kentucky on April 1, 1968. Various committees were appointed and other decisions affecting the entire membership of the conference were decided. The 1969 meeting is scheduled to be held at the New Albany Hotel, Denver, Colorado, May 25-29.

The Executive Board originally selected the Edgewater Beach Hotel, Chicago, Illinois as the location for the 1971 meeting. The Edgewater Beach has, since that time, gone out of business. The Board voted to hold the 1971 conference at the Chase-Park Plaza Hotel, St. Louis, Missouri, May 16-20.

During the 1967 conference in Miami Beach, Chairman Johnson was directed to appoint, with the approval of the Executive Board, several interim committees. Each chairman will welcome any constructive criticism or suggestions.

(1) Standards for Single Service Containers. Chairman: R. M. Parry, Chief, Dairy Division, Department of Agric. & Natural Res., State Office Building, Hartford, Connecticut.

(2) Reciprocity. Chairman: Carl E. Henderson, New Mexico Health Department, 408 Galisteo, Santa Fe, New Mexico.

(3) Reorganization of the National Conference. Chairman: Harold J. Barnum, 659 Cherokee Street, Denver, Colorado.

(4) Abnormal Milk Control. Chairman: Dr. John C. Flake, National Mastitis Council, 910 - 17th Street, N.W., Washington, D. C. 20006.

(5) Credentials and Membership. Chairman: Earle K. Borman, Connecticut Department of Health, P. O. Box 2340, Hartford, Connecticut.

(6) Over-The-Road Tankers. Chairman: E. G. Huffer, Chief, Division of Milk Control, Ill. Dept. of Public Health, 701 South Second Street, Springfield, Illinois.

(7) Program Committee. Chairman: Dr. Earl O. Wright, Dept. of Dairy Industry, Iowa State University, Ames, Iowa.

(8) Nominating Committee. Chairman: Brace Rowley, State Board of Agriculture, State Office Building, Topeka, Kansas 66612.

(9) Resolutions Committee. Chairman: Evert Wallenfeldt, University of Wisconsin, 117 Babcock Hall, Madison, Wisconsin.

(10) Local Arrangements Committee. Chairman: Harold J. Barnum, 659 Cherokee Street, Denver, Colorado.

(11) Constitution Revision Committee. Chairman: Clarence Luchterhand, Wisconsin State Board of Health, Room 453, State Office Building, Madison, Wisconsin 53702.

The New Albany Hotel, Denver, Colorado, will provide a special room rate of $10 for a single and $16 for a double plus 6% Colorado state tax. Special hotel reservation cards will be sent with the next Newsletter which will be issued some time in January, 1969.

FOOD PRODUCT DEVELOPMENT OPPORTUNITIES TO BE DISCUSSED AT OCTOBER FOOD FORUM

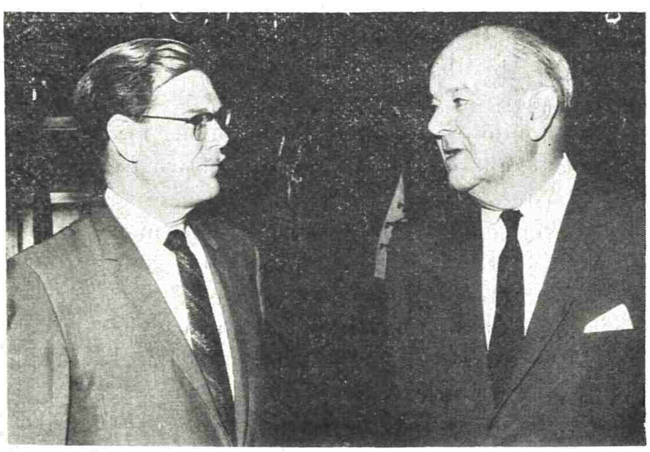
Food processors visiting Food & Dairy Industries Expo during the week of Oct. 13-17, 1968 in Chicago, may also attend a discussion of food product development opportunities.

Three authorities will participate in the Third Biennial Food Forum for Management to be held Monday afternoon, Oct. 14 at the International Amphitheatre. Panelists will explore such topics as innovative prospects in today's food industry, food potential of the seas, and world plant protein resources as an opportunity for product development.

The participants are: Dr. Aaron M. Altschul, special assistant for International Nutrition Improvement, U. S. Department of Agriculture; Dr. John H. Nair, immediate past president of Institute of Food Technologists; and Dr. Ernest Pariser, chief scientist and director for Marine Resources, AVCO Corporation.

Food Forum occurs in conjunction with Food & Dairy Industries Expo. Held biennially, both are sponsored by Dairy and Food Industries Supply Association, 1145-19th St. N.W., Washington, D. C. 20036.

TRADE MISSION TO AUSTRALIA



Secretary of Commerce, Cyrus R. Smith, right, held a brief session with Joseph S. Cunningham, executive vice president of the Dairy and Food Industries Supply Association, shortly before Mr. Cunningham left on a 3-week Commerce Department-sponsored trade mission to Australia and New Zealand. Mr. Cunningham and Paul K. Girton, a past president of the association, were among 48 business and government representatives taking part in the mission which left New York on April 24. The primary purpose of the trip for the dairy and food suppliers representatives is to encourage businessmen from the two countries to attend the Food & Dairy Expo '68 this fall in Chicago.

FOOD UPDATE BEGINS 1969 SEMINAR PLANNING

Executive and technical management of the U. S. food industry is invited to contribute topic suggestions for the Food Update seminar scheduled February 9-12, 1969, at the Sheraton-Boston Hotel, Boston, Mass. The program committee, which is this year introducing "audience participation" in its preliminary planning, is designated the forthcoming forum: "Food Update 8—Bay State."

This eighth in a series of informational forums, by and for the food industry, is designed to probe the broad implications of governmental, management, educational and scientific factors on food field growth and change. It also will examine the latest thinking in new product development, processing, packaging, marketing and law.

Sponsored by The Food and Drug Law Institute, Inc., and directed by its president, Franklin M. Depew, the program will survey "practices and promises spanning food business activity, and will explore important ideas to assist the decision maker." Food Update seminars held throughout the country have attracted speakers and participants from major corporations, government, education, agriculture and science.

By offering to consider apt discussion topics solicited from food executives, the non-profit seminar expects to make its forthcoming program even more responsive to industry needs. The contribution of suggestions does not constitute a commitment to attend the 1969 Boston meeting.

All recommendations for presentation subjects may be sent to Food Update, The Food and Drug Law Institute, Inc., 205 East 42nd Street, New York, N. Y. 10017.

SHORT COURSE UNIVERSITY OF FLORIDA

September 9-12, 1968—Short Course in Instrumentation for Process and Quality Control. Sponsored by Florida Section IFT and Florida Agricultural Extension Service, University of Florida, Gainesville, Florida 32601. Fee—$30. For further information, write Dr. R. F. Matthews, Department of Food Science, University of Florida, Gainesville, Florida 32601.

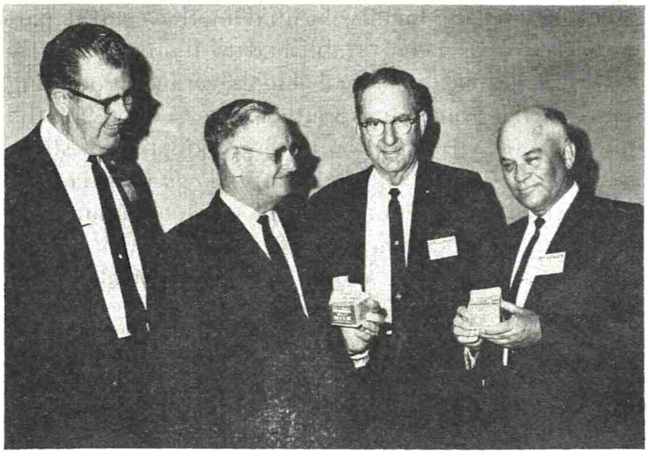
TEXAS A & M DAIRY INDUSTRIES CONFERENCE

Over 125 dairy industry representatives and regulatory officials attended the recent two day Dairy Industries Conference held at the Holiday Inn in Bryan, Texas. The Conference was sponsored by the Department of Animal Science at Texas A&M University. Dr. H. E. Randolph was chairman of the Conference program and arrangements.

The Conference was highlighted by the banquet and luncheon activities. The speaker for the banquet was Congressman Earle Cabell, Representative of the 5th District of Texas, who spoke on the topic of "Today in Washington". Mr. Al A. Schock, Terrace Park Dairy and Norica Food Company, Sioux Fall, South Dakota, spoke on the subject of "Problem—Solutions—And Opportunities in the Dairy Industry" at the luncheon.

Other speakers appearing on the program and their subjects were: Mr. Gail A. Smith, Wyandotte Chemicals, Wyandotte, Michigan—Control of Psychrophiles in Dairy Products"; Mr. John F. Speer, Milk Industry Foundation, Washington, D. C.—"Current Aspects of Milk Regulatory Programs"; Dr. B. R. Weinstein, Milk Proteins, Inc., Detroit, Michigan—"Are Imitation Dairy Products in Your Future?"; Mr. W. J. Moore, Carnation Company, Los Angeles California —Company View of Imitation Products"; and Dr. O. D. Butler, Chairman of the Department of Animal Science, Texas A&M University—"Dairy Manufacturing at Texas A&M". Mr. David H. Evans, Texas State Department of Health, Austin, Texas, Mr. L. B. Smith, Cabell's Dairies, Dallas, Texas, Mr. James S. Rudy, Foremost Dairies, Dallas, Texas and Mr. Ralph Button, Superior Dairies, Austin, Texas presided at the various sessions.

SPEAKERS AND PROGRAM PARTICIPANTS: Left to Right: James S. Rudy, Foremost Foods Co., Dallas, Texas, Dr. B. R. Weinstein, Milk Proteins Inc., Detroit, Michigan, Mr. John F. Speer, Milk Industry Foundation, Washington, D. C., Mr. Tom Thomas, Sanitary Farms, Bryan, Texas.



CONFERENCE PARTICIPANTS DISCUSS CONFERENCE PROGRAM AT MILK BREAK: Left to Right: Mr. Carl Scholle, Wyndotte Chemical Corp., San Antonio, Texas, Mr. Roy Barn, The Lilly Co., Bryan, Texas, Mr. Collin Callaway, Mr. D. F. McGowen, City of Dallas, Health Dept., Dallas, Texas.

FOOD & DAIRY EXPO VISITORS ADVISED TO MAKE HOTEL RESERVATIONS EARLY

Room reservations are now being accepted in Chicago for the week of the Food & Dairy Industries Expo, October 13-17, 1968.

Because of large numbers of persons who will attend the exposition, all hotels are pooling their rooms in a central housing bureau to which one should write for reservations. The address is Food and Dairy Housing, Chicago Convention Bureau, 332 S. Michigan Avenue, Chicago, Ill. 60604.

The Bureau will then make the reservations requested. Guests should list several hotel selections, although the Bureau will make every effort to house the guest in his first choice of hotel. The earlier a reservation is mailed, the greater chance the visitor has of being housed in his preferred hotel.

Persons not familiar with Chicago hotels may request a map showing all available hotels and a reservation form listing hotel rates from Expo's sponsor, the Dairy and Food Industries Supply Association, 1145 19th Street, N. W., Washington, D. C. 20036.

WALKER STAINLESS EQUIPMENT COMPANY, NEW LISBON, WISCONSIN OPENS FLORIDA DIVISION

The Walker Stainless Equipment Company, designers and manufacturers of stainless steel equipment for the food, beverage, chemical and dairy industry, announced recently that their new Florida division plant at Tavares, has been completed and is in production.

The new plant facility located in the central part of the state has been established to more effectively serve dairy, food, chemical and beverage processing plants in the South and Southeastern sections of the United States. In addition to the production of stainless steel processing equipment, Walker's Florida division repairs and rebuilds stainless steel, plant and transportation equipment. The tank repair service is offered to operators of stainless tanks of all makes and models.

The new facility is equipped with the latest production equipment. It is under the management of Lynn Walker, whose knowledge and background in stainless steel fabrication, was acquired at the parent plants.

One of the product lines will be the Walker "Porta-Cut", an abrasive cut-off machine, designed and manufactured by Walker.

The company with home offices and plants in New Lisbon, Wisconsin also has recently expanded its facilities for manufacturing large stainless steel vessels, coded and non-coded.

MILK AND CREAM TESTERS

Garver Super Series milk and cream testers are dynamically balanced for smooth operation are designed for controlled, consistently accurte test results — and are built for rugged, constant use.

Available in 12, 24 and 36 bottle models for either Babcock or Gerber testing — and constructed of cast aluminum — the Super Series is equipped with Visiscope, the most accurate speed indicator known. Other outstanding features include variable speed control . . . thermostatic heat control . . . dual starting speeds for light or heavy loads . . . fingertip stopping brake . . . dual switches for motor and heater . . mounted thermometer . . . and pilot light that goes on whenever heater or motor is in operation.

For complete information, write the Garver Manufacturing Company, Dept. 209, Union City, Indiana 47390.

NEW LISTING OF APPROVED VENDING MACHINES

The National Automatic Merchandising Association (NAMA) has announced the publication on May 1, 1968 of a new listing of vending machines approved under NAMA's Machine Evaluation Program.

Copies will be sent automatically to health and military officials on the NAMA mailing list. Others may obtain free copies from NAMA, 7 South Dearborn Street, Chicago, Illinois 60603.

FOOD INDUSTRY CONFERENCE UNIVERSITY OF RHODE ISLAND

Associate Professor Clifford J. Cosgrove, chairman of the Food Industry Conference, with one of the speakers, Dr. Robert H. Holland, chairman of the food science department at Cornell University. Professor Cosgrove was chairman of the annual conference at the University of Rhode Island, which focused on the controversial issue of imitation and filled dairy products.

CANADIAN INSTITUTE OF FOOD TECHNOLOGY ANNUAL MEETING

The 1968 Annual Conference of the Canadian Institute of Food Technology will be held at the Banff School of Fine Arts, Banff, Alberta, Canada on June 9-12.

Forty-five technical papers will be presented dealing with Meats, Fruit and Vegetable Products, Dairy Products, Food Engineering and Microbiology. A symposium on Water and Food Processing Wastes will be chaired by R. A. Gallop, Food Science Department, University of Manitoba. A symposium on New Edible Oil Products, chaired by A. H. Mathieu, Department of Industry, will discuss margarines and the substitute dairy products and the nutritional significance of fats. Another symposium will discuss the role of the Food Technologist in Industry and the Education of Food Technologists in Canada and U.S.A.

Other activities include a bus tour of the Rockies, hot pools, gondola lifts, barbecue and interesting Ladies' Program.

Accommodation at Banff is limited. Contact Mr. H. S. Murdy, Continental Can Co., P. O. Box 20, New Westminster, B. C., for registration information.

DONALD GREENAWAY, NRA EXECUTIVE, RESIGNS

Robert D. Parks, President of the National Restaurant Association, announced acceptance by the Board of Directors of the resignation by Donald Greenaway from the position of Executive Vice President of the Association. Mr. Greenaway will be relieved of his responsibilities and assigned other less arduous duties in accordance with his own wishes. Health was the reason given for the request.

President Parks paid tribute to Mr. Greenaway's ten years of outstanding service to the Association which witnessed its most dramatic growth in history; during this time the Association doubled its membership and its services to the industry many times over. The NRA President recognized further that during this period, relationships with state, international and allied associations have been greatly strengthened and that NRA was in a sound position to move ahead to meet the future needs of a dynamic and growing restaurant industry.

NEW APPROACH IN MILK FAT TESTING

For the first time in nearly 80 years, milk fat testing in the United States may use a new approach. An instrument developed in Denmark, faster and safer than methods used since the 1890's, is making a bid for acceptance.

Testing of the Danish instrument is underway in university and industrial laboratories in several countries, according to Manfred Kroger, assistant professor of food science at The Pennsylvania State University. If legally accepted, the new method will replace the present Babcock test and the Gerber test.

The Danish instrument uses the principle that opaqueness of milk is caused by protein and fat globules suspended in emulsified form throughout the milk. The fat and protein cause light to be scattered and absorbed throughout the solution. When the milk protein is dissolved and the remaining fat globules are homogenized to a uniform size, light dispersion and absorption depend only on the number of homogenized fat globules which are proportional to the fat content of the milk. Light passing through a sample is picked up by a photometer and indicated as milliamperes on a scale reading per cent fat.

Fat percentage of a milk sample can be determined in about 30 seconds, Dr. Kroger says. In contrast, the Babcock test and the Gerber test require about 20 minutes to determine fat content. No flammable solvents or acids are used in the Danish system as with the other methods.

Dr. Kroger and associates believe this Danish milk fat tester will be especially useful for milk companies handling large numbers of butterfat tests daily. It will also benefit the Dairy Herd Improvement Associations which test milk samples among herds in all states. Such testing helps to evaluate cow performance. In addition, federal, state, and local control agencies use milk fat tests to determine whether market milk has the required minimum fat content.

Proper calbiration of the instrument is extremely important, Dr. Kroger says. Apart from this, the equipment operates fairly easy. Precision and accuracy are considered superior to the other fat testing methods.

NEED NEW SOLUTIONS TO WORLD OIL AND PROTEIN SHORTAGE

The population explosion has resulted in a serious shortage of oils and proteins, according to Dr. Raymond Reiser, president American Oil Chemists' Society, in an address given at the Joint Meeting of The American Oil Chemists' Society and the American Society of Cereal at Washington, D. C., April 1, 1968.

There is not enough animal fat and protein—essential nutritional elements—to go around. Basic meats, including the steaks and roasts we enjoy so well, will be replaced with substitutes in the not-too-distant future, since the cost of the cereal and the land acreage needed to produce them is becoming prohibitive. Even improved agricultural methods and the reclaiming of arable land will not suffice to bridge the "nutrition gap."

Chemical research and engineering must supply the answers. One approach to the problem is to extend the new microbial solution being used by petroleum industrialists, a method by which carbon dioxide may be used as a source of needed carbon, rather than hydrocarbons.

A more sophisticated approach, according to Dr. Reiser, would be to utilize our steadily growing knowledge of the mechanisms of genetics and protein synthesis. Molecular biology or advances in the knowledge of synthetic mechanisms may provide an earlier solution.

NEW BEVEL SEAT FITTINGS CATALOG OFFERED BY TRI-CLOVER

Over 100 different sanitary type stainless steel bevel seat fittings and valves in four sizes are illustrated and described in this new 40-page catalog.

Dimension data and specifications for elbows, bends, tees, crosses, ferrules, adapters and reducers in 1-inch through 4-inch tube OD sizes are shown. A valve section includes specification data on the full Tri-Clover line of plug, check, compression, relief tank truck and service valves. In addition to fittings, a 7-page section in the catalog gives ordering data and instructions for using Tri-Clover's *Super-Speed* line of expanding tools for preparing bevel and gasket seat joints.

The new catalog will, according to Tri-Clover, superceed their present catalog No. BS-164.

Catalog BS-168 is available from Ladish Company, Tri-Clover Division, Kenosha, Wisconsin.

INDEX TO ADVERTISERS

CLASSIFIED ADS

DIRECTOR OF PUBLIC HEALTH

Responsible for administering a comprehensive city-county public health program encompassing air pollution control, food, milk, housing and environmental sanitation, out-patient clinic, laboratory facilities, rabies control and vital statistics. Salary range $12,720 to $16,200. Apply Personnel Department, City Hall, 830 Boonville, Springfield, Mo. 65802.

FOOD MICROBIOLOGIST

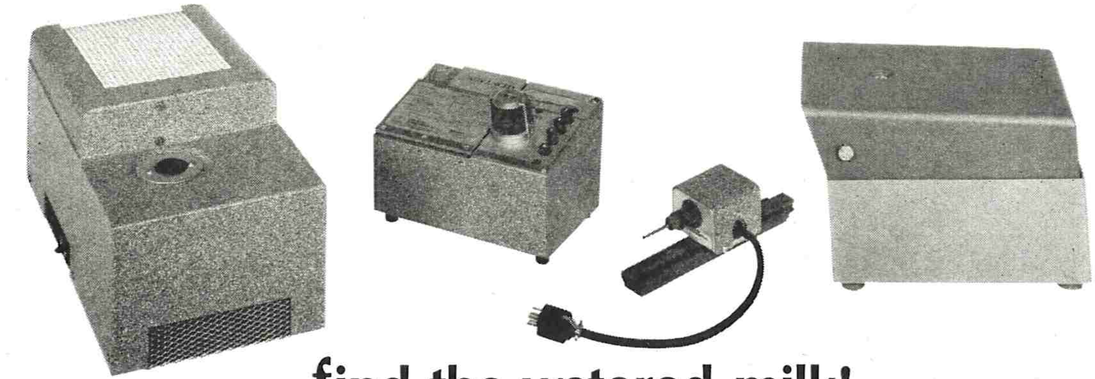
B.S. or M.S. in Microbiology with 3-5 yrs. experience. Challenging position with company on the move. Excellent working conditions and fringe benefits. Box 437, Shelbyville, Ind. 46176.

PLANT SANITARIAN

A growth opportunity exists in a dynamic division of National Food Concern for a PLANT SANITARIAN. Responsibilities will include the control and supervision of the sanitation department which encompasses the application of pesticides, germicides and sanitizing agents required in our manufacturing process. We are located in Central Pennsylvania and offer an excellent benefit program which includes an outstanding tuition refund plan. Salary will be commensurate with experience and relocation expenses will be borne by the Company. Please address your reply in confidence to Box 437, Shelbyville, Ind. 46176.

FOR SALE

Single Service milk sample tubes. For further information and a catalogue please write, Dairy Technology Inc., P.O. Box 101, Eugene, Oregon.



Application for Membership

INTERNATIONAL ASSOCIATION OF MILK, FOOD & ENVIRONMENTAL SANITARIANS, INC.

Box 437, Shelbyville, Indiana 46176

Name ______________________________ Date __________

Please Print

Address ______________________________ ☐ Renewal

______________________________ Zip Code __________ ☐ New

Business Affiliation ______________________________ ☐ Re-instatement

Annual Dues $10.00 ☐ Check ☐ Cash

(Membership Includes Subscription to Journal of Milk & Food Technology.)

Please Print

Recommended by ______________________________

Shelbyville, Ind.
Box 437

Subscription Order

JOURNAL OF MILK & FOOD TECHNOLOGY

(Monthly Publication)

Name ______________________________ Date __________

Please Print

Address ______________________________ ☐ New

______________________________ ☐ Renewal

Educational Institution & Public Libraries (Annually) $8.00 ☐ Check ☐ Cash (Please Print)

Individual Non-Member Subscription (Annually) $10.00 Government Agencies, Commercial Organizations

---

I.A.M.F.E.S. & J.M.F.T.
Box 437, Shelbyville, Ind.

Change of Address

FROM

Name ______________________________ Date __________

Please Print

Address ______________________________

TO

Name ______________________________

Please Print

Address ______________________________

I.A.M.F.E.S. & J.M.F.T.
Box 437, Shelbyville, Ind.

Order for 3A Standards

Name ______________________________ Date __________

Please Print

Address ______________________________

( ) Complete Set @ $4.50 = ________ ( ) Complete set bound (durable cover) @ $6.00 = ________

( ) Revised HTST Std.—without cover = $1.00 F.O.B. Shelbyville, Ind.

5 Year Service on Standards as Published = $3.50 additional

Order for Reprints of Articles

Amt. __________ Title ______________________________

Schedule of prices for reprints F.O.B. Shelbyville, Indiana

	1 Page	2 Pages	3 & 4 Pages	6 & 8 Pages	12 Pages	Cover
100 or less	$16.25	$19.50	$27.30	$39.00	$65.00	$28.00
Add'l 100's	2.00	2.50	4.00	5.50	9.00	4.50

THE ONLY *Approved* SANITARY METHOD OF APPLYING A U. S. P. LUBRICANT TO DAIRY & FOOD PROCESSING EQUIPMENT

Haynes-Spray

U. S. P. LIQUID PETROLATUM SPRAY

U.S.P. UNITED STATES PHARMACEUTICAL STANDARDS

CONTAINS NO ANIMAL OR VEGETABLE FATS. ABSOLUTELY NEUTRAL. WILL NOT TURN RANCID — CONTAMINATE OR TAINT WHEN IN CONTACT WITH FOOD PRODUCTS.

- SANITARY — PURE
- ODORLESS — TASTELESS
- NON-TOXIC

This Fine Mist-like **HAYNES-SPRAY** *should be used to lubricate:*

SANITARY VALVES
HOMOGENIZER PISTONS — RINGS
SANITARY SEALS & PARTS
CAPPER SLIDES & PARTS
POSITIVE PUMP PARTS
GLASS & PAPER FILLING MACHINE PARTS
and for ALL OTHER SANITARY MACHINE PARTS which are cleaned daily.

The Modern HAYNES-SPRAY Method of Lubrication Conforms with the Milk Ordinance and Code Recommended by the U. S. Public Health Service

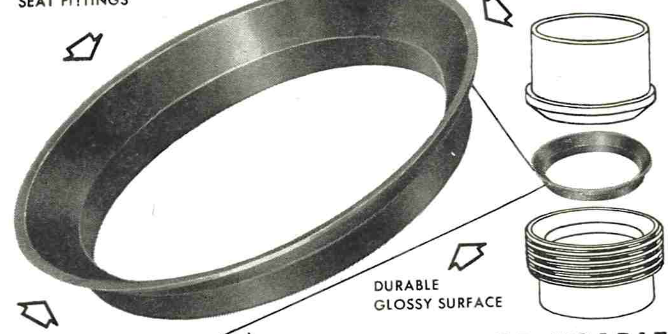
The Haynes-Spray eliminates the danger of contamination which is possible by old fashioned lubricating methods. Spreading lubricants by the use of the finger method may entirely destroy previous bactericidal treatment of equipment.

PACKED 6-12 oz. CANS PER CARTON
SHIPPING WEIGHT — 7 LBS.

THE HAYNES MANUFACTURING CO.
4180 Lorain Avenue • Cleveland 13, Ohio

HAYNES-SPRAY INGREDIENTS CONFORM WITH FDA REGULATIONS AND CAN BE SAFELY USED AS A SANITARY LUBRICANT FOR FOOD PROCESSING EQUIPMENT WHEN USED IN COMPLIANCE WITH A EXISTING FOOD ADDITIVES REGULATION.

HAYNES SNAP-TITE GASKETS



- **LOW COST . . . RE-USABLE**
- **LEAK-PREVENTING**

NEOPRENE GASKET for Sanitary Fittings

Check these SNAP-TITE *Advantages*

Tight joints, no leaks, no shrinkage
Sanitary, unaffected by heat or fats
Non-porous, no seams or crevices
Odorless, polished surfaces, easily cleaned
Withstand sterilization
Time-saving, easy to assemble
Self-centering
No sticking to fittings
Eliminate line blocks
Help overcome line vibrations
Long life, use over and over

Available for 1", 1½", 2", 2½" and 3" fittings.
Packed 100 to the box. Order through your dairy supply house.

THE HAYNES MANUFACTURING CO.
4180 Lorain Avenue • Cleveland 13, Ohio

HAYNES SELF-CENTERING SNAP-TITE® *Gaskets*

SIZES 1" - 1½"
2" - 2½" - 3"

*MADE FROM **TEFLON®**

Gasket Color . . .
slightly off-white

"The Sophisticated Gasket"

THE IDEAL UNION SEAL FOR BOTH VACUUM AND PRESSURE LINES

SNAP-TITE self-centering gaskets of TEFLON are designed for all standard bevel seat sanitary fittings. They SNAP into place providing self-alignment and ease of assembly and disassembly.
HAYNES SNAP-TITES of TEFLON are unaffected by cleaning solutions, steam and solvents. They will not embrittle at temperatures as low as minus 200° F. and are impervious to heat up to 500° F.

FOR A FITTING GASKET THAT WILL OUT-PERFORM ALL OTHERS...

Specify . . . **HAYNES SNAP-TITES of TEFLON**

• *TEFLON ACCEPTED SAFE FOR USE ON FOOD & PROCESSING EQUIPMENT BY U. S. FOOD AND DRUG ADMINISTRATION*

*Gaskets made of DuPont TEFLON® TFE-FLUOROCARBON RESINS

THE HAYNES MANUFACTURING COMPANY
4180 LORAIN AVENUE • CLEVELAND, OHIO 44113

A HEAVY DUTY SANITARY LUBRICANT

Available in both

SPRAY AND TUBE

All Lubri-Film ingredients are approved by F.D.A. and can be safely utilized as a lubricant for food processing equipment when used in compliance with an existing food additive regulation.

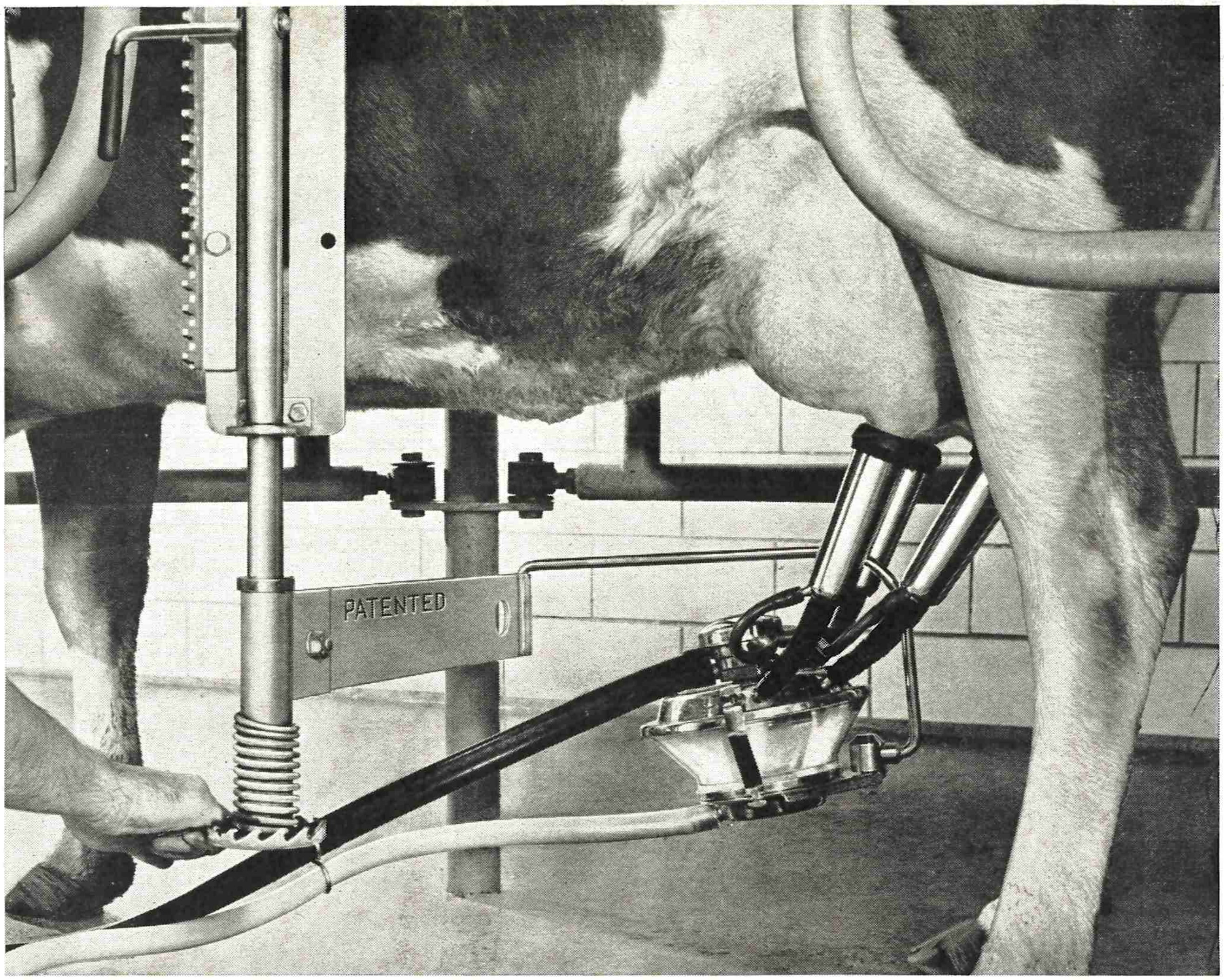
ESPECIALLY DEVELOPED FOR LUBRICATION OF FOOD PROCESSING AND PACKAGING EQUIPMENT

For Use in Dairies — Ice Cream Plants — Breweries — Beverage Plants — Bakeries — Canneries — Packing Plants

SANITARY • NON TOXIC • ODORLESS • TASTELESS

SPRAY — PACKED 6 — 16 OZ. CANS PER CARTON
TUBES — PACKED 12 — 4 OZ. TUBES PER CARTON

THE HAYNES MANUFACTURING CO.
CLEVELAND 13, OHIO



Why do more dairymen use Surge than all other brands combined?*

Surge does a better job of cow milking. It started in 1923 with the Suspended Bucket Milker. Nearly half a century of progress has produced the Surge Lo-Profile Breaker Cup. The patented Surge Randel Support makes the Breaker Cup best for milking parlors. Surcingle suspension makes it ideal for stanchion pipeline systems.

The Surge Breaker Cup breaks the column of milk for safer, faster milking. Milk flows quickly and smoothly away from the teat and empties into the breaker cup to prevent milk backwash; eliminates irritating vacuum fluctuation; guards against possible infection.

Pulsator is right on the unit. Vacuum moves only 8 inches from pulsator to teat cups. The result? Inflations open and close positively for full milk flow and gentle massaging of teat. You milk faster and safer with Surge.

Gentle Tug and Pull milking action keeps milk ducts open to release trapped milk and increase production. Surge gets all the milk . . . Surge does automatically what other machines have to be helped to do.

Extra large milk capacity provides enough reserve for even the fastest, heaviest producers in your herd.

No wonder more dairymen milk with Surge than all other brands combined.

For a free demonstration, see your Surge Dealer . . . for more information on Surge Dairy Equipment, use this coupon.

*** Based on U.S. Census figures on herds of ten cows and over.**

SURGE

Please send me more information on:

☐ Stanchion Pipeline ☐ Parlor Pipeline ☐ Breaker Cup

Mail to: Babson Bros. Co.
2100 South York Road, Oak Brook, Ill. 60521

NAME

ADDRESS TOWN

STATE (OR PROVINCE) ZIP MF-7

BABSON BROS. CO., OAK BROOK, ILLINOIS • BABSON BROS. CO. (Canada) LTD., REXDALE, ONTARIO