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Dairy and Food Sanitation

A Publication for Sanitarians and Fieldmen

- PCB's in the Food Chain and Regulatory Activities
- The Cost of Dairy Wastewater — Disposal and Management
- Yogurt Quality
- A Food Poisoning Case History
- PH — Acidity by the Numbers

A Publication of the International Association of Milk, Food and Environmental Sanitarians, Inc.

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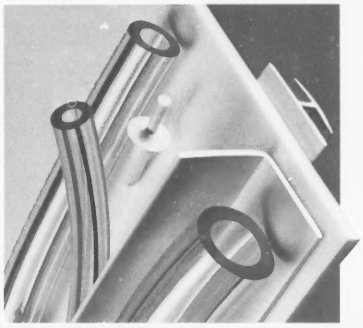

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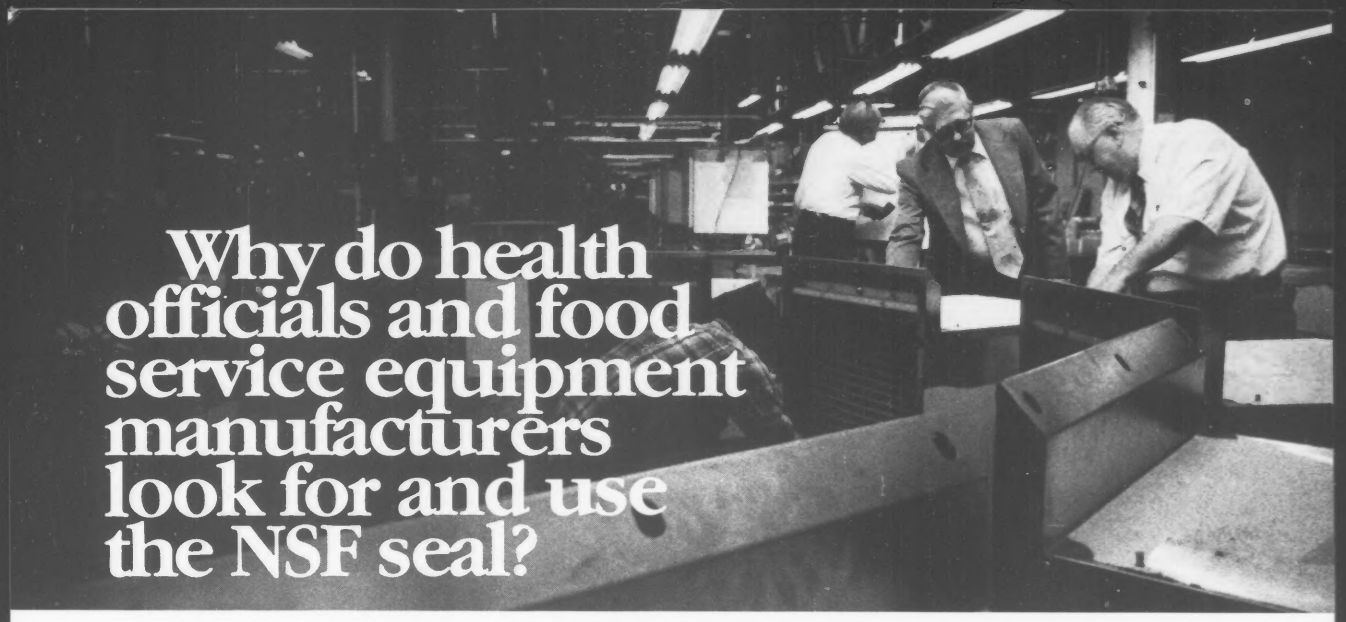

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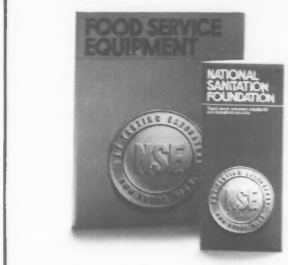

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Dairy and Food Sanitation

April, 1981

*Yogurt – A Test of Quality**

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Yogurt, a popular dairy product, was once consumed almost solely for its therapeutic benefits. Between 1970 and 1978, US sales of the product tripled, and have grown more since. A study conducted in Connecticut of the quality of various yogurt products--fresh plain, fresh strawberry, and frozen yogurts--found them to be of acceptable quality microbiologically, with many viable lactic acid bacteria. Fat content of most yogurts was lower than claimed, but nutrient content was otherwise as claimed.

Yogurt has been in man's diet since the days of Abraham and Genghis Khan. But a gain in its popularity didn't occur until 1889, when a Professor Elie Metchnikoff claimed health benefits and long life for those who ate yogurt (6). The yogurt available in those days was predominately plain and unflavored, different from much of the yogurt sold today.

In 1954 average per capita sale of yogurt in the United States was 45 grams (0.10 pounds). That's about one-fifth of an eight-ounce serving per person. From 1970-1978 yogurt sales in the United States tripled (1). Although some consumers still eat yogurt for special nutritional reasons, the dramatic increase in yogurt sales during those years came about as processors added flavoring, fruit, and sugar, making yogurt more palatable and pleasing.

Yogurt production begins when milk is soured by lactic acid bacteria. Large amounts of lactic acid are produced through fermentation of the milk sugar, lactose. The type of bacteria used in the cultured product differentiates yogurt from other fermented products--buttermilk, cottage cheese and hard cheese. These bacteria give plain yogurt its acidity, characteristic flavor, and custard or gel-like consistency.

Of all yogurt sold in the United States, 88% is packaged in 8-ounce cups, and is usually one of four styles (4).

Plain. This yogurt usually contains no added flavoring and has a custard-like consistency.

Sundae. Fruit on the bottom of the container is overlain with plain yogurt. This product has a custard-like consistency and the consumer usually mixes the fruit with the yogurt before eating it.

Swiss. The fruit in this product is usually mixed with plain yogurt in a custard-like consistency.

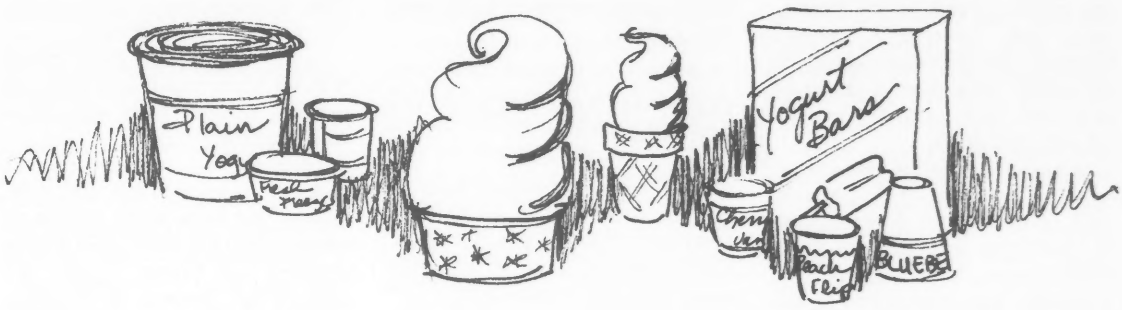
Shake. This usually has fruit mixed with plain yogurt of a liquid consistency.

Plain yogurt accounted for about 9% of all yogurt produced in the United States in 1977. Sundae style made up 54% and Swiss style 37% of all yogurt produced that year. Strawberry was the flavor most produced, at 17.4%, followed by raspberry, blueberry, peach, and plain yogurt. These five flavors accounted for 60% of all yogurt produced in 1977 (4).

Frozen yogurt is produced in two styles: hard-frozen, in bulk or as novelties, and soft-serve, in cups or cones. Frozen yogurt in 1977 made up 18% of the U.S. yogurt market. Of the total yogurt market 12.5% was hard-frozen, 5.4% was soft serve yogurt.

Some yogurt is not marketed with dietetic claims, while others emphasize that they are non- or low-fat or imply a diet claim through names such as "Easy Dieter," "Stay 'n Shape," "Light 'n Lively," "Sweet 'n Low," and "SomeTHIN Lite."

* *This article from Bulletin 785 of the Connecticut Agricultural Experiment Station, Box 1106, New Haven, CT 06504; available on request.*



Many compounds, in addition to fruit, fruit puree and flavoring are added to yogurts for various appeals to consumer taste, aesthetics, and consistency, or to enhance keeping and nutritional qualities.

Stabilizers and thickening agents, such as gelatin, carrageenen, vegetable gums, food starches, and pectins produce different consistencies of yogurt. Nonfat milk solids, sodium caseinate, and whey solids are added for better consistency. They may also be added to increase the protein content of the yogurt.

Sorbic acid and potassium sorbate, when added to the yogurt product, inhibit molds. Acidulants such as citric acid and lemon juice, provide flavor and acidity. Food coloring, including natural carmine color, beet juice concentrate, or artificial colors may be used to improve the yogurt's aesthetic appeal.

The total calorie count of the yogurt is determined by the amount of fat, protein, and carbohydrate it contains. The fat content is regulated by the type and amount of fat in the milk from which the yogurt is made, and the protein content is dependent on the amount of protein in the milk, or if milk solids are added in processing. Carbohydrate content varies according to the sweeteners added. Sugar, fructose, dextrose, honey and corn sweeteners provide a sweet flavor, or if no sugar or sweetening agent is added, the only carbohydrate present in the yogurt is lactose, or milk sugar.

Most yogurt contains live lactic acid bacteria. Two lactic acid bacteria are most widely used in yogurt manufacture: *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. *Lactobacillus acidophilus* is occasionally used, separately, or with *S. thermophilus*. The ideal ratio of lactobacilli to streptococci is 1:1. Manufacturers often heat yogurt after fermentation to enhance its shelf-life. True yogurt should contain live lactic acid bacteria.

The two lactic acid bacteria complement each other. Streptococci grow first, removing oxygen and acidifying the mixture to provide a favorable growth situation for Lactobacilli. These also produce diacetyl and other compounds to give yogurt some of its distinctive flavor. The lactobacilli growing at the lower oxygen level caused by the Streptococci produce more lactic acid, acetaldehyde and other products, and also provide the sharp flavor characteristic of yogurt products. If the ratio of Streptococci to Lactobacilli varies greatly from 1:1, the yogurt consistency or flavor may be poor.

Because yogurt is usually acidic, contamination by other bacteria is unusual, and long shelf-life can be expected. Yogurts containing fruit are more subject to yeast and mold problems, so some manufacturers add preservatives to these products.

A study was made of yogurts collected at Connecticut retail food stores. The study determined what products were available, the product age, the number and ratio of the two kinds of lactic acid bacteria in the yogurt, and any microbial contamination present. The accuracy of nutritional claims made about protein, fat, carbohydrate content, and the number of calories in the various yogurt products was also determined.

Microbial determinations made on the different yogurt products included the number of lactic acid

bacteria present, coliforms, yeasts, and molds, as well as the Streptococci and Lactobacilli present. Chemical determinations included pH, acidity of the product expressed as percent lactic acid, fat, protein, ash, and total solids.

Samples for the study were collected from December, 1979 to March, 1980. Of the samples, 32 were plain, 37 strawberry, and 10 were hard-frozen yogurts.

Samples were transported to the laboratory in ice where, for microbial analysis, each sample was thoroughly stirred and an 11-gram portion was mixed with 99 ml of sterile phosphate solution. (5). Appropriate dilutions for plating were made in sterile phosphate solution and acid producers were determined on a medium (8) incubated at 35 C in a GasPak system (BBL). Acidified potato dextrose agar (Difco) was used to determine the number of yeasts and molds while Violet Red Bile agar (Difco) was used for assaying coliform bacteria. Chemical analyses were made according to Standard Methods (5) and Official Methods of Analysis (7). Both pH and titratable acidity as percent lactic acid were determined. Titratable acidity is more valuable to determine the quantity of organic acids in the yogurt. This is because pH is a measure of hydrogen ion concentration, and organic acids may not be ionized completely (3). Manufacturers use a measure of pH to determine when yogurt has reached the desired acidity.

Style, consistency, and quality or the flavor intensity of the yogurt are matters of personal choice of the consumer, so no effort was made in the study to grade yogurts for these qualities.

Nutritional claims of yogurt products are usually made for an 8-ounce serving. A few show nutritional claims by other units, such as an individual frozen yogurt bar or an 8-fluid-ounce serving of a soft serve style yogurt.

FRESH YOGURT, PLAIN AND STRAWBERRY

Plain yogurt--19 brands from 14 manufacturers and 15 plants---was examined. Thirty brands of strawberry yogurt made by 15 manufacturers in 16 plants were tested.

Most containers included on the label the code date, the last date the product was to be offered for sale. This date is set by the processor. The average age of plain yogurts tested was 16.9 days, although the range varied from 8 to 42 days. Strawberry yogurts tested ranged from 1 to 38 days in age, with an average of 18.3 days.

A good yogurt consistency and flavor most often accompanies a 1:1 ratio of Streptococci to Lactobacilli. No samples tested were completely devoid of either of the two bacteria, but two samples of one brand contained few Lactobacilli. One brand claimed it used a pure *L. acidophilus* culture, but as many Streptococci as Lactobacilli were found in the product.

The number of acid-producing bacteria (lactic-acid bacteria) ranged from 2 million to 1,590 million per gram. The average for plain yogurt was 456 million per gram and for strawberry, 366 million per gram. No sample was completely devoid of acid-producing bacteria, showing none were heat-treated after manufacture.

Acidity, expressed as percent lactic acid, of both plain yogurt and the sundae style strawberry yogurt was greater than that of the Swiss and strawberry shake styles. Data showed that the plain and sundae styles were usually more tart, or acidic, then the other styles. This is not expected as the Sundae style and plain are more alike, with the sundae style consisting of plain yogurt over fruit.

Acidity measured as pH averaged 4.26 for plain yogurt and 4.23 and 4.36 for sundae, Swiss, and shake style strawberry yogurts.

There is not a simple linear relationship between pH and titratable acidity because the amount of added nonfat dry milk varies among products and brands. Nonfat dry milk not only increases the titratable acidity, but also increases the buffering capacity. The more nonfat dry milk added to the product, the higher is the pH value for conversion of carbohydrate to lactic acid during fermentation (2).

A yogurt containing more Lactobacilli than Streptococci is expected to be more acid since Lactobacilli produce more lactic acid than do Streptococci. Plain yogurts containing more Lactobacilli than Streptococci had an average pH of 4.29 compared to 4.40 for others.

Many plain yogurts contained added solids, usually nonfat dry milk, to improve consistency or flavor. Some products also contained a stabilizer or thickener to stiffen consistency. Only one plain yogurt sample contained a sweetener, sugar.

Almost all strawberry yogurts declared a stabilizer or thickener. Sixteen declared added acidulants, probably for added flavor. Ten declared artificial color. Three sample containers indicated the product had added colors. The added colors were beet juice extract, natural carmine, and turmeric spice.

Only seven of 32 samples of plain yogurt contained excessive numbers of yeasts, and only three contained viable molds. All plain yogurts contained less than 10 coliform bacteria per gram. In only two of the strawberry yogurts was yeast contamination detected, and in none was mold contamination detected.

Eleven samples declared sorbate among the yogurt's ingredients. The two samples with yeast contamination did not indicate that a preservative had been added.

In both plain and strawberry yogurt, fat was generally about half the amount claimed. The actual protein content was close to that claimed, averaging 85% of the claim for plain, and 81% for strawberry.

The amount of carbohydrate was generally more than claimed, averaging 26% more in plain and 9% more in strawberry yogurt. Calories were generally close to those claimed, averaging 90% for plain and 98% for strawberry yogurt.

There was wide variation among brands between nutrients claimed on the product label, and those found in the product. The fat in plain yogurt, for example, ranged from 16% of that claimed, to 70%. The range in carbohydrate was from 69 to 171% of the claim.

Label claims of lowfat fresh yogurts showed about 50 to 60% less fat than regular fresh yogurts, and these claims were essentially correct. The lowfat products contained, on the average, more protein---23% more in plain and 8% more in strawberry---than did the regular yogurts.

The lowfat products, or those suggesting fewer calories, however, generally contained more carbohydrate than did the regular yogurt. This group of plain and strawberry yogurts claimed about 10 to 13% fewer calories, but had only 8 to 9% fewer calories. Thus, the diet products did not have, on the average, substantially fewer calories than the other products.

FROZEN STRAWBERRY YOGURT

All ten frozen yogurt samples contained live lactic acid bacteria, but generally only one third as many as were in plain or strawberry yogurt. Some of the bacteria were probably killed by freezing. Although most samples contained more Streptococci than Lactobacilli, the flavor compounds diacetyl and acetaldehyde produced by these bacteria tended not to be as important in the highly sweetened and flavored frozen yogurt as in the fresh plain yogurt.

All frozen yogurt samples from dairy plants were devoid of yeasts, molds, and coliform bacteria. The two samples collected at dairy bars from bulk containers, however, contained contaminants. This may reflect microbial contamination from handling in the dairy bar, rather than during manufacture.

The acidity of frozen yogurt was less than that of fresh yogurt.

Frozen yogurts, like some fresh, contained additives such as sugar and stabilizers. They also contained additives not found in the fresh, such as cellulose, glycerides, neutralizers, and egg yolk.

The average fat and protein content of frozen yogurt was as claimed. Carbohydrate averaged about 43% more than claimed, and calories about 38% more than claimed. The most fat was found in a chocolate-covered yogurt, with most probably coming from the chocolate.

In summarizing the study findings, plain, unflavored and strawberry yogurts tested had acceptable microbial quality and contained many viable lactic acid bacteria. More samples of plain yogurt had yeast and mold contaminants than did strawberry samples. This difference, however, can be attributed to the preservatives added in making strawberry yogurt.

Plain yogurts contained few additives, and nine samples claimed only milk was used in their manufacture. Some contained added solids, to improve consistency and nutrition through addition of extra milk protein. The strawberry yogurts contained more additives, generally, than did the plain yogurts.

The fat content of all yogurts was considerably lower than claimed. Otherwise, the nutrient content was as claimed. The calorie difference between regular and lowfat yogurt was only about 8%.

Frozen yogurts were of good microbial quality and provided many live lactic acid bacteria, although fewer than in fresh yogurt. The caloric content of frozen yogurt was about 60% higher than the fresh yogurt.

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A FOOD POISONING WHODUNIT

EMIL CORWIN

FDA Public Affairs Staff
Washington, D.C.

There was no disputing the fact that a can of contaminated salmon caused the botulism that led to the deaths of two people in England, in July 1978. But how did the contamination happen, and why? The search for the answer led to one of the most exhaustive international investigations in the annals of public health.

At about 5 o'clock on the evening of July 30, 1978, two retired brothers, Jesse and Leonard Farmer, and their wives sat down to a light Sunday dinner at the Jesse Farmers' modest flat at Shard End on the outskirts of Birmingham-England's second largest city-about 100 miles north of London.

The Farmer couples lived about 2 miles apart and visited frequently. On this Sunday they began their meal with fresh fruit and fruit juice, followed by a salad consisting of tomatoes, lettuce, cucumbers, and canned salmon. They also had bread and butter, and tea with canned milk. Their meal finished, the couples sat around chatting until it was time for the Leonard Farmers to leave for their home in nearby South Yardley.

At 2 o'clock the following morning Jesse Farmer, 64, and his wife Bessie, 66, awoke feeling sick. They vomited, later complained of dryness in their mouths, blurred vision, and difficulty in swallowing and speaking. At about 6 a.m. they were taken by ambulance to the East Birmingham General Hospital. In South Yardley, police summoned to the home of Leonard Farmer, 79, and his wife Clara, 72, found both of them seriously ill. They also were taken by ambulance to the hospital, arriving an hour after the Jesse Farmers.

The four patients were placed in intensive care for respiratory assistance when paralysis of the chest muscles threatened asphyxiation.

To Dr. A. P. Ball, the examining physician, the symptoms suggest botulism, a rare and dreaded type of food poisoning. The disease affects the nervous system and is often fatal. No case of botulism had been reported in England for 20 years. Botulism results from eating food contaminated by botulinal toxin, a poison that infrequently occurs in preserved foods in which spores of the microorganism *Clostridium botulinum* have survived the processing. It is the failure to inactivate these spores that produces the deadly poison, which is really a byproduct of growth. Even after adequate processing, contamination can occur if spores of the bacterium enter the can.

The search for the poisoned food began early on Monday, July 31, soon after the Farmer couples were hospitalized. Although finding the cause of food contamination proved to a fruitless, needle-in-the-haystack search, it created an international crisis and touched off one of the most far-reaching investigations in the annals of public health. Such consequences didn't seem likely at the time to Roger Beery, a food specialist at the Birmingham Environmental Health Department, who went with a policeman to the Farmer home to collect food remnants for laboratory analysis. He found a neat home, but noticed there was no refrigerator. He picked up the remains of a pudding, some cooked chicken left over from an earlier

Reprinted from FDA Consumer, November, 1980.

meal, and an empty salmon can. The "evidence" was brought to Dr. James Hutchinson, director of the Midland Laboratory Services in Birmingham, for microbiological examination.

The chicken and pudding were ruled out as a source of the botulinal toxin since they showed no pathogenic or unusual microorganisms. So Dr. Hutchinson focused his attention on the can of salmon. He noticed it had a slightly strong odor, however one not objectionable enough, as he said, "to put me off" from eating the contents. (An insidious aspect of botulinal contamination is that the toxin sometimes can develop in food without producing spoilage odors or other signs of deterioration.) But this time Dr. Hutchinson's preliminary laboratory tests of salmon particles suggested that the salmon was the source of the botulism episode. For confirmation he sent his findings and the suspect can to the Food Hygiene Laboratory in London, a unit of the Department of Health and Social Security. By this time, the patients' symptoms, plus the early laboratory results from testing the salmon residue, had made the outcome of the London tests practically certain.

A botulism alert, it has been said, is "as dramatic and highly prioritized as a hurricane warning." Within hours of the incident in Birmingham, the appropriate scientific and investigative resources of Great Britain and the United States were mobilized to track down the cause of the salmon contamination.

When word reached the Food and Drug Administration in Washington, the suspected salmon had been traced to an Alaska cannery. The Agency's Emergency Command Center, a unit of the Epidemiology and Environmental Health branch, which is on alert day and night to deal with such emergency problems, sprang into action. Richard Swanson immediately telephoned Dr. Richard Gilbert, director of the London Food Hygiene Laboratory:

SWANSON: Did you check the can seam?

GILBERT: Mercy, no. We have our hands full confirming the clinical diagnosis.

SWANSON: Why did they suspect only salmon?

GILBERT: Because we observed gram positive sporulating rods in the can in large numbers and further, we injected mice and the mice died with characteristic botulism symptoms - wheezing and extended hind legs.

Because Dr. Hutchinson, in Birmingham, and Dr. Gilbert, in London, were looking at the patients and food under suspicion, they failed to notice that the salmon can itself had a rusty, abraded area on the bottom seam through which botulinum spores might have entered to eventually cause all the trouble. Botulinum spores are normally harmless, but when not destroyed by heat, and when in the kind of environment suitable for growth, the spores will begin reproduction or sporulation and produce the lethal toxin. Botulinal microorganisms are classified as anaerobes, that is, their spores grow only in an oxygenless environment (anaerobic growth). This growth may occur in sealed cans, jars, plastic bags, or in any place where the organism is shut off from the air and other conditions such as temperatures and acidity of food are favorable for growth. If spores of this ubiquitous microorganism enter or are drawn through a hole in a can, it is hypothesized that the gaseous condition produced by food spoilage microorganisms can cause the hole to be clogged with food and seal live spores in the oxygenless environment necessary for them to sporulate and begin producing their deadly toxin.

In a botulism poisoning incident, there's no waiting for confirmation of laboratory tests to move to prevent further incidents, and there was no waiting this time in London or in Washington to do what was required to prevent other possibly contaminated stock from reaching consumers and to determine the cause for the contamination of the can of salmon.

On the same day that the Farmers were confined to the Birmingham hospital, the British Department of Health and Social Security issued warning to the public not to buy American or Canadian salmon and not to open their old stock if they had any doubts about the product. The department also sent a cautiously worded telegram to the British Embassy in Washington, the British Commissioner in Ottawa and Canada's Department of Health and Welfare that read as follows:

> Advising that four elderly people were admitted to hospital in Birmingham suffering from what appears botulism. The source of the disease seems to have been a 7 ½ ounce can of John West salmon from North America. You will wish to take such action as you consider necessary to ensure that this warning is effective.

John West Foods, Ltd., the British importers, issued a press release announcing they would take back any of the 400,000 cans they had distributed bearing the same code number as they suspected "index" can. This release went on to say:

> The suspect salmon was purchased from a highly reputable canner in the U.S. The canned salmon is subject to many checks before it is sold . . . It has been sold for over 100 years and in great quantities in the United States and throughout the world . . . 100 million cans per year were sold . No previous case of botulism has been proved in canned salmon. Full efforts are being made by the company to locate cans bearing the suspect code. It is too early at this stage to say when clearance for the resumption for sale will be given.

This importer's reference to "many checks" being made to assure

the safety of salmon is something of an understatement. Salmon canning is one of the most thoroughly inspected food processing preparations in the United States. This industry has a voluntary Salmon Control Plan which since the 1930's has been most effective in minimizing the processing of an unsafe product. In addition, FDA's food processing inspection program, known as the Hazard Analysis Critical Control Point (HACCP), begun several years ago, is designed to spot potential hazards at critical points in the canning process. FDA's Good Manufacturing Practice (GMP) regulation for thermally processed low-acid canned foods is the most extensive and detailed of all FDA GMP's. It covers more than 40 pages in the Code of Federal Regulations, including diagrams of complete and proper thermal processing machinery.

With such safeguards as the industry and Government - administered Salmon Control Plan, the GMP regulations for thermal food processing, and the intensive inspection program, how could anything go wrong? How did it happen? On the United Kingdom side, John West looked for some answers. John West sent the retrieved cans to the laboratories of Unilever, its parent company, for a series of microbiological tests. The suspect can itself was studied for possible defects, first by canning experts at the London can manufacturing firm of Metal Box, Ltd., and then at the laboratory of the Government Chemist.

Official confirmation of botulinal contamination awaited the outcome of tests conducted at London's Food Hygiene Laboratory under the supervision of Dr. R. H. G. Charles, chief medical officer in charge of the investigation in England. In one test, minute particles of salmon rinsed from the original can with a saline solution revealed the "shadow" of botulinal spores. In another test, a few drops of the washing from the can cultured in agar showed anaerobic growth. In a third test, a solution from the suspect can injected into a mouse killed it in 80 minutes. The evidence clearly pointed to the patients being victims of botulinal poisoning. The clincher came on August 4 when serum from the blood of the four patients, still in intensive care, was injected into four mice. Botulism symptoms appeared in 2 ½ hours and within 4 hours all 4 mice were dead.

FDA was informed that the botulism verdict was official. By this time the U.S. agency was already 3 days into the investigation and the searchlight had shifted from London to two focal points in the Pacific Northwest - False Pass, Alaska, where the suspect salmon was canned, and Seattle, the headquarters of the cannery owner, Peter Pan Seafoods, Inc., and location of the company's salmon storage facilities.

Peter Pan stopped distribution. Importers in foreign locales which had received Peter Pan salmon under the John West label - in Canada, Australia, South Africa, Singapore, and Hong Kong - were requested to return or to hold all of the 1977 pack. There were no returns, but Australia sent to FDA (via diplomatic pouch to the State Department), 48 cans of the salmon for testing before releasing the rest of its 1977 consignment. The FDA tests were negative and marketing of the salmon was resumed in that country.

Notwithstanding this evidence of safety of the 1977 pack, FDA instructed its Seattle District Office to collect all of the cannery processing and inspection records for Peter Pan's 1977 and 1978 packs, and also to send investigators to the Alaska cannery in False Pass.

The cannery visit was not the easiest assignment that Norman Wong and Dan Schneringer had ever undertaken. Briefcases stuffed with Peter Pan Seafood's overseas shipment records of the suspect code, plus data on processing and seam records, the investigators flew from Seattle to Cold Bay, Alaska, the location of a U.S. military base during World War II. There they boarded a single engine plane, with a "bush" pilot at the controls, for what proved to be a hazardous 2-hour flight to False Pass on bleak, wind-swept Unimak Island, in the Aleutians. The aircraft, buffeted by strong winds and a heavy rain, landed precariously on an airstrip that had been cut by a flooding stream. Since the cannery was the only building at False Pass, and there was no room for visitors in the plywood shanties where employees lived, the FDA men passed the next two nights in their sleeping bags on the cannery floor. Their assignment was to determine whether the salmon contamination was attributable to inadequate thermal (heat) processing done to render the contents sterile or to a leak in the can resulting from faulty closure or handling.

FDA meanwhile dispatched a second team of investigators-Dr. Thomas Mulvaney and Frank Barnes-to England to review the botulinal tests and to trace the movement of the implicated can of salmon. In Birmingham they reviewed a health department report about the Farmer couples and then visited the supermarket where the salmon was purchased to look for any evidence that there had been can damage in handling. In Liverpool, they inspected the John West warehouse, where labels were put on the cans to see if, in that process, botulinal spores in the labeling paste or in environmental dust might have entered the can through a leak. Samples of the paste and swabs from the surface of the equipment cultured in meat broth proved negative, confirming similar tests performed at Unilever. In London, Mulvaney and Barnes studied the problem can with Dr. Charles and noted an apparently damaged part of the bottom seam that could have allowed escape of the large amount of gas that *C. botulinum* normally produces. They felt this might explain why the can was not swelled when opened by the Farmers.

Dr. Charles hypothesized the trouble began at the cannery, with a defect in seam formation. Other

experts thought the seam damage occurred after the can was formed.

To help cannery investigators test these and other theories, British authorities were asked to send detailed information on the index can, including electron microscope pictures of swabs from the surface of the can and a spectograph analysis that could show any foreign metal left at the abrasion site on the can's double seam that might have come from malfunctioning can handling equipment.

Accordingly, the implicated salmon can in London was measured, weighed, and photographed from all angles. An artist's sketch, a movie, and color slides were made for good measure. An abrasion was noticed that had caused a microleak at the can's double seam. The investigators reported that the can seam appeared to have been worn flat for approximately 2 inches on one side of the bottom seam; the worn area had a microleak requiring 6 pounds of air pressure per square inch to produce leakage bubbles; the worn area consisted of two areas.

This description, together with the visuals of the damaged can, were sent in a diplomatic courier's pouch to FDA in Washington, transmitted by wire to Seattle and then to False Pass. The information enabled Wong and Schneringer to compare results they had obtained by experiments at the cannery with actual damage to the can, to strengthen their hypothesis about the cause of the original external damage, and how it resulted in a leaking can.

The FDA team studied each step of the cannery operation-unloading salmon caught in the Bering Sea off fishing boats, depositing them in a tank to be circulated in chilled seawater, and conveying them to the fish house where the heads and fins were mechanically lopped off, the eggs removed, and the belly cavity brushed clean. The critical final stages were studied with special care as sections of the fish were placed in a can with a salt tablet, the can was seamed and moved to the retort for thermal processing, and afterward moved to the cooler trays to complete the processing. Everything checked out: there was no undercooking, no seam defects or leaks similar to that of the implicated can. Could the seam damage be caused by one can hitting the other as the filled cans slid down the metal chute into the metal retort basket? This too was tested, but there was no can damage.

The only faulty practice noted at False Pass was that workers from the slaughtering area were placing their wet gloves and aprons to dry on the retort baskets loaded with hot retorted cans. It was conjectured that if there was a leak in any of the hot cans, the suction created by cooling could draw in botulinum spores from the workers' clothes. However, some botulinum spores could be expected on cans handled in an environment of this kind, even in the absence of these faulty practices. The critical safety factors are container integrity, retorting room processes, and can handling equipment sanitation.

Several other theories were considered and tested. In England, for example, 1,500 cans of salmon were deliberately damaged at Unilever and then challenged with spores in a variety of ways so the investigators could more fully understand the routes by which the botulinal strain may have entered the can. The cans were examined for botulinal toxin and the open cans were photographed at intervals.

On the theory that the hole on the bottom of the can may have been caused by a conveyor belt "burn," the FDA investigators ran experiments at the cannery to find the possible effects of several hours of continuous abrasion on 7½-ounce cans. None of the cans wore through.

No clue, however remote, was overlooked. Thus, when it was reported that someone with a handsaw might have cut the index can while sawing a piece of wood on a case of salmon cans, tests were held to determine whether wood fibers carrying botulism spores could enter an opening in a "damaged" can and infect the contents. A number of cans were subjected to this sawing action and sent to England for examination. Photomicrographs and other examinations revealed no evidence of saw-type damage.

In early September 1978, FDA sent Donald Kautter, of its Microbiology Division, and Dr. Mulvaney to England to meet with British health authorities, and representatives of Unilever, Metal Box, Ltd., and the U.S. National Food Processors Association to review the various theories and all the biological and mechanical test results received up to that time.

When all tests and examinations had failed to show any definite sign of canning error, or any likelihood of further contamination, the British Department of Health and Social Security withdrew its warning advising the public not to eat canned salmon from the United States. On September 19, 1978, the department announced that the investigations had not revealed with certainty the cause of the damage to the can or how it came to be contaminated. "It is very unlikely that any other cans from the cannery have been similarly contaminated, but the possibility cannot be ruled out," the department said.

Lifting of the warning against buying U.S. salmon came 1 month after Jesse Farmer died of botulism. He died on August 16, 1978, 17 days after being admitted to the hospital. His wife died of the same disease a week later, on August 24; both were victims of an accidental food contamination of still undetermined cause. As the London Times put it, the couple had obtained one faulty tin in thousands or millions. The older Farmer couple, the Leonard Farmers, recovered and were discharged from the hospital.

Such is a public health detective story. The "criminal" may prove elusive but the search continues.

A CORPORATE COMMITMENT TO QUALITY ASSURANCE

WILLIAM E. HATTAWAY

President, Red Lobster Inns of America
Orlando, FL 32809

Growth and success of a restaurant or restaurant chain is enhanced by the identification and commitment to factors essential in its previous success. For one chain, Red Lobster Inns, these factors were: quality, value, and service. A total corporate commitment to these elements is crucial in attracting both new and repeat customers. The Red Lobster quality control program is outlined.

In the expanding foodservice industry, one must be able to recognize and develop the key factors which will enable a company to grow and prosper in tomorrow's restaurant market. Red Lobster has found three key factors which have been essential in the company's growth from one restaurant in 1968 to 255 restaurants in 33 states today. The factors identified are: Quality, Value, and Service. A total corporate commitment to these elements is crucial in attracting both new and repeat customers.

Quality is the one factor which an entire organization must address and support. When quality is at stake, one or two lone heroes aren't going to rescue a company. Quality is not the product of the quality control or quality assurance department alone. It is a valued organizational goal and outcome (1).

Quality is a word, like professionalism, which is used indiscriminately, as a sweeping statement. The problem is that quality has numerous definitions and before we discuss how to assure quality, we must establish a common definition.

It has been said that quality, as it relates to foods, is that point of decomposition which the consumer is still willing to accept. Foodservice quality control has been identified by Thorner and Manning as a procedure, or program which will ensure continuity of product standards during handling, processing, and packaging. They further note that foodservice quality control will ensure that original and desirable food characteristics are retained and will remain so until consumption.

Regardless of the precise definition, two dominant factors emerge in the evaluation of quality: the actual chemical or physical measurement of the product, and the acceptance of the product by consumers, based on whether it will fulfill their "wants" with complete satisfaction.

Management often has a different viewpoint of quality, relating to profits. For example, economic factors, such as product costs, profits, and consumer acceptance are often equated with quality. Careful evaluation of these factors is necessary to ensure a successful operation, producing adequate return on investment.

Many factors are responsible for poor quality foods. Most can be traced to poor sanitation, faulty handling, malfunctioning equipment, incorrect preparation, and carelessness (2).

Quality control can only achieve success if it is instituted at all levels of a foodservice operation. When this is accomplished, a thorough quality control program not only increases business and profits, but also results in greater customer satisfaction.

While an organizational commitment to quality assurance is essential in meeting long-term objectives, of equal importance is the line of communication between the quality control department and higher management levels. In order for quality control to meet its objectives, direct communication between the Director of Quality Control and the Chief Executive Officer is a fundamental factor. At Red Lobster, the Director of Quality Control reports to the President, enabling the Chief Executive Officer to become directly involved in quality control.

The Red Lobster Quality Control Department combines specialized personnel, equipment and

procedures in six basic functions: product safety, raw material inspection, quality control training, store audits, safety accident prevention, and nutritional services.

Product Safety

All foods purchased must meet stringent standards and specifications at point of supply. These apply not only to meat and seafood, but also the variety of dry goods used, such as breading and canned items.

Standards covering such criteria as bacterial count, chemical and physical composition, and packaging, are designed to make certain that food products are of a specific quality. Once suppliers have completed "out-turn" reports guaranteeing that company specifications have been met, products come under the close scruntiny of the company's own quality control teams. Product safety is also ensured through close cooperation with the menu planning department to review handling procedures for new menu items prior to store distribution.

Raw Material Inspection

All seafood purchased is shipped to one of the three regional warehouses, Indianapolis, Dallas, or Orlando, where it is carefully tested and evaluated against company standards. In addition, fresh seafood, mostly shrimp, undergoes similar quality evaluation in a St. Petersburg laboratory. This year alone, samples from 40 million pounds of seafood delivered to Red Lobster will be tested for proper uniformity, food safety, and quality.

Samples are first checked for proper weight and size. Laboratory technicians also look for physical defects, such as bones or bruises, as part of the "organoleptic", or sensory, stage of the test. Next, smaller samples are cooked to judge flavor, texture and aroma. Spoilage that cannot be detected in the initial phase of testing is revealed by odor during cooking.

As an additional safety check, random samples are also subjected to a microbiological analysis at the Orlando Lab. This process not only provides an additional quality test, but is also useful in analyzing how new products should best be handled and stored.

Laboratory technicians examine foods for bacterial levels, as well as physical traits, such as lean-to-fat ratio, shelf life, salt or oil content, and water activity, to determine if conditions are conducive to bacterial growth.

Due to the nature of the seafood industry, being seasonally operated and consisting of small businessmen, diversified interests, and remote locations, domestic seafood is not inspected by a governmental agency, unlike poultry and beef which are federally inspected. Therefore, to ensure that only wholesome products will be served, unless seafood samples measure up to company standards, the entire shipment is rejected.

Quality Control Training

All managers of Red Lobster Inns receive extensive training in hygiene, food safety, and sanitation to assure that at each restaurant safe, wholesome food is served in a sanitary environment.

Classroom and home study materials for the training are derived from the National Institute for the Foodservice Industry and the Center for Disease Control. These materials include a basic background on microbiology plus instruction for following the flow of food from receipt to serving, ensuring that time, temperature, cooking and handling techniques are consistent with production of safe, high quality food.

In addition, managers are provided instructional materials to train their employees in sanitation, safety and quality control procedures. Currently, special emphasis is being placed on developing bilingual (Spanish/English) training aids.

Over 95% of all Red Lobster management personnel have been trained and certified in food protection.

Regional Field Consultants

Once product specifications have been set, laboratory tests conducted, and management training provided, the final step involves determining whether quality control is actually being accomplished.

This is the task of regional quality control field consultants (Registered Sanitarians) who carefully monitor operations of the individual restaurants.

Field consultants, accompanied by restaurant managers, conduct inspections which are more stringent than those required by local public health agencies. Unlike most public health inspections, Red Lobster checks on weekends and at night as well as during weekdays to examine restaurant operations under the most diverse conditions.

Consultants scruntinize more than 50 "critical control points" in food handling and preparation, equipment and physical cleanliness. Managers are instructed in correction of problems and follow-up audits are made to determine that deficiencies have been resolved. Currently, regional quality control field consultants are visiting each restaurant an average of eight times per year.

SPOKANE'S THE ONE IN '81

Welcome to Spokane, the capital of the Inland Empire. We hope that you'll come to the 68th Annual Meeting of IAMFES, August 9-13, 1981 at the Sheraton-Spokane Hotel, Spokane, WA. During the meeting a variety of events are planned, ranging from an ice cream social to a Salmon Barbeque at Riverfront Park, site of the 1974 World's Fair.
We'll see you in Spokane!

1981 IAMFES ANNUAL MEETING

Advance Registration Form for the 68th Annual Meeting, August 9-13, 1981, Spokane, WA

Mail to: Donald L. Kilgore, Registration Chairman
IAMFES
Dairy and Food Division
North 222 Havana
Spokane, Washington 99202

Please check where applicable:

Affiliate Delegate	☐	Speaker	☐
Past President	☐	Affiliate Member	☐
Executive Board	☐	ADA Member	☐
30 yr. IAMFES Member	☐	HIEFSS Member	☐
		Non-member	☐

Make checks payable to: IAMFES 1981 Meeting Fund

Advance register and save – refundable (prior to June 30) if you don't attend

ADVANCE REGISTRATION FEE (prior to July 1)
(All in American currency)

	*Member**	*Spouse of Member*	*ADA HIEFSS*	*Student*
Registration	$22.50	$10.00	$27.50	no chg.
Banquet	17.50	17.50	17.50	17.50
Salmon Barbeque	6.00	6.00	6.00	6.00
Total	$46.00	$33.50	$52.00	$23.50

REGISTRATION FEE AT DOOR
(All in American currency)

	Member	*Spouse of Member*	*ADA HIEFSS*	*Student*	*Non Member*
Registration	$27.50	$13.00	$32.50	no chg.	$32.00
Banquet	20.00	20.00	20.00	20.00	20.00
Salmon Barbeque	7.50	7.50	7.50	7.50	7.50
Total	$55.00	$40.50	$60.00	$27.50	$60.00

*Member of IAMFES or Washington Milk Sanitarians Association

Name (Member) _____ Spouse _____
Children's First Names and Ages _____
Employer _____
Address _____
City _____ State _____ Zip _____
Means of Transportation _____

SHERATON-SPOKANE HOTEL
North 322 Spokane Falls Court
Spokane, Washington 99201
Telephone 509-455-9600

Arrival Date _____
Arrival Time _____
Name _____
Address _____
City _____
Please check type of accommodation required
_____ Single (one person) $36.00
_____ Double (two persons) $43.00

Reservations must be received by July 17, 1981.
The best arrival time is after 3:00 p.m.

Departure Date _____
Means of Transportation _____
Name _____
_____
State _____ Zip _____

Mail directly to: Sheraton-Spokane Hotel
North 322 Spokane Falls Court; Spokane, WA 99201

By providing valuable information for use in management training, purchasing standards, and laboratory procedures, field audits ensure that quality control will be totally integrated into the corporate system. The end result is a continuous monitoring of all phases of company operations to uphold consistent standards of food safety, quality and uniformity, chainwide.

To supplement in-store sanitation and safety, the quality control department reviews and evaluates new restaurant plans prior to construction. This process enables sanitation and safety to be "engineered in," which can prevent operational problems and costly revisions at a later date.

Safety

An additional area of responsibility for the quality control department is the development and monitoring of a corporate safety/accident prevention program. Management and employee awareness is essential in elimination of hazards which can cause accidents. The safety program, a cooperative effort between all Red Lobster departments and Regional Operations, is designed to provide accident hazard awareness through educational materials and programs.

Nutrition

A final area of responsibility for the quality control department is to serve as a technical nutrition resource center, and to coordinate nutritional information. Quality control monitors nutritional activities at local, state and federal regulatory levels, assists other Red Lobster departments with consumer nutritional inquiries, initiates special projects or research in the area of nutrition; and develops nutritional information for Red Lobster personnel to increase awareness of nutritional components of menu items.

Other areas, such as foodborne illness monitoring, product recall procedures, emergency preparedness procedures, OSHA tracking, product complaints, and regulatory or public health liaison are also integrated into the quality control function of the Red Lobster chain.

The quality control department is part of the total corporate team, helping provide the customer Quality, Value and Service.

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PH: Acidity By the Numbers

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"This generation of field and plant sanitarians has come a long way since the days when raw milk was accepted or rejected at the receiving station on the basis of a quick acidity test."

Hydrogen-ion concentration (pH) is a new term in the field of quality control. Portable pH meters and pH test papers have given food processors accessibility to follow the changes of acidity or alkalinity in the food industry. At the turn of the century degree *of acidity or alkalinity was discovered by a man named Sorenson. Changes in pH values are very important in farm operation, the swimming pool industry and in cleaning food equipment. A knowledge of the basic principles of pH helps us to define our needs.*

A new term from scientific literature has crept into the language of "field" quality control. Now field sanitarians are talking about "pH" or hydrogen-ion concentration, a term that is well known in the laboratory but has seldom been used in field operations until recent times. Use of the pH concept provides a number system to accurately describe the degree of acidity or alkalinity in a food system or in a cleaning solution designed to remove food residue.

The development of inexpensive, portable pH meters and pH test papers has given food processors and field sanitarians an easy way to follow changes in acidity or alkalinity during the various operations in the technically controlled food industry. Regulation of pH has become an important tool in controlling the yield, quality, and safety of many processed foods. Such pH control is especially important in modern waste disposal systems.

Recording pH meters allow the operator or environmental agency to maintain a continuous monitoring of plant or treatment operations. Modern cheesemaking technology, for example, has changed from an art to a science. Many of the new technical procedures depend on controlling pH at the several stages of the "make" process. Alarm systems activated by critical changes in pH alert operators that a breakdown has taken place or a system is exceeding acceptable pH variations.

Some of the normal milk constituents affect the more familiar test for "titratable" acidity but do not affect pH readings. This generation of field and plant sanitarians has come a long way since the days when raw milk was accepted or rejected at the receiving station on the basis of a quick acidity test. Such was the state of the art during dairy days around World War II.

There is nothing mysterious about the concept of pH. Concepts of "near" and "far", "hot" and "cold" are relative, but not much is known about a situation unless it's known *how* hot or *how* far. A worker isn't instructed to use a "hot" cleaning solution. He is instructed to maintain it at 130° F. A definite value, rather than a general concept, is what is needed.

The fact that some things are "acidic", some "basic" was understood centuries ago. Between the two there is a "neutral" zone. In chemical actions such as dairy cleaning, it's important to know how acid or how alkaline (basic) a solution is. pH measures the effective, rather than the total, acidity or alkalinity of a solution. A four percent solution of acetic acid, vinegar, has a pH value of 4. A four percent solution of sulfuric acid, with a pH value of 0, is a violent poison even though the total acidity of the two products is the same. Faulty pH relationships in polluted water can kill fish. If the pH of human blood is lowered one unit, people die.

Soon after the turn of the century a man named Sorensen developed a scale that would allow the degree of acidity or alkalinity to be stated in terms others can understand. He called it a "pH" scale

because it was based on the ionization, or breakdown, of acid substances to yield a certain amount of either hydrogen (H) ions or of alkaline materials to give hydroxyl (OH) ions. If the hydrogen ions exceed the hydroxyl ions, the substance is called acidic. If there are more hydroxyl ions than hydrogen ions, it is called basic.

The scale which Sorenson developed was divided into units from 0 to 14. A reference solution of hydrochloric acid was assigned the zero value. A similar reference solution of lye, sodium hydroxide, was given the value of 14. All solutions which break down to form hydrogen or hydroxyl ions fall within this 0-14 range. When hydrogen and hydroxyl ions are equal, a value of 7 is given. This is a "neutral" relationship.

All substances in solution ionize less completely than hydrochloric acid or sodium hydroxide and vary from each other in the extent of breakdown, or ionization. Thus, there are "strong" acids and "weak" acids, or "strong" and "weak" alkaline compounds. Fresh milk is slightly "acid" with a normal pH value of about 6.8. Blood is slightly alkaline with a pH of 7.4.

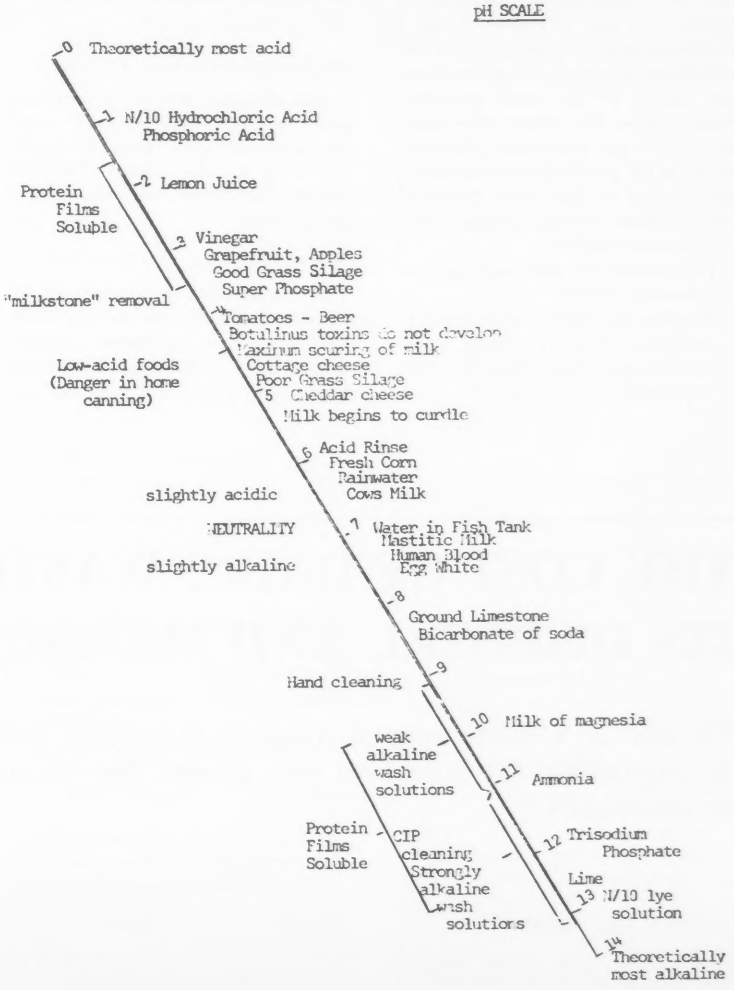
Changes in pH values are very important in farm operations. Garden crops and grasses do better in slightly acid soils, pH 6.5, but good grass silage requires much stronger acid conditions, pH 3.5, for proper development. In old-fashioned jelly making, pH must be below 4.0 if the product is to jell. Ground limestone, at pH 8.3 is used to neutralize excessively acid soils. "Low-acid" foods with a pH above 4.5, meats, peas, corn, beans, are associated with dangers of botulism in improperly processed home canned foods.

In the swimming pool industry, incorrect pH can be responsible for staining, etching, scaling of pool plaster, off-colored water, excessive eye irritation, and corrosion of metal parts and accessories. The stability of chlorine and its activity against microorganisms is affected by changes in pH.

Sanitarians are now emphasizing the role of pH control in cleaning dairy or other food equipment. It wasn't so much a concern in the days of hand washing. Milkstone films were accepted as a fact of life and periodic film removal was included as part of the cleaning routine. Cleaning solutions were relatively mild because hands will not stand too much caustic action.

But now there are pipelines and automated cleaning systems. Velocity and increased "solution strength" have replaced hand scrubbing action. Cleaning specialists talk about protein films and fat films, applesauce, and streaking. Cleaning solutions maintained at the "proper pH" will help avoid these problems and many others that have crept into the new vocabulary of sanitation.

Different types of milk films require different chemicals to condition them for removal. "Strong" alkalies with a pH 11-12 are needed to remove fats and proteins. Mineral deposits dissolve under acid conditions. Suppliers of dairy sanitation chemicals can help plan a proper balance of alkaline and acidic detergents to produce a suitable cleaning system in individual cases.



All food processing plants, regardless of product produced or size, generate wastewater. Primary factors contributing to the waste stream are: the food preparation steps that result in loss of by-product materials; sanitation activities; and product losses. While it benefits plant management to reduce product loss, present day operational experiences indicate that considerable losses occur annually, no matter what the product. Consequently, unsaleable product plus inherent waste must be discharged from the dairy processing plant.

Dairy Waste Sources:

Determination of the significant sources of dairy food plant wastes requires an understanding of the processing of dairy foods, the various unit operations and their potential role as sources of wastewater, milk solids and refractory compounds. Typical market milk flow diagrams are presented in Figures 1, 2 and 3. Figures 1 and 2 identify the specific plant processes and relate these processes to the point sources and nature of the waste generated. Figure 3 shows the volume and organic strength of the wastewater generated, based on the plant's processing activity and amount of milk being processed. Values reflect average in-plant waste management practices.

The unavoidable major waste generating processes include:

- -Rinsing, cleaning and sanitizing of all pipelines, pumps, processing equipment, tanks, tank trucks, and filling machines;
- -start-up, product change-over and shut-down of HTST and UHT pasteurizers;
- -losses during filling operations;
- -lubrication of caser, stackers and conveyors.

In Figures 1 and 2, piping associated with a unit process is considered to be an integral part of that operation. For example, the waste generating process of the tank truck washing operation would include all pumps and piping in the receiving room; or cleaning of the raw storage tanks would include the associated raw milk pumps, valves and lines (3).

Spills and leaks from pipe-line joints, valves, and pumps must also be included as waste generating sources for any unit process. Although this waste varies in significance in different dairy food plants, it is inherently controllable through good management practices.

What Process Wastewater is Costing:

Approximately 96% of the fluid milk plants discharge to municipal waste treatment systems (3). Thus, this section will focus on the related municipal charges encountered, as well as dairy product loss.

Municipal Charges - What are They?

Generally, municipal charges for industrial plants include water use, sewer, surcharges for wastewater organic strength and suspended solids contained therein, and possibly an industrial cost recovery charge (1). Most municipalities compute water and sewage charges as follows:

Water . . . Based on water consumption metered into the plant. Often on a declining block scale so that the cost/unit decreases as more water is used. Note that the bill is usually in hundreds of cubic feet (1 cu. ft. = 7.48 gal.). Cost usually ranges from $0.10 to $1.00 per 1000 gallons.

Sewer Charge . . . Based on computed water charge, this usually represents 10 to 200% of the water bill. The most common figure seen in the Southeast is 100%.

Surcharge . . . Based most often on metered water consumption and pollutant parameters measured in the wastewater. The two most frequently used parameters are organic loading, expressed as BOD_5, at the rate of $0.10 to $2.00 per pound, in excess of the normal domestic sewage

THE COST OF DAIRY WASTEWATER- ITS DISPOSAL AND MANAGEMENT

"A key to a waste control program is keeping daily plant operating records. Accountability for ingredient use, process flow-through and final product must be established."

JAMES V. CHAMBERS

Animal Sciences Dept., Purdue University, West Lafayette, IN.

strength. The total suspended solids (TSS) load is also used. A hydraulic load charge is sometimes included and is often used as a "demand charge," especially for seasonal operations.

Industrial Cost Recovery . . . Recovery by the grantee from the industrial users of a treatment works of the grant amount allocable to the treatment of wastes from such users pursuant to section 204 (b) of PL 92-500.

The Surcharge

A charge based on the pounds of dairy waste material in the wastewater in excess of normal levels of concentration is referred to as a "surcharge". This charge is levied as a supplement to the normal sewer service charge because additional treatment costs are involved to handle the extra waste load. Normal wastewater (domestic type) can be characterized as follows:

	mg/1
BOD	250 - 300
COD	250 - 370
Suspended Solids	50 - 200
Fats, Oils and Greases	100

Because dairy wastes are much stronger in organic pollutants than domestic wastewater, more treatment capability must be made available in the municipal waste treatment facility and more highly skilled operators are needed to maintain that system. The surcharge is where some real dollars can be saved by the dairy plant management.

Dairy Wastewater and Its Real Cost:

The cost of disposing dairy wastewater depends largely on the volume of milk being processed daily, the level of in-plant control on waste generating sources and whether product recovery systems are employed. For the purpose of discussion, a typical market milk processing plant will be used, one that is processing 258,000 lbs. of milk or 30,000 gallons per day. It will be assumed that the dairy plant is operated 22 working days per month. The municipal charge rates are as follows:

1. Water $0.42/1000 gallons
2. Sewer discharge 0.42/1000 gallons
3. Surcharges
   a) BOD (over 300 mg/1) 0.026/pound
   b) Suspended solids (over 250 mg/1) 0.045/pound

Characterization of the dairy wastewater using correct sampling and analytical procedures reveals the following:

	Daily	Monthly
1. Water use	45,000 gallons	990,000 gallons
2. Sewer discharge	30,000 gallons	660,000 gallons
3. Surcharge parameters		
a) BOD	640 pounds	14,080 pounds
b) Suspended Solids	320 pounds	7,040 pounds

With the above information known, a monthly municipal sewer bill might look something like this:

1. Water use	$415.80
2. Sewer use (100% of water)	$415.80

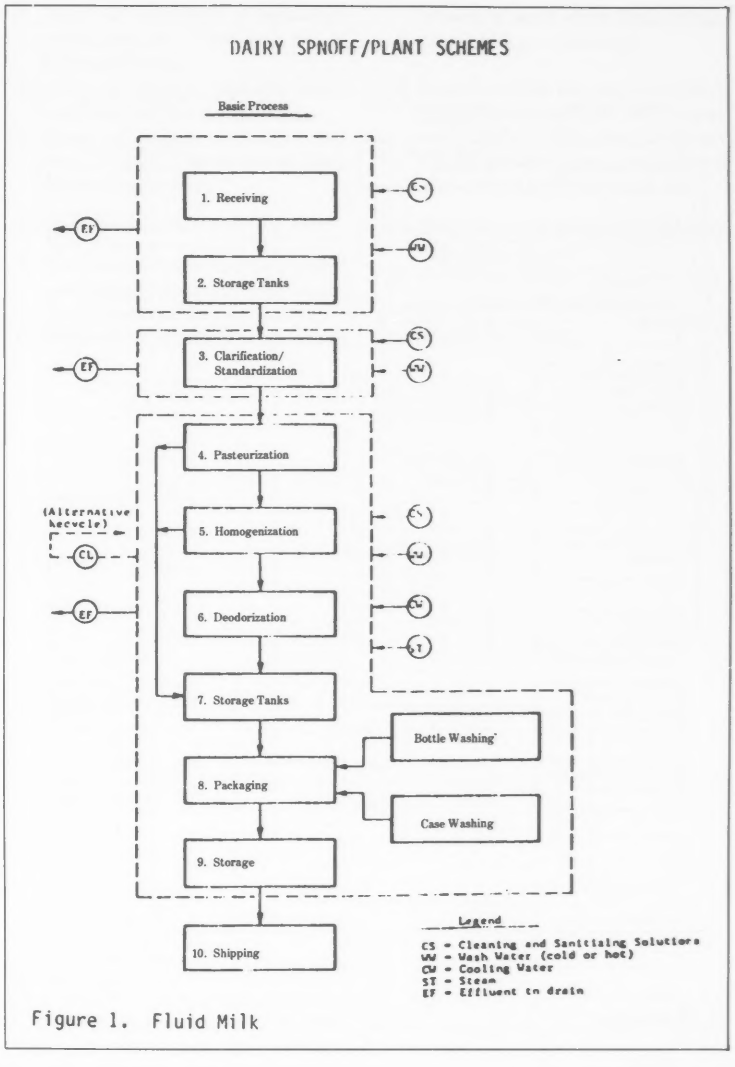


Figure 1. Fluid Milk

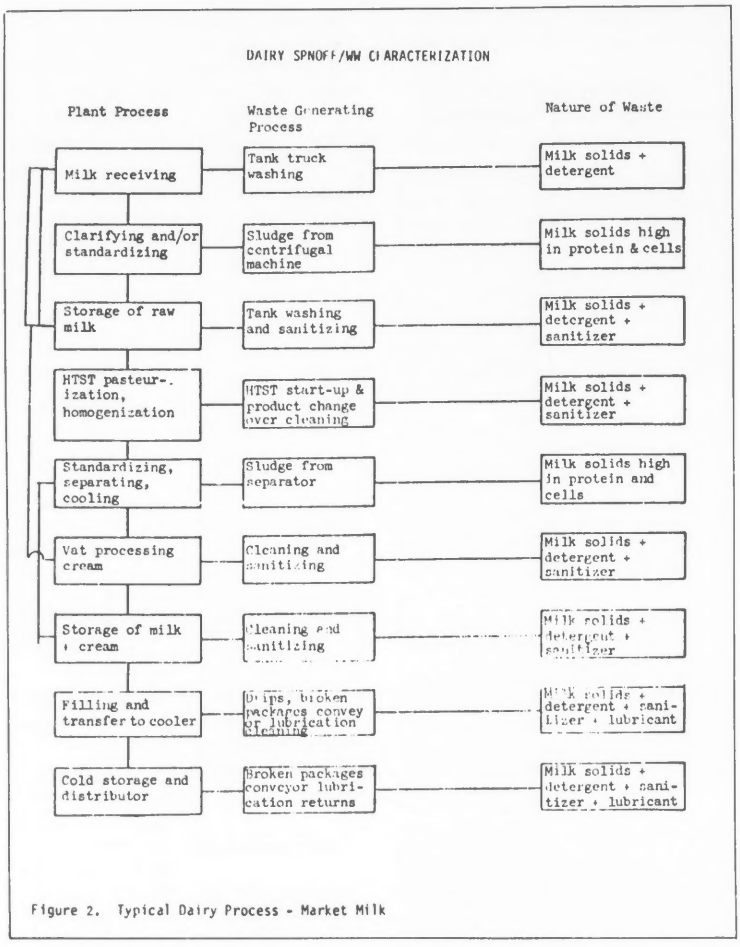


Figure 2. Typical Dairy Process - Market Milk

3. Surcharges --

a. BOD
   1) Base amount 1650 lbs.
   2) Excess amount 12430 lbs. = $323.18

b. Suspended solids
   1) Base amount 1375 lbs.
   2) Excess amount 4554 lbs. = $254.92

Total Municipal Sewer Bill: $1409.70

Thus, the production cost for wastewater disposal is $0.0021 per gallon of milk processed. On the surface, this amount does not appear to be significant but when one considers the profit per dollar sales of the average dairy plant is around 2.8%, then the approximate 1/4¢ per gallon of milk becomes important (represents 4% of expected profit). However, the real profit loss is in what has been lost to the wastewater stream. In reassesing the dairy wastewater characteristics, one can calculate that the 14,080 lbs. of BOD discharged to the sewer represents approximately 140,800 lbs. of 3.5% raw milk. At $11.50 per cwt (blend price, Grade A), this represents $16,192, which adds another 2.45¢ to the processing cost per gallon of milk bottled. If the milk loss could be reduced by 40%, this would represent a savings of 0.98¢ per gallon or a new monthly cash gain of $6476.80 for this dairy plant.

In-Plant Control through Management:

Reducing product waste can result in dollar savings to the dairy processing operation. But how does management initiate in-plant control programs to achieve these savings?

Before any waste reduction can be achieved the dairy management must be dedicated to the task, develop effective waste reduction programs, and provide the needed manpower to follow through. A cooperative relationship must be developed between management, supervisory personnel and the maintenance support group to implement an effective waste control program (1). Management control of water resources and waste discharges should involve all of the following:

* Installation and use of a waste monitoring system to evaluate progress. (Refer to Table 1 for evaluation criteria).
* Use of an equipment maintenance program to minimize all product losses.
* Use of a product and process scheduling system to optimize equipment utilization, minimize distractions of personnel, and assist in making supervision of the operation possible.
* Use of a planned quality control program to minimize waste.
* Development of alternative uses for wasted products.
* Improvement of processes, equipment and systems as rapidly as is economically feasible.

The key to a waste control program is keeping daily plant operating records. Accountability for ingredient use, process flow-through and final product must be established. This product accounting explains where and why there are differences between receipts and usage and pinpoints any location where these losses might be reduced. One pitfall common to most dairy operations when using product records, however, is the problem of unreconcilable differences between what has been processed and the final product inventory. A number of factors can influence these differences which include: inaccurate production reports; the use of standard conversion values, rather than the actual values of the product, as package weight and composition are considered; counters on packaging machines that counted packages, but did not exclude those packages lost after counting; and probably the most significant factor -- unreported losses. When unresolved differences occur between receipts and usage, then

active supervision must be inserted to resolve the problem areas.

Another phase of the dairy operating records is the operations report. This report identifies production "bottle necks", equipment failure and repair requirements, and "out of normal" process operations. The information recorded in this report can assist management in optimizing the dairy plant operation and further reduce the opportunity for waste to be generated.

Good waste management programs incorporate such activities as establishing explicit waste reduction programs with defined goals and individual responsibilities, close plant supervison, adequate training of plant employees, enforcement of good housekeeping practices, establishment of proper equipment and facility maintenance schedules, careful production scheduling, and the use of product salvaging for reuse in a process or sold as an animal feed. An interesting fact is that such program activities require nominal expenditures but the economic return in saved product more than offsets the investment.

Management effectiveness for controlling waste can easily be assessed by following the evaluation criteria for a dairy plant listed in Table 1. While the criteria listed is subjective in nature it can reveal the over-all quality of management practices aimed at reducing waste. Table 2 lists those measures needed in a good waste prevention program. The keys to a successful program are management awareness and involvement and active participation of the plant employees in the program. In the final analysis, it is the plant personnel who ultimately reduce the water use and product waste.

Table I. Criteria for Evaluating Dairy Plant Management Practices.[a]

Number	Criteria
1)	Housekeeping practices.
2)	Water control practices; frequency with which hoses and other sources of water were left running when not in actual use.
3)	Degree of supervision of operations contributing to either volume or BOD coefficients.
4)	Extent of spillage, pipe-line leaks, valve leaks and pump-seal leaks.
5)	Extent of carton breakage and product damage in casing, stacking and cooler operations.
6)	Practices utilized in handling whey.
7)	Practices utilized in handling spilled curd particles during cottage cheese transfer and/or filling operations.
8)	Utilization of practices to reduce the amount of wash water from cottage cheese or butter operation.
9)	Extent to which the plant is utilizing procedures to segregate and recover milk solids in the form of rinses and/or product from pasteurization start-up and product change-over.
10)	The procedures utilized in handling returned products.
11)	Evaluation of the management attitude toward waste control.

[a]Harper et al., 1971.

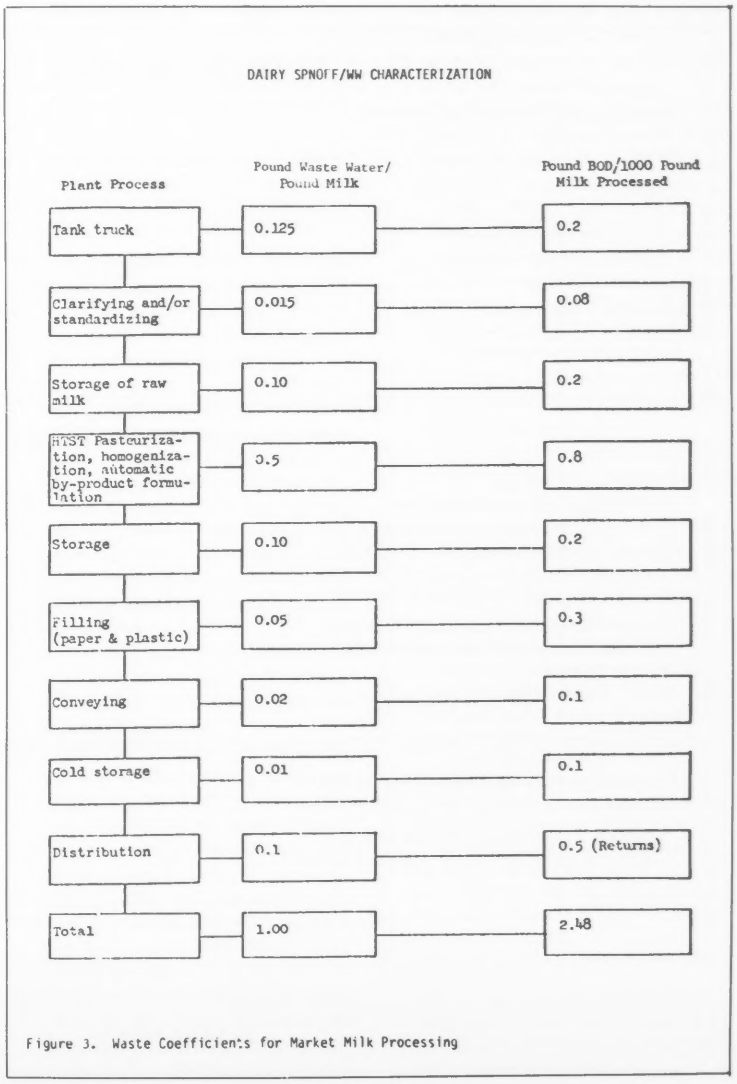


Figure 3. Waste Coefficients for Market Milk Processing

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"The cost of disposing dairy wastewater depends largely on the volume of milk being processed daily, the level of in-plant control on waste generating sources and whether product recovery systems are employed."

Table II. Waste Prevention Measures for a Dairy Plant Operation

1) Adopt and maintain a definite waste prevention program. Waste prevention committees and group discussions will help make employees "Waste Prevention Conscious".
2) Display a visual chart of weekly water consumption; perhaps compare weeks, or compare water use and waste production between unit operations over several weeks' time. This chart should be posted where employees can see it and know that their efforts are directly reflected in the chart. This allows employees to monitor their own work results.
3) Produce weekly or monthly ratios of the amount of water consumed to the amount of product handled. For example, a milk bottling depot in the United Kingdom, handling about 12,000 gpd milk is achieving a ratio of 1:1.
4) Encourage a dialogue between management and staff on the subject of water conservation (related, perhaps, to product waste control).
5) Instruct plant personnel in the proper operation and handling of equipment.
6) Make a thorough study of plant operation to determine where losses occur.
7) Provide ample equipment, especially for receiving, cooling and storing, to take care of maximum volumes so that there can be no spoilage due to delays in handling.
8) Mark all valves clearly, especially multiport, so that it is practically impossible for inexperienced help to turn the valve the wrong way.
9) Handle with extreme care all sanitary fittings, valves, rotary seals, and pump parts during every phase of operation to prevent marring which may cause leaks.
10) Provide reliable standby power so that processing can be completed as quickly as possible in case of a breakdown of the regular source of power.
11) Provide accurate temperature controls on plate, internal tubular, and surface coolers to prevent freezing-on.
12) Eliminate valves on the outlet side of internal tublar or plate heaters or coolers to avoid waste due to blown gaskets.
13) Install suitable liquid level controls with automatic pump stops, alarms, or other devices at all points where overflows are likely to occur.
14) Vats and tanks should have well-rounded corners, be properly pitched, and be installed high enough from the floor for easy draining and rinsing into standard buckets.
15) Install equipment such as vats, tanks, and processing machinery designed to reduce to a minimum losses due to leaky joints, gaskets, packing glands, and rotary seals, etc.
16) Install all sanitary lines so that they can be drained thoroughly and prerinsed with a small amount of water into standard buckets. This residual material is suitable for animal feed.
17) Never fill vats, pasteurizers, or cooling tanks to such a high level that spillage will occur when the product is agitated.
18) Foam can contain a considerable amount of food product solids and should be kept out of the sewer. Common sources of excessive foaming are open-type separators, splashing when filling tanks, air sucked in through leaky connections in lines under partial vacuum, through leaky packing, and through faulty rotary seals or pumps.
19) Do not use constantly running water hoses in any room. Eliminate the cause of spillage, rather than just wash it away after it has occurred.
20) Avoid the use of hot wells for preheating because of the danger of filling them too full or of their boiling-over. Use regular plate, tubular, or surface heaters. If hot wells must be used, equip them with liquid level controls which operate alarms or pump stops with good temperature regulators.
21) Operate evaporators at low liquid level to prevent boiling-over.
22) Wherever possible, equip the condensers of evaporators with a full barometric leg so as to eliminate the possibility of spoiling products by sucking water back through the condenser into the evaporator in case of pump or power failure. A full barometric leg will be very helpful in maintaining a steady vacuum which again helps to reduce entrainment losses.
23) In filling or moving cans or barrels of liquid products, take extreme care to avoid spillage.
24) Where ingredient additives are used in the manufacture of products, take extreme care to avoid spillage.
24) Where ingredient additives are used in the manufacture of products, take care that they are not spilled on the floor and washed into the sewer.

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News and Events

VASDF Holds Dairy Industry Workshop

The Virginia Association of Sanitarians and Dairy Fieldmen held their annual meeting during the Dairy Industry workshop held at Virginia Tech, Blacksburg, VA, February 24 & 25, 1981.

There were over 80 members in attendance. Dairy economics, microbiological testing, and herd management were some of the program sessions. The banquet speaker, Dr. Al Ortego discussed moving an abundant milk supply. Dr. Ortego pointed out the abundance of milk available at this time of year and a need for moving more milk. Fluid consumption could be better which would help use surpluses, he noted. He also pointed out that soft drinks are number one in fluid beverage consumption in the U.S., with water second and milk third.

Charles Worley was elected President of the VASDF; A. N. Smith, First Vice President; Wendell Smith, Second Vice President; W. J. Farley, Secretary-Treasurer; and J. G. Hampton, Past President.

New officers of the Virginia Association include, top photo, l to r, Charles Worley, A. N. Smith, Wendell Smith, W. J. Farley, and J. G. Hampton. Bottom photo, l to r, members register for the Dairy Industry Conference, held at Blacksburg, VA.

Seiberling Honored by OSU

Dale A. Seiberling, co-founder and president of Seiberling Associates, Inc., South Beloit, IL, recently received the 1980 Distinguished Alumni Award from the Department of Food Science and Nutrition of Ohio State University.

University officials presenting the award noted Seiberling's accomplishments as an innovative dairy and food engineer and company executive.

Accomplishments cited included his development of the sanitary air-actuated valve, development and application of automated CIP cleaning and computer-based processing systems and written contributions to food industry textbooks and technical articles.

Seiberling began his career as assistant manager of the dairy plant, then as instructor of Dairy Technology at Ohio State. From 1957 to 1976 at Klenzade Products, Inc., Beloit, WI, he progressed from Engineering Consultant to Vice President and General Manager of EL/Equipment-Engineering. In 1976 he formed Seiberling Associates, an engineering consulting firm which provides professional services in process and control systems design, project management and personnel training for dairy, food and pharmaceutical industries. Its offices are in Illinois, California and Ohio.

Farmer Converts Farm Waste to Energy

A dairy farmer near Gettysburg, Pa. is converting 2.7 million tons of manure from his 700 cows to methane gas worth $30,000 a year. After separation, the solids from the manure are put into a tank with an airtight black plastic cover and left to ferment. Bacteria devour the solids and then die. In the oxygen-free atmosphere they decay and the methane gas generated is held in the tank until drawn out for use for generating electricity. The owner believes that with proper financing, such a scheme could generate enough electricity to serve the nearby town. The heat from the generator could be used to distill ethanol.

Reprinted from Market Frontier News *of the Dairy Society International.*

NIFI Honors Three Foodservice Leaders

Three industry leaders who have made important contributions to foodservice education will be recognized by the National Institute for the Foodservice Industry (NIFI) at a champagne brunch May 17 in Chicago.

More than 300 industry members will gather at the Palmer House to honor William H. Edwards, President, Hotels Division, Hilton Hotels Corporation, Beverly Hills, CA; Joseph W. Gilbert Sr., Vice President-Public Relations, Gilbert/Robinson, Inc., Kansas City, MO; and Alex Schoenbaum, Senior Chairman of the Board, Shoney's, Inc., Charleston, WV.

The three will be named 1981 members of the NIFI College of Diplomates, which was established eight years ago to pay tribute to outstanding members of the foodservice industry who have actively supported the advancement of professionalism through education.

Edwards is being honored for a long record of advancing professional management, both systemwide in Hilton hotels and nationwide in all American hotels. He has been a major force for hospitality industry education--particularly on the subjects of tourism and energy management--in the American Hotel and Motel Association and in the National Restaurant Association.

As a founding Trustee of NIFI, Edwards provided further impetus to management education. Under his leadership as President, NIFI greatly expanded its course acceptance and programs in research, career promotion, scholarships and teacher grants.

Gilbert is being recognized as a long-time benefactor to foodservice education and training. Starting in 1933, his personal effects have been reflected in countless programs in high schools, colleges and community centers, which he served as founder, instructor, lecturer and advisory committee member.

Gilbert has provided scholarships, guidance and support to educational institutions across the country. Stressing the need for continuing education, he established company training seminars and participated as a faculty member in seminars of the Missouri Restaurant Association. A pioneer of in-flight foodservice, he emphasized the importance of service to training classes of airline flight attendants.

Encouragement of young people to prepare themselves for careers in the foodservice industry has always been a major interest of Schoenbaum. His restaurants have served as school for many, who--starting as hourly workers--have themselves become foodservice operators and executives.

Always energetic and innovative, Schoenbaum has been an industry teacher through such organizations as Junior Achievement and through his high standards set for food quality and service. He has lent his experience and counsel to educational programs at New York University's Center for the Study of Foodservice, Charleston University, and his alma mater, Ohio State University.

Sandine Presented Fisher Award

William Sandine is the 1981 recipient of the Fisher Scientific Company Award for Applied and Environmental Microbiology.

After completing a postdoctoral fellowship at the University of Illinois, Dr. Sandine joined the Department of Microbiology at Oregon State University in 1960. He is recognized as one of the leading authorities in dairy fermentation.

Dr. Sandine has published more than 100 technical papers and has authored books entitled *Lactic Starter Culture Technology* and *Microbiology of Foods.* He is now or has been on the editorial board of a number of scientific publications, including the *Journal of Food Protection* and the *Journal of Dairy Science.*

Among the contributions in the scientific control of dairy fermentations made by Dr. Sandine are the genetics of lactic streptococci and the improvement of the quality and shelf life of cheese and cultured buttermilk. His interests have included the host-phage relationships among streptococci, diacetyl synthetic pathways among aroma bacteria, and the interaction among strains of lactic streptococci and enzymatic mechanisms in the utilization of sugars.

Dr. Sandine has served on numerous advisory committees for the National Dairy Council and the American Dairy Science Association. He was a visiting scientist at the Food Research Institute in Canada in 1969 and the New Zealand Dairy Research Institute from 1974 to 1975. He received the American Dairy Research Foundation Award in 1979.

The Fisher Scientific Company Award consists of $1,000, a plaque, and expenses to the ASM Annual Meeting. The award will be presented at the opening session of the American Society for Microbiology annual meeting in Dallas.

NMC Holds 20th Annual Meeting

The 20th Annual Meeting of the National Mastitis Council was held Feb. 15-18, 1981 at Louisville, KY.

More than 330 attended the meeting. In addition to the educational program, many important committee meetings of the National Conference on Interstate Milk Shipments as well as several sub-committee meetings of IAMFES were held.

A symposium on stray electric current in milking farms was conducted at the meeting. Stray currents are often blamed for aiding in the cause of mastitis. Therefore, every angle of this subject was explored with a valuable question and answer period after the symposium.

Panel discussions were held on priorities in future mastitis research as well as practical application of information among bovine practioners, extension personnel, sanitarians and fieldmen.

Papers presented at this meeting are available in a bound volume and can be obtained from the National Mastitis Council, Inc. 30 F Street N.W., Washington, D.C. 20010.

Bob Dawson was elected President of the National Mastitis Council for 1981.

National Mastitis Council officers include, top photo, l to r, Robert Dawson, President, John B. Adams, Executive Secretary, and James Jezeski, Past President. Middle photo, the NMC Executive Board works through a report. Bottom photo, social events were also a part of the NMC meeting.

ASAE Offers Livestock Wastes Symposium Proceedings

The American Society of Agricultural Engineers has published the proceedings of the Fourth International Symposium on Livestock Wastes. The proceedings are titled *Livestock Wastes: A Renewable Resource.* The conference, held in Amarillo, TX, April 15-17, 1980, was sponsored by ASAE and 27 cooperating organizations.

The 450-page, hardbound book contains 116 papers that encompass such aspects as processing manure for feed, methane production, land application, lagoons, runoff, odors, economics, stabilization treatment, collection and transport, storage, and solid-liquid separation. Papers were reviewed by an editorial committee.

This is the first major conference publication on livestock wastes produced by ASAE since the publication of *Managing Livestock Wastes,* the proceedings of the 1975 symposium.

The proceedings are priced at $49.50 and may be ordered directly from ASAE, P.O. Box 410, St. Joseph, MI 49085.

IAICM Officers Named

Peter Turner of Tennessee, a vice president of the Foremost-McKesson Group, is the new chairman of IAICM (Int. Assn. of Ice Cream Mfgrs.), and Rollin S. Reiter, pres. of Reiter Foods of Ohio, chairman of Milk Industry Foundation. Staff-head John F. Speer is president of each.

Case Studies in Sanitation

This and future Case Studies in Sanitation *are written by Frank Raffaele, Vice President of Regulatory Compliance, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.*

Case #2-Insect Infestation

During the last several months in 1977, FDA activity in a midwest city was described as "intense" by food processors and restaurant managers. It seemed as though everyone was being investigated. Almost daily for the past several weeks, the major newspaper in the city printed a list of restaurants and food processing establishments who were facing court action by the FDA for insanitary conditions. Worst of all, consumers were becoming more and more interested in the reports and causing some businesses to lose sales due to boycotting.

Caught in the middle of "operation clean sweep" was 42 year old Bill Derby, president and owner of Derby's Bakery.

Derby's was a moderate sized bread, roll and sweet goods bakery located in the heart of the industrial area. The bakery serviced the community through 12 retail outlets, both in and around town. A sign on the door read: "Temporarily Closed for annual cleanup. Sorry for the inconvenience, please call again."

The sign was misleading. The "annual clean-up" mentioned in the sign was actually due to major insanitary conditions found by FDA inspectors.

Derby's 60 employees were all at home, without pay, waiting. Waiting to hear from Bill Derby so they could return to work.

Inside the now quiet bakery, Plant Manager, Carl Fenning, and Shift Supervisor, Ken Baltic, worked feverishly at the cleaning task at hand. All the while, Bill Derby was growing both physically and mentally sick when he considered the worsening financial picture. Every day without production brought him closer to bankruptcy.

Dan Watson, Derby's lawyer, was working hard preparing an official statement for the upcoming 305 hearing. After reviewing the FDA form 483, Watson wondered how Bill Derby could have let things go for so long.

Even though Derby's management had preached sanitation to its people, no formal program had ever been put into effect. Sanitation was considered "everyone's responsibility," a policy which would not necessitate the services of a full time sanitarian.

Following is a listing of the deficiencies noted at Derby's on two separate inspections.

FDA Form-483 - November 10, 1977

1. Five live Confused Flour Beetles were removed from the top housing of the horizontal mixer and three live Confused Flour Beetle larvae were removed from under the pressure blow-off valve of the flour hopper. Spec. #1.
2. Twenty live Confused Flour Beetles were removed from both side panels of the horizontal mixer. Spec. #2.
3. Two live Confused Flour Beetle larvae were removed from inside an ingredient container of corn meal. Spec. #3.
4. Approximately 200 live Tribolium Beetle larvae and numerous cast skins were noted inside the housing of the mixer. Emerging insects fall directly into the mixing bowl when in place. Spec. #4.
5. Twenty-five live Confused Flour Beetles were removed from the horizontal ledges in the undercarriage of makeup table #1 and two live beetles were seen on the make-up belt. Spec. #5.
6. Ten live Confused Flour Beetles were removed from the horizontal ledges in the undercarriage of the table. Twenty-five live Confused Flour Beetles were removed from the dusting hopper on the same equipment. Spec. #6.
7. Fifteen live Saw Tooth Beetles were removed from ledges and junctions of the wooden storage rack containing raw materials. Spec. #7.
8. A bag of oatmeal, with no receiving date, located in the ingredient storage area was grossly infested internally and externally.
9. Two live German Cockroaches were seen inside the sweet goods proof box on line #1.
10. Three live German Cockroaches were noted in and around the rack wash pit. Several leaking valves contribute abundant water around and under this unit.
11. Several torn screens were noted on the south side of the building.
12. Fluorescent light fixtures in the production areas and over raw materials were not provided with safety shields and caps.

FDA Form 483 - November 20, 1977

The purpose of this follow-up inspection was to evaluate the status of the 12 original violations outlined on the November 10 report. During this eight hour inspection, the FDA inspector observed the following:

1. Three live Confused Flour Beetles were again seen on top of the mixer and hopper housings. Repeat Spec. #1.
2. Twelve live Confused Flour Beetles were again removed from both sides of the horizontal mixer. Repeat Spec. #2.
3. Additional repeat violations were listed as follows:
   Item 5: additional insects noted Spec. #3.
   Item 6: additional insects noted Spec. #4.
   Item 7: additional insects noted Spec. #5.
   Item 8: additional insects noted Spec. #6.
4. Numerous insect and larvae trails were noticed inside the base of the bread rounder.
5. Ten live Tribolium Beetles were crawling inside an electric box on make-up table #1.
6. Four live Tribolium Beetles were removed from under the plexiglass covers of the make up roller on the table. Spec. #8.

Immediately after the second inspection, Bill Derby voluntarily closed the bakery. However, this action did not prevent the FDA from prosecuting. In total, the bakery was closed for three weeks at a loss of $150,000.00 and a major account.

Among improvements suggested were:

1. It is essential that Derby's hire a qualified professional sanitarian to implement an adequate preventive sanitation program within the plant.
2. The entire bulk flour system must be dry-cleaned, fumigated, and put on a regular 3 week cleaning cycle.
3. Dismantle the horizontal mixer, and remove all the flour and old dough. Application of a pryethrin based contact insecticide must be undertaken by a certified individual.
4. Empty and clean thoroughly all ingredient scaling containers. Sift contents where applicable.
5. Remove the drive motor to the mixer and replace with a more sanitary design including a sealed housing.
6. Field strip both make-up tables by removing the belts and side housings. Meticulously examine and vacuum out all insect harborages in the lower framework. This will have to be done several times until no signs of insects actually exist.
7. Eliminate the wooden storage rack and replace with a metal one of a more sanitary design.
8. Closely examine and/or sift all varieties of raw materials and discard any infested product. Implement a program of dating materials upon receipt to facilitate first in-first out stock rotation.
9. Carefully seal and fumigate the line proof box.
10. Repair all water leaks in and around the rack washer. Physically remove all dirt, soil, debris, and employ a commercial sanitizer to the area according to label directions.
11. Replace all torn screens at the south side of the building.
12. Install plastic shielding and end caps on all overhead fluorescent lights.
13. Field strip base of rounder, vacuum and carefully spray with a pyrethrin based insecticide.
14. Remove all panels, plexiglass guides, switch box covers, etc., from the table and remove stagnant flour and insects.
15. In addition to the employment of a full time, qualified sanitarian, it is essential that a master sanitation schedule, an in-plant self inspection program, and an intensive personnel training program be undertaken by the management of Derby's.

Food Service Sanitation Notes

Food Service Sanitation Notes *is written by the National Sanitation Foundation. Write to the NSF with your questions on food service sanitation, problems for which you need answers, or issues you feel should be aired. They'll be included in a future issue of* Dairy and Food Sanitation.

Q. When installing free standing food service kitchen equipment, what is considered the best spacing arrangement for cleaning and maintenance?

A. From the NSF "Manual on Sanitation Aspects of Installation of Food Service Equipment," the following relationships are presented:

a. When the distance to be cleaned is less than two feet (0.6 M) in length, the width of the clear, unobstructed space should not be less than six inches (152.4 mm).

b. When the distance to be cleaned is greater than two feet (0.6 M), but less than four feet (1.2 M) in length, the width of the clear, unobstructed space should not be less than eight inches (203.2 mm).

c. When the distance to be cleaned is greater than four feet (1.2 M), but less than six feet (1.8 M) in length, the width of the clear, unobstructed space should not be less than twelve inches (304.8 mm).

d. When the distance to be cleaned is greater than six feet (1.8 M), the width of clear, unobstructed space should be 18 inches (457.2 mm).

To conserve floor space, the use of casters or rollers may be practical to permit easy removal for cleaning.

The dimensions given above apply when a piece of equipment is installed adjacent to another piece or a wall.

The intent of this manual is to cover the more common and usual types of food service equipment and conditions encountered, and to do this in such a manner that the fundamental concepts can be transposed easily and understandably to more specialized circumstances when needed.

ADDRESS any problems or questions you wish clarified or answered to:

Food Service Sanitation Notes
National Sanitation Foundation
3475 Plymouth Road
P. O. Box 1468
Ann Arbor, Michigan U.S.A. 48106

Selected responses will be published in a scheduled issue of "Dairy and Food Sanitation."

Raw Vegetables May Endanger Cancer Patients

Salad and raw vegetables are dangerous foods for certain hospitalized cancer patients to eat, according to a report in the February 12 issue of the *New England Journal of Medicine.*

Many bacteria lurk on fresh salad vegetables, even after washing, and these are known to include types of bacteria that frequently cause life-threatening illness and death in certain types of cancer patients, says the report by Dr. Jack S. Remington, professor of medicine at Stanford University School of Medicine and Dr. Stephen Schimpff, professor of medicine at the University of Maryland School of Medicine.

The problem is most serious for those cancer patients receiving radiation or drug treatment that helps control the cancer but at the same time drastically reduces their white blood cell count. Since the white blood cells are a vital component in the body's defense against bacteria, these patients become extremely vulnerable to bacterial infections while receiving cancer therapy, the doctors explain.

The patient's weakened defenses are unable to prevent foodborne bacteria from invading, and once they colonize the digestive tract, the bacteria may proliferate and spread, causing serious or fatal infection throughout the body.

Most physicians are very fastidious about keeping susceptible hospitalized cancer patients away from sources of airborne bacteria, Remington and Schimpff note, with the use of isolation rooms and through administration of antibiotic drugs.

But ironically, these antibiotics may actually foster, rather than hamper, infections from some of the bacteria commonly found on fresh produce.

Harmless bacteria normally live in peoples' intestines, the doctors explain, and these "friendly" denizens actually do their human hosts a favor by producing noxious substances that discourage virulent bacteria from surviving in the gut.

However, antibiotics kill a large number of the "friendly" bacteria, thereby permitting antibiotic-resistant strains of the harmful ones to take hold.

About 50 percent of hospitalized cancer patients die from an infection rather than from their cancer, Remington notes.

And "nearly 50 percent of infections in cancer patients have been shown to be caused by hospital-acquired organisms which have colonized the patients' digestive tract," state Remington and Schimpff.

"There appears to be insufficient appreciation of the potential role of food as a major origin of these organisms," state the two researchers, both experts in the area of infectious diseases in cancer patients.

Remington is chief of the division of allergy, immunology and infectious diseases at the Palo Alto Medical Research Foundation, and Schimpff is head of the section of infection research at the Baltimore Cancer Research Program (National Cancer Institute), University of Maryland.

Several independent studies have found that salad ingredients, more than any other foods tested in hospital kitchens, harbor harmful bacteria, the doctors note.

"Physicians must recognize this problem now and deal with it. . .by eliminating salads from the diets of certain high risk patients," they declare.

"The hesitation to limit or prohibit feeding salads to patients stems, in some instances, from lack of prospective controlled studies which doctors feel should be performed before such a practice can be recommended or accepted," the two physicians note.

"But shall we really feed harmful bacteria to these high-risk patients to answer such a question, as is being done now with salads."

"We doubt that prospective, randomized trials are indicated to prove that food, especially salads, serve as a major source of new pathogenic bacteria," they conclude.

AVMA Takes Stand On Public Health Issues

For almost 40 years, most every state has had laws requiring pasteurization of milk and most milk products. Recently such laws have been challenged and in several states they have been repealed. The AVMA Council on Public Health and Regulatory Veterinary Medicine submitted a resolution to the AVMA House of Delegates at its annual convention in Washington D.C., in June 1980. This resolution and 2 others submitted by the Council were passed and are printed below with supporting statements.

Milk and Human Health

RESOLVED, that in as much as apparently healthy cows and goats can shed in their milk organisms which

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IAICM Reveals Marketing Study

A new marketing study by the International Association of Ice Cream Manufacturers (IAICM) on ice cream and related products has pinpointed several strategies and practices for manufacturers to follow in order to maintain a sizeable share of the dessert and snack market.

The study, "Marketing Information On Ice Cream And Related Products," is the first industry-wide study of these products in more than a decade. It was conducted to help IAICM member companies learn more about the major changes taking place in consumer preferences, competitive product marketing and other key factors which influence consumer puchasing. The International, the membership of which includes those companies making approximately 80% of the annual U.S. gallonage of ice cream, is headquartered in Washington, D.C.

Included in marketing study is data on the demographic characteristics of ice cream consumers, the frequency and conditions of eating occasions, the supermarket performance of these products, and the product lines and the consumer segments which hold the best future marketing potential.

A variety of marketing facts was gathered in an industry survey of IAICM member companies. These included the product lines currently offered, present methods and trends in product distribution, advertising and promotion practices, and market share for categories or "qualities" of ice creams and related products. Considerable attention to novelty products was also given in the study, and to the marketing patterns for these products in convenience stores and ice cream specialty stores.

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AVMA Stand, *con't. from p. 166*

are pathogenic to human beings and may cause diseases such as brucellosis, *Campylobacter* enteritis, salmonellosis, and tuberculosis; and, in as much as milk handlers may introduce pathogenic agents during the handling of unpasteurized milk (including certified and raw milk), only pasteurized milk and milk products should be sold for human consumption. Be it further resolved that in those states where the sale of unpasteurized milk is authorized, those products should be labeled *"Not Pasteurized and May Contain Organisms that Cause Human Disease"*.

Statements About The Resolution

1. Milk is a highly nutritious food especially beneficial to the growth of children and is consumed by a large portion of the population.

2. Milk, because of its nutritional quality, is an excellent culture medium for microorganisms. As such, it is a potential vehicle for the transmission of pathogenic organisms. In the history of the United States and in other parts of the world today, milk has been responsible for the widespread dissemination among the human population of many severe diseases including: bacillary dysentery, brucellosis, diptheria, salmonellosis, streptococcal infection, tuberculosis, and typhoid fever.

3. In the United States, milk pasteurization has been a major contributor to the drastic reduction in the occurence of these diseases. Milkborne bovine tuberculosis and brucellosis have been extensively reduced in the human population. In the United States today, milk, properly handled and stored after pasteurization, is rarely implicated in disease transmission.

4. There is no definitive evidence that pasteurization significantly decreases the nutritional value of milk.

5. Information in the scientific literature documents the human health hazards of unpasteurized milk consumption including Certified Raw Milk. Available scientific methods utilized by Certified Raw Milk producers in lieu of pasteurization does not assure a product safe for human consumption. This is evidenced by isolations of *Salmonella dublin* from Certified Raw Milk and associated cases of salmonellosis in human beings.

6. A similar resolution, submitted by the Council in 1979, was referred back to the Council for further consideration. The Council heard additional testimony and discussed the subject at its fall 1979 and spring 1980 meetings. It is the unanimous opinion of the Council that it is not possible to develop economically feasible standards for unpasteurized milk that would insure its freedom from pathogenic organisms. The public health and regulatory agencies of those states that permit the sale of unpasteurized milk and milk products for human consumption must bear the responsibility for their actions. The Council resubmits the resolution in its present form and recommends its adoption.

Reprinted from CDC Veterinary Public Health Notes, *October 1980 issue.*

Salmonellosis Epidemic Linked to Marijuana

Outbreaks of salmonellosis epidemiologically linked to marijuana were recently reported in Ohio and Michigan.

Samples of marijuana obtained from several households of patients in both states were subsequently found to be contaminated with *Salmonella muenchen,* the organism isolated from all 62 patients. This is the first outbreak of salmonellosis in which marijuana has been identified as the source of infection.

From December 12, 1980 to February 4, 1981, *S. muenchen* was isolated from 36 persons in eastern Ohio and from 26 persons in Michigan. In Ohio 72% of the ill persons were hospitalized. Diarrhea, fever, and abdominal pain were the most frequently encountered symptoms.

Teenagers and young adults accounted for an unusually large number of the cases. In Ohio in the households of 75% of the child patients, 71% of young adults, and 1 of 3 older adult patients, there was a history of marijuana use. In Michigan, where data were available from 17 patient households, a history of marijuana use was found in the households of 80% of the children and 71% of the young adult patients.

To test the hypothesis that marijuana was associated with *S. muenchen* infection, a case-control study was performed using 17 Michigan patients. All patients, their age and residence-matched controls (2 each), and all household members older than 13 years in the families of cases and controls were interviewed. Patients were significantly more likely than their matched controls to live in households where marijuana was in current use.

MMWR editors report that had Ohio and Michigan not serotyped their *Salmonella* isolates, it would not have been evident that these outbreaks were related.

Although saliva on shared marijuana cigarettes has been implicated in the spread of hepatitis B, this is the first instance reported to CDC in which marijuana was the source of infection.

In these salmonellosis outbreaks, the precise mechanism of transmission is unknown. For the marijuana users, the most likely route of infection was direct contact with the marijuana while preparing or smoking a cigarette. These patients may have been an additional risk, editors note, because this drug has been shown to lower gastric acidity. Thus, a low dose of *Salmonella* organisms may have led to the illness. The cases among children and other non-marijuana users indicate that secondary transmission probably occurred, although it is possible that these patients had direct contact with contaminated environmental sources.

There are 300-400 isolates of *S. muenchen* from humans reported to CDC each year. *S. muenchen* has been isolated from poultry, cattle and swine. In this outbreak, the marijuana could have been contaminated with animal feces either at the time of cultivation or at the time of drying and storage. *Salmonella* organisms can tolerate dry conditions and are frequently isolated from soil and dust samples around poultry-rearing facilities.

Excerpted from the Center for Disease Control's Morbidity and Mortality Weekly Report, *Vol. 30, No. 7, February 27, 1981.*

IAICM Report, *con't. from p. 167*

Several essential marketing theories were either identified or confirmed in the study. Among those were that ice cream is now most frequently consumed as a snack rather than a dessert, and that the most popular serving time for these products is the evening/bedtime snack, or with dinner, with these times accounting for nearly 75% of all eating occasions for these products. Another key fact which the study documents is that these products continually out-perform other products in the supermarket frozen food section in such vital aspects as space productivity and contribution to retailer gross margin.

Researchers at two major universities conducted the marketing study. They are Dr. Ronald D. Knutson and Charles Hunter, both of Texas A & M University, College Station, TX; and Dr. Karl W. Kepner of the University of Florida, Gainesville, FL.

One of the most important results of this study, according to the IAICM, is that it points the way to the next marketing data needed; in-depth, regional information on consumer attitudes to help individual companies develop and market the products consumers want.

"We have learned, from this just-completed study, much more about what consumers are buying and the conditions of purchase and consumption. What is now needed is to learn why, so that future marketing efforts continue to meet consumer demands," the Association said.

Single copies of "Marketing Information On Ice Cream And Related Products," are being provided to each manufacturer member of the International. Additional copies to members are available at $50.00 each and nonmembers can purchase a copy for $150.00 each. Orders should be directed to IAICM, 910 - 17th St., N.W., Washington, D.C. 20006, 202-296-4250.

Does business stress cause high blood pressure?

Stress on the job is a real problem for most of us. Many people think high-pressure jobs cause high blood pressure.

Scientists and doctors aren't sure if stress causes high blood pressure. But one thing is for sure: *anybody*, no matter how they react to stress, can have high blood pressure.

If you have high blood pressure you can control it—with medication, weight control, less salt, and whatever else your doctor tells you to do, every day.

No matter what you do for a living, keep on living.

High blood pressure. Treat it and live.

National High Blood Pressure Education Program. National Heart, Lung, and Blood Institute. U.S. Department of Health and Human Services.

Committee Reports

PRECOOLING RAW MILK ON THE DAIRY FARM SUBCOMMITTEE, FARM METHODS COMMITTEE

In many dairy operations the milk cooling equipment is inadequate because of changes in cooling requirements, increased milking rates, loss of efficiency in the condensing unit (s) and/or milk in refrigerated milk tanks. Consequently, the dairyman is faced with a decision to install a complete new milk cooling system or to improve his existing system.

Every year an increasing number of dairymen choose the latter alternative and install a precooler. As the name implies, a precooler cools the milk before it enters the milk tank. Sanitary heat exchangers designed to clean in-place with the milking system cool the milk in the portion of the pipeline used to convey the milk to the tank. The heat exchanger may be designed to remove a small portion of the heat from the milk or to cool it to a safe storage temperature. The amount of cooling accomplished is usually determined by the need (how bad the existing system is) and/or the amount of coolant available.

Precoolers are not limited to retro-fitting. Large producers find it possible to reduce the operating cost of milk cooling systems if part of cooling is accomplished in a precooler. The reduced load on the milk tank condensing unit (s) permits the use of smaller condensing units. The reduced cost of the smaller condensing unit (s) and/or the reduced running time will, in part, offset the cost of the precooler.

Although a precooler cannot improve the quality of the milk being cooled, two problems associated with refrigerated milk tanks, churning and rancidity, are minimized because cooling is rapid and without agitation.

Sanitary heat exchangers using well water as the cooling medium serve a dual purpose. The well water is "preheated" enroute to conventional water heating equipment. The resulting cost reduction is partially responsible for the increasing popularity of precooling milk and "preheating" of water on dairy farms.

In an ideal situation, no water is wasted. The heat exchanger is sized for maximum cooling based on the normal water flow during the milking.

Definitions

Precooler

A heat exchanger that partially cools the milk before it enters the tank. May be emloyed when the existing cooling equipment lacks the needed capacity for maintaining the desired temperatures or to reduce the load on mechanical refrigeration equipment. Also used as a means of tempering water.

Instant Cooler

A heat exchanger designed to cool milk to a safe storage temperature (38°F or lower) before it enters the tank. In large dairy operations instant coolers may be used in preference to conventional methods due to the increased capacity.

Combination Cooler

A heat exchanger using a booster cooling section and an instant cooling section.

Milkway

The portion of a heat exchanger that conveys milk.

Waterway

The portion of a heat exchanger that conveys the cooling medium.

Types of Equipment

Plate Type Heat Exchanger

Plate type heat exchangers have been used in milk receiving situations, processing plants and on large dairy farms for many years. New compact designs that lend themselves to wall or floor mounting account for their increased use.

Cooling is accomplished by pumping milk through very narrow milkways between two gasketed stainless steel plates, the opposite sides of which have coolant moving in a counterflow direction.

Tubular Type Heat Exchangers

Milk is pumped or allowed to drain by gravity through milkways (tubes) inside a shell or concentric tube carrying coolant in the opposite direction. The milking system pump is usually sufficient for pumping the milk through the tubes.

Other (To Be Developed)

Cooling Medium

Refrigerant

Heat exchangers using direct expansion to cool the milk must be equipped with refrigerant controls designed to maintain a temperature of 32°F (minimum) to avoid freezing the milk. This is often accomplished by using a by-pass valve that admits high pressure vapor directly into the low side.

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Well Water

Heat exchangers using well water are the most common. Small amounts of water counterflow the milk, producing efficient heat transfer. The water is not wasted. In a stanchion barn the water may be piped directly to the drinking cups. In a parlor operation the water may go to the prep stalls, flush tanks or hose stations. In some cases the water may return to the water system by means of a storage tank and a second pump. A dairyman who is using warm water during his milking operation receives the greatest benefit from precooling. He saves cooling costs and also water heating costs. Savings can be substantial.

Chilled Water

This method requires the use of an instant chiller or ice bank capable of providing 32°F water. The chilled water is returned to the ice builder for recirculation permitting the use of a storage tank without additional cooling and the use of a much smaller condensing unit operating over a longer period.

Glycol

Food grade propolyene glycol may be added to the ice builder to reduce the chilled water temperature. A 6% solution will not interfere with ice formation and will provide 29°F water leaving the ice builder. If an instant chiller is used, food grade propolyene glycol must be added to prevent ice formation in the chiller passages.

Fabrication

3-A Approved Equipment Only

Installation Guidelines

1. Openings to the heat exchanger should be in the milkroom for adequate environmental protection for cleaning, sanitizing and drainage.
2. Heat exchangers should be installed so that adequate space is provided for disassembly and inspection.
3. Milkways shall be self-draining following the cooling cycle.
4. Waterways in tubular heat exchangers shall be self-draining following the cooling cycle to prevent lowering of cleaning solution temperatures.
5. Milk filtering shall be between the milk receiver group and the heat exchanger.
6. Tubular or plate heat exchangers must be installed in a manner that permits ease of disassembly for visual inspection of the milkways. (Milkways designed for cleaning-in-place are not required to be accessible for visual inspection if the milkway is cleaned as a continuous tube.)
7. The refrigeration unit (s) used on tanks in connection with a precooler may be sized so that the *combined* cooling effect of the precooler and the refrigeration unit (s) meets or exceeds applicable cooling requirements.
8. It is recommended that recording thermometers be used with refrigerated milk tanks that are equipped with minimum refrigeration and with holding tanks that have no refrigeration. (It is recommended that all raw milk holding tanks have sufficient refrigeration for maintaining the milk at safe storage temperatures).
9. In lieu of built-in refrigerated surface in milk holding tanks, it is recommended that means be provided for recirculating milk through the precooler.

Subcommittee members:
Richard Ayres
Clarence Luchterhand
Alvin Tesdal
Aubrey Wisdom
B. J. Demott
Russell Lock
Marshall Cooper
Darl Evans (Chairman)

SAMPLING OF MILK IN TRANSPORT TANKS SUBCOMMITTEE, FARM METHODS COMMITTEE

Some progress has been noted in the sampling of milk in transport tanks. Jay Boosinger, Florida Department of Agriculture and Consumer Services, reported at the Farm Methods Committee Meeting held in conjunction with the National Mastitis Council on February 20, 1978, in Louisville, Kentucky, on trials conducted by Elbert Cammack, Chief, Bureau of Dairy Laboratories, Tallahasse, Florida. High speed agitation in the over-the-road tanker for five minutes was adequate in obtaining a representative sample. The interval fat testing was used as an index for getting a representative sample that then could be used for compositional, bacteriological and other testing.

Dr. Edward P. Glass, Department of Food Sciences at the Pennsylvania State University, is conducting tests on the use of an automatic sampler that shows promise in obtaining representative samples to perform fat, bacteriological and obtaining a representative sample from a tank truck.

A nationwide survey of current tank truck sampling practices is to be conducted using a questionnaire that

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will be sent to milk co-operatives, proprietary milk plants and state milk sampling surveillance officers. This information will be helpful in preparing a quideline for sampling tank trucks prior to or during the unloading of the milk from the tank truck. It has been suggested a pamphlet be printed on "Procedures for Sampling".

Subcommittee Members:

Robert Farst
P. Fred Ahalt
William Arledge
Ray Belknap
Mark Campbell
Bernard Schieb
Franklin Balliet
Virgil Grace (Chairman)

WATER TREATMENT AND PROTECTION SUBCOMMITTEE, FARM METHODS COMMITTEE

On the dairy, properly treated water is essential to proper cleaning and sanitizing of equipment and tankage, for udder washing, as well as for drinking for the herd and for humans. These various uses and the government regulations pertaining to them means the dairyman must give his water supply careful attention.

The New PMO

The 1978 Pasteurized Milk Ordinance has been completed and approved by the National Conference of Interstate Milk Shippers and has been distributed to the various state agencies involved with putting it into effect. It is to become effective July 1, 1980. The new PMO will require sampling and bacteriological testing of water supplies every three years instead of only when the supply system is built or changed. This is a major improvement which should improve water quality and public health. The basic policy on water system construction is the same, though expanded, and clarified. It is in close agreement with EPA "Manual of Individual Water Supply Systems." This manual, of course, requires that all well casings extend above ground level.

The FDA position on buried well casings remains the same. Their position is to allow wells with casings below ground level to be used if constructed before 1965, but they are to be sampled and must pass the bacteriological test every six months. If the water system is ever changed or it fails the bacteria test, it must be built with the casing terminating above ground.

Water Supply Manuals

The committee remains in support of the EPA manuals EPA-430/9-74-007 "Manual of Individual Water Supply Systems" and EPA-430/9-73-002 "Cross-connection Control Manual." These two booklets form a comprehensive guide to water supplies and cover construction, bactericidal treatment, mineral content control and prevention of contamination by non-potable waters. The recommendations in these booklets are well worth following by the dairymen.

It is recommended by the committee that good planning and care be applied to the original construction of a well. A carefully placed and built well will avoid problems in the future and can reduce the need for water treatment or conditioning.

Water Quality Education Program

The subcommittee has been continuing its work on an education program about water quality for the dairyman. The basic idea behind the program is that the way to make sure water is safe and prepared for use on the dairy is to test it after the well is constructed and properly treat it as required before use. Proper treating methods and equipment coupled with periodic water sampling and testing will result in good water for the dairy or farm.

The committee has undertaken to distribute information about water treatment to the dairyman. To date, there are 2200 sets of brochures in varying stages of the distribution process. They are being disseminated mainly in the Midwest and West by subcommittee members. They are being distributed by means of state health departments, university extension services, and milk producer cooperatives. Preliminary reports are that extension agents and dairymen find them helpful. By this time next year we should have a sounding as to the extent they have been put to use.

The brochures that are being used are published by the Water Quality Association, Lombard, Illinois. These brochures are informative, technically accurate, impartial and were presented to the Farm Methods Committee with the last two year's reports. The titles are descriptive of the content:

1. "Bacteriological Safety"
2. "Water Hardness"
3. "The Stainers - Iron and Manganese"

Funding for additional brochures from committee members or their organizations is welcome. The cost of these brochures is now $.27 per set. These booklets are available to any IAMFES member from the subcommittee chairman.

Disinfecting Equipment

Chlorination is the most commonly used disinfecting method in this country. It has been suggested that chlorinating equipment is not completely reliable for

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Calendar

April 12-15---DAIRY AND FOOD INDUSTRIES SUPPLY ASSOCIATION, 62nd Annual Meeting. Hyatt Hilton Head, Hilton Head, SC. Contact: Dairy and Food Industries Supply Association, Inc. 5530 Wisconsin Ave., Washington, DC 20015.

April 13-15---PESTICIDE RECERTIFICATION. Hershey, PA. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

May 11-13---QUALITY CONGRESS. Sponsored by the American Society for Quality Control, in cooperation with the 5th Triennial Conference of the International Academy of Quality. San Francisco, CA. Contact: D. C. Schmidt, Manager, Public Relations, American Society for Quality Control, 161 W. Wisconsin Ave., Milwaukee, WI 53201.

May 12-14---36th ANNUAL PURDUE INDUSTRIAL WASTE CONFERENCE. Stewart Center, Purdue University, West Lafayette, IN. Contact: J. D. Wolszon, Purdue Industrial Waste Conference, Civil Engineering Bldg., Purdue University, West Lafayette, IN 47907.

May 13-15---3A SANITARY STANDARDS COMMITTEE MEETINGS. Galt House, Louisville, KY. Contact: Harold Thompson, DFISA, 5530 Wisconsin Ave., Room 1050, Washington, DC 20015.

May 16-20---61st ANNUAL NATIONAL RESTAURANT SHOW. McCormick Place, Chicago, IL. Contact: NRA Convention Dept., One IBM Plaza, Chicago, IL 60611.

May 18-21---INTERSTATE MILK SHIPPERS CONFERENCE. Hot Springs, AK. Contact: Herb Vaux, Indiana State Board of Health, 1330 W. Michigan St., Indianapolis, IN 46206.

May 27-29---AMERICAN SOCIETY FOR QUALITY CONTROL, 36th Annual Quality Congress San Francisco, CA. Hilton & Tower. ASQC, Dept. P1-1000, 161 W. Wisconsin Ave., Milwaukee, WI 53202.

June 1-4---PENNSYLVANIA DAIRY FIELDMEN'S-LABORATORY DIRECTORS CONFERENCE. Keller Conference Center, The Pennsylvania State University, University Park, PA. Contact: Wallace C. Jackson, RD 2, List Hill Road, Valencia, PA 16059.

June 5-6--INSTITUTE OF FOOD TECHNOLOGISTS' BASIC SYMPOSIUM. Atlanta, GA. Symposium topic: Food Carbohydrates. Contact: Dan E. Weber, Director of Marketing/Administration, Institute of Food Technologists, 221 N. LaSalle St., Chicago, IL 60601.

June 7-10---IFT 81, 41st ANNUAL MEETING AND FOOD EXPO, Institute of Food Technologists. World Congress Center, Atlanta, GA. Contact: IFT, Suite 2120, 221 North LaSalle St., Chicago, IL 60601, 312-783-8424.

June 8-10---AIB/FDA SANITATION AND QUALITY ASSURANCE MANAGERS WORKSHOP. Chicago, IL. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

June 21-24---24th ANNUAL CANADIAN INSTITUTE OF FOOD SCIENCE AND TECHNOLOGY. Theme: "Research: Whose Business?" Winnipeg Convention Centre/ Holiday Inn, Winnipeg, Manitoba, Canada. Contact: Barry McConnell, Conference Chairman, Dept. of Food Science, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2.

July 13-15---PRINCIPLES OF QUALITY ASSURANCE. Washington, DC. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

August 3-5---PESTICIDE RECERTIFICATION. Manhattan, KS. Sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

Aug. 9-12---IAMFES ANNUAL MEETING. Sheraton-Spokane, Spokane, WA. Contact: IAMFES, PO Box 701, Ames, IA 50010, 515-232-6699.

Aug. 17-21---21st ANNUAL MEETING, HOSPITAL, INSTITUTION & EDUCATIONAL FOOD SERVICE SOCIETY. Houston, TX. Contact: HIEFSS, 4410 West Roosevelt Road, Hillside, IL 60162.

Aug. 30-Sept. 4---WORLD ASSOCIATION OF VETERINARY FOOD HYGIENISTS, Eighth Symposium. Theme: "Animal Health, Food Safety and the Consumer." Dublin, Ireland. Contact: The Secretariat, 8th WAVFH Symposium, 44 Northumberland Road, Ballsbridge, Dublin 4, Republic of Ireland.

Sept. 14-16---PESTICIDE RECERTIFICATION. Chicago, IL. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

Sept. 16-18---NEW YORK STATE ASSOCIATION OF MILK AND FOOD SANITARIANS, Annual Conference. Hotel Syracuse, Syracuse, NY. Contact: D. K. Bandler, 11 Stocking Hall, Cornell University, Ithaca, NY 14853.

Sept. 23-24---SOUTH DAKOTA STATE DAIRY CONVENTION. Downtown Holiday Inn, Sioux Falls, SD 57100. Contact: Shirley W. Seas, Dairy Science Dept., South Dakota State University, Brookings, SD 57007, 605-688-5420.

Sept. 25---FOCUS ON FOOD SCIENCE SYMPOSIUM III, "Modern Meat Technology---Microbial Considerations." Kansas State Union. Contact: D.Y.C. Fung, Food Science Graduate Program, Call Hall, Manhattan, KS 66506, 913-532-5654.

Oct. 19-21---CANADIAN SANITATION SEMINAR. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

Nov. 15-19---FOOD AND DAIRY EXPO '81, Dairy and Food Industries Supply Association. World Congress Center, Atlanta, GA Contact: Fred Greiner, DFISA, 5530 Wisconsin Ave., Room 1050, Washington, DC 20015.

Nov. 16-19---ADVANCED FOOD MICROBIOLOGY. Manhattan, KS. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

IAMFES Affiliate Officers

ALBERTA ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS

Pres., Lawrence Roth, Food Laboratory Services, 5th floor, OS Longman Laboratory Building, 6909 116 Street, Edmonton, Alberta T6H 4P2
Past Pres., Don Paradis ..... Edmonton
Pres-Elect, Ed Bristow ..... Wetaskiwin
Sec'y., Elwin Loney, Agriculture Canada, 8th floor, 9820 107 Street, Edmonton, Alberta T5K 1G2
Treas., Glen Evoy, ... Edmonton
Directors:
Bob Hunter ..... Red Deer
Shauna McCann ..... Edmonton
Gordon Klassen ..... Edmonton
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Past Pres., Morris L. Holt ..... Citrus Heights
First Vice-Pres., Peter J. Benedetti . San Leandro
Second Vice-Pres., Howard Eastham . . Sacramento
Sec'y-Treas., Jack Pollock, 402 Johnson St., Manhattan Beach, CA 90266

CONNECTICUT ASSOCIATION OF DAIRY AND FOOD SANITARIANS, INC.

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Vice-Pres., Robert de Hughes ... South Windsor
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Stronger Dairy Promotions Encouraged

In an industry which has shown almost a genius for production-witness the tremendous increase in milk per cow in the last 20 years-the necessity for an equal achievement in milk utilization is beginning to sink in. Canada has stepped up its local promotion of dairy products through its Dairy Bureau. The co-responsibility levy of the European Community is just getting into action to try to generate sales of butter and cheese. The US industry is being urged to do something about its increasing milk production. (Earlier estimates of a 1% increase for 1980 have been revised to 3%, with more expected for 1981.)

As an example of what can be done, Canada's Dairy Bureau, which started butter promotion in 1977, when butter use had declined 9%, reported zero decline by 1979 and a 7.4% increase in 1980. In the US, a New York State special promotion yielded $2.4 million in new sales for every $1 million spent, while a survey of 10 major markets showed an average increase of $2.20 for each $1 million of promotion. California, which has had a special State promotional fund for many years, consistently leads the US in per capita milk consumption.

Almost any hour of US television on any commercial station will demonstrate what the competition is doing. Margarine is "natural", soft drinks (more popular now as beverages than milk) will make life beautiful, beer is the great reward. One of the negative factors, the cholesterol scare, is beginning to abate, but overall, the competition is winning, hands down. Milk has been nosed recently out of first place; butter's long skid is legendary. Only cheese and such specialized products as yogurt are gaining. A close look at the advertising budgets of the competition might be revealing.

Reprinted from Market Frontier News *of the Dairy Society International.*

Committee Reports, *con't. from p. 172*

many situations. The committee is considering doing a study of disinfecting equipment alternatives as a project in the future.

Subcommittee members:

Keith Harvey
Gene Ronald
James Black
Charles Gilman
Kenneth Seaman
Steven Sims (Chairman)

Dairy and Food Sanitation

The new IAMFES magazine, *Dairy and Food Sanitation* addresses many of the same concerns as does the *Journal of Food Protection. Dairy and Food Sanitation*, however, provides articles of immediate interest and application to the work of the practicing sanitarian, fieldman, and quality control person.

As such, it complements the scientific *Journal of Food Protection,* which continues to offer the latest research in milk and food sanitation and technology.

In addition to articles, *Dairy and Food Sanitation* contains departments formerly included in the *Journal;* but they're expanded in the new magazine to offer readers more complete information about news, events, and others in the field. Among the expanded departments are news about IAMFES affiliate members, meetings, and events; Association events; new product news; excerpts from such publications as the Center for Disease Control's "Morbidity and Mortality Weekly Report," and the Federal Register. New 3A and E-3A Sanitary Standards and amendments to existing standards are also included in *Dairy and Food Sanitation.*

Regular publication of *Dairy and Food Sanitation* began this January. Give the portion below to a colleague who might like to receive *Dairy and Food Sanitation*, or to request additional information about IAMFES and the *Journal of Food Protection.*

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JFP Abstracts

Abstracts of papers in the April Journal of Food Protection

Oilseed Protein Ingredients as Antioxidant for Meat in Foodservice, Ki Soon Rhee and Yolanda A. Ziprin, Department of Animal Science, Texas Agricultural Experiment Station, Texas A & M University, College Station, Texas 77843

J. Food Prot. 44:254-256

This study indicates that glandless cottonseed, peanut or soy protein ingredients may be incorporated in gravy or sauce for precooked meat products to retard development of oxidative rancidity. The oilseed protein ingredients were incorporated in the gravy in which cooked ground beef patties (100% beef) were stored; also, hot-water extracts of the protein ingredients were used as a cover liquid for refrigerated roast beef slices. Oxidative rancidity in the beef patties or in the roast beef slices after 3 and 6 days of storage at 4 C was determined by the thiobarbituric acid test.

Comparisons of Tests of Milk Samples taken Conventionally and with an Automatic In-Line Sampler, R. T. Marshall and D. S. Shelley, Department of Food Science and Nutrition, University of Missouri-Columbia, Columbia, Missouri 65211

J. Food Prot. 44:257-262

Samples of manufacturing bulk milk were collected from 102 producers by the conventional procedure and were randomly coded. At least 3 h later, samples were collected by haulers from the same tanks with in-line samplers (ISOLOK MS5) mounted on the truck. Overall weighted mean fat tests for producers on nine routes were 3.669% for conventional and 3.644% for in-line samples. The overall weighted mean of load samples taken at the plants was 3.655%. Unweighted means of the producer samples taken by the conventional and in-line methods were 3.781% and 3.752%, respectively. The difference between the means, 0.029%, was highly significant ($P<0.001$). There was a significant difference ($P<0.05$) in fat content of samples taken conventionally after 5 and 8 min of agitation. Carryover of bacteria from tanks with high counts to samples with low counts was not detectable by direct microscopic counts in field studies. However, in laboratory studies with an emptied hose and a few seconds of delay before sampling small carryover occurred. Significance of the carryover effect depends on volume of milk sampled and whether bacterial content is marginal.

Inhibition of *Staphylococcus aureus* Growth and Enterotoxin-A Production in Cheddar Cheese Produced with Variable Starter Activity, G. F. Ibrahim, A. K. Baldock, D. R. Radford and L. B. Ireland, Dairy Research Centre, Department of Agriculture, P.O. Box 217, Richmond, New South Wales, Australia

J. Food Prot. 44:263-267

Twelve cheese batches were made with variable starter activity, from milk inoculated with *Staphylococcus aureus*. At the end of cheddaring, only half the curd of each batch was salted and each portion was then pressed separately, cut and stored at 11 and 4 C for 6 weeks. Changes in bacterial counts, pH, enterotoxin A concentration and organoleptic properties were monitored. At the end of cheddaring, enterotoxin was detected in batches made with large initial inocula of *S. aureus* and/or low starter activities. At the end of pressing, the count of *S. aureus*, pH and enterotoxin concentration in the unsalted cheese (USC) were significantly lower than in salted cheese (SC), due to the adverse effect of salting on growth of microorganisms other than *S. aureus*. No change in enterotoxin concentration was detected in USC during storage at 11 and 4 C, and a sharp decline in *S. aureus* count occurred. The rate of such decline at 11 C exceeded that at 4 C. Increases in *S. aureus* count and enterotoxin concentration occurred in some SC batches stored at 11 C, whereas a slight decrease in *S. aureus* count and no change in enterotoxin concentration occurred in all SC stored at 4 C. At the end of storage, no cheeses had gas defects or significant flavor defects, which could have prohibited further processing.

Effects of Preenrichment Media and Their Incubation Conditions on Isolating Salmonellae from Fish Meal, S. Kafel, Agro-Technical Academy, Veterinary Faculty, 10-957 Olsztyn, Poland

J. Food Prot. 44:268-270

Various combinations of preenrichment media, their incubation times and temperatures and atmospheres were examined for their efficacy in recovering salmonellae naturally occurring in fish meal. Variations included three preenrichment media (lactose broth, lactose broth supplemented with 10% defibrinated horse blood, and lactose broth with 10% egg yolk), three (25, 37 and 43 C) incubation temperatures, two (24 and 48 h) incubation times, and two (aerobic and anaerobic) incubation atmospheres. Three hundred and twenty samples (50 g each) of various consignments of fish meal known to be contaminated with salmonellae were examined. The lowest number (282) of isolations of salmonellae was obtained using lactose broth for preenrichment. Lactose broth with addition of blood gave 321 isolations, and lactose broth with egg yolk 357 isolations. In general, advantage was observed for preenrichment for 48 h (504) over preenrichment for 24 h (456). This was particularly evident at 25 C with 201 and 144 isolations,

respectively. However, at 43 C the results were reverse (135 isolations after 48 h, and 156 after 24 h). At 37 C not so significant differences were found (168 - 48 h, and 156 - 24 h). Salmonellae were isolated 345 times with preenrichment at 25 C, 324 times at 37 C and 291 times at 43 C. Anaerobic preenrichment gave more (510) positives as compared with aerobic preenrichment (450 positives).

Survival of Bacteria in "Soul Foods" at 10-Centigrade, Adelle W. Stewart, Department of Natural Sciences, South Carolina State College, Orangeburg, South Carolina 29117

J. Food Prot. 44:271-274

The fate of naturally occurring and added bacterial pathogens was determined in "soul foods" purchased at local supermarkets and farm families while the foods were stored under conditions simulating those used for retail distribution, home storage, and preparation before use. Viable count determinations for 10 samples at the end of a 5-day period at 10 C showed considerable decreases in comparison to the inoculum size, indicating that growth was not promoted. *Escherichia coli* survived in all the food samples but the populations decreased by 1 to 9 log cycles/g of food. *Salmonella typhimurium* survived in 59% of the food samples. Except for farm family collard greens and sausage (encased), *Staphylococcus aureus* remained viable in all of the foods tested and was the only survivor in cracklings (cooked) obtained from both sources. *Clostridium perfringens* was detected in farm family sweet peas and 23% of the pig offal samples.

Rapid Estimation of Microbial Numbers in Fresh Ground Beef by Use of the *Limulus* Test, James M. Jay, Department of Biological Sciences, Wayne State University, Detroit, Michigan 48202

J. Food Prot. 44:275-278

From 153 samples of fresh ground beef, aerobic plate counts (APC) and counts of viable gram-negative bacteria (GNB) were determined along with ng of endotoxin/g by use of the *Limulus* amoebocyte lysate (LAL) test. When the 153 meats were grouped by one-half log cycle ranges beginning with samples that contained < log 4.00 GNB/g, they were placed into eight groups. Mean ng endotoxin for these groups increased from 14 for the five samples with GNB < log 4.00 to 52,340 for the 16 samples with log GNB from 7.00 to 7.49. The APC to GNB ratios for the 13 meats with log GNB between 4.00 - 4.49 was 21, but decreased steadily to 2.2 for the 16 with log GNB of 7.00 -7.49/g, reflecting the progressive decrease in the proportions of gram-positive bacteria and yeasts as total viable counts increased. The mean number of viable GNB/ng of total endotoxin for 148 of these samples was 1900. To calculate the number of GNB in a sample, the latter value was multiplied by the LAL-determined endotoxin in the sample. When GNB/g was multiplied by the respective APC to GNB ratio values, the approximate APC/g was derived. Although the variance and confidence limits of some of the APC and GNB ratio values were wide, use of LAL to estimate APC in 1 h was found to be workable.

Prevalence of *Clostridium perfringens* in Pork during Processing, F. T. Bauer, J. A. Carpenter and J. O. Reagan, Department of Food Science, University of Georgia, Athens, Georgia 30602

J. Food Prot. 44:279-283

The prevalence of *Clostridium perfringens* on pork carcasses, fluid from the body cavity, livers, hearts, spleens, visceral pans, scalding vat water and pork sausage was determined. *Clostridium perfringens* was not detected on pork carcasses, hearts, spleens nor visceral pans. Fluid from the body cavity had 11.8% positive incidence while livers had 21.4% for interior tissues and 11.8% for exterior tissues. The organism could always be isolated from scalding vat water. Commercial pork sausage had 38.9% prevalence of *C. perfringens*. Numbers of spores and their heat resistance are also reported.

Microbial Spoilage of Mexican-Style Sauces, F. A. Draughon, M. Elahi and I. E. McCarty, University of Tennessee, Department of Food Technology and Science, Knoxville, Tennessee 37916

J. Food Prot. 44:284-287

The objective of this study was to determine causes for spoilage of Mexican-style sauces prepared "in-house" by restaurants, and to suggest improvements in handling to eliminate this problem. A microbial profile was determined for spoiled enchilada and hot and mild taco sauces. There was no indication of a potential health problem associated with spoiled sauces since *Salmonella* was absent and *Clostridium perfringens* and *Staphylococcus aureus* were present only in low numbers. Spices used in preparing sauces had plate counts ranging from log 4.1 to log 7.7 bacteria per gram. Spoiled sauces had bacterial counts up to log 6.6 per gram. The enchilada and hot sauces which contained the greatest amount of spices had higher bacterial numbers and spoiled more rapidly than the mild taco sauce. Use of ethylene oxide-treated spices, prompt refrigeration of sauces and thorough sanitation reduced counts by 4 log cycles and eliminated spoilage problems.

Development of Microbial Populations in Fermented Wastes from Frozen Vegetable Processing, Nancy J. Moon, Department of Food Science, University of Georgia, Experiment Station, Experiment, Georgia 30212

J. Food Prot. 44:288-293

Changes in microbial populations were evaluated in fermented silage-like products prepared from wastes generated during frozen vegetable processing. *Lactobacillus plantarum* (10^7/g) was used to inoculate wastes from black-eyed peas, corn, potatoes, turnip greens and green beans. Populations of facultative anaerobic flora (lactobacilli, lactic acid cocci), anaerobes (clostridia) and lactate-hydrolyzing microflora differed in silages of different composition. Development of microflora correlated with pH decline and production of volatile and nonvolatile acids. Lactic and acetic acids were produced early while secondary metabolic end products (propionic, butyric acids) accumulated later in silages as populations of clostridia and propionibacteria increased. Minimum pH levels were attained after 2 and 4 days of fermentation. Black-eyed pea and potato silages had relatively high pH levels (>4.50). This was correlated with low soluble carbohydrate content. No generalized role could be determined for population changes of fungi or coliforms. The most desirable waste silages can be produced from temperature-stressed materials adjusted to proper composition to ensure optimum fermentation patterns.

Demonstration of Viral Contamination of Oysters Responsible for an Outbreak of Viral Gastroenteritis, M. J. Eyles, G. R. Davey and E. J. Huntley, Department of Veterinary Pathology, University of Sydney, N.S.W. 2006, Australia; Division of Analytical Laboratories, Health Commission of N.S.W., Lidcombe, N.S.W. 2141, Australia and Food Inspection Branch, Health Commission of N.S.W., Wagga Wagga, N.S.W. 2650, Australia

J. Food Prot. 44:294-296

Two viruses, echovirus type 8 and a reovirus, were isolated from a batch of oysters responsible for an outbreak of gastroenteritis. Characteristics of the illness, detection of Norwalk virus in the feces of one of the victims and other factors indicated strongly that the illness was due to infection with Norwalk virus. Examination of the implicated oysters and a fecal specimen from a victim failed to provide evidence of the involvement of any other causative agent. Thus laboratory evidence of human enteric virus contamination of a batch of food responsible for a viral illness has been provided.

Proper Control of Retail Case Temperature Improves Beef Shelf Life, G. Gordon Greer and L. E. Jeremiah, Research Station, Agriculture Canada, Lacombe, Alberta, TOC 1SO, Canada

J. Food Prot. 44:279-299

Using laboratory-simulated retail conditions, a variety of retail case blower temperatures were selected to determine their influence upon the surface temperature of displayed rib eye steaks, bacterial growth and steak shelf life. Steak surface temperature was found to be significantly correlated with blower temperature and exceeded the temperature of the incoming blower air by 9 C. Furthermore, bacterial generation time and steak shelf life were significantly and inversely related to blower temperature. Shelf life was also dependent upon the initial psychrotrophic bacterial load. Retail blower temperature could be easily adjusted to reduce steak surface temperature to 2 C, and thereby extend the visual shelf life from 3.8 to 8.2 days. From a practical standpoint, these results indicate that a relatively simple temperature adjustment by the retailer could improve the microbial quality and more than double the shelf life of meats on display.

Effect of Frozen Storage on Fungi in Foods, John A. Koburger, Food Science and Human Nutrition Department, University of Florida, Gainesville, Florida 32611

J. Food Prot. 44:300-301

Thirty food samples were frozen and stored at -18, -26 and -34 C. Subsamples were analyzed for changes in total aerobic flora, coliforms and fungi after 0.5, 1, 2, 4 and 6 months. Fungal populations were determined using both acidified Potato Dextrose Agar (PDA) and antibiotic Plate Count Agar (SPCA). Analysis of the data showed that coliforms, as measured by Violet Red Bile Agar, exhibited the greatest decrease during storage, whereas, the fungal population exhibited a sensitivity to freezing greater or less than the total aerobic flora, depending upon the medium used. Since PDA does not accurately measure the total fungal population, the SPCA count may reflect the true fate of fungi during frozen storage.

Role of Nitrite in Cured Meat Flavor: A Review, J. I. Gray, B. MacDonald, A. M. Pearson and I. D. Morton, Department of Food Science and Human Nutrition, Michigan State University, East Lansing, Michigan 48824

J. Food Prot. 44:302-312

Little is known about the mechanism of the reactions leading to formation of cured meat flavor or of the identity of volatile

and non-volatile substances responsible for it. This review of the contribution of nitrite to cured meat flavor in products such as ham, bacon and frankfurters includes sensory analyses and studies of the chemical components contributing to cured meat flavor. The antioxidant properties of nitrite in retarding development of warmed-over flavor in cured meats are also discussed.

Space Shuttle Food Processing and Packaging, C. T. Bourland, M. F. Fohey, R. M. Rapp and R. L. Sauer, Technology Incorporated, 16821 Buccaneer, Suite 206, Houston, Texas 77058 and NASA-Johnson Space Center, Space and Life Sciences Directorate, Mail Code SE-3, Houston, Texas 77058

J. Food Prot. 44:313-319

A new space food system will be introduced on the fifth Shuttle mission. The change includes redesign of the package for rehydratable foods and a new galley. The package will be an injection molded base with a thermoformed flexible lid and a needle-septum concept for rehydration. One package will be used for both rehydratable foods and beverages. Automated production and more readily available materials reduce the cost of space food packaging. The galley system has a food preparation area, a semi-automatic rehydration unit and a convection oven. The time required to add water to the packages has been reduced to 3-5 min. Foods for space flight are purchased in lots and held at 40 F until 1 to 2 months before a scheduled flight. Most of the safety and quality testing are done while the foods are in storage. Foods which pass the tests, i.e. microbiological, sensory, rehydration, storage, and oxygen headspace, are transferred to flight packages in a Class 10,000 clean booth, using clean room techniques. The menu for the Shuttle food system is derived from a variety of foods that are preserved by dehydration, thermostabilization, irradiation and moisture control.

Food Contaminants - Viruses, Edward P. Larkin, Virology Branch, Division of Microbiology, Food and Drug Administration, 1090 Tusculum Avenue, Cincinnati, Ohio 45226

J. Food Prot. 44:320-325

Viruses have been detected in a limited number of foods. Although methods used to examine these foods were usually restricted to detection of human enteroviruses, animal viruses were found in some meats, milk, and eggs; limitations in methodology may have caused other viruses present to go undetected. As the sensitivity of methods increases, studies are being undertaken to detect a greater variety of human intestinal viruses. Data from these investigations should provide the information needed to determine the incidence and public health significance of food contamination by viruses. In areas where virus-contaminated foods may be expected, washing and heating foods to 70 C should provide reasonable protection against the inadvertent consumption of viruses.

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You'll breathe a lot easier knowing your business has CPR-trained people on hand—maybe one for every 50 people. You already have the manpower, and training doesn't take much time. Red Cross can train one of your employees to become an instructor certified to teach CPR classes in your company.

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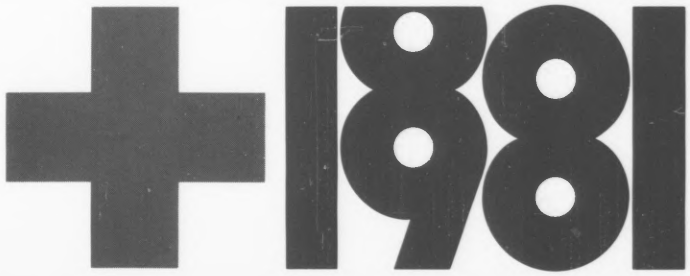
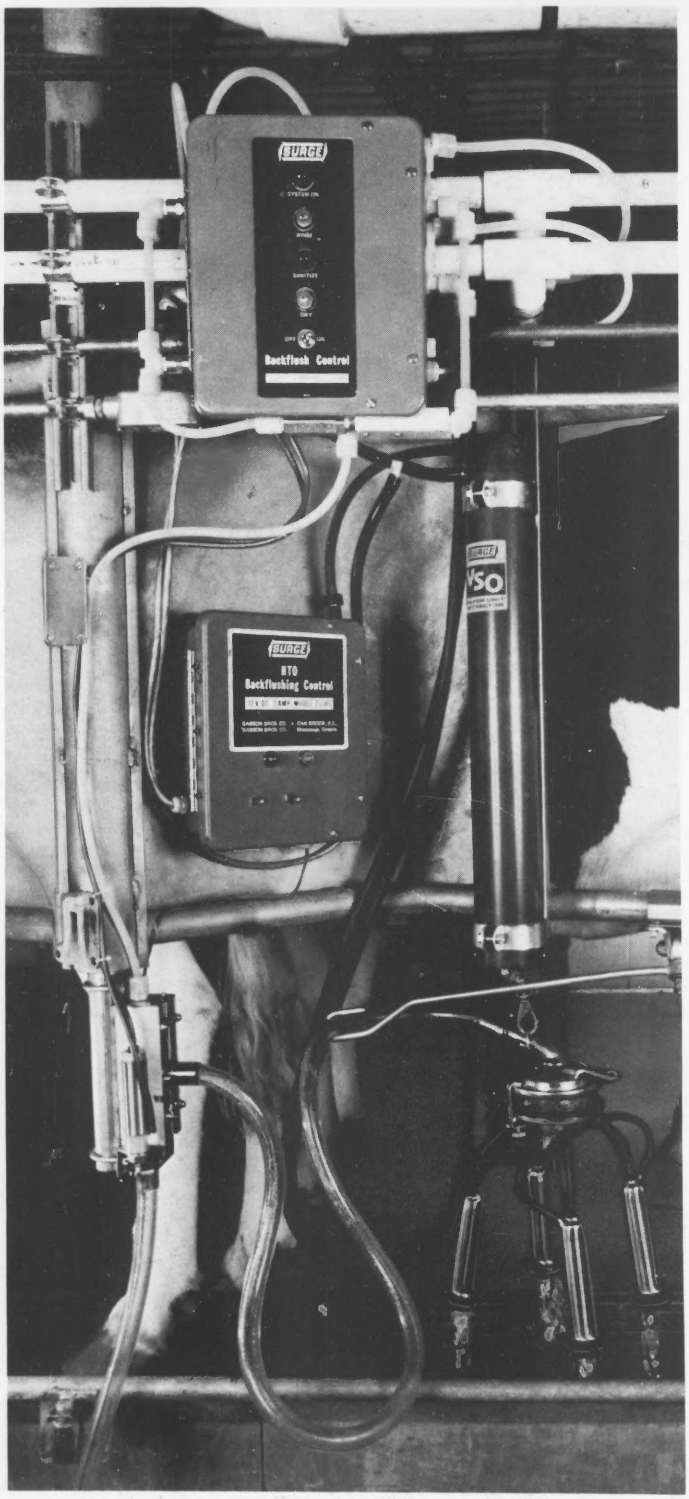


NEW SURGE BACKFLUSH SYSTEM



THE AUTOMATIC WAY TO HELP CONTROL MASTITIS

The Surge Backflush System can cut your mastitis losses substantially by helping to prevent mastitis-causing bacteria from hiding in the milker inflations and getting a free ride from infected cows to healthy cows.

4 STAGES

Here's how it works. After the cow is milked out, the milking unit is switched from the milk line to the backflushing position. The system then treats the miiking unit to a four-stage cleaning and sanitizing process. First a water rinse clears any leftover milk from the unit. Then a solution sanitizes the milker for approximately 50 seconds. Finally the milker is rinsed and dried. Cleaner and fresher for the next cow.

JUST OVER A MINUTE

It's all done automatically in just a shade over a minute. The system works all by itself, completely independent of the operator. The duration of the different stages of the treatment cycle can be adjusted for individual requirements.

Check out this new mastitis fighter. Call your Surge Dealer today. Or write Babson Bros. Co., 2100 South York Road, Oak Brook, Illinois 60521.

We can make your cows worth more.

SURGE