ISSN:0273-2866
Box 701
Ames, Iowa 50010

October, 1984
Vol. 4, No. 10
Pages 373-416
$5.00

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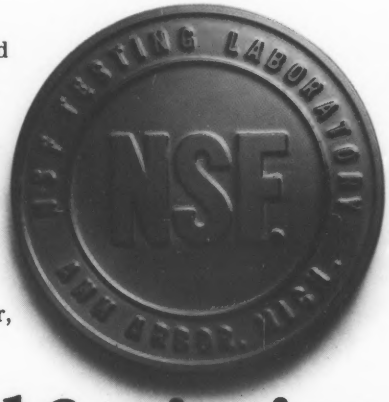

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Dairy and Food Sanitation is published monthly by the International Association of Milk, Food and Environmental Sanitarians, Inc., executive offices at PO Box 701, 5th & Burnett, Ames, IA 50010. Printed by Heuss Printing, Inc., 911 Second St., Ames, IA 50010. **Second-class postage paid at Ames, IA. Postmaster: Send address changes to IAMFES, 5th & Burnett, Ames, IA 50010-0701.**

Manuscripts: Correspondence regarding manuscripts and other reading material should be addressed to Kathy Hathaway, PO Box 701, Ames, IA 50010-0701. 515-232-6699.

"Instructions to Contributors" can be obtained from the editor.

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Subscription Rates: $60.00 per volume, one volume per year, January through December. Single copies $5.00 each. No cancellations accepted.

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Dairy and Food Sanitation

CONTENTS **Vol. 4** **No. 10** **October, 1984**

Dairy and Food Sanitation, Vol. 47, No. 10, Pages 376-379 (October 1984)

Milk: Drinkable or Good - A Case for Mandatory Dating

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A review of some of the factors that have contributed to declining consumption of milk, with special emphasis on deterioration of milk flavor, is presented. Several studies pointing to psychrotrophic bacteria and others implicating exposure to light as the cause of off-flavors during refrigerated storage are cited. Reference also is made to losses of vitamin A and riboflavin when milk is irradiated. Based upon these phenomena, a mandatory shelf life of five days is proposed under present storage temperature limits (45°F) or seven days with an upper limit of 42°F.

INTRODUCTION

A casual comparison of the quality of fluid milk in the market place today with milk sold forty years ago would lead one to believe that great strides have been made. With the automated methods of handling, processing, packaging and distributing milk and an extended shelf life, it would seem apparent that milk quality would have to be improving. But like so many things, what appears on the surface is not always true.

Since I have been involved in milk flavor research for over 30 of the last 40 years, I feel qualified to address this subject and to draw some personal conclusions. Much of the compulsion that I feel to write this paper comes from my concern for the decline in milk consumption since World War II and the impact that it has had on the industry. Surplus dairy products are a very serious problem for the dairy industry, the federal government, and even a concerned public. One of the major causes for this surplus is a gradual but steady decline in the consumption of fluid milk that has occurred over the past 40 years. In 1945, the per capita consumption of whole milk in the U.S. was 335 lbs. and skim and low fat 41.7 lbs. (7). In 1982, skim and lowfat had increased to 75.7 lbs., but whole milk had decreased to only 130.7 lbs. per capita (8). This represents a decrease of more than 60 percent in consumption of whole milk. Even with an increase in the consumption of lowfat milk, the overall loss in consumption of these fluid milk products was greater than 40%. The decline continues.

Factors Contributing to a Decline in Milk Consumption

A number of things happened shortly after World War II that contributed to the decline in milk consumption. First, there was widespread concern about radioactive fallout in foods; milk was a convenient vehicle to monitor the level strontium 90 and relate it to environmental radioactivity. Then Rachel Carson's book "Silent Spring," with its ominous warnings about pesticides appeared, and subsequent testing showed pesticides at low levels in milk. Finally, a suspicion that animal fats could contribute to the development of coronary heart disease caused many to question the value of milk. Each of those incidents was sensationalized in the popular press and had an effect on loss of consumers' confidence in milk. Although each problem was thoroughly dealt with by extensive testing and/or by research and subsequent corrective actions and controls to exonerate milk, the tarnished image somehow continues to hang on.

Certainly another reason for the loss of some of the milk market is the growth of alternative beverage industries. During the same period that milk consumption declined from 43.8 to 24 gallons per capita (1945-1982), soft drink consumption increased from 8.3 to 40.1 gallons. It was pointed out by Bill McDonald, Marketing/Economic Research Director for the American Dairy Association, cited in an article by Norton (9), that the fluid milk promotion and research was out-spent $57 to $1 in the beverage field and $23 to $1 in the soft drink industry.

A Decline in the Flavor of Fluid Milk

A more subtle phenomenon, however, occurred during that same period of time that has had an even more damaging effect on milk consumption; that is a deterioration in the overall flavor quality of fresh fluid milk.

Let us for a moment go to the mid-forties; some dramatic things were happening in the dairy industry.

Farm bulk tanks and pipeline milkers with better sanitation began to replace the ten gallon milk cans that often were inefficiently cooled. As this occurred, there was a belief that this rapidly cooled milk could be kept on the farm longer, in the plant, and even in the retail outlets for extended periods of time. Milk was no longer considered a *very* perishable product that consumers had to replenish every 2 to 3 days. Not only was there every-other-day or longer pickup of raw milk on the farm, but store deliveries were often once a week, and milk shelf lives of 10 to 12 days became commonplace. Milk in larger size packages became popular and was certainly convenient for consumers. Milk bacteria counts from efficient processing plants were often less than 1000 cells per milliliter. However, the microflora changed in the raw and even in the pasteurized milk. Psychrotrophic (cold tolerant) bacteria became a dominant factor in the quality of raw milk, whereas previously mesophilic or "body temperature" organisms predominated. These cold tolerant organisms produce "unclean," "fruity" and "fermented" flavors when present in very high numbers. Some psychrotrophic bacteria produce proteolytic enzymes which *survive* pasteurization and produce bitter flavors during storage.

Even though most of the cold tolerant bacteria are destroyed by pasteurization, it is virtually impossible to package pasteurized milk without some post-pasteurization contamination by these organisms. When present, even in low numbers, psychrotrophs reproduce during refrigerated storage. At 40°F they reproduce fairly slowly, but when the temperature gets near 45°F (the legal limit for storing pasteurized milk), they reproduce at a relatively rapid rate. This was illustrated in a study by Hankins and Shields (5), of the University of Connecticut, of commercial milk from 9 dairies in Connecticut where the flavor of over 90% of milk held at 40°F remained acceptable at the "sale day" during three different test periods; whereas only 50 to 70% of that milk was acceptable in flavor when held at 45°F. Research from several other universities has shown that milk undergoes a deterioration in flavor during refrigerated storage. Janzen et al. (6) of South Carolina suggested a 7 day shelf life (acceptable flavor) for milk held at 40°F and 2-3 days at 45°F on the basis of their work.

Shipe et al. (13) from Cornell, using a 50-member consumer taste panel and an 8-member trained panel, evaluated randomly selected commercial milks from 24 pasteurizing plants. There was excellent agreement between the consumer and trained taste panels. The consumer panel disliked 3 of the 24 fresh (43 h after processing) and 13 of the "sell-by" date (aged) samples. In the aged samples, 12 of the 13 samples disliked by the consumers were criticized as being fruity-fermented, rancid, or both by the trained panel. Bassette et al. (3) found that four of six Kansas milk processors' samples showed serious flavor deterioration after one week in the display case. The samples with high psychrotrophic bacteria counts in this study first gave "unclean" flavor, then as numbers increased, flavors such as "fruity," "fermented" and "bitter" appeared. When these flavors develop, the milk may still be drinkable, but it certainly does not have the good, clean, and fresh flavor normally attributed to milk.

With longer storage times for raw milk on the farm and in the plant, often milk is 4 to 5 days old when it is pasteurized. Patel and Blankenagel (10) found that when bacteria exceeded 1,000,000/ml in the raw milk before heating, objectionable flavors frequently developed after pasteurization and most commonly during refrigerated storage. They concluded that in commercially pasteurized and packaged milk, post pasteurization contamination is by far the most common cause of flavor defects of microbial origin. However, even in the absence of post-pasteurization contaminants, off-flavors may be encountered if the raw milk contained large populations of psychrotrophs. Several other researchers have attributed those flavors (in the absence of organisms) to heat stable enzymes.

Not all of the flavor deterioration in stored pasteurized milk is of microbial or enzymatic origin. Milk, and particularly homogenized milk, is very susceptible to an irradiated flavor defect (sunlight, light activated flavor). This defect is a combination of photo degradation of some protein component and lipid oxidation. As little as 20 minutes under direct sunlight or 24 h or less under fluorescent light will produce an objectionable off-flavor in milk (in plastic jugs or glass bottles). Milk in paper cartons is more resistant to this defect because cartons transmit less light, particularly if they are dark-colored. However, milk in cartons over an extended period will develop the light activated off-flavor. Dimick (4) at Pennsylvania State University showed that fiberboard containers were protected from light activated flavor for 48 hours when held in a sliding door display case under 100 foot candles of light, whereas plastic and glass containers developed the off-flavor in 12 hours under that condition. There are numerous reports of the extensive occurrence of this flavor defect, particularly in milk in plastic containers. Barnard (2) at Pennsylvania State University reported that as much as 86% of the milk in plastic jugs surveyed and 12% of the milk in fiberboard had this defect.

Loss of Nutritive Value of Milk During Storage

In addition to the deterioration in flavor of milk under refrigerated storage, there also is some loss of nutritive value due to the exposure of milk to light. Senyk and Shipe at Cornell University (12) reported losses of as much as 37% of added vitamin A in whole milk and 57% in skim milk in polyethylene containers exposed to fluorescent light for 4 h (2000 lumen/m^2). More than 75% of the vitamin A was lost from skim milk exposed in either plastic or glass after 24 h. Similarly, 8 and 14% of the riboflavin was destroyed in these two milks respectively, after 24 h. Dimick (4) also reported losses of 10-

17% of the riboflavin from milk in plastic or glass following 72 h exposure to 100 ft C. light.

Certainly more important than the loss of vitamins in stored milk is the decline in its per capita consumption. From a study of government statistics reported in the American Journal of Clinical Nutrition, it was shown that nearly two-thirds of all women between 18 and 30 years of age consumed less than the 800 mg/day recommended daily allowance of calcium. As the women get older, they consume even less calcium, resulting in weak and brittle bones (1). The combination of inadequate calcium in the diet due to reduced milk consumption and the substitution of phosphate type soft drinks that leach calcium from the system has produced a serious nutritional deficiency.

Mandatory Milk Dating

A number of states in the U.S., recognizing the adverse effect of unreasonably long shelf life on milk, have enacted laws to require removal of milk from outlets after a "reasonable" time. Some examples of the "sell by" dates are shown in Table 1.

An interesting study reported by Mol and Vincentie in Chapter 9 of *Psychrotrophic Microorganisms in Spoilage and Pathogenicity,* edited by Roberts et al. (11), illustrates that voluntary "pull dates" may not be effective. Prior to 1973 in the Utrecht inspection area in the Netherlands, milk had a mandatory pull date of 3 days, and a consumption period of 5 to 6 days. The mandatory pull date was replaced by an "Ultimate Selling Date" (USD) which was decided upon by the processor. In the following year, rejections of routine milk samples for microbiological reasons increased from a range of 2 to 5% with the mandatory 3-day shelf life to a range of 51 to 57% with the USD. An improvement in sanitation procedures, particularly in the packaging lines, resulted in a sharp drop in the rejections. However, rejections again rose to a higher level than before as new psychrotrophic flora became apparent.

Conclusion

There is no doubt that commercial pasteurized milk deteriorates in flavor and quality during refrigerated storage.

TABLE 1. *States with mandatory milk "pull dates".*

State	Shelf Life (days)	Legal Document	Comments
Pennsylvania	10	Pennsylvania Code Dept. of Agric. Title 7. Agric. 59.22 Milk Dating	The words "Sell by" or "Not to be sold after" shall precede the designation of the date.
Montana	12	81-2-102 Montana Statues, Montana Admin. Regulation 32.8.202 A.R.M.	(3) For the purpose of this rule, 12 days after pasteurization or bottling means the midnight closest to 288 hours following the hour that pasteurization or bottling of the milk is completed.
Maryland	7	Annotated Code 4-426 of the Health Environmental Article. Milk Product Dating	(d) Sell-by period established -(1) A milk product that is cooled to, packaged, and stored at 45 degrees Fahrenheit or less before it is purchased by or delivered to the ultimate consumer has a sell-by period of 7 days. (e) Extension of sell-by period -(1) A milk processor may apply for permission to extend the sell-by period of a milk product by not more than 5 days.
Georgia	10	Rules of Georgia Dept. of Agric. Milk and Milk Products. Chapter 40.40-2-2-.01 Labeling	The "Pull Date" for fluid pasteurized, uncultured milk and milk products shall not exceed ten (10) days from the date of packaging unless technical supporting justification has been supplied the Department and specific authority to use a longer "Pull Date" has been granted.
Florida	10	Florida Admin. Code Annotated. Ch. 120 Florida Statutes Vol. 2, Title 5 Ch. 5 D-1 (d)	Provided, however, that the maximum shelf life for fluid uncultured milk products shall not exceed ten days from date of processing unless technical supporting justification has been supplied the regulatory agency and specific authority to use a longer shelf life has been granted.
Connecticut	12	Connecticut General Statutes Ch. 430. Sec. 22-197b	If such milk or cream was pasteurized at a temperature of two hundred twelve degrees Farhenheit or less, the last sale date shall not exceed twelve days from the day on which such milk or cream was pasteurized except as provided in subsection (b) of this section. (b) The commissioner may authorize an extended last sale date for milk or cream upon request of a milk processor.

However, I believe most producers, processors, and consumers are unaware of the effect subtle changes in milk flavor have on its acceptance. If we are to reverse the declining milk consumption pattern and make effective inroads on dealing with milk and dairy product surpluses, it will be from the following two major changes. First, the flavor of milk *must* be improved. This means more frequent pickups of farm milk and rapid processing of that milk in the plant. Milk should be pasteurized no later than three days after it is produced. Research data from several states clearly shows that a major portion of commercial pasteurized milk in retail outlets has undesirable flavors on the "sell-by dates." If we assume that the consumer expects to keep milk in the home for 3 to 5 days, the currently used shelf life is too long. With the current 45°F limit for pasteurized milk, the shelf life or "pull date" should not be longer than 5 days, recognizing that milk is often in the home 5 days. If the temperature limits were reduced to 42°F, a 7-day shelf life would be reasonable. Mandatory pull dates should be imposed. Several states already have recognized the importance of limiting the shelf life of milk and legally established pull dates.

Secondly, the industry should undertake a massive promotion of milk and dairy products. Other facets of the food industry have recognized the benefits and reaped the rewards of such an effort. Since the dairy industry is in competition with those industries, it is essential that they initiate programs to dovetail with improved quality. Furthermore, it is necessary that more money also be made available for research. Milk is an extremely important food which, because of misinformation and poor flavor, is being passed over in favor of beverages with little or no nutritional merit. The attributes of milk and consequences of insufficient amounts in the diet need to be spelled out clearly.

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Dairy and Food Sanitation, Vol. 47, No. 10, Pages 380-383 (October 1984)

A Systems Approach To The Quality Of Spices

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INTRODUCTION

Spices, probably the oldest form of food flavoring, come in an ever increasing variety of styles. Being natural products from a variety of sources and countries, spices will vary dramatically in quality, flavor, strength and cost. A systems approach using six quality impact areas is followed by a spice company to insure that the spices manufactured will be consistent and will meet customers' needs and specifications. Quality must be a valued organizational goal and outcome. These impact areas, the integral parts of the total Quality Assurance System of a spice company, will be discussed in this paper.

QUALITY?

Quality can be defined as a conformance to a standard, a standard established by a manufacturer or by the consumer. We've heard of quality assurance and quality control. What is the difference? Quality assurance can be defined as a planned and systematic management tool to produce and market foods which are uniform, safe, nutritious, flavorful, economical and provide the confidence that a product will conform to established requirements. What is quality control then? Quality control can be defined as the day-to-day implementation and execution of the quality assurance program.

SPICES

Spices are exotic, romantic, and colorful. Many of them are a product of far-off lands and ancient cultures.

Spices carry a unique power. Usually, specific spices are used at certain times of the year, usually associated with specific holidays. However, due to the influx of ethnic foods in America, American consumers are being exposed to various different spices, thus, exposed to new flavors and aromas.

Today's definition of spices includes whole or ground forms of tropical spices, temperate herbs and other seeds, blends of ground spices, dehydrated vegetables and seasonings (onions, garlic, parsley, sweet peppers, celery, chives, shallots).

What is the difference between herbs and spices? Herbs can be defined as the soft stems of plant materials, while spices are all the other aromatic plant products: part of plants, part of roots, seeds, fruits, buds. Usually, spices contain more aromatics, more essential oils and other non-volatile flavor components. Heath, in his book "Flavor Technology" (AVI, 1978), divides herbs and spices into five and six different categories, respectively.

HERBS:

- Those containing cineole: bay laurel, rosemary, spanish sage.
- Those containing thymol and/or carvacrol: Thyme, oreganum, wild marjoram, sweet savory, Mexican sage, oregano.
- Those containing sweet alcohols: sweet basil, sweet marjoram, tarragon.
- Those containing thujone: Dalmation sage, Greek sage, English sage.
- Those containing menthol: Peppermint, corn mint, spearmint, garden mint.

SPICES:

- The pungent spices: Capsicum, ginger, black and white pepper, mustard, horseradish.
- The aromatic fruits: Nutmeg and mace, cardamom, fenugreek.
- The umbelliferous fruits:

(a) Anise, fennel (cf: star anise, basil, Tarragon).
(b) Caraway, dill, Indian dill.
(c) Celery, lovage, parsley (cf: fenugreek).
(d) Cumin.
(e) Coriander.

- The aromatic barks containing cinnamic aldehyde: Cinnamon bark, cassia bark.
- The phenolic spices containing eugenol: clove bud, allspice (pimento), cinnamon leaf, clove stem, clove leaf, West Indian Bay.
- The colored spices: Paprika, saffron, safflower, turmeric.

Spices are natural. This means that they are not processed beyond drying, cleaning, grading, grinding, chopping or slicing. But, just because spices are natural and are harvested in many areas of the world, they are liable and susceptible to normal variations in flavor, quality and strength. Some factors that affect the value and quality of spices include:

Country of Origin
Soil Conditions
Husbandry Practices
Harvesting Practices
Climate
Storage conditions before shipment
Processing and handling methods
Packaging methods
Storage conditions after packaging.

QUALITY ASSURANCE

What can manufacturers of spices and seasonings do to assure the quality of their products? Six quality assurance impact areas of importance at Tone's Inc. which make the Total Quality Assurance System include:

1) Quality control
A) Laboratory testing
B) Manufacturing QC
C) Vendor reliability
2) Documentation
A) Standard operating procedures
B) Product data files
3) Specifications
4) Regulatory compliance
5) Technical service and support
6) Strategic, operational and technical planning.

Each quality assurance impact area will be discussed separately.

1) *Quality Control:* Included in this impact area is the following:

A) Laboratory testing
- Raw ingredients
- Work-in-process
- Finished goods
- Packaging materials

B) Manufacturing quality control
- Label weights
- Labels
- Product identity
- Sensory evaluation
- Finished product granulation

C) Customer inquiries/marketing support
D) Developmental support.

The quality control laboratory tests all raw ingredients, work-in-process and finished goods. The following tests are done by the laboratory on raw ingredients, ground products (work-in-process) and blends:

1) Chemical:
- Volatile oils
- Ash
- Moisture
- Salt
- Heat (pungency)
- Color

2) Microbiological:
- Total plate count
- Fungal plate count
- Total coliforms
- *Salmonella*

3) Physical:
- Granulation
- Bulk index

4) Cleanliness/extraneous matter.

Product specifications are available and used to approve/reject incoming raw ingredients and to assure customers that the whole, ground spice or blend will meet or exceed their quality requirements. Packaging materials (corrugate, cans, glass, plastic, caps, labels, flexible) are tested by the quality control laboratory. Quality of spices and packaging materials is documented by the laboratory personnel and used for vendor monitoring.

Procedures outlined by the American Spice Trade Association, American Dehydrated Onion and Garlic Association, Food and Drug Administration Bacteriological Analytical Manual and the Official Methods of Analysis of the Association of Official Analytical Chemists are used by the quality control laboratory technicians for product testing.

The chemical, microbiological and physical quality parameters of work-in-process spices and blends are tested by the laboratory technicians, but the Manufacturing QC personnel will monitor the appearance and aroma quality parameters of these products regularly. Manufacturing quality control personnel also look at labels (color and graphics), label positioning on container, label weights, product identity (product seals), granulation of ground spices, packaging (corrugate, plastic, can, glass), code dates, and line documentation. The product is evaluated

for color, aroma, appearance and flavor. Appearance is a very important quality attribute in that Tone's packages spices in clear plastic PETG containers.

The quality control laboratory responds to every customer inquiry and assists marketing with quality problems. Developmental and laboratory support is also provided to research and development and engineering.

2) *Documentation:* Tone's has developed a comprehensive documentation program which includes:

A) Standard Operating Procedures (SOP's)
- Processes (HACCP)
- Products
- Equipment
- Warehouse
- Shipping
- Quality control laboratory
- Material management

B) Vendor auditing

C) FDA - inspection procedures

D) Total product data files

E) Customer notifications, market withdrawals, recall procedures.

Standard operating procedures are used by all company employees. They are also a training tool.

Quality Assurance is also responsible for customer notifications, market withdrawals and recall procedures. Vendor auditing is an important function within the documentation impact area of the total Quality Assurance System in that we have attempted to shift the responsibility for the quality of our raw ingredients and packaging materials to our vendors. We expect vendors to have documentation, protocols and quality assurance systems to provide Tone's with the assurance that their products are going to meet or exceed our criteria of acceptability. Quality Assurance is the liason with the Food and Drug Administration (FDA) and is responsible for the FDA inspector during FDA inspections. Quality Assurance provides and maintains all total product data files. These data files maintain records of products, per lot, for traceability purposes and for obtaining the quality history of specific individual lots.

3) *Specifications:* Specifications are available for raw ingredients, packaging materials, work-in-process and finished goods. The specification for raw ingredients and finished goods will include a product guarantee, chemical quality, microbiological quality, cleanliness specifications, packaging specifications and physical parameters. These quality attributes were discussed and listed in the Quality Control Methods and Protocols impact area. A similar set of specifications exists for all packaging materials and work-in-process. These specifications are updated periodically.

Quality Assurance also maintains master formulas/bill of materials for all items manufactured. Specifications for labels, label colors, graphics, ingredient statements, positioning on the containers, and packaging have also been written where applicable. These specifications are issued to selected vendors and customers.

4) *Regulatory Compliance:* The regulatory compliance impact area includes the administration, following and auditing of:

A) Good Manufacturing Practices (GMP's)

B) Good Laboratory Practices (GLP's)

C) Total sanitation systems
- Master sanitation schedules
- Sanitation audits
- Housekeeping
- Pest control

D) Education and training of personnel on:
- Good Manufacturing Practices (GMP's)
- Sanitation
- Quality practices and specifications

E) FDA relationships.

All employees are educated periodically on GMP's, sanitation, product specifications, and quality. "Making it right the first time" and pride in our products and in their workmanship is stressed.

5) *Technical Support:* Quality Assurance assists sales and marketing with product quality concerns, product problems and technical inquiries. Customer inquiries are investigated, and the customer is promptly informed. In some instances, the technicians will work on special formulations and blends for specific customers. Tone's stresses product quality and reliability and attempts to provide customers with products that will meet their specifications. Quality Assurance will provide the technical assistance to existing and potential customers for their spice requirements and the laboratory expertise for the proper testing of these spice products.

The technical personnel in the Quality Assurance Department provide laboratory and technical support for product packaging and process development for superior product performance and quality.

6) *Technical and Strategic Planning:* Quality Assurance should be, and is at Tone's, part of the strategic planning and technical planning of the company. It is the responsibility of Quality Assurance, as a technical part of the company, to scan technology and provide the technical vision of the company. Looking at automation, new methods, new technologies and new applications to existing technologies is necessary in order to be current technologically and to improve our quality systems.

SUMMARY

By implementing these six Quality Assurance impact areas, spice companies can provide products to customers which are going to meet their criteria of acceptability and are going to add value to their finished food products.

However, QUALITY is not the product of the Quality Assurance Department alone. It is, and must be, a valued

organizational goal and outcome. From Tone's corporate quality policy, we have extracted the following statement: "We as a company want to provide products and services of high utility and quality which meet or exceed the customer's criteria of acceptability." Within the Quality Assurance Department's mission, the following statement is extracted: "To establish and audit programs, processes and procedures to insure that the quality of products we sell meet or exceed customers' requirements and needs, and are consistent with our quality standards, technological advances and regulatory requirements, at maximum cost effectiveness with a minimum of waste." Quality must be a corporate objective and a corporate committment. This is the case at Tone's, Inc.

Today, quality is a much sought after reality with the consumer, thereby becoming a competitive tool for marketing. Quality provides a more competitive product, and nowadays consumers demand consistency in the spices and seasonings they purchase. Consistency can only be maintained by instituting measures to maintain continuous and unvarying product quality through a standardization program. This standardization program is a Total Quality Assurance System, which at Tone's incorporates the six impact areas discussed in this paper. By implementing a Total Quality Assurance System, spice companies can supply customers with ingredients (spices and seasonings) that would add value and make their products more flavorful and more acceptable.

Nominations for '85 Awards Now Due

Awards nominations are due for the 1985 IAMFES Awards. The success of the IAMFES Awards Program depends on organizations which generously and regularly fund the program, but also on you, for nominating persons you know who are worthy of the awards.

Contact A. Richard Brazis, 1006 Martin Drive West, Bellevue, NE 68005, with information on your nominees. Present Executive Board members are not eligible for the 1985 awards.

The awards are as follows:

*Sanitarian's Award. This is a $1000 award presented to any Sanitarian who has made outstanding professional contributions during the past seven years.

*Harold Barnum Award. This $500 award will go to an industry representative in 1985. It is presented to a person who has shown outstanding service to food safety and sanitation.

*Educator Award. This $1000 award will be presented to an educator. It is presented to a person who has shown outstanding service to food safety and sanitation.

*Citation Award. This award will be presented to an IAMFES member who has given outstanding service to the Association in helping to fulfill its objectives.

*Shogren Award. This award will go to the affiliate organization with the best state or regional program.

*Honorary Life Membership. This is presented to a member who has shown long and outstanding service to IAMFES.

*Certificate of Merit. This is presented to members who are active within their state and international group.

National Mastitis Council Meeting To Be Held Feb. 15-17 In Las Vegas

The 24th annual meeting of the National Mastitis Council will be held Feb. 15-17 at the Frontier Hotel, Las Vegas, Nevada.

The program features numerous papers and presentations by mastitis authorities. The featured international speaker is John Bramley, National Institute for Research in Dairying, Reading, England.

The meeting also features exhibits in the Technology Transfer Session and committee and board meetings of the National Mastitis Council. All members and prospective members are encouraged to attend the meeting which precedes the Western States Veterinary Conference Feb. 17-21 at the Las Vegas Hilton Hotel.

For more information and registration materials, contact John Adams, National Mastitis Council, 1840 Wilson Blvd., Arlington, VA 22201. 703-243-8268.

IAMFES Secretary-Treasurer Nominations Due

Nominations are open for the IAMFES Secretary-Treasurer. This year an industry representative will be elected.

Send a biographical sketch and photograph of your nominee to the Nominating Committee as soon as possible, but no later than November 15, 1984.

Send the information to: William Arledge, Dairymen's Inc., 10140 Linn Station Road, Louisville, KY 40223.

Canned Foods Compare To Fresh and Frozen

When it comes to nutritional value, fresh and frozen vegetables are good--but not necessarily better--than canned vegetables, says a Texas A&M University Agricultural Extension Service nutritionist.

A study by the National Food Processors Association and the U.S. Department of Agriculture shows that the levels of nutrients in fresh, frozen or canned vegetables are nearly comparable, reports Mary K. Sweeten.

Researchers compared prepared fresh, frozen and canned lima beans, peas, spinach, sweet potatoes, carrots and squash for levels of thirteen minerals, eight vitamins and fiber, she explains.

The study shows very little difference in the vitamin A content of any of the products. In the case of peas and spinach, the canned product was even a little higher in vitamin A than the fresh produce.

Analysis also showed very little difference in minerals and fiber content between fresh, frozen and canned samples, says the nutritionist.

Sweeten attributes the comparable vitamin and mineral levels to the fact that vegetables are preserved in cans within hours of harvest. "Vitamin A is very light sensitive, and can be destroyed by artificial light or sunlight, and vitamin C can be lost by heat and exposure to air," she notes.

Cans also protect against nutrient loss that occurs in shipping and handling produce between field and

home. Few nutrients are lost if fruits and vegetables are eaten directly from the garden, says Sweeten, but the nutritional quality of fresh produce in the supermarket depends on the care it receives during harvesting and shipping, as well as shipping time.

Earlier studies compared canned vegetables with uncooked vegetables. Since canned vegetables are "cooked in the can" during the canning process, it's more appropriate to compare them with cooked produce, she observes.

This research considered the most important nutrient loss due to home cooking of fresh vegetables, says the nutritionist. The comparisons were made between canned foods cooked in their canning liquid and drained, and unpeeled fresh and frozen foods cooked in as little water as possible to avoid the necessity of draining. The fresh vegetables were prepared within two days of harvest, so they had not been commercially handled and shipped as the produce in most retail outlets and homes.

Southeastern District (Idaho) Health Department National Food Protection Award Winner For 1984

The local health department serving the environmental health needs of the Southeastern District of Idaho has been awarded the 1984 Samuel J. Crumbine Consumer Protection Award for conducting an outstanding program of food service sanitation.

The Southeastern District Health Department received the Award at the annual Educational Conference of the National Environmental Health Association in Grand Rapids, Michigan, on June 26, 1984. Accepting the Award on behalf of the department was Jack Jelke, Director of the Southeastern District Health Department, and Jack Palmer, Environmental Health Director for the District.

The Crumbine Award is intended to give national recognition to the local health authority which has demonstrated outstanding achievement in the design and execution of a comprehensive food protection program in a given year. A panel of seven jurors made up of public health professionals and consumer representatives selects the winning entry.

In choosing the Southeastern District Health Department as this year's Award winner, the Crumbine Jury cited the following features of the District's entry as compelling reasons for their choice:

"Your sound philosophy of public health; your concise statement of the problems you faced; your well documented evaluation of the steps you took to solve the problems; the dramatic improvement in 1983 inspection scores over the 1981 survey; your enviable achievements in the area of public awareness; and your honesty and resolve in abandoning the "Superior Rating" program which was judged to have lost its effectiveness."

The Crumbine Award is sponsored by the Single Service Institute, Inc. (SSI), the national trade association of manufacturers of disposables for food service and packaging. The Award takes its name from the Kansas State Health Officer and public health pioneer, Dr. Samuel J. Crumbine, who banned common drinking cups from public facilities in 1909.

The Award consists of a bronze medal depicting Dr. Crumbine and an engraved plate mounted on a walnut plaque. Engraved bronze medallions are also presented to the individual public health officials who are directly responsible for the winning agency's program.

USDA Offers Guidelines For Aseptic Processing Of Meat and Poultry

The U.S. Department of Agriculture has developed guidelines for the design and control of aseptic processing and packaging systems in federally inspected meat and poultry plants, according to Donald L. Houston, Administrator of the USDA's Food Safety and Inspection Service.

"Aseptic processing and packaging is the placing of a commercially sterile product into a sterilized container in an environment free of microorganisms. The container is then hermetically sealed with a sterilized closure," Houston said. He described the procedure as an alternative method for preserving food products for nonrefrigerated distribution.

"We recognize the growing interest in aseptic processing and packaging in the meat and poultry industry," Houston added. "The guidelines will ensure that products processed under this method will meet the requirements of the Federal inspection laws."

Federally inspected meat and poultry plants that want to install and operate an aseptic processing and packaging system must first submit a proposal to USDA. The Department will then use the new guidelines to determine the acceptability of the proposed system.

The guidelines define the minimum requirements for equipment, system testing and processing control procedures, according to Houston. Detailed criteria are provided for piping structures; temperature indicator, recorder and controller devices; differential pressure controllers and recorders; and for pumps, valves, diversionary systems, steam seals and packaging units.

"If the system is found to be acceptable, the company must then submit a proposal for a Partial Quality Control (PQC) program for operating and maintaining the accepted system," Houston said. "The PQC proposal must include the formulations, process controls, and operating schedules for all aseptically processed and packaged product produced. Information for preparing the quality control program is included in the guidelines."

Packaging systems intended for use in aseptic processing systems must consist of FDA-approved materials and be proven by testing to maintain package integrity in food distribution channels.

Houston urged plants to secure a copy of the guidelines and review them carefully before purchasing or constructing equipment for a proposed system. Copies of the guidelines are available from Mr. Bartie T. Woods, Jr., Director, Facilities, Equipment and Sanitation Division, Meat and Poultry Inspection Technical Services, FSIS, USDA, Room 1186 South Building, Washington, DC 20250. The telephone number, for further information, is 202-447-5627.

The Food Safety and Inspection Service is responsible for ensuring that meat and poultry shipped in interstate and foreign commerce is safe, wholesome, and accurately labeled. All equipment used in federally inspected meat and poultry plants must be accepted by USDA to ensure a safe and sanitary operation. In adopting the guidelines for aseptic processing systems, FSIS consulted with the Food and Drug Administration, the National Food Processors Association and the National Meat Canners Association.

Sulfites In Food: Concern Vs. Panic

A dried apricot. A glass of wine. A restaurant lettuce salad. A tablespoon of corn starch. All of these foods may contain sulfite preservatives, but which should you avoid? And should you even worry about sulfite exposure?

These are the types of questions you should ask about sulfites, according to Steve Taylor, a University of Wisconsin-Madison food scientist.

Taylor, who is studying the food additives, says that recent publicity about sulfites may have needlessly frightened people. Sulfites--which are used to preserve various foods like wine, dried fruit and corn starch--can cause severe asthma in some people.

Taylor, along with allergists Robert Bush and William Busse of the University of Wisconsin Hospital and Clinics, is studying who reacts to sulfites and which foods contain large amounts of the chemical.

Although he's heard from people who have forbidden their children to eat food that may contain sulfites, Taylor says most people are not at risk.

"We've determined that only 'severe' asthmatics are sensitive to sulfites, and that only between five and 10 percent of them react, so we're talking about between 60,000 and 120,000 of the nine million asthmatics in America," he says.

Taylor defines a severe asthmatic as one who needs to take a steroid-based drug to control the disease. The group tested 50 "mild" asthmatics who did not use steroids and found that none of them reacted when challenged by various levels of sulfite.

"That's not to say that no other asthmatics should be concerned, but zero out of 50 is a pretty compelling figure," Taylor says. "In general, people who have experienced asthma after eating restaurant salads or dried fruits are the ones who should be concerned about a possible sulfite sensitivity."

Some asthmatics who reacted to the chemical were sensitive to levels down to five milligrams, while others had thresholds as high as 100 milligrams. These thresholds, combined with Taylor's research on what sulfite levels are commonly found in food, can indicate what foods sensitive people should avoid.

For example, you'd probably have to eat a bowlful of corn starch to reach a reactive level for even the most sensitive patient. On the other hand, a two gram sliver of apricot could give sensitive people asthma and worse. Dried apricots, at least those that look bright orange and plump, are heavily sulfited. They contain from 2,500 to 3,000 milligrams of sulfite per kilogram of apricots, according to Taylor.

Besides apricots and other dried fruits, Taylor recommends that sensitive people avoid wine, dried vegetables and potatoes, and sulfited restaurant foods like lettuce and guacamole from the salad bar. Some restaurants also use sulfited whole-peeled potatoes, which they use to make mashed, hash browned or homestyle fried potatoes.

Here's where deciding what's safe gets tricky.

Prunes and brown raisins are dried fruits that contain no sulfite. Golden raisins are sulfited. Dried apricots and dried apples are treated with sulfite, but apples have half the sulfite of apricots. Dried instant soup ingredients like peas and carrots are probably sulfited, but dried garlic and onions aren't.

Sulfite tends to bleach wine, so white wines generally contain more than red wines. But, since sulfite levels in all wines are limited by law to 350 milligrams per liter, you'd have to drink nearly two liters of the most heavily-sulfited wine to equal the sulfites in an average half-pound of dried apricots.

And although sulfites are used to prevent salad bar lettuce from browning, Taylor didn't find any sulfites in the lettuce he tested at 15 Madison-area restaurants early this summer.

As a rule of thumb, Taylor says, "when in doubt, do without."

Taylor also warns severe asthmatics against testing themselves with apricots or other sulfited foods.

"Sulfite challenges should only be done in a hospital with proper emergency equipment. They shouldn't even be done in doctors' offices," he says, "because when people react, they often have severe reactions."

Taylor is currently studying whether sensitive people react to the total amount of sulfite added to apricots, for example, or to only the free sulfite that doesn't combine with the apricots' own proteins and sugars.

This distinction between free and combined sulfite could have a bearing on the foods that sensitive people can eat. Foods combine with sulfites at different rates. Apricot proteins and sugars combine with sulfites more readily than those in lettuce, which is made mostly of cellulose and water. Therefore, if it turns out that only free sulfite causes the reactions, a given amount of sulfite added to lettuce would be a bigger problem than the same amount on apricots.

The Federal Food and Drug Administration will soon appoint a committee to study the problem of asthmatics' reactions to sulfite, according to Taylor. He adds that another national committee is currently studying the allowable amount of sulfite in non-asthmatics' diets.

Barber Ice Cream Co. Recognized for Excellence

Barber Ice Cream Company has been selected to receive the 1983 Merit Award for Excellence in the processing and packaging of ice cream products by the Quality Chekd Dairy Products Association, during the group's annual conference in Dallas, Texas.

Presented to Joe Knott, General Manager, the award acknowledges the extra effort by Barber Ice Cream Company employees in the producing and packaging of products that were outstanding in test results as compiled with those submitted by dairy companies across the United States and Canada.

This is the third such award won by Barber Ice Cream Company in the last four years.

When asked about winning the award, Knott commented that "while the company is very proud of the award, the major winners are the consumers who use Barber Ice Cream products. The high quality that Barber products represent means added value to consumers and an assurance that they are obtaining the very best dairy products available anywhere," he added.

Barber manufactures and distributes quality dairy products throughout Alabama, the Florida panhandle, Northern Mississippi, and in Middle Tennessee.

1983 Whey Products Survey Now Available

The Whey Products Institute, national trade association of the whey processing industry, is pleased to announce the availability of its publication *1983 Whey Products, A Survey of Utilization and Production Trends,* a yearly compilation of whey products utilization. Data assembled and published in this bulletin reflects the results of the Institute's ninth industry-wide survey of end-uses for whey products. The survey included Whey Products Institute members, other cooperating processors and resellers, and reflects approximately 86% of the USDA-reported whey solids processed during 1983.

Comparisons of reported end-uses for whey and whey products in both human foods and animal feeds are shown for 1982 and 1983, as is a 3-year (1981-1983) summary of domestic sales by distribution outlet.

The publication is available for purchase at $4.00 per copy. For further information about this publication, or the production and use of whey and whey products, contact the Whey Products Institute, 130 North Franklin Street, Chicago, IL 60606. 312-782-5455.

New Position for Ulrich In Norton Co.

The Norton Company has named Anthony Ulrich, Jr., eastern regional manager of distributor sales for Performance Plastics products in its Engineering Materials group.

Ulrich steps into the sales position, after serving as manager of marketing for the Industrial Plastics strategic business unit of the Performance Plastics operation.

"Tony's experience and abilities in the sphere of distributor sales add significant depth to our group," said H. Wesley Wheeler, national sales manager of distributor sales and service, in making the announcement.

Reporting to Ulrich are district sales supervisors in Boston, Philadelphia, Atlanta and Akron; and Jim Yannarella, manager of sales development for sealant

distributor sales. Ulrich will be based in the company's Akron office.

Performance Plastics products include sealants for motor vehicles, appliances and homes; Tygon® tubing and other specialty plastics for laboratory, food handling and industrial uses; and fluoropolymers used in numerous mechanical, chemical, electrical and biomedical applications.

Remodeling MSU Dairy Barns Will Help Improve Research

Substantial alterations in the Dairy Research and Teaching Center at Michigan State University will improve the facilities for both teaching and research.

"The old dairy facilities were no longer adequate," says Russell Erickson, MSU associate professor of animal science. "We are upgrading, remodeling and consolidating two sites to make them more usable."

One of the new additions is a barn 240 feet long and 86 feet wide, which will house 136 Holstein cattle. The cost of the new barn and other improvements being made will be about $1.3 million.

Remodeling of the center started about four years ago and is expected to be completed by 1985. A replacement feed storage haybarn was built in 1982, and eight silos, to replace those that were no longer safe, were built in 1983. A feed room for mixing and preparation, located between the silos and a heifer barn for replacement heifers, will be built this summer. The feed room will enable researchers to evaluate nutrient quality and maintain consistency, and will provide protection from the elements. The existing milk parlor will continue to be used.

"One of the criticisms by the dairy industry was that we were using mostly tie stalls, when in fact most dairy cattle are being housed in free stalls," Erickson says. "The new barn is a free-stall unit and will enable us to conduct research for that kind of an environment, monitoring individual behavior, the effects of group feeding, animal density and individual comfort, and how this bears on reproduction, lactation, etc."

One reason for the facility expansion at MSU and the new dairy barn construction at MSU's Kellogg Biological Station (the two are being funded separately) is to increase the number of animals available for applied research and teaching.

"We've always had a problem with not having enough animals to meet the demand for student teaching and research," Erickson says. "Some of our researchers and graduate students have had to wait upwards of 2 1/2 years to do their work, which is quite frustrating when some research has to be done that is needed by the dairy industry."

The KBS facility will be primarily used for applied teaching of students and farmers, though it will also enable researchers to conduct long-term projects.

"That facility will allow us to put to practical use what research on campus indicates should be done for the industry," Erickson says. "It will also give us the room we need for teaching dairy producers, something we've never really had on campus.

"KBS will be a better environment in which to teach students, many of whom do not have a farm background, about the basic side of agriculture and dairy production," Erickson says. "The way it is now, we have the student, the researcher and the farmer essentially standing in line waiting to get information, and that really isn't the most effective and efficient way to operate a dairy teaching and research center."

The two facilities will involve some overlap in use, but the emphasis will be on individual skill building at KBS, while the campus facility will emphasize basic research and classroom instruction.

Campus research will continue to probe how to get more milk per cow without harming the animal. The aim is to enable producers to have fewer cows that produce more milk without stress. A smaller herd reduces producer labor and expense.

"Having both facilities will provide many benefits from a commercial standpoint," Erickson says. "The research performed at the dairy center and applied at KBS may make the combination of facilities one of the most productive and best teaching and research units in the nation, one from which producers and the industry will benefit substantially in the years to come."

Pricing Policies Key To Food Production, Pearson Suggests

Pricing policies are the key to food production, says Prof. Scott Pearson, associate director of the Food Research Institute at Stanford.

Around the world, "poorest countries tend to have the lowest prices" while "the richest have the highest," he notes.

To encourage more food production by farmers, poor countries need to raise food prices generally while "targeting" lower prices for their poorest consumers.

This is not easy, he adds. In Egypt, bread prices have been kept so low that loaves are often fed to chickens.

Governments mindful of civil servants and fearing civil unrest find it hard not to keep food prices low,

especially when many citizens live at the margin of existence.

But low food prices are "a huge disincentive to agricultural production," which provides 60 to 70 percent of all employment in poorer countries. Sustained low prices may force farm workers off the land and into the cities, adding to unemployment and unrest.

"The poorest people in the world are the most responsive" to changes, Pearson says. "They have to be the cleverest and most flexible to survive."

In the African Sahel, residents may hold as many as six or eight different jobs a year for this reason.

Africa is "a real danger zone" in the battle against hunger, with a decline in per capita food production over the past 25 years.

While this can be partially blamed on bad luck, bad weather, and lack of appropriate technology, it is "mostly due to bad policy," Pearson believes. He has studied the region extensively.

Hunger and poverty tend to go together. "The major problem is a shortage of calories," not protein, he adds. "We need to pump energy--calories--into people."

The strong consumer demand for meat in more prosperous countries put additional demand on grain production. Six to eight pounds of grain are needed to produce a single pound of beef, for example.

Where Europe once was a major food importer, now it has "mountains of butter and lakes of wine" to export, because government decisions to keep agricultural prices high "brought enormous resources into agriculture," he notes.

Many European countries now have higher per capita incomes than the U.S., with "very little, if any, real hunger."

While Eastern Europe has long food lines, rationing, and poor quality food, it too has "very little real hunger," he adds. "Eastern Europeans eat more than Americans do. There are a lot of chubby people."

China has made "truly enormous" gains, but 10 to 20 percent of its population may still be hungry, Pearson says. Land reform, "heavy-handed" population control, and technological gains have contributed to "a truly impressive job."

India has been "a qualified success" and now is "just about self-sufficient" in food, although its production is not well distributed. Population growth rates appear to have started to turn down.

"Japan is enormously efficient--except in agriculture," where its price for rice is five times the world level, Pearson says.

Among the countries with real food problems are Indonesia, Pakistan, the Philippines, Ethiopia, and Zaire.

Overall, Pearson believes the world today is in "reasonably good shape" on food production, even though estimates of hunger range from 400 million to 1 billion of the total estimated 4.8 billion population.

He currently is working on food policy analysis with both Indonesia and Portugal. His views were developed in an hour-long talk during the Stanford campus conference May 12.

Contrary to the prophecies of George Orwell's *1984*, he said, no governments today appear to be practicing "economic doublethink" and using food policy to deliberately lower living standards and keep the populace submissive.

"There are lots of despicable governments and authoritarian regimes," he noted. Some, like Cambodia's, have occasionally used starvation as a political and military tool.

New Product News

The products included herein are not necessarily endorsed by Dairy and Food Sanitation.

Prefab Wastewater Treatment Plants

• Clow Corporation, Waste Treatment Division, offers a complete line of prefabricated package treatment systems capable of treating wastewater flows from 500 GPD to 100,000 GPD from food processing plants. Clow Aer-O-Flo Package Plants are especially effective in the treatment of wastewater flows which are high in BOD and suspended solids. These units can be used to pretreat wastewater prior to municipal sewers in order to reduce or eliminate surcharges. They also can be used to treat wastewater discharging to an open stream in order to conform to local, state and federal EPA guidelines.

The Clow Aer-O-Flo Package Plant utilizes a modification of the activated sludge process known as extended aeration. The system works by maintaining sufficient oxygen, mixing and detention time to allow micro-organisms to decompose treatable wastes into carbon dioxide, water and stable sludge.

The prefabrication construction of the Aer-O-Flo Package Treatment Plants eliminates the need for field assembly. Major components are installed at the factory, which eases installation in the field. All that is required of the user is for the site to be prepared prior to delivery for either above or below ground installation. After electrics and influent/effluent pipes are connected, the unit is ready for operation. Aer-O-Flo Package Plants are painted with weather resistant coatings which assure the durability of the systems. Over 5000 units are currently in use worldwide.

Typical applications for these units include treatment of wastewater from dairy operations, slaughter houses, small and seasonal packing plants and other facilities which have concentrated BOD and suspended solids loading.

For additional information contact Steve Deiters, Manager, Marketing Services, Clow Corporation, Waste Treatment Division, Florence, KY 41042. 606-283-2121.

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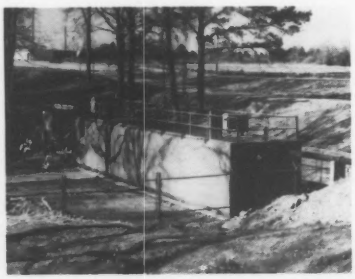

Clow Aer-O-Flo Package Plant

Sar-A-Lee Butter and Margarine Pouches Eliminate Knife Costs

• For the first time, a patented method of placing fresh creamy butter or margarine into portion control packets is being introduced by Sar-a-Lee, Inc. The plastic pouches make it convenient, less costly and easier for food operators to handle butter or margarine. Knives are unnecessary. The Sar-a-Lee P.C. packs are almost identical in price to butter cups, eliminating plastic knives and permitting food service operations to shave approximately .0125 cents per serving.

The P.C. pouches are easy to handle and are sealed, unlike traditional pats, for absolute cleanliness and freshness. Air and bacteria can't destroy the flavor, and there's absolutely no waste. Savings are great, because unopened P.C. pouches can be served again and again without violating health codes.

The patented Sar-a-Lee P.C. packs don't stick to food trays or clog dishwashers the way tissue paper tops of traditional butter pats do.

Patrons simply tear a corner of the 3- by 1-1/2 in. package and squeeze the butter or margarine into their food. The butter is grade A first quality and is packaged in one-fifth ounce pouches. The margarine, available in one-quarter ounce pouches, is fortified with vitamins A and D. Other sizes are available in both products.

The P.C. packets developed by Sar-a-Lee of Cleveland, Ohio, a leading institutional food manufacturer and supplier, were tested for two years in food service operations nationwide. One 300-unit West Coast chicken and biscuit chain has reported customer reaction to be extremely favorable. The franchisee now uses approximately four million Sar-a-Lee packs a month.

"One store sold 11,600 biscuits on Mother's Day," reports Sar-a-Lee president Ralph Kovel.

"When you consider that each biscuit used to come with a plastic knife to spread butter, the use of Sar-a-Lee pouches saved the chain over $145 in one day.

"Multiply this by 52 busy weekends annually, and the cost savings are substantial," he says.

The Sar-a-Lee pouches are ideal for almost any institutional or fast food service operation. They are already being used by hamburger and chicken chains, convenience and carry-out stores, school and corporate cafeterias.

The P.C. packs can be stored refrigerated or frozen. A frozen package takes only four minutes to soften for serving.

Sar-a-Lee P.C. packs can be imprinted with any desired message.

Sar-a-Lee, founded in 1924, produces over 60 varieties of salad dressings, sauces and condiments. The company is located at 27621 Chagrin Blvd., Cleveland, OH 44122. 216-831-5100.

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Babson Bros. Co. Announces New Line Of Milk Tanks

• Babson Bros. Co., builders of Surge Dairy Farm Equipment, announces the addition of four intermediate diameter milk tanks to its line of cooling equipment. The four new 66 inch diameter 1000, 1250, 1600 and 2000 gallon tanks permit installation inside many milkrooms not large enough for other sized tank models.

With the addition of the 66-inch tanks to the existing lines of 55 and 80-inch diameter models, Babson Bros. Co. now offers milk tank sizes from 500 to 3000 gallons to fit a variety of milkroom dimensions.

The Surge line of Automatic Response Cooling (ARC)™ tanks automatically adjust cooling rate to necessary levels. As milkflow into the tanks increases, so does the flow of refrigerant. Conversely, as cooling needs decrease, so does the refrigerant flow. This economical process helps eliminate the costly practice of running the refrigerant unit at full capacity, regardless of specific cooling requirements.

All of the Surge ARC tanks, including the new models, are available in either stainless steel or white Polane™ enamel on stainless. The white exteriors are easy to clean and enhance the cooling efficiency of the tank by reflecting radiant energy.

For more information about the Automatic Response Cooling milk tanks, contact your local Surge dealer or write to Babson Bros. Co., 2100 S. York Road, Oak Brook, IL 60521.

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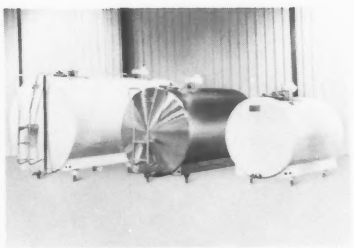

Babson Bros. new 66-inch diameter ARC™ milk tanks

New Tamper-Proof Bait Station From J.T. Eaton & Co.

• A durable and weather proof new metal tamper-proof bait station has been added to J.T. Eaton & Company's pest control products for industry, institutions, and professional exterminators.

One of the strongest bait stations on the market, the new Eaton unit is fabricated from heavy-duty galvanized metal that will stand up to years of use in all weather conditions. It is strong enough to prohibit entry by large, nontarget animals, and will carry a man's weight.

A single-piece seamless base and raised entrance holes keep water out. Raised entrance holes and an overhanging lid protect the content from weather.

A removable plastic insert tray with a baffle system prevents children, pets and non-target animals from reaching the bait inside. The plastic insert is divided into compartments and can hold up to 16 ounces of bait.

The insert also provides insulation for the rodent against the cold metal of the station and is easily cleaned.

Eaton's plastic inserts are available separately and will fit all of the firm's metal bait stations currently in use in the field.

When the plastic inserts are used, Eaton's metal bait stations are "Tamper-Proof" under the proposed guidelines issued by the United States Environmental Protection Agency in PR Notice 83-5.

EPA's "proposed criteria" for Tamper-Proof Bait Boxes, met or bettered by Eaton's metal bait station with the new plastic insert, encompass these key design features:

1. Resistant to weather;
2. Strong enough to prohibit entry by large, nontarget species;
3. Equipped with removable lid that can be securely attached;
4. Equipped with entrances which readily allow target animals access to baits while denying access to larger, nontarget species;
5. Capable of being anchored securely to resist efforts to move the container or displace its contents;
6. Equipped with an internal structure for containing baits;
7. Made in such a way so as not to be an "attractive nuisance"; and
8. Capable of displaying "proper" precautionary statements in a prominent location.

For maximum safety, Eaton's metal bait stations have an overhanging galvanized lid stamped with a large "POISON - DO NOT TOUCH" warning.

Non-poisonous, customized STICK-EM insert glue trays that fit both metal and plastic rat size stations also are available. Specially gelled, non-drying glue catches and holds rodents as they enter bait stations. Eaton's glue trays are USDA accepted for use in food plants.

Chlorine Colorimeter Is Direct Reading

• The New LaMotte Model STC-CL is a battery-powered, direct-reading colorimeter for measurement of chlorine in process waters, drinking waters, wastes, and other chlorinated waters. Stable, unit-dose DPD tablet reagents are added to the test sample, and the resulting color reactions are analyzed with electronic speed and accuracy on the colorimeter. Chlorine concentrations are read directly on the calibrated meter face--no calculations and no visual color matching are required. The test measures both Free and Total chlorine in a single sample over the range 0 to 2.5 mg/L with a sensitivity of 0.05 mg/L. Higher level readings can be obtained by dilutions. The STC unique fixed wavelength design assures optimum lighting characteristics for reading the color reaction developed in the test sample and substantially reduces the number of components in the optical system. The portable colorimeter, DPD tablets for 100 tests, and complete labware are furnished in a compact, foam-lined carrying case. The Model STC-CL outfit is manufactured by the LaMotte Chemical Products Company, P.O. Box 329, Chestertown, MD 21620. 301-778-3100, Telex (WUI) 6849068.

Please circle No. 250 on your Reader Service Page

A leading pest control products firm, J.T. Eaton & Company, Inc., of Twinsburg, Ohio, also manufactures SAFE-TEE plastic bait stations, professional pack Stick-Em Glue Traps, and other products.

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TAMPER-PROOF METAL BAIT STATION from J. T. Eaton & Company, Inc.

STC-CL Chlorine Colorimeter by LaMotte Chemical Products Company

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Sparta's "Hi-Lo" Floor Scrubber Now Features New Threaded Handle

• Sparta Brush Company's unique "Hi-Lo" Floor Scrubber now features a new plastic threaded hardwood handle.

This new 027-60 handle has plastic threads that are fused directly onto the handle, making them stronger and more durable than wood or metal threads. There is no thread backoff, allowing the handle to remain firm at all times. This new threaded handle design is another first for Sparta Brush.

The "Hi-Lo" head features Sparta's heavy-duty Spartex golden polypropylene bristles that clean easily and flare open to cover wide areas in a few fast strokes. The bristles are crimped to hold more water and are directly set into the structural foam block. The block will not absorb water, warp, crack, split or splinter, for maximum brush life and elimination of areas for bacteria buildup.

The "Hi-Lo" is especially ideal because of its far-reaching capabilities to scrub effectively under heavy equipment and service counters. Whether the application is food service, food processing, dairy or industrial, the "Hi-Lo" will clean floors quickly and thoroughly. It cleans easily under ice machines, stainless steel counter/work areas, conveyors, packaging equipment, grinders, holding tanks, refrigeration units, steamers, ovens, and any application required, meeting stringent sanitation requirements.

Sparta Brush Company manufactures and markets a quality line of specialized brushes for the food service and food processing industries. For more information and literature on Sparta's No. 38X "Hi-Lo" Floor Scrub and new threaded handle, call or write today. Contact: Jack Horner, Director of Marketing, Sparta Brush Company, Sparta, WI 54656. 608-269-2151.

Please circle No. 251 on your Reader Service Page

Food Science Facts
For The Sanitarian

Robert B. Gravani
Cornell University
Ithaca, NY

CHEMICAL FOOD POISONING (Cont'd)
Toxic Plants and Animals

When thinking of chemical food poisoning, we often focus on metals, toxic hazards associated with additives that are intentionally used in foods, or with residues of chemicals used in food production, processing, storage and distribution. It is easy to overlook the fact that many plants and animals used for human food contain natural substances that have toxic properties. In most cases, these foods are avoided, but through lack of understanding, carelessness, or misuse, the food may be consumed and poisoning can occur.

Although toxic plants and animals are present in our environment, proper vigilance keeps them from becoming a significant threat to public health. The information presented here is a limited discussion of common toxic plants and animals that cause chemical food poisoning and how to avoid problems with these foods.

TOXIC PLANTS

Common plant foods such as rutabagas, turnips, cabbage, kale, broccoli, mustard and other related vegetables contain goitrogens which are capable of blocking the body's ability to properly absorb iodine. When these foods are consumed in normal amounts they cause no problems, but when eaten in excessive amounts for prolonged periods, they can lead to abnormal conditions. Cooking destroys most of the goitrogenic activity. Even though there are a great number of toxic substances naturally present in plant foods, few hazards exist for healthy people who consume a normal diet.

There are several types of poisonous mushrooms that have been mistaken for edible varieties and these have resulted in illness and sometimes death for those who consumed them. Although mushroom poisoning occurs sporadically in the United States, it is a complicated problem involving many toxins. These toxins affect different organ systems in the body and require different treatments. By purchasing foods from approved and inspected sources, mushroom poisoning can easily be prevented.

TOXIC ANIMALS

It is thought that toxic animals cause more poisonings than toxic plants. The tissues of some animals, particularly fish and shellfish, can be naturally toxic to humans even when the meat is fresh. Usually, the animal does not show any outward signs of illness and there is no simple way to determine whether a particular animal is poisonous. Most animal toxins are heat stable and are not destroyed by cooking.

Paralytic Shellfish Poisoning

These types of outbreaks have been reported after the consumption of poisonous clams, oysters, mussels and scallops. The shellfish become toxic by feeding on poisonous plankton (microscopic food eaten by fish and shellfish). This plankton, when growing in large masses, causes the water to appear red or reddish-brown and has been called the "red tide." The plankton produces a neurotoxin which does not affect the shellfish and is heat resistant. Even if the shellfish is properly cooked, the toxin will not be destroyed, and people who consume them will become ill. Paralytic shellfish poisoning can be controlled by early detection of increased numbers of toxic plankton in coastal waters.

Scombroid Fish Poisoning

This poisoning occurs in scombroid fish such as tuna, mackeral, bonito and skipjack. The toxin involved is thought to be produced by the action of certain bacteria (*Proteus* species) on fish flesh after they have been caught. This usually occurs on fish that have not been properly refrigerated. Fish contaminated with "scombrotoxin" may sometimes have a sharp or peppery taste or show signs of honeycombing, indicating decomposition. However, these signs cannot be relied on in all cases, since contaminated flesh may have a normal appearance and taste. This toxin is heat stable, so thorough cooking

con't. p. 397

Seventy-Second Annual Meeting of IAMFES

Nashville, Tennessee
Aug. 5-9, 1985

Instructions to Prepare Abstracts of Contributed Papers

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1. Use the printed Abstract form that appears on the other side of this page. Complete the form using a typewriter equipped with a reasonably dark ribbon.
2. Type in the title, capitalize the first letter of the first word and of any proper nouns.
3. List authors and institution(s). Capitalize first letters and initials. Indicate with an asterisk the author who will present the paper. Give complete mailing address of the author who will present the paper.
4. Type the abstract *double-spaced*, in the space provided on the abstract form.
5. Mail *two* copies of the abstract before February 15, 1985 to:

   Kathy R. Hathaway
   Executive Manager, IAMFES
   P.O. Box 701
   Ames, Iowa 50010

6. Enclose *two* self-addressed standard post cards. One will be used to acknowledge receipt of the abstract and the other to notify the speaker about the scheduling of the paper. Two cards must be included with *each* abstract that is submitted.

Content of the Abstract

The abstract should describe briefly: (*a*) the problem that was studied, (*b*) methods used in the study, (*c*) essential results obtained, and (*d*) conclusions. Statements such as "results will be discussed" should not appear in a abstract.

Oral Presentations

Papers will be scheduled so a speaker has a maximum of 15 minutes, including discussion. Hence the actual presentation should be no more than 11-13 minutes so that time for discussion will be available. Projectors for 2 × 2 inch slides will be available. If the speaker needs other projection equipment, Kathy R. Hathaway (address given earlier) should be contacted as soon as possible.

Subject Matter for Papers

Papers should report results of applied research in such areas as: food, dairy, and environmental sanitation and hygiene; foodborne disease hazards; food and dairy microbiology; food and dairy engineering; food and dairy chemistry; food additives; food and dairy technology; food service and food administration; food and dairy fermentations; quality control; mastitis; environmental health; waste disposal, pollution, and water quality.

Additional Abstract Forms

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Annual Meeting

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

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of the fish does not provide protection from the illness. Scombroid fish poisoning can be prevented by the adequate refrigeration of freshly caught fish.

Ciguatera Fish Poisoning

Ciguatera fish poisoning is related to a toxin, ciguatoxin, found in large tropical reef fishes. Most outbreaks reported to the Center for Disease Control occurred in Florida and Hawaii. Fish commonly involved are barracuda, red snapper, amberjack and grouper. These fish are thought to acquire the toxin through the food chain. The most toxic part of the fish is usually the liver, followed by the intestines, reproductive organs and least of all the muscle. There is no reliable method for determining whether a particular fish is toxic, so the viscera of large tropical reef fish should not be eaten. This toxin is also heat stable, so cooking will not protect against the illness.

Pufferfish Poisoning

This poisoning is caused by ingesting the flesh, viscera or skin of pufferfish (also called blowfish or globefish), ocean sunfish or porcupine fish. These fish are most dangerous to eat immediately prior to and during the reproductive season. The skin, liver, reproductive organs and intestines are the most toxic parts of the fish. It is thought that this family of fish become toxic through the food they consume. The toxicity of the fish vary according to the type of fish, geographical area, season of the year and organ of the animal. The toxin is not destroyed by heat, and there is no way that toxicity can be determined by appearance or size of the fish.

New Members

Robert Edward Chandler
Hobart, Tasmania, Australia

Roscoe L. Warner
Lansing, MI

Jose T. Hernandez
Maracay, Araqua,
Venezuela

Mark A. Feldworth
Madison, IL

James R. Hartman
Columbus, OH

Eric Jackson
Palm Dairies Ltd.
Lethbridge, Alberta,
Canada

Rick Katz
N. Dorman & Co. Inc.
Monroe, WI

Geetha Manian
Dairy Research Assoc.
Pittsburgh, PA

Roger Mshar
State Dept. of Health Svcs.
Hartford, CT

Dr. John A. Partridge
Michigan State Univ.
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Nizar W. Ramji
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Calgary, Alberta,
Canada

June Sadoti
Consumer Health Services
Houston, TX

Diane Weaver
Dorman Cheese
Monroe, WI

Dr. Catherine Wright Donnelly
The Univ. of Vermont
Burlington, VT

Dairy Quality

by **Darrell Bigalke,** *Food & Dairy Quality Mgmt., Inc., St. Paul, MN*

ICE CREAM MICROBIOLOGICAL QUALITY

Part II. Recommended Laboratory Procedures for Monitoring and Controlling the Microbiological Quality of Ice Cream

Last month's Dairy Quality Update pointed out that there are several factors influencing the bacteria and/or coliform count of ice cream. These factors include:

1) The level of plant sanitation and/or employee personal hygiene.

2) Contamination from environmental sources.

3) Pre- and post-pasteurization contaminants from ice cream ingredients.

4) Laboratory procedures used to monitor bacteriological quality.

The objective of this month's Dairy Quality Update is to suggest laboratory procedures that can be used to identify sources of bacteria and/or coliform contamination in ice cream and monitor the bacteriological quality of ice cream. Recommended laboratory procedures for monitoring the bacteriological quality of ice cream (as any other dairy product) must include ingredients inspection, process monitoring, and finished product inspection.

Ingredients added to ice cream mix prior to pasteurization normally do not contribute to the microbial content of pasteurized mix unless the ingredients contain thermoduric organisms, especially spore formers. However, bacterial analysis may be important in establishing the quality of ingredients added to mix prior to pasteurization. Standard Plant Count, Coliform Count, Yeast and Mold Count, and Spore Count can be useful tests in determining the quality of these ingredients.

The ingredients of main concern are those added after pasteurization. As *Standard Methods for Examination of Dairy Products* (2) points out, fruits, nuts, flavors, extracts and other ingredients can be important sources of bacterial contamination and/or coliform contamination. Ingredient standards and monitoring of ingredients for bacterial and/or coliform contamination is necessary to assure production of ice cream that will conform to legal specifications.

In addition to ingredients, ineffective sanitation of product contact surfaces and environmental sources may contribute to the bacterial and/or Coliform Count of ice cream mix. Line analysis (process analysis) can be an effective tool in identifying these sources of post-pasteurization contamination. Line analysis was first introduced by Sing, et al (3) and was later pointed out by Bigalke (1) as an effective means of identifying post-pasteurization contamination. Line analysis should be conducted by obtaining an aseptic sample from (A) the discharge of the HTST, (B) product prior to entering pasteurized mix tanks, (C) a sample from the pasteurized mix tanks, and (D) a sample obtained prior to the freezer. These samples should be obtained using a Capsule Tru-Test Aseptic Sampling System or other aseptic sampling system. Follow up conducting a coliform or other gram negative analysis on the sample. Coliform analysis can be conducted using Violet Red Bile Agar or Most Probable Number techniques as pointed out in *Standard Methods for the Examination of Dairy Products* (2). Sensitivity of line analysis can be increased by obtaining large samples (25 to 50 ml) and incubating these samples overnight at room temperature followed by coliform analysis. Properly conducted and routinely conducted line analysis can help identify such contamination sources as:

(a) Ineffectively cleaned and sanitized product contact surfaces.

(b) Cracks in pasteurized surge tanks.

(c) Contaminants from glycol or chill water through cracks in the HTST plates.

(d) Other environmental sources.

Equally important to the overall quality assurance program is finished product inspection. Standard Plate Count, Coliform Count, Psychrotrophic Count, and Yeast and Mold Count can be conducted on ice cream to determine microbiological quality. However, it is recommended that routine Standard Plate Count and Coliform Count be conducted. Test procedures for these tests can be found in *Standard Methods for the Examination of Dairy Products* (2). *Standard Methods* . . . (2) also points out that because of the presence of sucrose in ice cream, coliform-life colonies found on Violet Red Bile Agar should be confirmed. Procedures for confirmation can also be found in *Standard Methods* . . . (2).

In summary, controlling and monitoring bacterial and/or coliform contamination in ice cream requires:

(a) Establishing standards for ingredients along with monitoring ingredients.

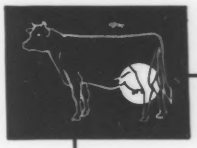
(b) Process monitoring and control including effective sanitation, time/temperature controls, and controlling environmental contaminants.

(c) Finished product inspection.

The subject of next month's Dairy Quality Update will be "Monitoring and Controlling Post-Process Contamination of Cottage Cheese," Part I.

REFERENCES

1. Bigalke, D. Post-Pasteurization Contamination. American Dairy Review. May, 1980.
2. Marth, Elmer H. 1978. *Standard Methods for the Examination of Dairy Products*. Washington, DC. American Public Health Association.
3. Sing, E. L., P. R. Elliker, L. J. Christensen and W. E. Sandine. 1966. Effective Testing Procedures for Evaluating Plant Sanitation. J. of Milk and Food Technology, p. 103-111.



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Coliform Mastitis Problems Increase During The Summer
Don Wesen, North Carolina State University

Each summer, with the coming of hot, humid weather, there has been an increased number of dairy producers reporting problems with coliform mastitis.

This term has been used to identify mastitis caused by a group of bacteria, including Escherichia (E. coli), Aerobacter and Klebsiella. These organisms, particularly E. coli, are normally found in the intestinal tract and, thus, are found in high numbers in feces and the barnyard environment. They usually live on dead or decaying matter, but can cause severe mastitis when they gain entrance into the udder.

Coliform mastitis normally occurs in well-managed herds that are relatively free of other types of mastitis-causing microorganisms. Generally, high-producing, fast-milking cows with no previous history of mastitis are involved.

At one milking the affected cow will appear normal and at the next milking the cow will have a high fever and a severely swollen quarter. The swollen quarter has only a small amount of watery, yellow, clumpy fluid and the noninfected quarters are nearly dry.

Endotoxins produced by the microorganisms cause the cow to be depressed, go off feed and dehydrate rapidly. The cow drops weight rapidly and the mortality rate may be very high.

Only a limited amount of research is available on controlling coliform mastitis. Thus, the following management recommendations are based on field observations:

- Attempt to have the microorganism identified. Samples should be collected from clinical cows as well as cows that have recently shown an elevated somatic cell count.
- Eliminate wet milking by drying udders with individual paper towels. Watch the top of the inflations during milking; there is a problem if water accumulates.
- Avoid excessive air leakage during the milking process, particularly when attaching and detaching units.
- Eliminate access to muddy areas, polluted ponds and use of contaminated water.
- Keep free stalls in good condition and avoid deep sawdust packs.
- Have feed available immediately after milking. This allows the teat orifice to dry and close before cows lie down on contaminated material.
- Avoid teat injury.

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703-243-8268

Abstracts of Papers Presented at the Seventy-First Annual Meeting of the IAMFES

Edmonton, Alberta, Canada, August 5-9, 1984

Abstracts of most papers given at the 71st Annual Meeting of the IAMFES appear on this and the following pages. The complete text of many of these papers will appear in future issues of the *Journal of Food Protection* or *Dairy and Food Sanitation*.

CONTRIBUTED PAPERS

Comparative Properties of Plastic vs. Metal Containers In Their Ability To Protect Spices. Ricardo Alvarez and Morris Binder, *Tone Brothers, Inc., P.O. Box AA, Des Moines, IA 50301.*

PET-G clear plastic is rapidly displacing metal cans as the standard of package identity for foodservice spices. This study was undertaken to compare the protective properties of PET-G plastic jars and metal cans in their ability to maintain the quality of selected spices. Paprika, parsley, garlic powder, pepper, nutmeg, cinnamon and cayenne pepper were stored at 100°F and 90% RH for 30 d in both containers. Controls were maintained at 40°F for the same period. Flavor loss, moisture uptake, color change, losses of oils and volatile compounds, and lumping were less in the PET-G container. Overall, the quality of the spices in the PET-G container was equal to or, in most instances, better than that of those stored in a metal can. In addition, the unique shape and clarity of the PET-G container offers convenience, visual spice quality evaluation and a more manageable packaging system.

What Dairy Plant Fieldmen Think of Their Work and What Some Are Doing About It. D. K. Bandler, *Cornell University, 11 Stocking Hall, Ithaca, NY 14853.*

New York annually produces 11 billion pounds of milk on about 15,000 farms. Over 200 certified milk inspectors (CMIs) hired by dairy cooperatives and processors are responsible for maintaining farm quality. A recent survey reveals what these dairy plant fieldmen think of their work and how they cope with keeping an average of 135 farms each approved for the Interstate Milk Shipments program. It includes such working conditions as current salary, travel time, frequency of farm visits, as well as individual likes and dislikes about the job. As a result of the questionnaire, workshops were developed to help introduce more effective inspection procedures. These will be outlined along with the basic survey results.

Can A Voluntary Industry Shelf-Life Program Take the Place of a Mandatory Milk Dating Law? D. K. Bandler and E. T. Wolff, *Cornell University, 11 Stocking Hall, Ithaca, NY 14853.*

Faced with the prospect of a mandatory milk dating law, 49 processors in New York State agreed to a voluntary, industry-sponsored shelf-life program. Administered jointly by a trade association and Cornell, a procedure was developed to assure that the sell-by date assigned to each product would reflect the approximate performance in the marketplace. The program was initiated when a statewide survey showed that 30% of the milk was judged unacceptable at the average (10.7 d) sell-by date and that 62% was rated unacceptable at the sell-by date plus 4 d. Flavor scores were substantiated by elevated SPCs, coliforms, and ADVs of 24,000,000, 1,800 and 2.1, respectively. A uniform survey form was developed and used with each participating plant. Information gathered included types of equipment used, quality control data, temperatures of processing and storage, as well as actual shelf-life performance. This was computed to arrive at a suggested sell-by date for each product. Plants with unacceptable scores were advised to either shorten the sell-by date or to improve processing controls.

Inhibition of Ochratoxin Production by Sorbate. Lloyd B. Bullerman, *Department of Food Science and Technology, University of Nebraska, Lincoln, NE 68583.*

The effects of potassium sorbate on growth and ochratoxin production by *Aspergillus ochraceus* NRRL 3174 and *Penicillium* sp. isolated from cheese were studied. Potassium sorbate at 0.05, 0.10 and 0.15% delayed or prevented spore germination and initiation of growth, and decreased the rate of growth of both organisms in YES broth at 12°C. Increasing concentrations of sorbate caused more variation in the amount of total mycelial growth of *Penicillium* sp. and generally resulted in a decrease in total mycelial mass. Potassium sorbate also greatly reduced or prevented production of ochratoxin by *Penicillium* sp. for up to 70 d at 12°C. At 0.05 and 0.10% of sorbate, ochratoxin production was greatly reduced over the control, and was eliminated at 0.15%. Overall, ochratoxin production by *Penicillium* sp. in the presence of sorbate was very low or eliminated. At 12°C, *A. ochraceus* was inhibited by all three levels of sorbate and did not produce ochratoxin. At 25°C, *A. ochraceus* grew quite readily and appeared to produce greater

amounts of ochratoxin in the presence of sorbate, especially at 0.05%, and somewhat higher amounts at 0.10 and 015%.

***Campylobacter jejuni* Infection of Hen's Eggs.** A. G. Clark and D. Bueschkens, *Department of Microbiology, University of Toronto, 150 College St., Toronto, Ontario M5S 1A8, Canada.*

Campylobacter jejuni occurs on up to 80% of retail dressed poultry and, being a major human pathogen, represents a health hazard. The study set out to examine the laboratory infection of eggs by *C. jejuni* and to enquire if such infection occurred on farms as might be seen in an abnormal dead-in-shell (DIS) ratio at hatching. Eggs could be infected with *C. jejuni* in the laboratory by temperature or pressure differential methods identical to those used for *Salmonella*. At 48 h all eggs were infected, but this dropped to 10% or less at 5 d incubation, irrespective of the source of *C. jejuni*. At hatching, up to 10% of chicks carried the same serotype of the inoculum in the intestinal tract. Holding eggs for 5 d after infection under hatchery egg storage conditions resulted in no infected birds at hatching. Despite the high infection rate, the hatch ratio was never significantly different from controls. Further, only occasionally did DIS eggs yield *C. jejuni* at 21 d. Thus, there is either no correlation between DIS eggs and *C. jejuni*, or *C. jejuni* survives poorly in egg parts beyond 5 d. On the farm, the analysis of 2810 DIS eggs and shell debris from the equivalent of another 4700 eggs never yielded *C. jejuni*. The question remains whether hatched birds can carry *C. jejuni* to the growing barns.

Use of Nisin as an Antimicrobial Agent in Bacon. D. L. Collins-Thompson, C. Calderon, D. Wood and R. Usborne, *Departments of Environmental Biology and Food Science, University of Guelph, Guelph, Ontario N1G 2L6, Canada.*

Studies on bacon with nisin (an antimicrobial agent produced by *Streptococcus lactis*) were undertaken both in the laboratory and on a pilot-plant scale. Levels of nisin tested were 50, 100, 200, 500 and 750 iu/g bacon made with 50 μ g/nitrite/g. Shelf-life studies at 5°C and 30°C showed a delay in growth of the lactic acid bacteria population at the higher nisin levels. Extension of shelf life of the nisin-containing bacon at 5°C, however, showed a marginal increase over the control. Studies with *Salmonella*- and *Staphylococcus aureus*-inoculated packs showed nisin to have little effect in controlling these foodborne pathogens both at 30°C and 5°C. Nisin losses in bacon were also studied. Such losses (750%) were related to chemical depletion rather than any enzymatic system present in the lactic acid bacteria.

Improved Bacterial Recovery by Membrane Filters in the Presence of Food Debris. J. M. Farber and A. N. Sharpe, *Microbiology Research Division, Bureau of Microbial Hazards, Health Protection Branch, Health & Welfare Canada, Sir Frederick Banting Research Centre, Tunney's Pasture, Ottawa, Ontario K1A 0L2, Canada.*

It is well established that brands of membrane filters (MF) vary widely in their ability to recover bacteria from various sources. Certain MF (e.g. Millipore HC), for which surface pores are relatively large, exhibit improved bacterial recovery. Bacteria on these MF are thought to be cradled below the surface and thus protected from environmental stresses. In experiments directed toward minimizing brand-to-brand variation, river water samples were filtered through MF in the presence of sterile food suspensions. In the absence of food debris, Sartorius MF recovered 30% fewer fecal coliforms (m-FC Agar, 44.5°C) than Millipore HC when filtering 50-ml samples of river water. However, bacterial recovery on Sartorius MF was improved to that obtained on Millipore HC MF by addition of a small quantity of sterile blended carrot-to-water samples. Scanning electron micrographs of the top surface of Sartorius MF showed bacteria cradled in crevices formed by the carrot fibers, and thus shielded from the effects of exposure. Similar protective effects were observed with *Escherichia coli*-inoculated cheese, green beans, peach, pear, tuna and turkey on Oxoid Nuflow MF (85-mm diameter). We conclude that food debris on the surface of MF reduces or eliminates not only brand-to-brand recovery variations seen with MF, but also inconsistencies between or within production lots.

Impedimetric Coliform Estimation in Dairy Products. R. Firstenberg-Eden, M. L. Van Sise, J. Zindulis and P. Kahn, *Bactomatic, A Division of Medical Technology Corporation, P.O. Box 3103, Princeton, NJ 08540.*

An impedance method for estimation of coliforms in raw milk and pasteurized dairy products (milk, heavy cream and ice cream) was developed. Impedance detection times (IDT) in CM, a medium developed for impedimetric detection of coliforms, were compared to confirmed Violet Red Bile Agar (CVRBA) plate counts. Correlations of 0.91 to 0.95 between the two methods were obtained for the four dairy products. The high correlation between IDT in CM and CVRBA counts indicates that the two methods can provide substantially the same information. Similar line equations were obtained for the relationship between IDT and CVRBA for all four dairy products. IDT shorter than 9 h was indicative of coliform levels >10/ml while IDT longer than 12 h was indicative of levels <10/ml. In raw milk, coliform levels $>10^3$/ml were detected within 6 h. With heavy cream, it was found necessary to add 0.1 M Tris buffer to CM to improve the impedance curves. The results of this study suggest that this technique may be applied to a wide variety of other dairy products, with minor modifications.

Quality Evaluation of Fluoridated Milk. Joseph F. Frank and Genevieve L. Christen, *Department of Animal and Dairy Science, Dairy Science Building, University of Georgia, Athens, GA 30602.*

Supplementation of milk with fluoride is one method for insuring adequate fluoride intake of infants and children in geographical areas where water fluoridation is not possible. The purpose of this research was to evaluate the shelf-life and flavor of fluoridated milk. Triangle taste tests were used to determine whether fluoride at 100 ppm could be detected in fresh milk

and milk stored for 8 d. These tests used between 91 and 178 tasters, and indicated that there was no detectable difference between fluoridated and unfluoridated milk. The shelf-life study was done using three trained judges. Results showed that pasteurized milk with 10 ppm fluoride had a similar shelf-life to the unfluoridated control. This research indicates that milk supplemented to achieve a recommended daily intake of 1 mg of fluoride (5 ppm) will be indistinguishable from normal milk in terms of shelf-life and flavor.

Use of the 3M Petrifilm™SM Method for Determining Viable Bacteria Counts in Raw Milk. R. E. Ginn, V. S. Packard, and T. L. Fox, *Dairy Quality Control Institute, Inc., 2353 Rice Street, St. Paul, MN 55113.*

The 3M Company has developed a new system that can be used for determining viable bacteria counts in raw milk. Called Petrifilm™SM, the method may be applied in a manner similar to the Standard Plate Count, using a pipette to add the milk sample, or as a Plate Loop modification. Petrifilm™SM uses dry Standard Methods nutrients coated onto a base film. This base is overlaid with a top film coated with a water-soluble gelling agent and a tetrazolium indicator dye (to facilitate counting). Plates are supplied ready to use; no medium preparation is necessary. Test packets are simply inoculated, then incubated at 32°C for 48 h, followed by counting of colony-forming units. This paper focuses on the step-by-step procedure for performing viable bacteria counts by the Petrifilm™SM method. Also included are results of a study comparing the 3M method with the Standard Plate Count and Plate Loop tests for viable bacteria in raw milk.

Psychrotrophic Bacteriophages for Beef Spoilage Bacteria. G. Gordon Greer, *Agriculture Canada, Research Branch, Lacombe, Alberta T0C 1S0, Canada.*

The objectives of this study were to isolate, purify and characterize virulent bacteriophages for beef spoilage bacteria. Thirty-eight phages, lytic for 1 or more of 37 *Pseudomonas* strains and 21 phages lytic for 1 or more of 16 *Brocothrix thermosphacta* strains, were successfully isolated from spoiled rib steaks. The psychrotrophy of the *B. thermosphacta* phages was demonstrated by an increase in plaque size and plating efficiency as incubation temperatures were decreased from 25 to 1°C. Electron microscopy of two homologous *B. thermosphacta* phages showed the virions to consist of hexagonal heads and tails and ranging in total length from 210 to 280 nm. On the basis of differential susceptibility to phage lysis a phage typing scheme was established which would provide a sensitive means of distinguishing different strains of beef spoilage bacteria. In addition, phages resulted in a pronounced inhibition of bacterial growth in a culture medium prepared from an aqueous extract of homogenized beef muscle. Phages may provide a unique method for biological control of beef spoilage.

The Maj-Ik-Box Mouse Station Baiting System. Charles E. Knote, Elizabeth A. Knote, and Victor Keller, *National Institute of Pest Management, 33 N. Frederick, Cape Girardeau, MO 63701.*

Eighty percent of FDA citations in food plants result from rodent contamination. Since 95% of the mice "move in" from the outside, control measures should be installed on the exterior of food plants. Present control methods include exclusion, trapping and baiting. For exterior control, present baiting systems are unsafe. The mouse bait stations fill with rain water, are difficult to secure and service; plus the bait can be accessed by children, pets and wildlife. The Knote Mouse Maj-Ik-Box bait station was developed to eliminate these problems. The EPA tested the Maj-Ik-Box and rated it as tamper-proof according to guidelines of PR Notice 83-5. Outdoor field tests were conducted at a 6-acre food warehouse and a hog farm. The Maj-Ik-Box was tested against the Eaton Station, Kal Kaplan's IMPS Station, and Solvit's Rat Cafe Junior. The bait consumption results were as follows: Maj-Ik-Box 98% - Eaton 8%; Maj-Ik-Box 80% - Kal Kaplan's IMPS 20%; Maj-Ik-Box 98% - Rat Cafe Jr. 2%. The Maj-Ik-Box outperformed the other stations because it is weather-resistant. Rain water does not accumulate in the station to ruin the bait or repel the mice. The entry way tunnel is dark and sized so that the mouse's very sensitive touch zones contact the station at all times. This gives the mice a feeling of security and lures them into the station. The Maj-Ik-Box's unique drawer design and tamper resistant locking device provide an economical means for securing and servicing the station.

Detection of Mold in Processed Foods by High Performance Liquid Chromatography. H. H. Lin and M. A. Cousin, *Food Science Department, Purdue University, West Lafayette, IN 47907.*

A high performance liquid chromatographic (HPLC) method was modified to analyze for mold contamination of processed fruit and vegetable products by detecting glucosamine, a breakdown product of fungal chitin. Processed fruit and vegetable products were spiked with 0.1 to 2.5 mg of mold (species of *Alternaria, Colletotrichum, Fusarium, Geotrichum,* and *Rhizopus*)/g, hydrolyzed in 6 n HCl at 121°C for 2 h, purified on a cation exchanger, derivatized by 0-phthalaldehyde, and fluorogenic reaction products were separated by reversed-phase HPLC. Optimal fluorescence was developed at pH 7.0 to 8.0 after a 15- to 20-min incubation. Maximum fluorescence occurred at an excitation wavelength of 337 nm and an emission wavelength of 439 nm. Linear relationships were observed for added mold and glucosamine content for all fruit homogenates; however, slopes varied depending on mold species. Comparable results were obtained for the same samples using amino acid analysis. Insect contamination of foods would not interfere with fungal analysis since fruit flies were barely detectable. A positive relationship was observed between the Howard mold count and the HPLC method for spiked tomato catsup, but the correlation coefficient was 0.74. This HPLC method has potential for analytical quality control because it is sensitive to picomole levels of glucosamine and the HPLC injection time is less than 10 min.

Rapid Enumeration of Enterotoxigenic *Staphylococcus Aureus* Colonies on Membrane Filters by Enzyme-Linked Antibody Techniques. Pearl I. Peterkin and Anthony N. Sharpe, *Bureau of Microbial Hazards, Health Protection Branch, Health and Welfare Canada, Tunney's Pasture, Ottawa, Ontario K1A 0L2, Canada.*

In the microbial analysis of foods using hydrophobic grid-membrane filters, methods are required which allow optical discrimination of colonies for manual or automated counting. A convenient method has been devised for enumeration of enterotoxigenic *Staphylococcus aureus* in foods using horseradish peroxidase-labelled antienterotoxin to identify colonies. The method can be applied to other microorganisms of interest in food microbiology.

Effect of N_2, CO and CO_2 on Microbial Protease Decarboxylase and Lipase in Meat Products. B. Pichard, J. A. Zee, R. E. Simard, and C. Bouchard, *Departement de nutrition humaine, Pavillon Comtois, Universite Laval, Ste-Foy, Quebec G1K 7P4, Canada.*

The activities of proteases extracted from *Pseudomonas fragi* and *Streptomyces caespitosus* as well as those of decarboxylase from *Lactobacillus* 30a and lipase from *Candida cylindracea* have been compared under air and argon (as controls), as well as under 10, 20, 40, 70 and 100% N_2, CO and CO_2 at 25°C. Nitrogen and CO at all concentrations had no effect on the protese activities, while CO_2 inhibited *Pseudomonas fragi* protease. This inhibition was apparent at 15, 20 and 25°C as well as at pH 6 and 7. However, CO_2 (10, 20 and 40%) increased *Streptomyces caespitosus* protease activities. Nitrogen, CO and CO_2 had no significant effect on the decarboxylase activity of *Lactobacillus* 30a. However, CO_2, when compared with Ar, inhibited the lipase activity of *Candida cylindracea*. Moreover, factors such as temperature, pH, Fe or Mg addition influenced the inhibitory effect.

Storage of Refrigerated Raw Milk Under N_2 and CO_2: Effect of Addition of Fresh Raw Milk on Proteinase Production by Proteolytic Psychrotrophic Bacteria. B. J. Skura, K. K. Kwan, and R. C. McKellar, *Department of Food Science, University of British Columbia, 248-2357 Main Mall, Vancouver, B.C. V6T 2A2, Canada, and Food Research Institute, Agriculture Canada, Ottawa, Ontario K1A 0C6, Canada.*

The effects of addition of fresh raw milk to milk stored under atmospheres of CO_2 or N_2 on growth and proteinase production by proteolytic psychrotrophic bacteria, and on dissolved oxygen, titratable acidity and lactic acid bacteria were evaluated. Addition of fresh raw milk at 24, 48 and 72 h of storage to raw milk under CO_2 or N_2 caused small temporary increases in dissolved oxygen contents. Proteinase activity was detected in milk stored aerobically but not in milk stored under CO_2 or N_2. Lactic acid bacteria grew most rapidly in milk stored under N_2 and CO_2, but titratable acidity of milk stored under N_2 increased at a slower rate than that of milk stored aerobically. Addition of fresh raw milk to raw milk stored under CO_2 or N_2 did not interfere with inhibition of proteinase production by proteolytic psychrotrophic bacteria observed in milk stored under atmospheres of flowing CO_2 or N_2.

Costs Resulting from Foodborne Disease Because of Mishandling in Foodservice Establishments. Ewen C. D. Todd, *Bureau of Microbial Hazards, Health Protection Branch, Tunney's Pasture, Ottawa, Ontario K1A 0L2, Canada.*

More persons are ill from foodborne disease because of mishandling in foodservice establishments than any other place. Yet, no costs have been systematically determined to measure the economic impact of such illnesses. A study has been initiated to obtain economic data on food at the production level, processed food and food served to the public. This presentation concentrates on the last area. Costs for outbreaks involving 5 restaurants, 4 hotels, 3 caterers, 2 hospitals, 2 old age homes and one college have been examined. There is considerable variation in the amounts of money expended, ranging from $4,000 to over $1 million, depending on the type of establishment, the etiological agent responsible, the extensiveness of the study done and whether legal suits were pursued or not; costs per case ran from $69 to over $40,000. These studies mainly involved larger outbreaks, and the economic impact of the typical incidents with several people ill has not been calculated. There is also no standard procedure for determining costs even for something as simple as laboratory testing (for instance, have shipping of samples, rental of building and wash-up time been included?). These factors make it difficult, at present, to determine an extrapolated national figure, but awareness of the need for this information among health and industry personnel has been increasing and more cost data are expected.

INVITED PAPERS

From Dairy Specialist to Producer. Sidney E. Barnard and William H. Folwell, *Departments of Food Science and Agricultural Communications, The Pennsylvania State University, 8 Borland Laboratory, University Park, PA 16802.*

With today's sophisticated audiences, an Extension Specialist can no longer just gather a bunch of slides to talk about at a meeting. Presentations must be planned with a considerable amount of professionalism. In looking for educational materials, few titles dealing with food science-dairy were available, so specialists had to create their own. Once attitudes changed toward the professionalism required to motivate and educate audiences, specialists had to learn new skills. They had to know how to produce, package, and present information in a manner that would not only convince differing audiences to accept the new, but to rededicate their efforts to improve on the old. Concurrent with these demands was the need to prepare educational materials for use by others as travel budgets shrunk, preventing specialists from attending each meeting requested. This second generation in the educational process consists of field staff of state and federal agencies, producer groups, processors, and Ex-

at 44 and 45°C, indicating traditional enrichment procedures using high-temperature incubation (44 to 45.5°C) to detect *E. coli* in foods are not likely to detect hemorrhagic *E. coli*. A selective enrichment procedure has been developed to detect toxin-producing *E. coli* O157:H7 in ground beef. This procedure is being used to determine the prevalence of the organism in meat.

The Use of Time/Temperature Monitors in Foodservice and Retail. John W. Farquhar, *Food Marketing Institute, 1750 K Street, N.W., Washington, D.C. 20006.*

The problem of quality loss in food has been a major concern in both the foodservice and retailing sector. This loss of quality has primarily been attributed to a combination of poor handling and storage practices, with the major emphasis being a lack of proper temperature control. This is particularly true for fresh meat and seafood, where temperature-abuse significantly shortens the shelf-life of the product. Very successful results have been achieved through use of time/temperature monitors in measuring effects of temperature mishandling. Examples on the use of time/temperature monitors will be shown in a number of different applications of food distribution models. Using monitors for assuring quality, estimating shelf life dates and proper storage rotation will be reviewed.

Biotechnology Developments In Analytical Methods for Food and Milk Industry. Y. Fouron, *Chembiomed Ltd., W5-56 Chemistry Building, University of Alberta, Edmonton, Alberta T6G 2G2, Canada.*

New analytical methods for the food and milk industry of increased performance (specificity, rapidity, etc.) are the result of the tremendous advances in biotechnology. A number of different technologies of great diagnostic potential (monoclonal antibodies, DNA-hybridization probes, etc.) are competing for what is perceived by experts to be the next target: the food and milk industry. Progress in biotechnological applications to analytical methods will be reviewed.

A Look At Audio Visual Training Aids. Robert B. Gravani, *Department of Food Science, Cornell University, 8A Stocking Hall, Ithaca, NY 14853.*

Education and training programs in food protection and food sanitation are instructional processes designed to facilitate learning and modify human behavior. To assure that the instructional message(s) will be received, retained and assimilated by the audience, educators and trainers must be creative, innovative, and use principles involved in learning as they plan their training programs. Studies have shown that the lecture is not the most effective technique for transmitting information. The inadequacy of oral instruction may be compensated for by the use of visual aids. Visual aids including drawings, diagrams, charts, posters, signs, photographs, films, slides, filmstrips, overhead transparencies, television, video, interactive video, programmed instruction and computer assisted instruction have all been used to enhance the learning process. Verbal communication, reinforced by visuals, enables the listener to gain a better understanding of the concepts being discussed. Several examples of innovative instructional methods complemented with high quality visual aids will be shown.

Safety Aspects of Modified-Atmosphere Packaged Foods. Andre Hauschild, *Health Protection Branch, Health and Welfare Canada, Ottawa, Ontario, Canada.*

The economic benefits from extended shelf life of meats and fish packaged in modified atmospheres or in vacuum are somewhat counterpoised by an increased risk from the development of clostridia. This risk is the result of an anaerobic environment, inhibition of the competitive spoilage flora, and more time for growth. Potential hazards from the packaging of meats and fish, both fresh and cured, in high-barrier films will be discussed.

Components Of An Effective Farm Inspection Program. Lloyd G. Johnston, *Alberta Agriculture, Provincial Building, 5201-50 Avenue, Wetaskiwin, Alberta T9A 0S7, Canada.*

Dairy farm inspection programs are effective if the incidence of milk quality problems are reduced and dairy farms are aesthetically pleasing to consumers. Effective programs include multiple components, none of which can be considered independently. Farm premises design and maintenance, laboratory support, milk grading, milk equipment function and regulatory enforcement all play important roles. Processor or regulatory fieldmen can not conduct an effective program alone. Dairy producers must be convinced that it is in their best interest to offer for sale only milk that meets or exceeds the standards and is produced from well maintained premises. Dairy producers who make this realization become their own inspectors, often correcting potential problems before they become serious. Alberta's Milk Grade and Price Program has created this awareness. In a consumer-oriented market, milk quality can be maintained or improved by a combination of preventative maintenance by dairy producers, well stated and enforced consequences for non-compliance, and a readily available source of information exchanged freely between field personnel and producers.

Industrial Application of Modified Atmosphere to Packaged Foods and Mechanisms of Microbial Inhibition in Modified Atmospheres. Patrick Jozon, *L'Air Liquide, Paris.*

For some years, a wide variety of specially modified atmospheres have been used for storing food products. The types of deterioration which can be controlled by use of these atmospheres fall into two groups, chemical deterioration, mainly oxidation, and deterioration due to the development of microor-

tension itself. Besides being willing to help with the teaching, these people and institutions were eager to cooperate in providing ideas for the educational messages, facilities for the production, and funds for out-of-pocket costs. The evolution of food science extension specialist from the traditional mode to more innovative teaching methods is detailed with samples of the slide/cassette sets that have been created. A list of titles/descriptions will be available for distribution.

***Campylobacter:* An Emerging Pathogen in Food.** Martin Blaser, *Veterans Administration Medical Center, Denver, CO.*

Campylobacter jejuni and related organisms are important causes for acute diarrheal diseases in all parts of the world. The reservoirs in nature for this organism are the intestinal tracts of animals, including cattle, poultry, swine and sheep, the principle species used for food production. Fecal contamination with *Campylobacter* of foods of animal origin occurring during the slaughtering and processing procedures is common, and numerous endemic and epidemic infections of humans have been traced to food. Proper cooking of meats and pasteurization of milk should avoid most such infections.

***Campylobacter* and Protection of Water Supplies.** Martin Blaser, *Veterans Administration Medical Center, Denver, CO.*

Campylobacter jejuni and related organisms are important causes for acute diarrheal diseases in all parts of the world. The reservoirs for this organism are the intestinal tracts of wild and domestic animals, and fecally-contaminated water may be a vehicle of transmission. Both endemic and epidemic infections of humans have been reported in persons consuming improperly treated water. *C. jejuni* is as susceptible to chlorination as is *Escherichia coli*, and thus proper treatment of drinking water should prevent transmission.

Bulk Food Merchandising. Ken Blom, *Barons-Eureka-Warner Health Unit, Coaldale, Alberta, Canada.*

Public health standards - are they too restrictive? How much responsibility should be placed on the consumer toward buyer beware self-protection? Will the dispensing of soup base, custard puddings, powders, garlic seasoning, along with a multitude of other consumer edible goods provide a seed bed for disease dissemination? Will this move toward the creation of "public food handlers" result in an erosion of public health safety standards? Several attempts have been made to view the problem from a singular perspective, e.g. microbiological. An attempt will be made to reflect upon the problem in the mosaic, taking into consideration several factors: along with the disease dissemination factors, which are normally incorporated in microbiological, parasitological, or chemical factors, we will also look into the question of aesthetics, social and ethical values, and the subsequent potential for erosion of standards which can have a very profound influence on public health standards of the future. In addressing the problem, we will look at the following: a synopsis of guidelines provided both by the trade and by governments; the Canadian scene; use of regulations; and a comparison of merchandising methods as they now appear, compared to those evident even as little as two years ago (on the Canadian scene), with some comments in terms of the effect of public health concern groups in bringing about the changes.

What Can Be Done About Low Farm Scores? William W. Coleman, *Dairy Industries Division, Minnesota Department of Agriculture, St. Paul, MN.*

As a regulatory agency charged with the enforcement of a farm inspection program, the buck stops here. We score the farm and we are the ones who enforce the regulations. This situation often leads to industry representatives saying, "If the inspector doesn't mark it, we can't do anything about it." Not really true, but it does put responsibility back to the regulatory agency all too often. If we are to solve this problem of low farm scores, we must do more than regulate, we must also educate. We have moved in this direction in Minnesota as have other states, and we are seeing some positive results. It is some of these ideas and programs which I would like to share with you. (1) The producers have to be convinced that what is being required of them is important, not just necessary. (2) Inspectors are "real" people and not just enforcers -- people who care about the producers they serve. (3) Producers must be kept informed of changes in regulations and the reasons for them. (4) Uniformity must be there, not just in a state but between all states. (5) Producers have to be thoroughly informed of items marked out of compliance and what is expected of them. And (6) A job well done has to be recognized in a substantial way. What I have pictured to the producers must now look like Darth Vader mounted on a white horse who goes around sticking gold stars on good dairymen's foreheads and zapping bad ones. This is not the way I intended it to be, but it will take a careful blending of all the points mentioned above to maintain farm scores 90 and above: a program of attitude, information, education and then regulation.

Hemorrhagic *Escherichia coli*. Michael P. Doyle, *Food Research Institute, University of Wisconsin, Madison, WI 53706.*

Escherichia coli O157:H7 has recently been recognized as a cause of hemorrhagic colitis, an illness characterized by bloody (frank) diarrhea and severe abdominal pain. In 1982, the organism was associated with three outbreaks of hemorrhagic colitis; two outbreaks occurred in the United States and were food-associated and one outbreak occurred in Canada. Studies have shown the organism produces a toxic metabolite(s) that specifically acts on the colon, producing colonic lesions and subsequent hemorrhage in mice following i.p. or i.v. injection. Studies in foods indicate the organism is more sensitive to thermal inactivation than salmonellae and survives for months during frozen storage (-20°C). Growth studies found that *E. coli* O157:H7 will not grow at 45.5°C and grows to relatively small numbers

ganisms: molds, yeast, bacteria. The problems of packaging foods under gases are all concerned with three main factors: (*a*) The packaging itself, which must provide a good barrier against gas transfer; (*b*) The packaging machine which is used to displace the air inside the package by the suitable atmosphere; (*c*) The occluded atmosphere, described hereunder using two examples: the meat products and the bakery products, which demonstrate the interest of the gas packaging technique. In the packaging, of meat we are concerned with the packaging of portion-control meat weighing between 200 and 400 g. The traditional packaging of meat is not suitable for long term storage. From the consumer point of view, two factors must be mastered: the color and the hygienic quality of the product. Experimental works have shown that the best method of preventing discoloration is to maintain a high percentage of oxygen in the packaging atmosphere, generally more than 40%. Microorganisms are the main cause of deterioration of meat. Many experimental works in this area have shown that carbon dioxide has an inhibiting effect on development of bacteria; it varies according to CO_2 concentrations and to temperature. Consequently, two types of atmospheres are currently used: binary mixtures of oxygen and CO_2 and ternary mixtures of nitrogen, oxygen and CO_2. The shelf-life of the meat can reach 10 d at low temperature. Bread is virtually sterile when it leaves the oven and contamination occurs while handling and storing after cooking. This contamination is mainly due to development of molds and yeasts. Various gas mixtures may be used to avoid the proliferation of molds. The most widely used gas is carbon dioxide, sometimes mixed with nitrogen. The shelf-life of a gas-packed bakery product depends on the water activity of the product, but generally speaking the gas packaging process triples the shelf life of bakery products.

Modified Atmosphere Packaging (MAP) Microbiology of Meats and Poultry. A. A. Kraft, *Department of Food Technology, Iowa State University, Ames, IA 50011.*

Vacuum packaging has been increasingly used as an adjunct to processing fresh meat items, but more attention is being given to modified atmospheres, in which a predetermined gaseous atmosphere is flushed into a gas-impermeable package. Gases include carbon dioxide, oxygen, and nitrogen. Modified atmosphere packaging extends keeping time of meats and poultry by inhibiting microbial growth, although concern still exists that the normal aerobic spoilage flora may be outgrown by less aerobic organisms and thus produce a possible hazard from potential pathogens. In studies with dry-packed chickens individually packaged by carbon dioxide flushing, vacuum packaging and conventional tray packaging, longest shelf life was obtained with the carbon dioxide flush package, followed by vacuum packaging and conventional packaging in air. Carbon dioxide packaging also produced a unique "snugging" effect resembling vacuum packaging after 1 d of storage at 5°C. Other work with vacuum packaged pork showed that high-barrier and low-barrier films were about equal in tripling shelf-life over conventionally packaged pork chops. No undue health hazard from potential pathogens was observed with refrigerated vacuum packaged fresh pork.

Reference Methods for Calibrating Instruments for Milkfat Testing. Robert T. Marshall, *Department of Food Science and Nutrition, University of Missouri, Columbia, MO.*

Instrumental methods are widely used to test milk for fat and other components. Industry commonly uses the Babcock or the ether extraction method for calibrating instruments that test for fat. A recently completed collaborative study showed that for every one million pounds of milk received, choice of one test over the other for calibrating fat testing instruments can result in a gain or loss by the buyer of the value of 510 pounds of milkfat.

Dietary Salt and Calcium and Their Relationship To Hypertenslon. David A. McCarron, *Oregon Health Science University, Portland, OR.*

This paper will address the current status of scientific data regarding the dietary exposure to sodium chloride and calcium and its relationship to high blood pressure in humans. Data will be presented as drawn from the National Center for Health Statistics studies in the United States as well as regional and community studies reported from the U.S. Relationships between sodium intake and blood pressure across the entire U.S. population will be reviewed. In a similar fashion, data regarding calcium intake and the risk of hypertension will also be assessed. The interaction of these two nutrients and their relationships to blood pressure profiles in adult subjects will then be discussed. Finally, the most recent information on modifying sodium intake and calcium intake in humans and the direct effects of such modifications on blood pressure will be summarized.

Professional Responsibility for Reporting Environmental Data. Vernon Millard, *Energy Resources Conservation Board, Calgary, Alberta, Canada.*

Environmental research and the assessment of that research impose a special responsibility and burden on the professional because of the sensitivity of that information to the public. This is particularly true where public health is at issue. The responsibility on the professional is to design, conduct, evaluate and report on that research in a truly scientific manner. This is difficult because: (*a*) all persons have biases which must be recognized and accounted for, (*b*) the research project frequently has implications for issues that are emotional to the public, and (*c*) members of the public frequently have pre-conceived views.

How to Improve Farm Scores. James H. Reeder, *Maryland and Virginia Milk Producers Association, Arlington, VA.*

The task of "how to improve farm scores" is one that has been given a tremendous amount of contemplation. Most of us have heard it said that farm conditions and milk quality have deteriorated during recent years; I don't buy that. I believe that

there have been tremendous strides made in regard to improved farm conditions, uniformity of inspection and overall milk quality, but improvement in all areas is still necessary. Perhaps this improvement could be had by better educating, interpreting and practicing of the codes by our regulatory and industry personnel. In this day of acronyms, we could refer to this as the EIP program. More means need to be available so that industry and regulatory people may become completely "educated" regarding the code. Once the education aspect is completed, the means need to be made available so that proper and uniform "interpretation" may be had. And after the education and interpretation phase, the "practice" part would come into play. I believe dairy farmers also need an EIP program. This program for farmers would involve "education, incentive and penalty." The "education" aspect with farmers would entail those of us in marketing organizations to continually emphasize to our dairy producer-members the proper requirements and criteria necessary to maintain a permit. The incentive phase of a program such as this would be just that: an incentive. Perhaps the marketing organization should provide more honorary and/or monetary programs for producers to take advantage of. For those producers that won't take advantage of an incentive, a punitive action or penalty is necessary, and we in marketing organizations should take the lead in this type of action also. How to improve farm scores? A difficult goal but one that can be made less difficult, through complete cooperation of industry and regulatory agencies.

Present and Future of *Standard Methods for the Examination of Dairy Products*. Gary H. Richardson, *Department of Nutrition and Food Sciences, Utah State University, Logan, UT 84322.*

Fourteen editions of *Standard Methods for the Examination of Dairy Products* (SMEDP) have been published by the American Public Health Association since 1905. The 15th edition is due out late in 1984. Approximately 5,000 laboratories use SMEDP to assure uniformity in conducting dairy product testing. Originally only bacteriological methodology was emphasized. However, recent editions have included chemical and physical methods to expand utility to the dairy laboratory. The new edition reflects a methods classification scheme that allows meshing with the Association of Official Analytical Chemists *Official Methods*. A1 and A2 will correspond with Official Final and Official First Action methods, respectively. Class B will be assigned methods that have met all requirements but a collaborative study. New methods being introduced will be given a C classification. Those being phased out will be assigned D while those "grandfather" methods will have an O classification. Methods proposed between editions will be approved by an interim Technical Committee and published in the *Journal of Food Protection*. Funding has been provided for development of SMEDP editions by the US Food and Drug Adminis ration. Future editions will receive more limited support and will not be published as often. With increased international interest and methodology development, the role of SMEDP needs evaluation.

Emerging Food Pathogens: *Yersinia Enterocolitica*. Donald A. Schiemann, *Department of Microbiology, Montana State University, Bozeman, MT 59717.*

Soon after the recognition of *Yersinia enterocolitica* as an important enteropathogen, it was suggested that yersiniosis was transmitted primarily by food. The evidence supporting this observation was, however, limited to the frequent harborage of human serotypes by swine, representing a food animal, and the occurrence of some large outbreaks that epidemiologically implicated a common vehicle. Three recent foodborne outbreaks have occurred in the United States, two involving serotype 0:8, which has infrequently been isolated from swine. Water used in manufacture was implicated in one outbreak, and a human carrier was the likely source in the second. The third outbreak involved pasteurized milk contaminated with serotype 0:13, which may have indirectly originated from swine. The isolation of *Y. enterocolitica* from food has been frustrated by laboratory methodology that requires a long period for "cold" enrichment. Furthermore, present isolation methods are not selective for the pathogenic forms of *Y. enterocolitica* which are likely to be overgrown by related forms and species of *Yersinia* that are common contaminants in foods. The most reliable procedure presently available for isolation of *Y. enterocolitica* from foods is: (*a*) pre-enrichment in peptone-yeast extract broth at 15°C for 1-2 d (or 4°C for 7-9 d); (*b*) selective enrichment in bile-oxalate-sorbose broth at 22-25°C for 3-5 d; (*c*) isolation on cefsulodin-irgasan-novobiocin (*Yersinia* Selective Agar). Pathogenic cultures of *Y. enterocolitica* can be identified by calcium-dependency and autoagglutination at 35°C, which are plasmid-mediated properties; and by biochemical profile (sucrose 25°C positive; salicin 35°C negative; esculin 25°C negative).

Pesticides and Industrial Chemicals in Foods. H. Michael Wehr, *Laboratory Services Division, Oregon Department of Agriculture, Salem, OR.*

Pesticides in foods is an important but an often complex and controversial issue and one which is of great current interest. This paper summarizes the results of an extensive survey of federal and state agencies and private organizations on issues and policies relating to pesticides. Specific topics to be discussed will include: (*a*) primary issues/problems/concerns related to pesticides and industrial chemicals identified during 1982-83, (*b*) problems and concerns that are anticipated to require attention in 1984-85, and (*c*) the major current public policy and scientific/technical issues of concern to those surveyed, and suggestions as to how these issues should be handled.

Book Reviews

Handbook Of Lethality Guides For Low-Acid Canned Foods, Volume I: Conduction-Heating by C. R. Stumbo, K. S. Purohit, T. V. Ramakrishnan, D. A. Evans, and F. J. Francis

Handbook . . . Canned Foods is primarily a collection of 492 process time tables for conduction heating low-acid canned foods.

In contrast to handbooks of fundamental data, this is a compilation of solved conduction-heated low-acid canned food problems indexed by can size and appropriate fh-value, initial product temperature, the microbial temperature coefficient (z-value), and a range of heating medium (retort) temperatures. Knowing the processing conditions, z-values, and the heating rate of the product in the container, the process time can be determined from the appropriate table.

The introductory material, rather limited in scope, includes: 1) a discussion of the microbiological considerations used in the thermal process calculations to reduce the probability of a health hazard or product spoilage to what the authors deem is an acceptable level as well as 2) a description of the Ball formula method, as modified by the authors, to calculate the process time necessary to deliver a specific sterilization value to a container of conduction heating product (integrated sterilizing value) rather than delivering a sterilization value to a specific location within a container of product.

The microbiological assumptions and considerations used by the authors are the basis of all of the tables. Both the numerical value of the microbiological parameters and the approach used in calculating processes are unique to these authors and do not represent a consensus of the thinking in the United States canned food industry.

The authors suggest that the tables be used as a guide to indicate the adequacy of existing sterilization processes when the heating parameters and z-value are known. The tables do not list F(T, z)- or Fo-values; consequently, they only provide information for a "yes" or "no" answer. To determine the extent of adequacy or inadequacy, additional calculations would have to be made.

The data in these tables are the result of a huge, dedicated effort by the authors. While recognizing this accomplishment, we also need to recognize that the computer revolution has placed, within the reach of all, the computing power to generate this type of data, not only for general conditions, as in the tables of this handbook, but for individual specific product conditions.

This handbook will probably be most useful to those who want to quickly get an idea regarding the adequacy of conduction heating sterilization processes.

Dr. I. J. Pflug
Department of Food Science and Nutrition
University of Minnesota

Rancidity In Foods, Edited by J. C. Allen and R. J. Hamilton, 199 Pages, Applied Science Publishers.

Rancidity In Foods is a collection of edited papers originally presented during a 1982 symposium held in York, England. The symposium, sponsored by the Society of Chemical Industries, brought together leading experts on the subject of rancidity. The focus of the symposium and the book is on the practical applications of rancidity control rather than the theoretical foundations underlying the phenomenon of rancidity.

The editors, J. C. Allen and R. J. Hamilton, have done an outstanding job of presenting and arranging the text. Initial chapters provide a basic understanding of the chemistry of rancidity and provide a review of methods for the measurement and evaluation of rancidity. Several chapters are devoted to discussions on the use of antioxidants for the delay and prevention of rancidity. The text concludes with chapters on rancidity in specific food products including: cereals, snack foods, creams and desserts, biscuits, dairy products, and confectionery products.

A brief discussion concerning the health effects of ingesting rancid foods is presented in a chapter titled "National Significance of Rancidity." Rancidity is one case where, "if it smells bad and tastes bad it probably is bad," holds true. The literature concerning health effects is limited, since it is unlikely that large amounts of rancid food are consumed due to its highly offensive flavour. The Spanish rapeseed oil scandal, in which some 2000 persons were affected and more than 200 died, is the major exception.

Rancidity In Foods provides an excellent introduction to a widely recognized but little understood problem. For the individual involved with quality control in the food processing industry, this book is highly recommended. I would have found the text more useful if more information on health effects could have been presented. J. C. Allen and R. J. Hamilton are to be congratulated for assembling a variety of symposium presentations into a practical and useful text. *Rancidity In Foods* will make an excellent addition to graduate libraries and a valuable reference for professionals in the food processing industry.

Homer C. Emery, Ph.D.
Maj, MS
Brooke Army Medical Center
Fort Sam Houston, Texas

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104	124	144	164	184	204	224	244	264	284	304	324	344
105	125	145	165	185	205	225	245	265	285	305	325	345
106	126	146	166	186	206	226	246	266	286	306	326	346
107	127	147	167	187	207	227	247	267	287	307	327	347
108	128	148	168	188	208	228	248	268	288	308	328	348
109	129	149	169	189	209	229	249	269	289	309	329	349
110	130	150	170	190	210	230	250	270	290	310	330	350
111	131	151	171	191	211	231	251	271	291	311	331	351
112	132	152	172	192	212	232	252	272	292	312	332	352
113	133	153	173	193	213	233	253	273	293	313	333	353
114	134	154	174	194	214	234	254	274	294	314	334	354
115	135	155	175	195	215	235	255	275	295	315	335	355
116	136	156	176	196	216	236	256	276	296	316	336	356
117	137	157	177	197	217	237	257	277	297	317	337	357
118	138	158	178	198	218	238	258	278	298	318	338	358
119	139	159	179	199	219	239	259	279	299	319	339	359
120	140	160	180	200	220	240	260	280	300	320	340	360

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JFP Abstracts

Abstracts of papers in the October Journal of Food Protection

To receive the* Journal of Food Protection *in its entirety each month call 515-232-6699, ext. A.

Method to STudy Antimicrobial Effects of Essential Oils: Application to the Antifungal Activity of Six Moroccan Essences, Bachir Benjilali, Abdelrhafour Tantaoui-Elaraki*, Aziz Ayadi and Mohamed Ihlal, Section de Technologie et d-Economie Alimentaires et de Nutrition Humaine, Institut Agronomique et Vétérinaire Hassan II, P.B. 6202, Rabat Instituts, Morocco

J. Food Prot. 47:748-752

The Micro-atmosphere method of Kellner and Kober was modified and used to study antifungal properties of six essential oils that have different chemical compositions (three chemotypes from mugwort, *Artemisia herba alba,* one from thyme, *Thymus capitatus,* one from rosemary, *Romarinus officinalis* and one from Eucalyptus, *Eucalyptus globulus*). They were tested against 39 mold strains (13 from the genus *Penicillium*, nine from *Aspergillus* and 17 others). The essential oil from thyme was the most effective, suscessively followed by those from mugwort, rosemary and eucalyptus. The strains studied were classified into three groups: sensitive, intermediate and resistant.

Evaluation of the 3M Dry Medium Culture Plate (Petrifilm™ SM) Method for Determining Numbers of Bacteria in Raw Milk, R. E. Ginn, V. S. Packard and T. L. Fox, Dairy Quality Control Institute, Inc., 2353 Rice Street, St. Paul, Minnesota 55113; Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Avenue, St. Paul, Minnesota 55108; and Riker Laboratories, Inc./3M, 3M Center, St. Paul, Minnesota 55114

J. Food Prot. 47:753-755

The 3M Company has developed a sample-ready system (Petrifilm™ SM) for enumerating bacteria in milk and other food products. The testing unit consists of Standard Methods culture medium coated onto a base film and overlaid with a second film coated with a cold-water-soluble gelling agent and tetrazolium indicator dye. As such, the system is ready to accept samples of product. A pipette or 0.001-ml plate loop continuous pipetting syringe can be used for applying samples. In this study, both methods of sample addition were used and results compared with those of the Standard Plate Count (SPC) and standard Plate Loop (PL) methods for determining bacteria numbers in raw milk. In total, 108 samples were analyzed in duplicate by each of the four methods. The correlation coefficients (r) between the 3M-SPC and SPC, 3M-PL and PL, 3M-PL and SPC and PL and SPC were 0.946, 0.935, 0.941, and 0.974, respectively. Repeatability, as measured by mean $\log_{10}$ variance for duplicate determinations, was essentially the same for the four methods, and in all instances less than 0.005. The mean $\log_{10}$ differences between the SPC and 3M-SPC, and SPC and 3M-PL were, respectively, -0.177 and -0.168. The preceding statistical criteria suggest the Petrifilm™ SM method to be a suitable alternative to the SPC or the PL procedure.

Scanning Electron Microscopic Study on Some Effects of Sodium Hypochlorite on Attachment of Bacteria to Stainless Steel, Tina S. Schwach and Edmund A. Zottola, Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Avenue, St. Paul, Minnesota 55108

J. Food Prot. 47:756-759

Scanning Electron Microscopy (SEM) was used to demonstrate the effects of rinsing with water and various concentrations of sodium hypochlorite (NaOCl) on extracellular attachment fibers of *Pseudomonas fragi* (ATCC 4793), *Salmonella montevideo,* and *Bacillus cereus* (F4165/75) attached to stainless steel chips. Results indicated that use of a water rinse before sanitization with NaOCl was not sufficient to eliminate attached microorganisms and debris.

Bcteriological and Biochemical Characteristics of Various Types of Yogurt Made from Sheep's and Cow's Milk, C. H. Kehagias and T. N. Dalles, Institute of Food Technology, Ministry of Agriculture, Lykovrissis, Athens, Greece

J. Food Prot. 47:760-761

Bacteriological and biochemical characteristics of various types of commercial yogurt were examined. Laboratory-scale preparations of yogurt from sheep's and cow's milk were also performed to study the above characteristics under controlled conditions. The viable counts of *Streptococcus thermophilus* and *Lactobacillus bulgaricus*, in most instances, exceeded 10^8/ml. During storage at 5° to 7°C for 2 weeks, the average viable counts decreased in both commercial yogurts and those prepared in laboratory. The average lactase activity declined only in the commercial yogurts during cold storage. Yogurt from sheep's milk had double the lactase activity of cow's milk yogurt.

Simple, Accurate Method for Evaluating the Amount of Fat and Protein Residue on a Food Contact Surface, H. E. Huff, M. E. Anderson and R. T. Marshall, U.S. Department of Agriculture Agricultural Research Service, 113 Eckles Hall, University of Missouri, Columbia, Missouri 65211 and Food Science and Nutrition Department, University of Missouri-Columbia, Columbia, Missouri 65211

J. Food Prot. 47:762-764

The objective of this research was to evaluate a method for quantitatively removing pork fat and blood plasma from different food contact surfaces - glass, stainless steel, plastic and food grade belting. Two studies were conducted. In the first study, a mass balance procedure was used to determine whether the developed method could remove virtually all the fat or protein placed on stainless steel and glass. In the second study, a gravimetric method was used to verify that the amount of fat on test strips could be harvested and quantified as residue. A recovery rate of from 98% or 100% was achieved for the different types of food contact surfaces.

Microbiology of Hydroponically-Grown Lettuce, Eve C. Riser, Joseph Grabowski and Edward P. Glenn, Environmental Research Laboratory, University of Arizona, Tucson International Airport, Tucson, Arizona 85706

J. Food Prot. 47:765-769

The microbial quality of lettuce (*Lactuca sativa* L. var. "Ostinata") cultivated in a hydroponic system was evaluated. Over a 3-month study period, samples of lettuce, nutrient solution, and peat-vermiculite growing mixture from the greenhouse were analyzed for total aerobic bacteria, yeasts, molds, and coliforms. There was a consistent amount of each type of organism occurring within each sample group for a given month, and the numbers of aerobic bacteria and coliforms present were generally similar to those reported for lettuce and leafy vegetable crops propagated by the conventional method of agriculture. Over the study period, the modal values for each type of organism in lettuce were: aerobic bacteria, 7.9×10^6 CFU/g (range of 3.8×10^4 to 2.3×10^8); coliforms, 1.5×10^4 CFU/g (range of none detected to greater than or equal to 5.3×10^7); molds, 2.9×10^3CFU/g (range of 1.2×10^2 to 5.3×10^4); and yeasts, 2.4×10^4 CFU/g (range of 6.9×10^2 to 2.3×10^6). The primary organisms associated with the growing system were *Citrobacter freundii*, *Enterobacter cloacae*, and *Enterobacter agglomerans*. No organisms of human health concern (i.e. *Salmonella* spp., *Clostrium botulinum*, *Escherichia coli*, or *Staphylococcus aureus*) were detected in the samples. The bacteriology of lettuce produced for market by this type of hydroponic farming and packaging appears to be generally comparable to that of field-grown lettuce and to present no unique microbiological hazards to consumers.

Melting Agar by Microwave Energy, Daniel Y. C. Fung and C. C. Sheree Lin, Department of Animal Sciences and Industry, Kansas State University, Manhattan, Kansas 66506

J. Food Prot. 47:770-772

The microwave oven is very convenient for melting agar for viable cell counts. Composite data of four microwave ovens indicated that melting time for 50 ml of agar per bottle was about 1 min for one bottle, 1.5 min for two bottles, and 2.5 min for four bottles heated simultaneously. Melting time for 100 ml of agar per bottle was about 1.5 min for one bottle, 2.5 min for two bottles, and 4 min for four bottles. Melting times of agar in square or flat bottles were similar. Agar melted by microwave treatment performed in viable cell counts equally as well as agar melted by the conventional boiling method. Even after prolonged (50% longer than melting time) microwave treatment, performance of the agar remained unchanged. Agar melted by microwave treatment can remain in liquid form (48°C) in situ for about 30 min (50 ml) and 1 h (100 ml). When removed from the microwave oven immediately after melting, the agar remained in liquid form (48°C) at room temperature for about 25 min (50 ml) and 40 min (100 ml). The microwave oven is highly efficient in melting agar without detrimental effects on the performance of agar.

Microbial Growth in Carcasses and Boxed Beef During Storage, R. E. Simard, J. Zee and L. L'Heureux, Centre de Recherche en nutrition and Département de Sciences et Technologie des Aliments, Université Laval, Sainte-Foy, Quebec, G1K 7P4, Canada

J. Food Prot. 47:773-777

Fresh western-Canadian beef delivered to an eastern-Canadian terminal (Quebec City, Qc) was evaluated for microbial contamination of carcasses (front and rear portions) and of boxed beef (heat and clip-sealed). Total microbial counts during a 12-month sampling varied from $\log_{10}$ values of 6.28 in front portions of carcasses to 7.10 in clip-sealed boxed beef. Lactobacillus counts were higher in clip-sealed boxed beef (6.93) than in the front portion of carcasses (4.39). Total and fecal coliform counts were much higher in vacuum-packed beef than in carcass beef (4.42 and 0.97, respectively). Microbial species isolated from carcasses and vacuum-boxed beef varied markedly, with *Pseudomonas* spp. as predominant in carcasses and a mixed flora of *Pseudomonas* spp., *Lactobacilli* spp. and *Aeromonas* spp. in vacuum-packed beef.

Microbial Flora of Pond-Reared Tilapia (*Tilapia aurea*) Held on Ice, G. Acuff, A. L. Izat and G. Finne*, Seafood Technology Section, Department of Animal Science, Texas A&M University, College Station, Texas 77843

J. Food Prot. 47:778-780

Microbiological and chemical characteristics for tilapia reared in 0.25-acre artificial ponds were investigated. At time of harvest, average bacterial count of the pond-reared fish was 7.3×10^2 per cm^2 while pondwater contained 2.2×10^4 organisms per ml. *Moraxella-Acinetobacter* and *Micrococcus* were initially the dominant organisms present on the fish. The total bacterial count of the tilapia decreased during the first 3 d of storage on ice and then remained stable for the next 6 d after which there was a sharp increase. *Pseudomonas* became the dominant organism during the later stages of ice-storage. Total volatile nitrogen and pH increased with increasing aerobic plate counts.

Survival of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* in Commercial and Experimental Yogurts, William T. Hamann and Elmer H. Marth, Department of Food Science and The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 47:781-786

Elliker's Lactic agar and Rogosa SL Agar, an agar medium selective for *Lactobacillus bulgaricus,* were used to determine numbers of *Streptococcus thermophilus* and *L. bulgaricus* in commercial and labortatory-manufactured yogurt. Typically, the population of viable yogurt organisms increased initially after manufacture of yogurt, and then decreased during refrigerated storage of the product. Numbers of *S. thermophilus* and *L. bulgaricus* remained above 100 million/g in plain and strawberry University of Wisconsin (UW) yogurts stored at 5°C for 60 d. Numbers of the bacteria decreased more when these yogurts were stored at 10°C, although they remained above 10 million/g, except for *S. thermophilus* in plain UW yogurt, which decreased to less than 1 million/g after 47 d of storage. Commercial custard-style plain and blueberry yogurts had *S. thermophilus* populations above 300 million/g during the 60-d storage period at both 5 and 10°C. Numbers of *L. bulgaricus* decreased from 300 million/g at 15 d after manufacture to less than 1 million/g after 42 to 56 d. Numbers of *S. thermophilus* in commercial stirred plain and raspberry yogurts remained above 1 million/g when the products were stored at 5°C for 60 d, although they decreased to less than 1 million/g after 48 to 58 d when yogurt was stored at 10°C. The *L. bulgaricus* populations decreased to less than 1 million/g after 25 to 32 d for both varieties of stirred yogurt at both storage temperatures. Presence of various fruits in commercial yogurts had little effect on survival of the yogurt bacteria. With laboratory-manufactured yogurt, different incubation temperatures and milk mixes used to make the yogurt had little effect on survival of the yogurt organisms during subsequent refrigerated storage of the product.

Hygroscopic Characteristics of Peanut Components and Their Influence on Growth and Aflatoxin Production by *Aspergillus parasiticus,* R. Y.-Y. Chiou, P. E. Koehler and L. R. Beuchat, Department of Food Science, University of Georgia, Agricultural Experiment Station, Athens, Georgia 30602 and Experiment, Georgia 30212

J. Food Prot. 47:791-794

Sound inshell runner-type peanuts, manually damaged inshell peanuts, shells, sound kernels, deskinned kernels and skins were stored in separate flasks under an atmospheric relative humidity of 100% at 28°C. After 5 d, water was adsorbed at levels of 1.2, 1.7, 3.9, 0.9, 1.0 and 9.5 g/100 g dry material, respectively. Surface disinfected components were inoculated with conidiospores of *Aspergillus parasiticus* NRRL 2999 and incubated under the same conditions. The time required for visible growth of the fungus was 8, 6, 4, 12, 10 and 3 d, respectively. The time for appearance of the conidiospores was 14, 10, 6, 16, 13 and 6 d. After a 3-wk incubation period, aflatoxin levels in peanut components were 111.4, 159.1, 4.4, 58.7, 99.0 and 1.5 μg/g, respectively.

Survival of *Campylobacter jejuni* at Different Temperatures in Broth, Beef, Chicken and Cod Supplemented with Sodium Chloride, Debra D. Abram and Norman N. Potter, Department of Food Science, Cornell University, Ithaca, New York 14853

J. Food Prot. 47:795-800

Growth and survival of *Campylobacter jejuni* strains ATCC 33250 and ATCC 29428 with NaCl levels ranging from 0 to 3% were studied in brucella broth at -18, 6, 10 and 42°C. Both strains grew under microaerobic conditions at 42°C with 0 to 1% NaCl, but counts declined sharply with higher salt levels. At -18°C, there was a large initial decline in counts with little subsequent change during 5 d of storage and no appreciable effect of NaCl. At 6 or 10°C, counts decreased with increasing NaCl concentration over the 5-d period, but the organism survived in substantial numbers even with 3% NaCl. Survival of *C. jejuni* in ground chicken, beef and cod with 0, 1 and 2% added NaCl was determined at -18, 6 and 10°C over a 5-d period. At -18°C, survival of *C. jejuni* was similar in all three types of flesh, whether raw or previously cooked, and *C. jejuni* counts during frozen storage were not affected by the level of NaCl. Survival patterns of *C. jejuni* at 6 and 10°C in raw and cooked chicken and beef were very similar. Statistically significant decreases in counts occurred with increasing NaCl concentration, but the differences were slight. Substantial decreases in counts occurred in refrigerated raw cod, but less in the cooked fish. In the raw cod, counts decreased significantly with increasing NaCl concentration and the decline was more pronounced during storage at 10°C than at 6°C.

Botulism Risk from Post-Processing Contamination of Commercially Canned Foods in Metal Containers, NFPA/CMI Container Integrity Task Force, Microbiological Assessment Group Report

J. Food Prot. 47:801-816

This report focuses on the potential public health risks of *Clostridium botulinum* from post-process contamination of commercially produced foods in metal containers. This review examines the environmental sources of *C. botulinum*, the effect of sanitizers in cannery cooling water and the botulism incidents involving U.S. canned foods. There is no evidence that leaker spoilage due to container defects is increasing. The post-processing contamination of commercially produced foods in metal containers by *C. botulinum* is a rare event which occurs randomly. Based on historical information, its probability of occurring is very small. This is a probability which compares well with the risk associated with the minimum acceptable thermal process of low-acid canned foods.

Calendar

1984

October 9-10, DAIRY INDUSTRY CONFERENCE, Hyatt/Long Beach, Long Beach, CA. For more information contact: John C. Bruhn or Shirley Rexroat, Dept. of Food Science & Technology, University of California, Davis, CA 95616. 916-752-2191.

October 9-10, NATIONAL MASTITIS COUNCIL MEETING, to be held in conjunction with the Dairy Industry Conference, at the Hyatt Regency Hotel, Long Beach, CA. For more information contact: Rick Bennett, Extension Dairy Advisor, Room 100-P, 2604 Ventura Ave., Santa Rosa, CA 95401. 707-527-2621.

October 14-17, LONDON INTERNATIONAL FROZEN FOOD TRADE FAIR. For more inforamtion contact: Sandra Paul, 212-752-8400.

October 15-17, ISSUES IN SENSORY EVALUATION - STABILITY AND QUALITY CONTROL - Palo Alto, California. Attendence is limited and there is a fee. For more information and registration contact: Tragon Corporation, 750 Welch Road, Suite 210, Palo Alto, CA 94304.

October 17, IOWA ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. ANNUAL MEETING, to be held at the Holiday Inn, Exit 225 Interstate 80, Little Amana, IA. For more information contact: Derward Hansen, R.R. #3, Exira, IA 50076. 712-268-2798.

October 18-19, RESOLVING CONSUMER COMPLAINTS SUCCESSFULLY, a course, to be held at the Minneapolis Plaza Hotel, Minneapolis, MN. For more information contact: The Food Processors Institute, 1401 New York Avenue NW, Suite 400, Washington, DC 20005.

October 19-25, FOOD SANITATION INSTITUTE 27TH ANNUAL NATIONAL EDUCATIONAL CONFERENCE & EXPOSITION, Holiday Inn Surfside, Clearwater Beach, FL. For more information contact: Jean M. Day, Executive Director, Food Sanitation Institute, 1019 Highland Ave., Largo, FL 33540. 813-586-5710.

October 23, ILLINOIS MILK, FOOD & ENVIRONMENTAL SANITARIANS ANNUAL MEETING, to be held at the Blue Moon Restaurant, Elgin, IL. For more information contact: Clem Honer, 1 South 760 Kenilworth Avenue, Glen Ellyn, IL 60137. 312-693-3200 (business). 312-858-9314 (home).

October 23-26, VETERINARY TOXICOLOGY WORKSHOP: ANIMAL TOXICOLOGY RELATED TO ENERGY INDUSTRIES, to be held at the Knoxville Hilton Hotel, Knoxville, TN. For more information contact: Dr. Charles F. Reed, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071. 615-974-7264.

October 25-26, 1984 WHEY PRODUCTS CONFERENCE, to be held at the Chicago O'Hare Marriott Hotel, Chicago, IL. For more information contact: Dr. Warren S. Clark, Jr., Executive Director, Whey Products Institute, 130 N. Franklin Street, Chicago, IL 60606. 312-782-5455.

October 28-30, NATIONAL-AMERICAN WHOLESALE GROCERS' ASSOCIATION FIRST ALL-COMPUTER CONFERENCE AND EXPOSITION, to be held at the Loews Anatole Hotel in Dallas, TX. For more information contact: Diane Aiken, Publications Manager, NAWGA, 201 Park Washington Court, Falls Church, VA 22046. 703-532-9400.

November 22-24, 14TH ANNUAL SYMPOSIUM ON THE ANALYTICAL CHEMISTRY OF POLLUTANTS, 3rd International Congress on Analytical Techniques on Environmental Chemistry-Expoquimia, Barcelona, Spain. For more information contact: Av. Reina Ma. Christina Palacio No. 1, Barcelona-4 Spain.

November 26-29, UCD/FDA BETTER PROCESS CONTROL SCHOOL, to be held at the University of California. For more information contact: Robert C. Pearl, Dept. of Food Science & Technology, University of California, Davis, CA 95616. 916-752-0980.

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January 3-5, MILLING FOR CEREAL CHEMISTS SHORT COURSE, to be held at Kansas State University, Manhattan, KS. For more information and registration form contact: Dotty Ginsburg, AACC Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121. 612-454-7250. Deadline for registration is Dec. 12, 1984.

February 4-8, MILK MANUFACTURING SHORT COURSE, North Carolina State University. For more information contact: John Rushing, 919-737-2956, or Bruce Winston, 919-737-2261.

February 13-14, DAIRY AND FOOD INDUSTRY CONFERENCE, The Ohio State University. For more information contact: John Lindamood, Department of Food Science and Nutrition, 2121 Fyffe Road, The Ohio State University, Columbus, OH 43210-1009.

February 15-17, NATIONAL MASTITIS COUNCIL ANNUAL MEETING, to be held at the Frontier Hotel, Las Vegas, NV. For more information and registration materials contact: John Adams, National Mastitis Council, 1840 Wilson Blvd., Arlington, VA 22201. 703-243-8268.

February 25-27, 11TH ANNUAL ABC RESEARCH CORPORATION TECHNICAL SEMINAR. For more information contact: Sara Jo Atwell, Administrative Assistant, ABC Research Corporation, P.O. Box 1557, Gainesville, FL 32607. 904-372-0436.

March 6-7, SECOND ANNUAL CHEESE RESEARCH AND TECHNOLOGY CONFERENCE, to be held at the Sheraton Inn and Conference Center, Madison, WI. For more information contact: Norman F. Olson, Walter V. Price Cheese Research Institute, Department of Food Science, University of Wisconsin-Madison, Madison, WI 53706. 608-263-2001.

March 25-29, MID-WEST WORKSHOP IN MILK AND FOOD SANITATION, The Ohio State University. For more information contact: John Lindamood, Department of Food Science and Nutrition, 2121 Fyffe Road, The Ohio State University, Columbus, OH 43210-1009.

April 14-18, INTERNATIONAL FOOD FAIR OF SCANDINAVIA - TEMA 85, the 8th international fair for food and beverages, held together with the 5th international hotel, restaurant and catering fair. For more information contact: Leslie Christensen, General Manager, Bella Center A/S, Center Boulevard, DK-2300 Kobenhavn, Denmark.

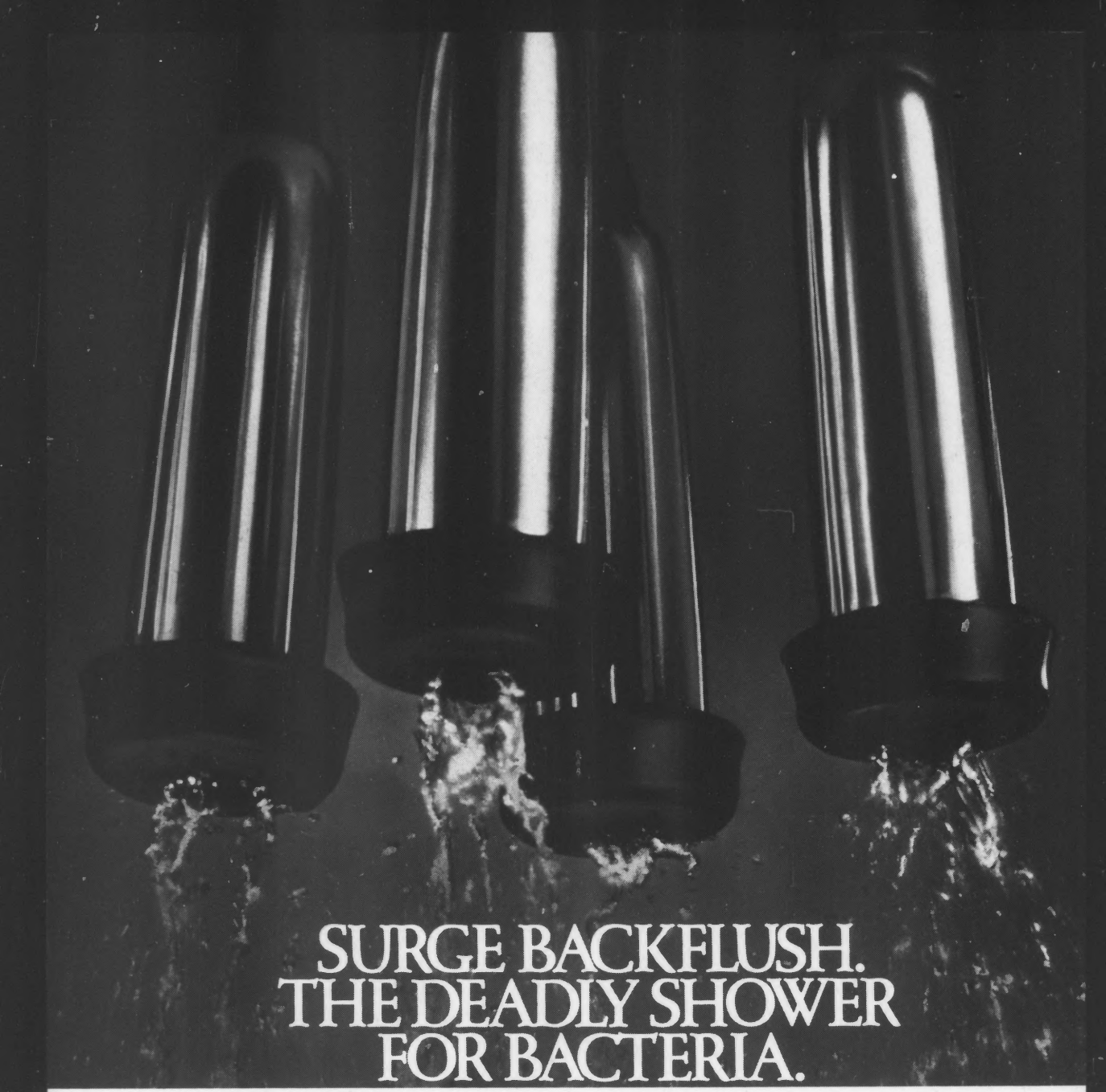
May 8-10, SOUTH DAKOTA ENVIRONMENTAL HEALTH ASSOCIATION meeting. To be held in Spearfish, South Dakota. For more information contact: Cathy Meyer, President S.D.E.H.A., PO Box 903, Mitchell, SD 57301. 605-996-6452.

May 20-23, FOODANZA '85, joint convention of the Australian and New Zealand Institutes of Food Science and Technology. To be held at the University of Canterbury, Christchurch, New Zealand. For more information contact: D. R. Hayes, Convention Secretary, 394-410 Blenheim Road, PO Box 6010, Christchurch, New Zealand.

May 21-23, INTERNATIONAL DAIRY FEDERATION SEMINAR, Progress in the Control of Bovine Mastitis, to be held at Bundesanstalt fur Milchforschung, D-2300 Kiel, FRG. For more information contact: Prof. Dr. W. Heeschen, Bundesanstalt fur Milchforschung, Institut fur Hygiene, Hermann-Weigmann-Strabe 1, P.O. Box 1649, D-2300 Kiel / FRG. Telephone: (0431) 609-392 or 609-1. Telex: 292966.

June 23-26, CANADIAN INSTITUTE OF FOOD SCIENCE AND TECHNOLOGY 28TH ANNUAL CONFERENCE, to be held at the Royal York Hotel, Toronto, Ontario, Canada. For more information contact: Mr. Bill Munns, Conference Chairman, Canada Packers Inc., 95 St. Clair Avenue W., Toronto, Ontario M4V 1P2, Canada. 416-766-4311.

August 5-9, IAMFES ANNUAL MEETING to be held at the Hyatt Regency, Nashville, TN. For more information contact: Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 515-232-6699.



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