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6200 Aurora Avenue•Suite 200W
Des Moines, Iowa•USA•50322

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. DECEMBER 1995

- **3-A Sanitary Standards**
- **Index to Volume 15**

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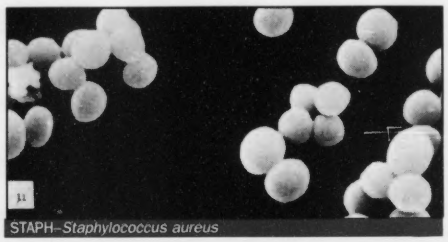
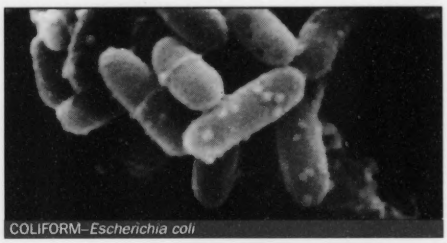
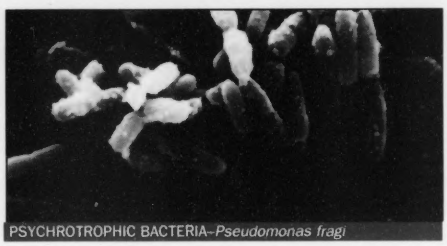
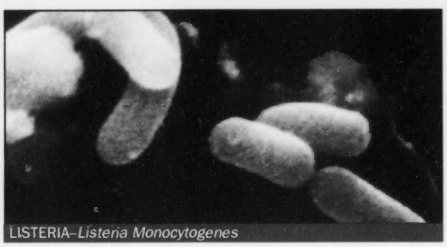

STAPH–*Staphylococcus aureus*


COLIFORM–*Escherichia coli*


PSYCHROTROPHIC BACTERIA–*Pseudomonas fragi*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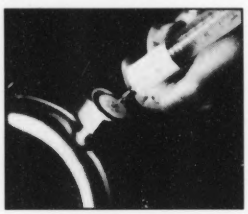

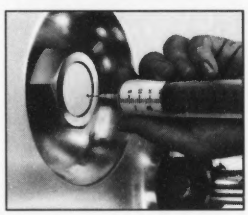

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ABOUT THE COVER. . .

Photo courtesy of Difco Laboratories. Violet Red Bile Agar w/MUG used for selective isolation of coliform bacteria and fluorogenic detection of *E. coli*.

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

ARTICLES

ASSOCIATION NEWS

Editor's Note:

In the November issue of *Dairy, Food and Environmental Sanitation* on page 687 the photo coption for the post president's table should have read Bill and Pat Arledge and Ran and Sara Case.

On page 705 the Narbert F. Sherman Award winners phata misidentified Lari Milanesi as Lucia Jomes-Davis.

We apologize to those misidentifed.

DEPARTMENTS

EXTRAS

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

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THOUGHTS

FROM THE PRESIDENT

By F. ANN DRAUGHON,
IAMFES President

"Ask, and you shall receive"

The word "December" brings a mixed bag of thoughts–both pleasant and unpleasant to most of us–holidays, annual reports, budgets, abstracts, inventory, the passing of another year, etc... Even the words "Christmas" and "Hanukkah" bring us mixed feelings these days. The tragic loss of a great man of peace in Israel has left many of us saddened as we approach this holiday season, while the budgetary process of the United States federal government has left some of us amazed and others in financial straits. I cannot help but think of the famous U.S. patriot Patrick Henry, and his stirring quotation "Taxation without representation is intolerable." I wonder what he would think if he could see how bad it is with representation.

I am thinking about budgets quite a bit since the IAMFES Executive Board takes our fiduciary responsibilities very seriously. The fiscal year ending August 31, 1995 was a year of many changes. Some of those changes played havoc with our budget. The 1994-95 fiscal year was difficult for IAMFES due to increases in the size of our journals and in the cost of ink and paper used. We were over budget on our publication expense by approximately $22,000 for the year, plus spending $26,000 more than projected on publication contract services. As a result of our heavy spending, our journals have become even more popular and respected as a place to publish quality scientific articles. The number of submissions to our journals has nearly doubled in one year. The downside of this success is that increasing journal pages means higher operating cost for both the association and members.

Additional budget difficulties included legal expense due to the threat of legal action by a former employee, as well as fulfilling the contract obligations of our past Executive Manager. Due to the combination of these factors, the Executive Board made and announced the decision at the Annual Meeting to increase member dues, subscription rates, Annual Meeting registration fees, and page charges for *Journal of Food Protection*, for 1995-96. At this time, I have not received even one letter objecting to the increases. I am humbled and amazed by the trust the members have shown in the Executive Board when they made this tough decision. In return, I think we need to be straight with our members and let them know why the increases were necessary.

I hope you had a chance to read the November issue of *Dairy, Food and Environmental Sanitation*, especially since the Committee and Professional Development Group reports are published in this issue along with the financial report. It is one of my favorite issues of the year since one can really find out what is happening in IAMFES. How does one get on a professional development group or task force in IAMFES? The best way to join a particular group is to call the chairperson or the current President of IAMFES: "Ask, and you shall receive." Chairpersons eagerly and enthusiastically welcome participation. Our November issue also included highlights and photos from the 1995 IAMFES Annual Meeting. One of the unique things about the Annual Meeting of IAMFES is that everyone is welcome to attend any meeting. There are no closed doors to any member.

As you plan your 1996 budget, I hope you will include attending and participating in the 1996 IAMFES Annual Meeting in Seattle, Washington. Although it doesn't seem possible, the program looks as though it will be an improvement over last year's, promising to be even more educational and enjoyable for all who attend.

On behalf of the IAMFES Executive Board, I wish you a safe and happy holiday season and a new year filled with hope for the future.

SEATTLE

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IAMFES
83rd
Annual Meeting
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Plan to Attend Now!

Seattle, Washington

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A MESSAGE

From the Home Office

"Over the last year we have been proud to be a part of the IAMFES team."

In today's employment world, the most prevalent management philosophy is empowerment through teams and employee knowledge. The more the employees know about the importance of their jobs the more ownership they will have over their work and the quality of that work. This philosophy is the same for IAMFES. Over the past several issues we have been highlighting the various departments that directly impact your membership. There are those who have an indirect impact but are still vitally important to our success.

Rick McAtee is our advertising/exhibits manager. He has been with IAMFES for one year and has been working to build a strong support team. His leadership and ability to communicate has helped him establish a successful sales staff. This team includes Darci Davenport, Matthew Triplett, and Carolyn Rubicam; our advertising account executives. Darci began her employment with IAMFES in May of 1995 and has quickly shown herself to be a valuable asset to the advertising department. Matthew and Carolyn joined our staff in October and have already begun to demonstrate their aptitude in this short time.

Rick and the advertising account executives solicit advertising for our journals, the IAMFES Membership Directory and our Annual Meeting Abstract Book. They are also responsible for selling the booth space for our Annual Meeting's Educational Exhibit. Our 1995 Annual Meeting included over 70 booths. In addition to the Annual Meeting duties, they are responsible for the increase in our Sustaining Memberships. Their success is illustrated by our current total of 87 Sustaining Members!

For most members, advertising is a part of IAMFES you are well aware of. You may appreciate the access to information from companies in the industry, but are not always aware of the other benefits it brings. Our advertisers place a strong emphasis on providing the latest information on industry technology, which fits well into the IAMFES mission. Advertising revenue also helps defray the production cost of our journals, without which our journals would be unable to exist. Many members have regular contact with our advertisers and Sustaining Members. Next time you talk with a Sustaining Member or advertiser, take a moment to thank them for their support of your association.

No office is complete without a dedicated support staff, providing the assistance needed to make our team successful. The IAMFES support staff includes Karla Jordan, our receptionist/order fulfillment coordinator. Karla greets our members and directs them to the proper staff person when they call as well as fulfilling the requests of members for booklets, manuals, and reprints. Karla has been with IAMFES for over two years.

Bryan Ladd is our accounting assistant and has been with IAMFES for almost a year. His duties include the handling of cash receipts and updating the accounting database. Bryan has proven his ability and has seen his duties and responsibilities grow throughout his employment.

Our newest employee is Tanya Smith. Tanya is now our lending library coordinator, taking over these duties from Karla in response to an increase in member requests for these materials.

Our team here in the Des Moines office isn't IAMFES, but rather the working nucleus of a larger team that makes up IAMFES—the MEMBERS. Over the last year we have been proud to be a part of the IAMFES team and we look forward to a long future of serving your needs.

We wish you a safe and happy holiday season.

Reward Industry Excellence

Nominate Now!

The 1996 IAMFES Black Pearl Award

Nominate a company superior in food quality and safety for the Black Pearl Award presented annually at the IAMFES Annual Meeting.

The Black Pearl Award, sponsored by Wilbur Feagan and F&H Food Equipment Company, was first presented in 1994. The Black Pearl Award was established to recognize a company for its outstanding commitment to and achievement in corporate excellence in food safety and quality. For more information and to receive nomination criteria and forms, contact the IAMFES office at 1-800-369-6337.

Dairy, Food and Environmental Sanitation, Vol. 15, No. 12, Pages 738-744

Incorporation of Modified Butteroil into High-Fat Dairy Products: Ice Cream Manufactured with Reduced–Cholesterol Reformulated Cream

Jodi Elling, Jeannie Harris, and Susan E. Duncan
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ABSTRACT

The objective of this research was to demonstrate an effective means of incorporating a modified butteroil (cholesterol stripped) into a high-fat processed dairy product. A 30% fat reformulated cream was manufactured with steam-stripped reduced-cholesterol butteroil (.025% cholesterol), 55% buttermilk, and 15% aqueous phase of butter; reformulated cream and natural cream (30% fat) were used in preparation of ice cream (10% milkfat). Cholesterol in the ice cream made from reformulated cream was reduced by 56%. Composition (protein, fat, fatty acids) and quality characteristics (protein stability, melt characteristics, heat shock stability) were similar to a product made with natural cream (control). Some sensory characteristics of the ice cream from the reformulated product were different from the control product. Descriptive analysis indicated that the sensory profile of the ice cream made from reformulated cream was less "fresh" and exhibited more "cardboard" flavor than a control product or a commercial ice cream. The mean hedonic responses from a naive, inexperienced consumer group for chocolate ice cream manufactured from the natural or the reformulated cream were 7.64 and 7.25 on a 9-point hedonic scale (9, like extremely).

INTRODUCTION

Alteration of milk fat to enhance utilization is a priority for the dairy industry. Methods such as supercritical fluid extraction *(5, 6, 18)*, vacuum steam distillation *(5)*, short-path molecular distillation *(3, 5)*, and selective solvent extraction (European Patent Application, 1989; patent #EP 0 329 347 A2) are effective in selectively removing cholesterol. Progress has been made toward fractionation of milk fat to alter its functional properties and enhance its nutritional characteristics *(5)*. However, methods for fractionating milk fat or stripping cholesterol from milk fat are primarily restricted to butteroil and are not applicable to cream or other fluid products. Currently, the only commercial source of modified butteroils (steam-stripped reduced-cholesterol butteroil) is Source Food Technology, Inc. (Burnsville, MN).

Natural milk fat contains minor amounts of phospholipids that function as emulsifiers *(2)*. The milk fat also contributes flavor qualities and serves as a carrier for other flavoring compounds *(8)*. These characteristics contribute to the superior flavor qualities of frozen dairy products manufactured from fresh milk fat *(2)*. Quality characteristics and functionality of the product can be adversely affected by incorporating butteroil directly into the food product. In manufacturing ice cream, cream is the preferred source of milk fat for use in the mix *(2)*. Mixes made with other sources of milk fat, including plastic cream, frozen cream, butteroil or butter may have slightly lower whipping properties and show a tendency to "oiling off" *(2)*. These concentrated milk fat sources do not contribute the flavor characteristics that a good-quality sweet cream will *(2)*.

Reformulation of cream with anhydrous butteroil and skim milk, milk powder, whey, or aqueous dispersions of milk protein fractions has been investigated *(15, 16, 21)*. Information on the ultrastructure and composition of the oil-water interface was provided. Kanno *(10, 11)* studied the emulsifying properties of milk fat globule membranes and characterized the composition and functional properties of the reconstituted cream. Oehlmann et al. *(14)* reformulated cream using natural components of sweet-cream buttermilk and aqueous phase from butter, developing a stable water-in-oil emulsion comparable in churn time to a natural cream.

Consumers believe that traditional dairy foods contain high levels of fat and cholesterol, and such be-

liefs often influence their choices, according to a recent study conducted by the Cooperative Extension Service Center for Consumer Research at the University of California–Davis *(7)*. Regular ice cream was perceived to be high in fat by 78% of the consumers surveyed. Thirty-six percent of the consumers reported eating less ice cream because it was not healthy. Changes in consumption of ice cream from 1989 to 1990 included 39% of the consumers reporting eating the same amount of ice cream but 47% reporting eating less *(7)*. Taste continues to be a primary consideration to consumers when shopping for food *(7)*.

Fat contributes 64% of the kilo calories of a 10% fat ice cream. The cholesterol contribution per one-half cup serving (66.5 g) is 29.5 mg *(17)*. Reduced-fat ice cream (formerly ice milk), with 4% fat, has only 34.1% of kilo calories from fat and 12.2 mg of cholesterol per serving. Yet, production volume of ice milk decreased 4.8% from 1991 to 1992 compared to a 1.4% increase in volume in ice cream and an 8% increase in volume of superpremium ice cream *(1)*.

Utilization of a reformulated cream in dairy and other food products should result in the same high quality, flavorful product as provided by a natural cream. Incorporation of a modified butteroil into a regular or superpremium ice cream (10 to 18% fat) could provide a more positive nutrition profile and the pleasing flavor characteristics of ice cream. Consumers choosing this product may do so with less concern about the impact of this dietary choice on health. The objective of this research was to demonstrate an effective means of incorporating a modified butteroil (cholesterol stripped) into a 10% fat ice cream. We hypothesized that a reduced-cholesterol ice cream formulation with stable chemical characteristics and a sensory profile similar to a natural ice cream would be achieved.

MATERIALS AND METHODS

Reformulation of Cream

Raw milk, obtained from the bulk tank at Virginia Polytechnic Institute and State University (VPI&SU) dairy farm, was separated into cream and skim phases in a pilot-plant-scale separator (Elecrem Separator Model 1G, Bonanza Industries, Calgary, Canada). The cream, approximately 30% milk fat, was chilled below 13°C and churned (Gem Dandy Standard Electric Churn, Alabama Manufacturing Co., Birmingham). Butter and buttermilk were separated, and the buttermilk was retained. The butter was melted at 40°C to separate the aqueous phase from the butteroil, and the aqueous phase was retained.

Cream was reformulated by mixing 55% buttermilk, 15% aqueous phase and 30% butteroil. The butteroil used in the reformulation was a steam-stripped butteroil with .025% cholesterol (Source Food Technology, Inc. Burnsville, MN). The mixture was homogenized twice with a two-stage pilot-plant-size homogenizer (APV Gaulen, Everett, MA) operated at 500 and 2000 psig on first and second stages, respectively.

Ice cream mix (10% fat) was manufactured with 33% cream, 43% skim milk, 4.6% nonfat dry milk, 6.7% corn syrup, 10% granulated sucrose, 0.7% stabilizer, and vanilla flavoring. The cream used in the ice cream mix was either the reformulated cream or a natural cream (30% milk fat) (control product) obtained from the pilot plant separator. The ice cream mix was homogenized and batch pasteurized at 73.9°C for 30 min, cooled to 21.1°C and stored at 3.3°C for approximately 16 h. Chocolate ice cream was manufactured in the same manner for the consumer study.

Ice cream was manufactured in a pilot-plant batch freezer (Emory Thompson Freezer 2HSC A, Emory Thompson Machine and Supply Co., New York). Products were frozen and stored at -28.9°C until all analyses were completed.

Chemical and Physical Analyses

Fat content of cream and ice cream mix and total solids of ice cream were determined by standard methods *(13)*. Viscosity of the ice cream mixes was measured by the pipet method *(2)*. The protein content of the ice cream was determined spectrophotometrically (Spectronic 1001 Split Beam Spectrophotometer, Milton Roy Company, Rochester, NY) on the basis of the Bradford method of the Bio-Rad protein assay (Bio-Rad, Hercules, CA). Protein stability of the ice cream was determined by alcohol coagulation *(2)*.

Cholesterol was determined spectrophotometrically *(19)* on lipid extracted from the final product *(4)*. Fatty acids in the lipid extract were methylated *(12)* and the fatty acid profile determined on a Shimadzu GC14A gas chromatograph (Siesakusho Ltd., Kyotot, Japan) with model AOC-14 Autoinjector (0.5µl sample) equipped with an SP2330 30m by .32mm capillary column (Supelco, Bellefonte, PA), and a Chromatopac C-R4AX processor. The initial temperature was 60°C programmed at 10°C/min to 100°C with a 2 min hold, then to 220°C at 15°C/min with a final hold time of 12 min. The carrier gas was helium at a flow rate of 1 ml/min. The make-up gas flow was 50 ml/min. The hydrogen to air ratio was 30:300 and the split ratio was 1:8. Injector and detector temperatures were 220 and 230°C, respectively.

Concentrations were calculated relative to the area of the plot of the C_{17} internal standard. Tentative identification of fatty acid methyl esters was based on retention times of fatty acid standards (C_4 to C_{20}) injected into gas chromatograph under same conditions.

Descriptive Sensory Evaluation

Panelist training.

Nine panelists, students and staff from the VPI&SU Food Science and Technology Department were selected on the basis of their willingness to participate in the project. Panelists participated in 7 1-h group training sessions during which product descriptors were selected and defined, and training in identifying and rating the intensity of each descriptor was completed. Eight attributes were selected by group discussion as measures of texture (coarse, thick) and flavor (vanilla flavor, caramel flavor, sweetness, freshness, old-cheese flavor, cardboard fla-

vor). Definitions for each attribute were developed by group consensus (Table 1, Table 2). During selection and defining of attributes, the group decided to avoid use of terms familiar only to those who had participated in the collegiate dairy products evaluation contest. Therefore, terms were selected with which all panelists could identify and defined on the basis of products that were familiar to everyone. Although there are many characteristics that could be described in ice cream, the eight selected represented the characteristics that the researcher hypothesized would be most affected by the experimental treatment.

Subsequent to the training sessions and before initiating the product evaluation, panelists were tested for their ability to distinguish attributes and repeat measurements. Panelists independently evaluated 4 ice cream samples representing commercial (Edy's Grand Vanilla Ice Cream, Edy's Grand Ice Cream Inc., Ft. Wayne, Ind.) and laboratory-manufactured ice cream products. Two of the four products were the same. This was useful in determining if panelists could replicate their own judgment. One-ounce samples in plastic souffle cups with lids were coded with 3-digit random numbers. Samples were presented such that each panelist received all samples, one at a time, in a random order. Each sample appeared in every position an equal number of times across all panelists. Samples were stored at -10°C in a counter-top freezer unit (Arctic Star of Texas model AS3, Arlington, TX) to maintain sample integrity during sensory analyses. Panelists evaluated one sample, then waited at least 30 seconds before the next sample was presented. Panelists rated each product for the 8 characteristics, rating intensity of each by placing a hash mark at the appropriate location on unstructured line scales (15.2 cm) with anchor terms and marked midpoints. Evaluations were completed in individual booths under white fluorescent light. Panelists were instructed to rinse the palate between samples and wait for 1 min before tasting the next product.

Table 1. Definition of sensory attributes for vanilla ice cream

Term	Definition
Coarse	Degree of roughness or granular feeling in mouth, usually from ice crystals, when product is first placed on tongue and on first bite through sample. Not coarse = smooth feeling, no ice crystals; extremely coarse = very rough and granular, large ice crystals.
Thick	Degree of viscosity in mouth when sample is first mashed with tongue against roof of mouth after first bite through sample until melted. Not thick = watery, quickly disappears from tongue; extremely = large mass still on tongue after manipulation, product doesn't melt, gummy.
Vanilla flavor	Degree of natural vanilla taste in sample. None = no identifiable vanilla flavor at all; extreme = alcoholic note and excess vanilla flavor.
Caramel flavor	Degree of caramel or cooked-like flavor as in evaporated milk. None = no identifiable notes; extreme = comparable to evaporated milk.
Sweet	Degree of the basic taste, sweet, from either sugar or corn syrup. Not = no sweetness; extreme = excess as comparable to cotton candy or pure sugar.
Fresh	Degree of aftertaste not associated with following characteristics of old cheese flavor or cardboard flavor. Not = strong aftertaste as from long storage, temperature abuse, or old ingredients; extremely = no aftertaste, cleans up quickly, pleasant.
Old-cheese flavor	Degree of flavor reminiscent of blue cheese, abused cheese, rancid notes. None = cannot identify such characteristic; extreme = intense flavor with strong aftertaste.
Cardboard flavor	Degree of flavor reminiscent of wet cardboard, old oil, or oxidized milk. None = cannot identify such characteristic; extreme = odor and flavor characteristics with lingering aftertaste.

To determine if panelists were responding similarly to the product characteristics, a one-way analysis of variance (Excel 4.0 for Windows, Microsoft Corporation) was completed for all 8 attributes. Panelist differences were noted ($P < .05$) for three attributes (coarse, thick, and caramel). Additional information was provided to help clarify those terms but no additional evaluation was completed prior to conducting the descriptive analyses on the research samples. For all other attributes, there were no panelist differences.

Product Evaluation

Descriptive analyses were completed on vanilla ice creams manufactured with natural cream (3 replications) or reformulated cream (3 replications) and a commercial ice cream product (2 samples of the same commercial product, Pet Vanilla Ice Cream, Pet Dairy, Inc.). Panelists independently evaluated a total of 8 samples of 4 products in each of 2 sessions within one day. Experimental, control, and commercial ice creams were presented as previously described. All panelists received the same set of samples, in random order, for the first session, and the re-

Table 2. Standards or products used for training sensory panel

Term	Standard or Product
Coarse	Not = commercial ice cream selected by the primary researcher to reflect the smooth characteristic; extremely = commercial ice cream that had been melted and refrozen.
Thick	Not = water; intermediate products = skim milk, whole milk, half and half; extreme = whipping cream.
Vanilla	None = ice cream mix with no vanilla flavor added; extreme = ice cream with approximately three times the normal concentration of vanilla flavoring. Products were manufactured in our pilot plant using the same ice cream formulation as the control product.
Caramel	None = fresh milk without an excess cooked flavor; extreme = evaporated milk.
Sweet	Not = milk; extreme = melted ice cream with added sugar.
Fresh	Not = commercial product stored for six months in consumer-type freezer; extremely = same commercial brand freshly purchased.
Old-cheese flavor	Not = fresh ice cream manufactured in pilot plant; extreme = rancid ice cream manufactured from rancid cream in pilot plant.
Cardboard	Not = fresh milk; extreme = oxidized milk.

Table 3. Composition (X ± SE) of vanilla ice cream manufactured from natural or reformulated cream

	Natural	Reformulated
Constituent	X ± SE	X ± SE
Total lipid (g/100 g ice cream)	10.28 ± 0.92	9.56 ± 0.78
Saturated fatty acids (g/100 g ice cream)	6.99 ± 0.63	6.35 ± 0.52
Cholesterol (mg/100 g ice cream)[b]	23.11[a] ± 2.34	10.12[b] ± 1.10
Protein (g/ 100 g ice cream)	2.61 ± 0.09	2.64 ± 0.18
Total solids (%)	37.51 ± 1.30	36.57 ± 1.56

[a, b] Means within a row are significantly different ($P < .05$) ($N = 3$).

maining samples were presented at the second session. Identification of the samples chosen for presentation in the first session was determined by random selection but all three products were represented in each session.

Consumer Evaluation

Flavor acceptability of chocolate-flavored ice creams manufactured with natural or reformulated creams (as previously described for vanilla ice cream) was determined. A consumer population ($n = 101$), recruited from the available and willing people in the student center at VPI&SU, evaluated either the control (natural cream) or the experimental product (reformulated cream) on a 9-point hedonic scale (1, dislike extremely and 9, like extremely). Consumers were asked to rate the product on how well they liked the flavor. Each participant was seated at an individual table isolated from the instruction area during the evaluation. Each participant also completed a demographic questionnaire.

Statistical Analyses

The experiment was replicated 3 times. A generalized randomized complete block (blocked on panelists) was used to determine significant differences between treatments and treatment by panelist interactions for each sensory characteristic (SAS, 1985). Significant differences among means were determined, when appropriate ($P < .05$), using least significant difference tests. Comparisons of values for appropriate assays (chemical measurements) were completed by t test between the experimental and control products (Excel 4.0 for Windows, Microsoft Corp.).

RESULTS AND DISCUSSION

The homogenized reformulated cream, with 30% milkfat, resembled an oil-in-water emulsion, similar to a homogenized natural cream on electron microscopic examination. The cholesterol-free butteroil globules were partially surrounded with milkfat globule membrane and casein micelles.

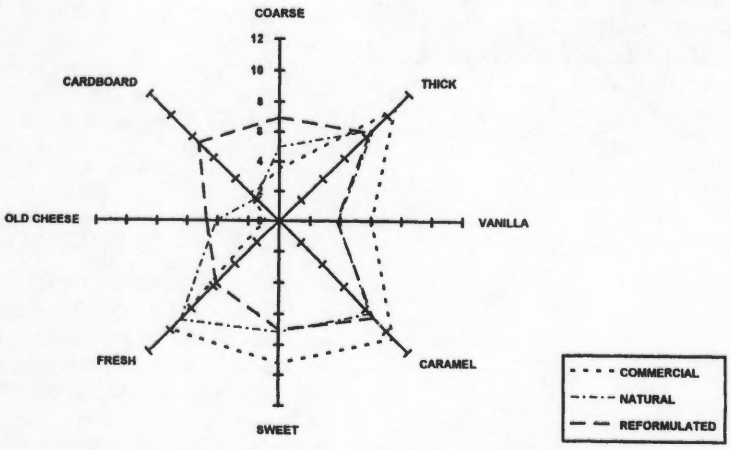
Table 4. Fatty acid profile (X ± SE)[a] of vanilla ice cream formulated from natural or reformulated cream and of cholesterol-stripped butteroil[b] from which reformulated cream was manufactured

	Ice Cream		
	Natural	Reformulated	
Fatty acid	X ± SE	X ± SE	Butterail
Butyric (4:0)	1.87 ± 0.07	2.36 ± 1.01	2.3
Capraic (6:0)	1.69 ± 0.14	1.51 ± 0.14	1.7
Caprylic (8:0)	1.02 ± 0.11	0.94 ± 0.08	1.1
Capric (10:0)	2.31 ± 0.29	2.33 ± 0.20	2.3
Lauric (12:0)	2.72 ± 0.33	2.86 ± 0.24	2.6
Myristic (14:0)	10.64 ± 1.21	10.13 ± 0.73	9.4
Palmitic (16:0)	35.45 ± 3.98	29.40 ± 2.15	28.9
Palmitaleic (16:1)	2.54 ± 0.38	2.46 ± 0.18	1.3
Stearic (18:0)	13.75 ± 0.61	13.48 ± 1.24	14.5
Oleic (18:1)	26.83 ± 2.60	25.74 ± 2.15	28.6
Linaleic (18:2)	3.10 ± 0.23	3.60 ± 0.38	3.6
Linalenic (18:3)	0.41 ± 0.07	0.26 ± 0.07	0.4
Arachidic (20:0)	0.47 ± 0.07	0.51 ± 0.11	0.2

[a] Mean percentage af tatal lipid based upan three replicatians.

[b] OmegaSaurce™ Chalesteral Reduced Anhydraus Milkfat typical fatty acids prafile, persanal cammunicatian. 1993. Saurce Faad Technalagy, Inc., Burnsville, MN.

Figure 1. Sensory prafile af a cammercial brand af vanilla ice cream ar praduct manufactured with natural ar refarmulated cream.



The average fat content for the ice cream manufactured from the reformulated cream was 9.56% which was slightly lower than the 10% total lipid targeted for manufacturing (Table 3). Average fat content for the control product was 10.28%. There was no difference ($P > .05$) in total lipid, total saturated fatty acids, protein content, or total solids between the two products. The values were very similar to those obtained from USDA Handbook 8-1 for dairy products *(17)*. The fatty acid profiles of the two products were also very similar with no significant differences ($P > .05$) (Table 4). The profiles for both products closely resembled the fatty acid profile for the reduced cholesterol butteroil (personal communication, Source Food Technology, Inc., Burnsville, MN). There was a slight numeric decrease in total saturated fatty acids; this may be attributed to a decrease in palmitic acid from 35.45% in the control product to 29.40% in the product manufactured from reformulated cream.

The cholesterol content was significantly lower ($P < .05$) in the ice cream manufactured from the reformulated cream compared to the cholesterol content in the control product. Cholesterol concentration indicated a 56% reduction in cholesterol, with concentrations obtained of 23.11 mg of cholesterol per 100 g of control product and 10.12 mg of cholesterol per 100 g of experimental product. A commercial product (Pet Vanilla Ice Cream, Pet Dairy Inc.) had 27.94 mg of cholesterol per 100 g of product.

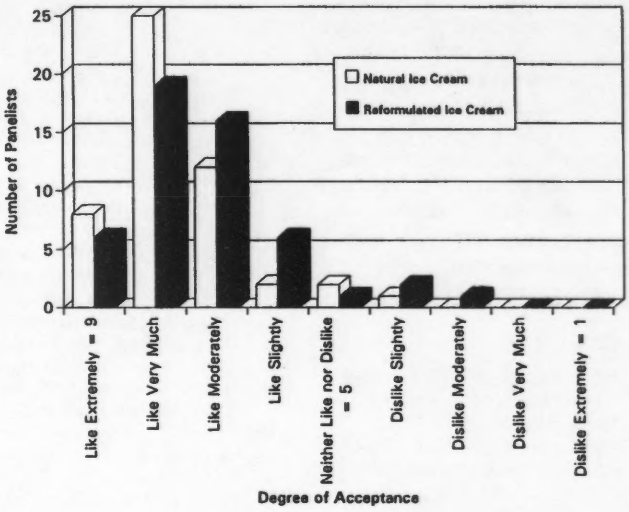
Physical quality characteristics (protein stability, milk characteristics, and heat shock stability) of both manufactured ice cream products were similar (data not shown). While there were no significant differences in the means for the sensory attributes of vanilla flavor ($P = .0587$) and sweetness ($P = .0671$) among the three products evaluated, other differences were noted (Figure 1). The ice cream manufactured from the reformulated cream was significantly different ($P < .05$) from the commercial product for all other attributes except caramel flavor. The control product was different from the ice cream made

with the reformulated cream with respect to coarse, fresh, and cardboard characteristics. The mean scores for the attributes coarse and cardboard were significantly higher for the product manufactured from the reformulated cream compared to both the commercial and control ice cream products ($P = .0001$) and significantly lower for freshness ($P = .001$). The cholesterol-stripped butteroil had a distinct oxidized aroma as observed by the researchers. The higher mean score for the cardboard flavor attribute in the ice cream made from the reformulated cream may have reflected oxidation in the butteroil. The use of antioxidants in the steam-stripped butteroil *(9)* and reformulated cream would alleviate this flavor problem.

The control product was not different from the commercial product with respect to the characteristics of coarse, fresh, cardboard, vanilla, or sweet, but the control product was less thick, had less caramel flavor and more old-cheese flavor than the commercial product. Differences in formulation and processing between the commercial product and our formulation probably attributed to the perceived differences in thickness, caramel flavor, and old cheese flavor.

The old-cheese attribute, which is an indication of a hydrolytic rancidity based on definition (Table 1), was more evident in the products manufactured in our facility than in the commercial product. The ice cream manufactured from the reformulated cream had a higher "old cheese" mean score than the product manufactured from natural cream. The mean scores for both products manufactured in our laboratory were still low, indicating that the flavor was only slightly perceptible to the experienced panelists. The development of this flavor was attributed to the preliminary method of manufacturing cream in our facility, which was homogenized prior to batch pasteurization, providing an opportunity for hydrolytic rancidity to occur. The processing of the reformulated cream has been improved to avoid this off flavor. Panelists were trained to detect this flavor so they could discern between the off flavor of old cheese that could possibly develop during manufacturing of the ice cream, and the off flavor of cardboard, which was associated with suspected oxidation of the cholesterol-stripped butteroil.

Figure 2. Consumer acceptability of chocolate ice cream manufactured from natural ($n = 51$) or reformulated ($n = 51$) cream.



Because the cardboard flavor was evident in the vanilla ice cream from the reformulated cream, a chocolate flavoring was added to the product used for consumer testing. The mean hedonic responses for the ice cream manufactured from the natural or the reformulated cream were 7.64 and 7.25, respectively, on a 9-point scale (9, like extremely). The flavor of the chocolate ice creams was acceptable (Figure 2). Results suggest that the cardboard flavor in the product made from the reformulated product was not sufficiently evident to cause the product to be disliked or that the chocolate flavor masked the cardboard flavor. The consumer panel ($n = 102$) consisted of persons of diverse ethnic backgrounds, 62% male and 38% female respondents, with 82% of the group between the ages of 18 and 64 (36% between 18 and 24) years old. Seventy-one percent of the population tested liked ice cream "very much" or "extremely" and 86% reported eating ice cream at least several times each month. Only 53% of the respondents considered ice cream a good nutritional resource. Of the people surveyed in this study, 68% were at least moderately concerned about cholesterol in food and 75% were concerned about the fat content of food.

CONCLUSIONS

Incorporation of a modified butteroil (cholesterol stripped) into ice cream may be accomplished by using a reformulated cream. The nutritional profile of a high fat dairy product was improved by incorporating a modified butteroil into the formulation. The ice cream product manufactured from a reformulated cream made with cholesterol-stripped butteroil had 56% less cholesterol than the ice cream made with natural cream. Other chemical characteristics were similar. Consumers found the flavor of the chocolate-flavored ice cream manufactured with the reformulated cream acceptable. Modifications in the processing of the reformulated cream have resolved problems linked to hydrolytic rancidity. Addition of antioxidants to the butteroil prior to steam-stripping would prevent the oxidative problems.

From a nutrition labeling standpoint, a cholesterol reduction greater than 50% was achieved. Labeling regu-

lations, however, have linked cholesterol reduction to saturated fat, which was not reduced significantly from the level normally found in ice cream. Technologies for the modification of fatty acid profile and saturated:unsaturated fat ratios of butteroil are advancing. Technological advancements in butteroil modifications will provide more options to dairy manufacturers. Utilization of modified butteroils in high fat dairy products can improve the nutritional positioning of these products.

REFERENCES

1. Anonymous. 1993. The latest scoop. International Ice Cream Association, Washington, D.C.
2. Arbuckle, W. S. 1986. Ice cream, 4th ed. Van Nostrand Reinhold, New York.
3. Arul, J., A. Boudreau, J. A. Makhlouf, R. Tardif, and B. Grenier. 1988. Distribution of cholesterol in milk fat fractions. J. Dairy Res. 55:361-371.
4. Bligh, E. G., and W. J. Dyer. 1959. A rapid method for total lipid extraction and purification. Can. J. Biochem. Physiol. 37:911-917.
5. Boudreau, A., and J. Arul. 1993. Cholesterol reduction and fat fractionation technologies for milk fat: an overview. J. Dairy Sci. 76(6): 1772-1781.
6. Bradley, R. L. 1989. Removal of cholesterol from milk fat using supercritical fluid carbon dioxide. J. Dairy Sci. 72:2834-2840.
7. Bruhn, C. M., A. Cotter, K. Diaz-Knauf, J. Sutherlin, E. West, N. Wightman, E. Williamson, and M. Yaffee. 1992. Consumer attitudes and market potential for foods using fat substitutes. Food Technol. 46(4):81-86.
8. Doan, F. J., and P. G. Keeney. 1965. Frozen dairy products. In W. S. Arbuckle, 1986. Ice cream, 4th ed. Van Nostrand Reinhold, New York.
9. Federal Register. 1995. Grading and inspection, general specifications for approved plants and standards for grades of dairy; general specifications for dairy plants approved for USDA inspection and grading service. Agricultural Marketing Service, USDA. Fed. Regist. 60:4824-4826.
10. Kanno, C. 1989. Emulsifying properties of bovine milk fat globule in milk fat emuision: conditions for the reconstitution of milk fat globules. J. Food Sci. 54(6):1534-1539.
11. Kanno, C., Y. Shimomura, and E. Takano. 1991. Physiochemical properties of milk fat emulsions stabilized with bovine milk fat globule membrane. J. Food Sci. 56:1219-1223.
12. Luddy, F. E., R. A. Barford, and R. W. Reinenschneider. 1960. The direct conversion of lipid components to their fatty acid methylesters. J. Am. Oil Chem. 37:447-451.
13. Marshall, R. T. (ed.). 1993. *Standard methods for the examination of dairy products.* 16th ed. American Public Health Association, Washington, D.C.
14. Oehlmann, S. M., S. E. Duncan, and T. W. Keenan. 1994. Butteroil emulsification with milk-derived membrane and protein fractions. J. Food Sci. 59(1):53-56.
15. Oortwijn, H., and P. Walstra. 1979. The membranes of recombined fat globules. 2. Composition. Neth. Milk Dairy J. 33:134-154.
16. Oortwijn, H., P. Walstra, and H. Mulder. 1977. The membranes of recombined fat globules. 1. Elecron microscopy. Neth. Milk Dairy J. 31:134-147.
17. Posati, L. P., and M. L. Orr. 1976. Composition of foods: dairy and egg products raw-processed-prepared. USDA Agriculture Handbook no. 8-1. Agriculture Research Service, USDA, Washington, D.C.
18. Rizvi, S. S. H., J. A. Daniels, A. L. Benado, and J. A. Zollweg. 1986. Supercritical fluid extraction: operating principles and food applications. Food Technol. 40:57-64.
19. Stadtman, T. 1957. Preparation and assay of cholesterol and ergosterol. Meth. Enzymol. 3:392.
20. Thomas, E. L. 1981. Structure and properties of ice cream emulsion. Food Technol. 35(1):41, 44, 46, 48.
21. Walstra, P., and H. Oortwijn. 1982. The membranes of recombined fat globules. 3. Mode of formation. Neth. Milk Dairy J. 36:103-113.

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Status of HACCP Implementation in the Food Industry

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ABSTRACT

In March 1994 a survey was developed with one of the objectives being a determination of the readiness of the food processing industry to comply with impending HACCP regulations. A total of 790 surveys were mailed out to QC/QA managers across the country and 219 were completed and returned (28% response). Of the 219 food processors who responded to the survey, 32% had HACCP plans for all products, 30% had HACCP plans for some products, 26% were in the process of preparing HACCP plans, and 13% did not have any HACCP plans. While most food processors responding to the survey did not have any HACCP plans for all products, a majority were working with HACCP. When food processors were asked how many man-hours they expect to spend per month complying to upcoming regulations, 64% responded 40 or fewer. When food processors were asked their feeling toward government inspection of collected QC data as a substitute for on-site inspections 51% responded like, 39% responded dislike, and 11% responded indifferent.

INTRODUCTION

With pending regulations proposed by the USDA and FDA regarding the mandatory use of the hazard analysis critical control point (HACCP) system by food processors to assure food safety, there are fundamental changes on the horizon in the way food processors will be interacting with the USDA and FDA. HACCP is a systematic, preventive approach to food safety. It consists of identifying significant food safety hazards, controlling these hazards at specific critical control points (CCPs) in the process, establishing critical limits, monitoring CCPs, and implementing corrective action, record-keeping procedures and verification procedures *(5)*. The HACCP concept has been evolving for the past 25 years (National Advisory Committee on Microbial Criteria for Foods) *(1)*.

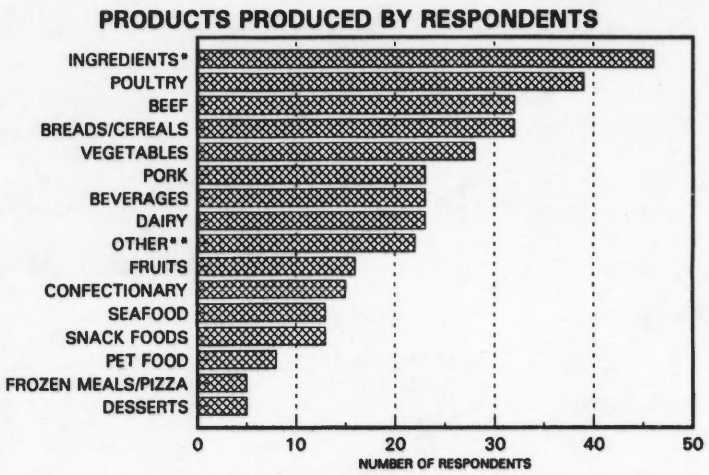
HACCP has been endorsed by the National Academy of Sciences, Government Accounting Office, National Advisory Committee on Microbiological Criteria for foods, and industry and consumer groups *(1)*. The HACCP concept has also been endorsed by regulatory agencies in the United States and abroad. HACCP concepts were used in the development of the low-acid canned food regulations by the FDA in the early 1970s. Twenty-four state regulatory agencies are using HACCP concepts during routine inspections of food processing plants *(2)*. The European Community has also included HACCP in its Food Hygiene Directive which was adopted in June 1993 *(3)*. The FDA published proposed seafood processing HACCP regulations in the Federal Register, 28 January 1994, and published an advanced notice of proposed rule making on 4 August 1994. Finally, the USDA published proposed HACCP regulations in the Federal Register on 3 February 1995. Despite the current widespread support for HACCP the majority of food processors may not have HACCP implemented for all the products they produce.

A 1992 survey conducted by Kelly J. Karr, Audrey N. Maretzki, and Stephen J. Knabel collected information on HACCP implementation among USDA-inspected companies in the Northeastern United States *(4)*. Despite the widespread support for HACCP at that time only 11% of the companies who responded to that survey had HACCP programs in place.

In March 1994, John Leifeit, R. P. Whitaker, and Kristine Hicks, students of Northern Illinois University's Small Business Institute developed another survey of food processors. One of the objectives of this survey was the determination of the readiness of food processors to comply with impending HACCP regulations. At that time, the FDA's proposed rule for safe processing and importing of seafood had just been published. Additional USDA HACCP regulations had been discussed, but were not yet published.

The survey consisted of 28 questions. Six of these questions were used to develop a profile of the respondent's company. Eight questions were related to the respondent's quality-control department and how their company collects and reports quality-control data. Nine questions dealt with government regulation and HACCP. Finally, five questions were related to the use of computerized data bases in relation to the respondent's quality-control systems. A presurvey was submitted to approximately 150 food processors to assure that there were not any unanticipated problems with the survey's design. A total of 790 surveys were then mailed to quality-assurance managers of food-processing companies throughout the country. Two hundred and nineteen surveys were completed and returned (28% response).

Figure 1. * Specific ingredients were not defined; ** Variety of foods with <5 respondents each.



Profile of Respondents

Approximately 15% of the food processors responding to the survey processed meat, poultry, or seafood, and 12% processed food ingredients (however, these ingredients were not specified); 10% processed fruits and vegetables, 10% processed breads and cereals, 5% processed dairy products and 52% processed a wide variety of other ingredients. See Figure 1 for a specific breakdown of food products processed by respondents. The number of respondents in Figure 1 add up to more than 219 because some of the respondents processed more than one type of food. Over half, 57% (124), of the food processors who responded had 300 or more employees, 11% (24) had 200-299, 16% (36) had 100-199, 11% (25) had 50-99, and 5% (10) had 49 or fewer. There were no questions on the survey regarding the respondent's company's sales volume.

Status of HACCP Implementation

Of the 219 food processors who responded to the survey, 32% (70) had HACCP plans for all products, 30% (65) had HACCP plans for some products, 26% (57) were in the process of preparing HACCP plans, and 13% (28) did not have any HACCP plans (see Table 1). While the majority of the food processors who responded to the survey did not have HACCP programs for all products, a majority did have some experience with HACCP. Food processors responding to the survey who process beef, pork, poultry, or seafood will be dealing with pending USDA or FDA HACCP regulations before other food processors.

Table 1. HACCP implementation status

	ALL PRODUCTS	SOME PRODUCTS	WORKING ON HACCP	NO HACCP
ALL RESPONDENTS	32%	30%	26%	13%
BEEF, PORK, POULTRY AND SEAFOOD PROCESSORS	23%	40%	31%	6%

Twenty-three percent (8) of those food processors had HACCP plans for all products, 40% (14) had HACCP plans, for some products, 31% (11) were in the process of preparing HACCP plans and 6% (2) did not have any HACCP plans (see Table 1).

The high percentage of all respondents who either have HACCP plans for all products, some products, or are in the process of preparing HACCP plans does indicate a widespread acceptance of the HACCP concept. The companies with no HACCP programs may have no HACCP programs for a wide variety of reasons, such as there being no significant food safety hazards in their process, lack of trained personnel or resources to develop and implement HACCP programs, or lack of awareness of the HACCP concept.

When the status of HACCP implementation was compared to the size of the respondent's company (see Table 2), the most significant difference came from those companies with 49 or fewer employees. Fifty percent of the respondents with 49 or fewer employees did not have any HACCP plans, 17% were in the pro-

Table 2. Status of HACCP implementation versus size of company

	300 OR MORE EMPLOYEES	200–299 EMPLOYEES	100–199 EMPLOYEES	50–99 EMPLOYEES	49 OR LESS EMPLOYEES	OVERALL RESPONSE
HACCP FOR ALL PRODUCTS	35%	55%	31%	24%	33%	32%
HACCP FOR SOME PRODUCTS	32%	20%	17%	43%	0%	30%
WORKING ON HACCP PLANS	20%	20%	41%	29%	17%	26%
NO HACCP PLANS	13%	5%	10%	5%	50%	13%

cess of preparing HACCP plans, none had HACCP plans for some products, and 33% had HACCP plans for all products. Although only a small percentage, 5% (10), of the respondents had 49 or fewer employees, these data could indicate that a large percentage of small companies have no HACCP experience and probably need the most assistance/training to implement a HACCP program. In the pathogen reduction hazard analysis and critical control point (HACCP) systems proposed rule published 3 February 1995 in the Federal Register, the USDA Food Safety and Inspection Service Administrator stated that the proposed rule will have a significant economic impact on small companies (defined as having a sales volume of no more than $2.5 million per year) *(1)*. FSIS has also stated in this proposed rule that "it is reasonable to allow small establishments additional time to meet the proposed HACCP requirements"*(1)*.

Time Food Processors Expect to Spend on Upcoming HACCP Regulations

When food processors were asked how much time they spend **per month** in complying with government regulations, 75% of the food processors responding to the survey indicated 40 or less man-hours per month (mhpm), 11% responded 41 to 80 mhpm, 4% responded 81 to 160 mhpm, and 11% responded 161 or more mhpm (see Table 3).

Table 3. Time currently spent on government regulations and time expected to spend on HACCP regulations

	<41 HRS/MONTH	41–80 HRS/MONTH	81–160 HRS/MONTH	>160 HRS/MONTH
ALL RESPONDENTS: TIME CURRENTLY SPENT ON GOV'T REGULATIONS	75%	11%	4%	11%
ALL RESPONDENTS: TIME EXPECTED TO SPEND ON HACCP REGULATIONS	64%	17%	7%	13%
BEEF, PORK, POULTRY SEAFOOD PRODUCERS: TIME EXPECTED TO SPEND ON HACCP REGULATIONS	50%	21%	12%	18%

When food processors were asked how many man-hours **per month** they expected to spend on upcoming HACCP regulations, 64% of those responding to the survey responded 41 or fewer mhpm, 17% responded 41 to 80 mhpm, 7% responded 81 to 160 mhpm, and 13% responded more than 160 mhpm (see Table 3). Response to this question varied slightly by facility size. Approximately 80% of respondents with less than 100 employees responded less than 41 mhpm compared to approximately 60% of respondents with more than 300 employees. This response could be related to larger facilities having more production lines or more complex operations.

A significant portion of respondents indicated that they do not expect to spend more hours complying with HACCP regulations than current government regulations. However, these data were collected shortly after publication of the FDA's seafood proposed rule, and before publication of the USDA's proposed rule. Eighty-one percent of the respondents expect to spend 80 hours or fewer mhpm on HACCP regulations as compared to 86% of the respondents who are currently spending 80 or fewer mhpm on government regulations. A

Table 4. Hours per month expected to spend on HACCP regulations versus HACCP implementation status

	HACCP FOR ALL PRODUCTS	HACCP FOR SOME PRODUCTS	WORKING ON HACCP PLANS	NO HACCP PLANS	OVERALL RESPONSE
< 41 HRS/MONTH	80%	45%	54%	95%	64%
41-80 HRS/MONTH	9%	28%	21%	0%	17%
81-160 HRS/MONTH	7%	13%	9%	0%	7%
161-320 HRS/MONTH	0%	9%	14%	0%	7%
> 320 HRS/MONTH	4%	6%	2%	5%	6%

slightly lower percentage of the respondents who processed either beef, pork, poultry, or seafood believed that they would be spending 80 or fewer mhpm complying with upcoming HACCP requirements. Fifty percent believed they would be spending 40 or fewer mhpm, 21% believed they would be spending 41 to 80 mhpm, 12% believed that they would be spending 81 to 160 mhpm, and 18% believed they would be spending 161 or more mhpm (see Table 3). This compares with a slightly lower percentage of beef, pork, poultry or seafood processors that had HACCP systems for all products when compared to all respondents.

Responses to this question of how much time food processors expect to spend on upcoming HACCP regulations could have been affected by factors such as the complexity of the respondent's operation, the number of different products produced at the respondent's production facility, status of HACCP implementation, number of personnel trained in HACCP, resources available to develop and implement HACCP systems, the respondent's past experience with government regulation/inspection, and an expectation for what the regulations would require. The proposed USDA HACCP regulations had not been published at the time of the survey. The proposed FDA regulations had been published but it is not known how many of the respondents were familiar with them. Over two-thirds, 68% of those who responded to this survey, indicated that they were aware of the HACCP data-recording recommendations outlined in the FDA 1993 model food code published at the same time as the seafood proposal. Although the majority of food processors who responded chose the lowest number of hours per month indicated on the survey, even less than 40 man-hours per month could be a burden for companies that are operating lean with as few personnel as possible.

As might be expected there were some differences when the status of HACCP implementation was compared to how much time food processors expect to spend on upcoming HACCP regulations (see Table 4). Eighty percent of food processors responding to the survey who had HACCP plans for all products responded that they expect to spend less than 41 mhpm complying with upcoming HACCP regulations, 9% responded 41 to 80 mhpm, 7% responded 81 to 160 mhpm, 0% responded 161 to 320 mhpm and 4% responded more than 320 mhpm. The majority of these food processors most likely responded that they believed they would be spending 40 or fewer mhpm complying with upcoming HACCP regulations because they have invested time in HACCP training and development, and they already have the resources in place to maintain their HACCP systems for all products.

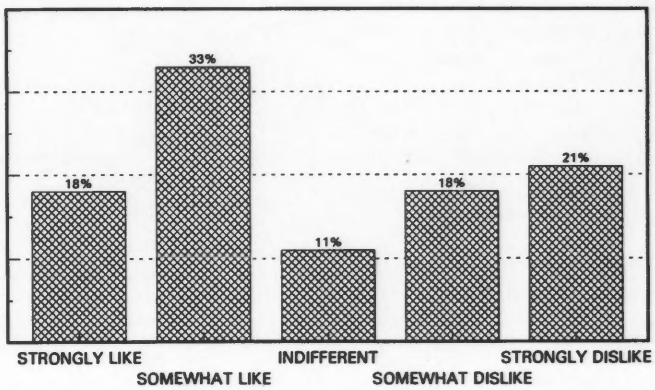
Almost all, 95% of the food processors responding to the survey that did not have any HACCP plans expect to spend 40 or fewer man-hours per month complying with upcoming HACCP regulations. A very small portion, 5% of these food processors, responded 321 or more hours per month. The large percentage of companies that did not have any HACCP plans that expect to spend less than 41 mhpm on upcoming HACCP regulations could be because many of these food processors are not familiar with the HACCP concept, their operations may be very simple, they may not have many significant food safety hazards associated with their process, or at the time of the survey they were not expecting to be included under the upcoming regulations.

A comparison was made between the time respondents to the survey are currently spending per month complying with government regulations and the time they expect to spend per month complying with upcoming HACCP regulations (see Table 5). A high percentage of companies currently spending the least amount of time complying to government regulations do not expect to spend more than 40 man-hours per month complying with upcoming HACCP regulations. Of the food processors responding to the survey, 86% who currently spend 20 or fewer mhpm complying with government regulations expect to spend 40 or fewer mhpm complying with upcoming HACCP regulations. Many of the companies currently spending less

Table 5. Hours/month expected to spend on HACCP regulations versus hours/month spent on current government regulations

	<21 HRS/MNTH ON CURR. GOV'T REG'S	21-40HRS/MNTH ON CURR. GOV'T REG'S	41-80 HRS/MNTH ON CURR. GOV'T REG'S	81-160 HRS/MNTH ON CURR. GOV'T REG'S	>160 HRS/MNTH ON CURR. GOV'T REG'S
< 41 HRS/ MONTH	86%	46%	41%	14%	29%
41-80 HRS/ MONTH	9%	19%	41%	29%	7%
81-160 HRS/ MONTH	2%	23%	14%	14%	14%
161-320 HRS/ MONTH	2%	8%	5%	14%	29%
> 320 HRS/ MONTH	1%	4%	0%	29%	21%

Figure 2. Respondent's feelings toward government inspection of collected QC data as a substitute for on-site inspections.



than 21 hours per month on government regulations may have the least complex operations without many significant food safety hazards. Many may also either have HACCP systems in place or plan on having HACCP systems in place with or without government regulations; therefore, they do not intend to spend much additional time on HACCP regulations.

Industry Feeling Toward HACCP Regulations

When food processors were asked their feeling toward inspection of quality-control data as a substitute for on-site inspections, half of the respondents strongly or somewhat preferred inspection of quality-control data as a substitute for on-site inspections, with 11% indifferent (see Figure 2). This question was open to wide interpretation because the survey did not define on-site inspection and it did not differentiate between the inspection of quality-control data and the inspection of data associated with monitoring food-safety critical control points. This question could also give the impression that inspection of HACCP records and systems would not be on site, which would not be the case. From this data it appears that a slightly higher percentage of the respondents like the concept of government inspection of collected data from monitoring CCPs as opposed to traditional on-site inspections. However, a significant proportion of those responding to the survey disliked government inspection of collected data.

When the status of HACCP implementation was compared with the respondents' feelings towards government inspection of collected quality-control data as a substitute for on-site inspections, there was a positive correlation between status of HACCP implementation and preference for inspection of data. A higher percentage (approximately 57%) of the respondents who had HACCP plans for all products, or some products, either somewhat liked or strongly liked government inspection of collected quality-control data as a substitute for on-site inspections. Approximately 45% of the respondents who were working on HACCP or had no HACCP plans preferred inspection of data to on-site inspections. The group with the largest percentage of respondents that were indifferent were those with no HACCP plans (see Table 6).

Table 6. Feelings toward government inspection of QC data versus HACCP implementation status

	HACCP FOR ALL PRODUCTS	HACCP FOR SOME PRODUCTS	WORKING ON HACCP PLANS	NO HACCP PLANS	OVERALL RESPONSE
STRONGLY LIKE	23%	11%	9%	23%	18%
SOMEWHAT LIKE	33%	47%	35%	23%	33%
SOMEWHAT DISLIKE	15%	15%	26%	18%	18%
STRONGLY DISLIKE	25%	17%	21%	14%	21%
INDIFFERENT	3%	11%	9%	23%	11%

CONCLUSION

The majority of food processors responding to this survey did not have HACCP systems in place for all products; however, a majority did have some experience with HACCP and believe they will not be spending more than 40 man-hours per month on upcoming HACCP regulations. A higher percentage of the respondents to this 1994 survey than those responding to a 1992 survey indicated that they had HACCP plans for all products. This could indicate that the use of HACCP by the food industry is increasing, which could be due either to impending regulations or to widespread acceptance of HACCP. HACCP regulations will have a greater impact on small companies who may not have the resources to develop and implement a HACCP plan. Even though a majority of the respondents to this survey liked the concept of inspection of collected data as a substitute for on-site inspections, a significant portion disliked this concept. The proportion in favor of the concept was highest among firms which had HACCP plans for all or for some products.

As is normally true with surveys, the results of this survey generated more questions than it answered. Since this survey was conducted, firms have had time to consider the implications of FDA's and USDA's proposed HACCP rules. Another HACCP survey is currently being developed that will cover these issues in more detail.

The authors wish to acknowledge the contributions of Adam Slotkowski of Abbyco Inc. All rights to the data accumulated are the property of Abbyco Inc. All data was used with the permission of Abbyco Inc.

REFERENCES

1. Anonymous. 1995. Pathogen reduction; hazard analysis and critical control point (HACCP) systems; proposed rule. Federal Register, Vol. 60, No. 23 1995. Government Printing Office, Washington, D.C.
2. Anonymous. 1993. State uses of HACCP. Government Printing Office, Rockville, MD.
3. Garrity, T. 1993. Food hygiene directive. Environ. Health. September 1993.
4. Karr, K. J., S. J. Knabel, and A. N. Maretzki. 1994. Meat and poultry companies assess USDA's hazard analysis and critical control point system. Food Technol. Vol. 48, No. 2 1994:117–122.
5. Stevenson, K. E. (ed.). 1993. HACCP establishing hazard analysis critical control point programs, a workshop manual. Food Processors Institute, Washington, D.C.

Guide to Food Labeling Regulations Implementing the Nutrition Labeling and Education Act of 1990; Questions and Answers; Availability

[Docket No. 93N-0293]

AGENCY: Food and Drug Administration, HHS.

ACTION: Notice.

SUMMARY: The Food and Drug Administration (FDA) is announcing the availability of a document entitled, "Food Labeling, Questions and Answers Volume II; A Guide for Restaurants and Other Retail Establishments" that addresses various questions concerning the regulations that FDA issued to implement the Nutrition Labeling and Education Act of 1990 (the 1990 amendments). The agency has received a large number of inquiries about how these final rules are being implemented in restaurants and other retail establishments, and it has prepared "Food Labeling, Questions and Answers Volume II; A Guide for Restaurants and Other Retail Establishments" to respond generally to many of the questions that it has received. Answers to some of the most frequently asked questions are included as an appendix to this notice. This document is intended to facilitate compliance with the new rules.

ADDRESSES: Copies of the document "Food Labeling, Questions and Answers Volume II; A Guide for Restaurants and Other Retail Establishments" will be available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FOR FURTHER INFORMATION CONTACT: Michelle A. Smith, Center for Food Safety and Applied Nutrition (HFS–158), Food and Drug Administration, 200 C St. SW., Washington, DC 20204; (202) 205-5099.

Duty to Report Violations; Amendment

21 CFR PART 19

AGENCY: Food and Drug Administration, HHS.

ACTION: Final Rule.

SUMMARY: The Food and Drug Administration (FDA) is amending the regulation that gives the responsibility to perform the centralized investigative activities in FDA to another office. The responsibility was recently transferred from the Division of Ethics and Program Integrity, Office of Management and Operations, FDA, to the Office of Internal Affairs, FDA. This action will codify this transfer of functions.

EFFECTIVE DATE: September 13, 1995.

FOR FURTHER INFORMATION CONTACT: Tommy L. Hampton, Office of Internal Affairs (HF-9), Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20857, 301-827-0243.

SUPPLEMENTARY INFORMATION: In the Federal Register of January 23, 1995 (60 FR 4417), the Department of Health and Human Services published a notice to reflect an organizational change in FDA. The positions assigned to perform the centralized investigative activities located in the Division of Ethics and Program Integrity, Office of Management, Office of Management and Systems, FDA, were transferred to the new Office of Internal Affairs within the Office of the Commissioner.

The new Office of Internal Affairs will serve as an FDA investigative resource to conduct internal FDA investigations and support the Office of Inspector General investigations. Therefore, the agency is amending 21 CFR 19.21 to reflect the organizational change.

Indirect Food Additives: Adjuvants, Production Aids, and Sanitizers

FDA is amending the food additive regulations to provide for the safe use of oxidized bis (hydrogenated tallow alkyl) amines as a process stabilizer for polypropylene intended for use in contact with food. This action is in response to a petition filed by Ciba-Geigy Corporation.

Analysis of Adverse Reactions to Monosodium Glutamate (MSG); Availability

FDA is announcing the availability of a document entitled "Analysis of Adverse Reactions to Monosodium Glutamate (MSG)," which the Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology (FASEB) has prepared under a contract with FDA. As announced in the Federal Register of December 4, 1992, the agency requested that LSRO/FASEB undertake a reexamination of scientific data on possible adverse reactions to MSG.

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Food Research Institute, Madison

New IAMFES Sustaining Members

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Puritan/Churchill Chemical Co.
Atlanta, GA 30318

Tony Vagnino
Warren Analytical Laboratory
Greeley, CO 80632

UpDates

Process Automation Engineer Joins A & B

A new engineer at A & B Process Systems Corp. brings additional expertise in automated systems integration services.

Charles J. Anderson recently received his bachelor's degree in electrical engineering, with an emphasis on controls and communications, from the University of Wisconsin-Platteville. Major courses included automatic controls, digital signal processing, advanced electronic circuits, logic and digital design, and microprocessor design. He also developed software programs and created prototype systems for Kohler Company through an electrical engineering co-op program with the university.

At A & B, his duties include process automation systems engineering, product management, commissioning and operator training.

Korolishin Joins IDFA Communications Department

Jennifer Korolishin joined the International Dairy Foods Association September 5th as their Communications Manager. She will be responsible for the IDFA newsletter *News Update*, and the National Fluid Milk Processor Promotion Board's *MilkPEP News*, as well as handling press requests and other public relations duties for the associations.

Korolishin holds a B.A. in Communication/English-Journalism from the University of Delaware in Newark, Del. and an M.A. in Political Communication from Emerson College in Boston, Mass. She has two years of experience with association communications from previous positions with the National Association of Workforce Development Professionals and the American Road and Transportation Builders Association.

Fractal and HMS Merge

Fractal, Inc., the leading supplier of perishable control equipment to the retail grocery industry, announced its merger with Humidity Management Systems (HMS), a supplier of humidification equipment to the post harvest handling industry.

This merger creates a "one-stop-shopping" source for humidity control equipment for distribution centers, ripening rooms, grower, packer and shipper storage, retail grocery stores and retail display cases.

The newly merged operation will retain the Fractal name while featuring Humidity Management Systems' innovative line of humidity control equipment.

Friedman Named Deputy Commissioner

Michael A. Friedman, M.D., was named Deputy Commissioner for Operations for the Food and Drug Administration, succeeding Linda Suydam who has taken a position at the University of New Mexico.

Friedman assumed the position on Oct. 1, 1995.

Friedman was the Associate Director of the Cancer Therapy Evaluation Program, Division of Cancer Treatment, at the National Cancer Institute. In that position he was responsible for the development and clinical testing of new therapies for cancer patients. More than half of the clinical trials currently sponsored by the National Institute of Health are conducted by Dr. Friedman's program.

A career Public Health service (PHS) officer, Friedman has also served as Acting Associate Director of the Radiation Research Program of the Division of Cancer Treatment and Chief of Clinical Investigations Branch at the Cancer Therapy Evaluation Program.

He is a member of the American Society of Clinical Oncology, the American Association for Cancer Research and the American Federation for Clinical Research. He has served on a number of professional committees and editorial boards and received various awards, including EEO Special Achievement Award, the PHS Commendation Award and the American Cancer Society Faculty Research Award.

Friedman received his B.A. from Tulane University and his M.D. from the University of Texas, Southwestern Medical School.

Acquisition Announced

John W. Caldwell, President of Dresser Instrument Division, has announced an agreement in principle for the friendly acquisition by Dresser Instrument Division of selected product lines, trade name and assets of Weksler Instruments Company, Freeport, New York. The terms of the final agreement are being negotiated.

The Weksler trade name will be added to the Ashcroft®, Heise®, Ebro® and Willy® pressure and temperature measuring instruments currently manufactured by Dresser Instrument Division headquartered

in Stratford, CT. A small segment of the Weksler product line not part of the acquisition will continue to operate as the Weksler Glass Thermometer Company.

U.S. Filter Acquires Polymetrics Inc.

United States Filter Corporation (U.S. Filter, NYSE/USF) has announced that it has completed the acquisition of Polymetrics Inc. Polymetrics is a leader in the design, manufacture and installation of ultrapure water treatment systems for the electronics industry. The company will be doing business as U.S. Filter/Polymetrics.

U.S. Filter/Polymetrics services approximately 4,000 customer sites nationwide and is also involved in the operation and management of water systems at customer locations. Nationwide, it has five sales offices and operates 31 large mobile demineralization trailers and six resin-regeneration facilities in Colorado Springs, CO; Hartford, CT; Los Angeles, CA; Richmond, VA; Seattle, WA; and Sunnyvale, CA. Among its products are the Aqua Media ultrapure line of equipment, Polytrex stainless steel ion exchange vessels and a broadly diversified line of reverse osmosis and service deionization technologies.

Helm Joins Flavorite Laboratories, Inc. as Director of Research and Development

Flavorite Laboratories, Inc., Memphis, TN, announces the appointment of Cozatta T. Helm as Director of Research and Development. In this position, Helm will lead the Research and Development activities of Flavorite Laboratories, Inc.

Helm comes to Flavorite with extensive experience in Food Technology, having spent fourteen years with Sara Lee Bakery, rising to Director of Food Technology. From Sara Lee, Helm moved to Product Manager at Keebler and then to NutraSweet where she worked as Applications Manager until joining Flavorite this summer.

Helm received her B.S. in Home Economics and her M.S. in Nutrition and Food Science from the University of Kentucky. She also holds a Masters in Management from Northwestern University. Helm is a member of the Institute of Food Technologists and the American Association of Cereal Chemists.

First List of Lead-Safe Faucets Released by NSF International: Consumers can Make Safe Choice

For the first time, consumers can buy kitchen and bathroom faucets confident that unsafe levels of lead will not be added to their drinking water. A list of faucets and other devices that pass new, stringent NSF standards, and are certified by NSF International, was released.

In addition, NSF announced that this new standard has been approved by ANSI (American National Standards Institute) as the American National Standard for faucets.

Lead in drinking water is a known health hazard. Especially dangerous for infants and children, exposure to even small amounts of lead can depress intelligence and learning ability. In adults, lead poisoning can produce high blood pressure and kidney damage; it is also associated with infertility.

The faucets on the list released today are all certified by NSF International under ANSI/NSF Standard 61, Section 9, for lead and other contaminants. The voluntary standard applies to "endpoint" devices used in drinking water applications. This includes kitchen and bathroom faucets, refrigerator ice makers, instant hot dispensers and other products used in drinking water applications.

"Consumers may be unaware that their faucets and ice makers might be releasing unsafe levels of lead into their drinking water," according to Dr. Ann Marie Gebhart, vice president, technical operations, for NSF International.

The subject of lead from faucets made news recently, when the state of California and the Natural Resources Defense Council settled a lawsuit over the amount of lead added to water from faucets. The settlement is based on compliance with this ANSI/NSF Standard.

"Anticipating the need to conform to the ANSI/NSF Standard, we've seen cases in which manufacturers have redesigned their products to meet the Standard's very stringent requirements," explains Dr. Dennis R. Mangino, NSF International president. "This is another example of how voluntary compliance standards can work to benefit Americans, without adding extra burdens to the government."

Consumers can obtain a copy of the list of NSF Certified faucets by calling 1-800-673-8010. The list can also be ordered from the NSF International Internet home page at http://www.nsf./com.

The More Consumers Learn about Irradiation, the Greater Their Interest in its Many Benefits

Consumers are generally accepting of food irradiation once they learn some basic information, according to research conducted by industry and academics.

Speaking at a Sept. 6th meeting of the AHI Food Safety Network, Susan Conley, director of information and legislative affairs for the U.S. Department of Agriculture's Food Safety and Inspection Service, referred to studies conducted by government, universities, and industry to illustrate the high rate of acceptance irradiated foods receive after facts on its benefits are shared. Benefits of irradiated foods include lower levels of harmful bacteria, delayed spoilage, and elimination of insects and fungi sometimes present in food.

In one study conducted by Purdue University, 54 percent of the participants expressed an interest in irradiation before any information was given. The group of 178 people were then divided and half were shown a video on irradiation. The other half were shown the video and received a sample product to taste. The acceptance rate increased by 90 percent for the first group, and 99 percent for the second group.

In addition to supporting Conley's assertion that information is key, the Purdue study also makes the point that having the product more available to consumers will be equally important in gaining full acceptance of this technology.

Irradiation is a food processing technique that relies on controlled amounts of ionizing radiation, or energy, to essentially pasteurize food. Contrary to what many consumers believe, irradiation does not alter the chemical make-up of food, it does not effect the nutritional content of food, and it does not result in radioactive food, reported FSIS' Lynvel Johnson, also speaking at the meeting. In fact there is virtually no detectable difference between irradiated foods and non-irradiated foods except that irradiated foods may provide a higher level of food safety protection.

Conley reported that a large part of consumer acceptance comes with access to information and the freedom to choose. In keeping with the idea of consumer choice, all irradiated foods must be labeled with an international symbol specifically designed to identify irradiated foods. The

symbol, simple green petals in a broken circle, must be accompanied by the words, "treated by irradiation" or "treated with radiation."

Many foods are being processed using irradiation these days, including bulk spices, grains, fruits, vegetables and poultry. The beef and seafood industries currently have petitions pending approval by the Food and Drug Administration, Johnson said. Until approvals are granted, however, regulations cannot be put in place by USDA.

Conley stated that a top priority for FSIS and the meat and poultry inspection program is to get systems of prevention in place under a Hazard Analysis and Critical Control Points, or HACCP, system. Food irradiation represents "one method of intervention and prevention" that can be used to help ensure a safer food supply.

$150,000 Siehl Prize Nominations Opened

Nominations are invited for the Siehl Prize for Excellence in Agriculture by the University of Minnesota's College of Agricultural, Food, and Environmental Sciences. The prize is awarded biannually in three categories. Each award carries a $50,000 cash award as well as a sculpture created by university artist Thomas Rose.

The prize, funded through a founding gift from Minnesota businessman and philanthropist Eldon R. Siehl, recognizes an individual or team exemplifying the highest ideals and achievements in production agriculture, agribusiness, or academics.

"The Siehl Prize offers us an opportunity to recognize leaders and celebrate agriculture in all its dimensions," says Michael Martin, dean of the college. "It's an honor to those who receive it and an honor for us to present it."

Citizens of all nations may nominate living individuals. To obtain a nomination form and additional information, call (612) 624-3235 or write: The Siehl Prize, Dani O'Reilly, Director of Communications, College of Agricultural, Food, and Environmental Sciences, University of Minnesota, 277 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108; e-mail doreilly @mes.umn.edu; fax (612) 625-1260.

National Food Safety Summit Focuses on Key Food Safety Issues

What is the most challenging food safety issue facing the foodservice industry? On September 11, five industry experts examined that question and many others during the first national Food Safety Summit, a live panel discussion on one of the industry's hottest issues. This one-hour broadcast, hosted by the Educational Foundation of the National Restaurant Association and Hospitality Television (HTV), brought together food safety experts representing different segments of the industry. Audience members called in with their questions and concerns on food safety throughout the broadcast.

Kyle Marie Gould, manager of technical education–food safety for The Educational Foundation, served as moderator of the panel and asked each panelist to explore the challenges the industry faces addressing food safety.

"The challenge facing fast foodservice establishments and restaurant chains is re-establishing credibility in the eyes of the consumer," said Chet England, chairman of the food safety task force of the National Council on Chain Restaurants. "To do that will take a partnership of all segments of the food chain to ensure the quality and safety of products."

Rita Fullem, executive director of the Food Processors Institute, the educational arm of the National Food Processors Association, agreed with England. "Microorganisms are the single biggest cause of any food safety problem," she said. "The importance of prevention exists from the farm to the table and is the responsibility of each segment of the industry."

One method of prevention is the concept of Hazard Analysis Critical Control Points (HACCP), which panelists discussed respective to their areas of foodservice.

Joel Simpson, of Food Safety Solutions and representing independent foodservice operators and small chains, said a challenge facing the independent operator is to make the concept of HACCP understandable to employees while keeping it operational with limited resources.

Commander Chuck Higgins, Food and Drug Administration State Training Branch, said the regulatory agencies have the opportunity to use the same principles of HACCP but apply them differently, making the concept more understandable for restaurants.

"The concept of HACCP has been in use for approximately nine years," he said. "The regulatory community faces the need to change from trying to apply HACCP in a formal and rigid way to applying it in a more practical way for a foodservice establishment."

The discussion on the regulatory community included the role inspectors play in food safety. The panelists agreed that the answer is not necessarily more inspectors, but instead a different approach to inspecting.

England stated again that there must be a shift from simply inspecting a restaurant to educating operators about food safety. "Inspectors know that technical information well, but there is a need to better understand the foodservice business," he said. "This shift is currently in process."

Simpson stressed that operators can't rely on inspections to guarantee food safety. "You can't wait for regulation to set forth food safety practices," he said. "It would be too late for your establishment. The government can't protect the food supply. Currently, the United States has one of the safest food supplies. However, problems still remain and they have to be addressed through partnerships and proper handling."

AffiliateNews

David D. Fry–Recipient of the C. Bronson Lane Award for Excellence

Florida Association of Milk, Food and Environmental Sanitarians Annual Meeting

"Fifty Years of Change in Food and Dairy Safety Issues" September 21 & 22, 1995

Meeting Highlights:

• Keynote address was presented by C. Dee Clingman, Vice President of Quality Assurance, Darden Restaurants and IAMFES Past President.

• Other speakers for the meeting covered a variety of topics concerning the changes in food and dairy safety issues over the last fifty years.

• A luncheon address chronicling the history of FAMFES was provided by a longtime FAMFES and IAMFES member, David D. Fry.

• Peter Hibbard and Faith Holcm were elected as Local Arrangement co-chair for the 1997 IAMFES Annual Meeting in Orlando.

1995 FAMFES Awards

• Sanitarian of the Year: Adeline Dobson, Sanitation and Safety Supervisor, Environmental Health Division of Duval County Public Health Unit.

• President's Award: Dean Elliot, Director, Division of Dairy Industry, Florida Department of Agriculture and Consumer Services and FAMFES 1995 Vice President.

• C. Bronson Lane Award for Excellence: David D. Fry, Retired, Trustee of 3-A Symbol Council, IAMFES Member and Co-founder of the Georgia Affiliate.

Iowa Association of Milk, Food and Environmental Sanitarians

Annual Meeting–October 11 & 12, 1995

Meeting Highlights:

• Lab session with Larry Maturin, Ph.D., Chief of LQAB.

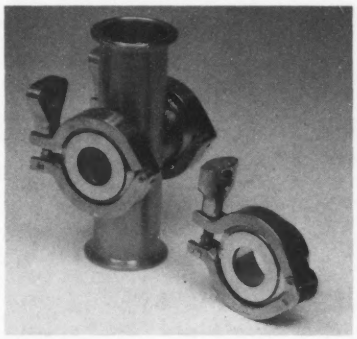
• Summary of *Salmonella* outbreak and preceeding investigation at Schwann's from Charles Price, FDA.

• A history of Swiss Valley Farms from Dick Walgrave, Swiss Valley.

• Leo Timms, Iowa State University Extension, provided an overview of his exchange work with dairies in China.

• Officers elected were: President, Loren Johnson, Wells Blue Bunny; President Elect, Jeff Meyer; 1st Vice President, Norieta Kramer; 2nd Vice President, Jon Knight; Secretary/Treasurer, Janet Burns.

• 1996 Iowa Annual Meeting tentatively October 10th & 11th.



L. J. Star Incorporated

Sanitary-Design Fused Glass/Metal Windows Improve Food Process Sight Glass Safety

The strongest, most secure glass elements available, Metaglas® mechanically prestressed windows, are now available in a sanitary design for visual flow indicators or sight ports in food and beverage processing applications. The new units incorporate Meta-Clamp™ sanitary-service fittings, 3-A approved for milk and milk products.

Described as offering the optics of glass and the strength of steel, these glass elements provide a level of safety, and a useful service life, well beyond that provided by conventional tempered glass or plastic in sanitary service. Even in the most extreme (to 536°F) or overpressure situations, sudden, total failure, with leakage or explosive shattering of the glass, essentially never occurs.

Patented Metaglas windows are formed by melting glass, typically borosilicate, into a precisely formed metal ring. As the glass cools, it solidifies and prevents the metal ring from contracting back to its theoretical size at normal temperatures. The result is a uniform, mechanically prestressed fusion of glass and metal that combines excellent optical characteristics with greatly enhanced physical characteristics. Also, vital in sanitary service, this high-pressure fusion of glass window and metal ring produces an uninterrupted surface with no open space between the two.

L. J. Star Incorporated, Fredonia, NY.

Reader Service No. 358

DuPont Affiliate Announces PCR-Based Food Testing Technology

FQMS, L.L.C., an affiliate of DuPont, has announced the commercial launch of the BAX™ bacterial assessment system for screening *Salmonella* in food.

The BAX™ system is the only commercially available system that utilizes Polymerase Chain Reaction (PCR) technology to detect *Salmonella* in meat, milk, or poultry. PCR is an innovative method that can produce millions of copies of DNA from a single target organism. By using the BAX™ system's convenient, pre-packaged reagents, a food microbiologist can determine whether a meat, milk or poultry sample contains even a tiny amount of the potentially deadly bacterium—as quickly as the day after sampling.

The BAX™ system for screening *Salmonella* is the first in a family of products that will use PCR to screen food samples for dangerous bacteria. It is sold under licenses from F. Hoffman-LaRoche, Ltd; Roche Molecular Systems, Inc. and The Perkin-Elmer Corporation. Future BAX™ systems will include screens for *E. coli* O157, *Listeria*, and *Listeria monocytogenes*.

Dupont, Wilmington, DE.

Reader Service No. 359

New Somatic Cell Counter from Foss Food Technology

Foss Food Technology now introduces a new advanced **Somatic Cell Counter**–the **Fossomatic 5000** targeting Central Milk Testing Laboratories. The new Cell Counter–based on Foss Flow Cytometry puts environmental and operator concerns first.

The **Fossomatic 5000** offers a completely closed reagent handling system with premixed reagents, making it easy and safe to operate. The environment is protected by reducing and separating the waste. The system does not employ a laser thereby reducing upkeep costs and increasing safety.

In addition, a new option enables a higher precision in user-specified measuring ranges.

The **Fossomatic 5000** uses Windows-based, user-friendly software and is fully compatible with all current-generation central laboratory equipment.

Reader Service No. 360

3M Introduces Reliable Carcass Test for Meat Processors

A simple carcass test introduced by 3M Microbiology Products can help slaughtering and fabrication plants monitor their processing steps to meet critical control point guidelines. This test using 3M Petrifilm Test Kit-HEC has been

successfully used in the laboratory and field as an effective and easy-to-use-method for the detection of *E. coli* pathogen, O157:H7.

The test is a simplification of the United States Department of Agriculture–(USDA) allowed Petrifilm Test Kit–HEC method incorporating carcass swabbing prior to chilling. Swabs of carcass surfaces are plated directly onto Petrifilm *E. coli* Count plates (without a broth pre-enrichment step) and incubated to determine total coliform and *E. coli* levels. Any presumptive colonies can be directly assayed for the presence of O157:H7 using the Petrifilm Test Kit–HEC. Results are available in about one hour following incubation of Petrifilm *E. coli* plates.

This new application is currently being used to test animal carcasses at slaughtering plants. It is an easy-to-use, reliable method for suppliers to monitor critical control points by surface testing with Petrifilm Test–HEC prior to carcass chilling.

3M, St. Paul, MN.

Reader Service No. 361

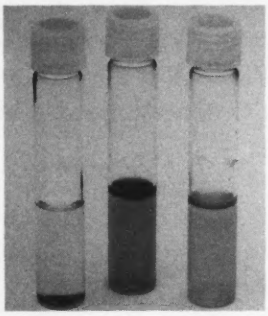
Eliminate Risk of Broken Glass in Food Plant Measurements

Orion's pHuture pH systems are ideal for in-plant, in the field or other demanding pH measurements where glass electrode breakage is a serious risk. Orion uses advanced solid-state (ISFET) sensing technology that replaces the glass pH measurement bulb with a rugged, unbreakable flat surface sensor. Temperature measurement is combined right on the same sensor chip for accurate, temperature compensated pH measurement in a wide range of samples.

Wherever glass pH electrodes pose a breakage risk, pHuture pH systems offer the right solution for rapid, accurate, on-site pH measurements. Orion's pHuture systems are available in both portable and benchtop configurations for all measurement locations. Conversion systems are also available to allow the use of pHuture pH probes with most conventional pH meters.

ATI Orion, Boston, MA.

Reader Service No. 362



Difco Laboratories

New Culture Medium from Difco Laboratories Detects *E. coli*, Meets European Regulatory Requirements

A new culture medium from Difco Laboratories accurately detects indole formation in food and water samples and is particularly useful in the detection of *E. coli* in meat and meat products. Bacto® Tryptone Water is recommended for use in the detection of *E. coli* in meat products and the differentiation of this bacterium from other organisms on the basis of indole production.

Bacto Tryptone Water comes as a preformulated, dehydrated culture medium–eliminating the need to weigh and mix individual ingredients. This saves the quality control laboratory the labor time and costs associated with mixing ingredients, and offers the additional benefit of a consistent, standardized product.

Bacto Tryptone Water meets all European regulatory requirements that govern meat production and inspection. The formula is based on the Tryptone Water formula described in AFNOR and ISO Standards. Bacto Tryptone Water is one of a wide selection of dehydrated culture media that conform with European standards.

Difco Laboratories, Detroit, MI.

Reader Service No. 363

Unique Stainless Steel Filter Unaffected by Ozone Treatment

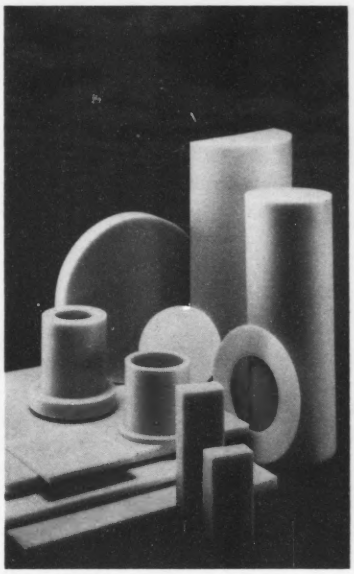
The exceptional durability of Osmonics DURATREX™ stainless steel filters makes them ideal for post-ozonation treatment applications, as well as in other high temperature, corrosive liquid and gas filtering processes.

Ozone's strong disinfection and oxidation capability has spurred its use in a variety of water purification applications, including bottled water and beverage manufacturing. DURATREX filters are unaffected by ozone's powerful corrosive effects, providing continuous and reliable post-filtration in this aggressive treatment environment.

The rigid, porous metal surface of DURATREX filters allow them to be backflushed, autoclaved, and used repeatedly after chemical or ultrasonic cleaning. These unique stainless steel filters are available in 10-,20- and 30-inch lengths, with ratings from 0.2 to 100 microns. Applications for DURATREX filters include high temperature oils, corrosive gases, high viscosity liquids, acids, alkalies and other hazardous chemicals.

Osmonics, Inc., Minnetonka, MN.

Reader Service No. 364



Cast Nylons, Ltd.

FDA and USDA Approve New Oil-Filled Cast Nylon for Direct Contact with Food

Nyloil® FG, an oil-filled cast nylon material manufactured by Cast Nylons, Ltd. is approved by the FDA and USDA for direct contact applications in food processing. Manufactured by Cast Nylons, Ltd., Nyloil FG is a tough, wear-resistant material that offers longer service life and improved dimensional stability. Available in a wide range of shapes and sizes, Nyloil FG is ideal for any number of food processing applications.

In applications where stainless steel is traditionally used, Nyloil FG reduces both noise and weight. Compared with other polymer materials, Nyloil FG offers four times the water resistance of acetals, twice the tensile strength of UHMWs, half the thermal expansion of PTFEs, lower moisture absorption than other nylons. In addition, Nyloil FG offers a higher PV value and higher continuous service temperature than a number of other polymer materials. Because of the material's higher flexural modulus, components made of Nyloil FG hold machining tolerances better than those made from UHMWs and PTFEs.

Cast Nylons, Ltd., Willoughby, OH.

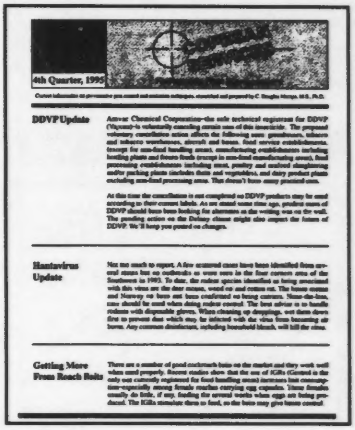
Reader Service No. 365

Copesan Offers Food Industry Technical Expertise for Integrated Pest Management

Professional collaboration in field research is now available to food processing and related companies through Copesan Services, a Milwaukee, WI-based firm specializing in food industry pest management services. The Copesan Technical Committee (CTC) is offering its expertise to help food industry firms solve challenging pest problems and develop unique Integrated Pest Management (IPM) solutions.

CTC offers the food processing industry uniquely practical and local expertise. As Technical Directors of leading pest management firms, CTC members provide hands-on, day-to-day technical support in their companies' geographic areas. As partners with Copesan Services, CTC members also network to provide ongoing technical support for Copesan's nationwide service operation. The result of these dual responsibilities means CTC members have the local expertise that can only be gained by living and working in their areas, plus the national pest management perspective needed to design IPM solutions coast-to-coast.

CTC's food industry pest management expertise includes stored product pests, insect control, rodent control, bird control, fumigations and other pest or sanitation problems facing food processors and manufacturers. The committee taps the expertise of more than 100 degreed technical specialists, many of whom have advanced degrees in entomology, biology or other sciences, and who are also nationally-recognized pest management experts.


4th Quarter, 1995

DDVP Update

Hantavirus Update

Getting More From Roach Baits

Copesan Services

Copesan has developed many service innovations, including its recently released Signature Care™ IPM partnership program. Signature Care™ utilizes only Certified IPM Specialists specifically trained in food processing industry needs, including regulatory compliance and inspection service standards.

Copesan also offers complimentary subscriptions to their *Copesan Pest Control & Sanitation Newsletter*. Authored by noted pest control industry consultant, C. Douglas Mampe, Ph.D., for Copesan, the newsletter is packed with current information on pest control and sanitation issues. Mampe, former Technical Director for the National Pest Control Association, provides expert information on pest prevention, integrated pest management, pesticide issues, regulatory compliance and challenging pest problems. To receive your free subscription contact Jon Bain at Copesan by calling 1-800-COPESAN.

Copesan Services, Brookfield, WI.

Reader Service No. 366

BusinessExchange

Services/Products

Dairy, Food and Environmental Sanitation, Vol. 15, No. 12, Pages 763-768

Revisions to 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment

Number 18-01

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Multiple-use rubber and rubber-like materials specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein.

A SCOPE

A1 These sanitary standards cover the material and serviceability requirements[1] of rubber and rubber-like materials intended for multiple-use as product contact surfaces or solution contact surfaces in the production, processing and handling of milk or milk products. Test procedures and criteria are also provided for rubber and rubber-like materials as a means of determining their acceptance as to their ability to be cleaned and to receive effective bactericidal treatment or steam sterilization and to maintain their essential properties in these accelerated use-simulating conditions.[2] These standards are not meant to cover design and fabrication criteria for individual rubber or rubber-like components because such criteria are provided for in other 3-A Sanitary Standards and 3-A Accepted Practices.

A2 In order to conform with these 3-A Standards, multiple-use rubber and rubber-like materials shall comply with the following material, original physical properties and serviceability requirements.

B DEFINITIONS

B1 **Rubber and Rubber-Like Materials**

B1.1 *Rubber and Rubber-Like Materials:* Shall mean materials that are capable of recovering from deformations quickly and forcibly and can be, or already are, modified to a state in which they are essentially insoluble (but can swell) in boiling solvent, such as benzene, methylethylketone, and ethanol-toluene azeotrope.[3]

B1.2 *Rubber (except for hard rubber as defined in B1.3):* Shall mean when in its modified state and free of diluents, retracts within 1 min to less than 1.5 times its original length after being stretched at room temperature, 72 to 75°F (22 to 24°C).[3]

B1.3 *Hard Rubber:* Shall mean a vulcanized rubber having a ratio of combined sulfur to rubber hydrocarbon in excess of 15% and a Shore A Durometer value in excess of 90.

B1.4 *Low-fat Tolerance Rubber and Rubber-Like Materials:* Shall mean rubber and rubber-like materials designed to meet the requirements of this standard only when used in contact with products containing 8.0% fat or less.

B2 *Temperature of Exposure:* Shall mean temperatures to which rubber material is subjected when in contact with the product and/or cleaning and bactericidal treatment or steam sterilization.

B3 **Classifications** (See Appendix, Section F for examples.)

B3.1 ***Class I:*** Shall mean rubber materials suitable for temperature of exposure to product or sterilization up to 300°F (149°C), and temperature of exposure to chemical solution used in cleaning and bactericidal treatment up to 180°F (82°C).

B3.2 ***Class II:*** Shall mean rubber materials suitable for temperature of exposure to product or sterilization up to 250°F (121°C), and temperature of exposure to chemical solution used in cleaning and bactericidal treatment up to 180°F (82°C).

B3.3 ***Class III:*** Shall mean rubber materials suitable for temperature of exposure to product up to 120°F (49°C), and temperature of exposure to chemical solution used in cleaning and bactericidal treatment up to 180°F (82°C).

B3.4 ***Class IV:*** Shall mean rubber materials suitable for temperature of exposure to product up to 100°F (38°C), and temperature of exposure to chemical solution used in cleaning and bactericidal treatment up to 180°F (82°C).

B4 **Product Definitions**

B4.1 Product: Shall mean milk and milk products.

B5 **Surfaces**

B5.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product or from which liquids may drain, drop, diffuse or be drawn into the product.

B5.2 *Solution Contact Surfaces:* Shall mean the interior surfaces of the equipment or system which are used exclusively for supply and recirculation of cleaning and/or sanitizing solutions, except those used to supply concentrated cleaning and/or sanitizing materials to the point of use.

B5.3 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

C MATERIALS

C1 Rubber and rubber-like materials used as product contact and/or solution contact surfaces shall be nontoxic, shall not adversely affect the product and shall comply with the Food, Drug and Cosmetic Act, The Code of Federal Regulations, Title 21, Part 177.2600[4] and shall comply with these materials criteria and be compatible with cleaning and sanitizing agents as defined by the procedures in Section D herein.

C2 The allowable physical properties of rubber and rubber-like materials, as determined by the testing procedures specified, are the following (for suggested report form, see Appendix, Section K):

C2.1 Low-fat tolerance rubber and rubber-like materials used for contact with products with a maximum of 8.0% milk fat shall be exempt from the test criteria and acceptable maximum changes in Section C2.2.1 but shall meet the test criteria in Sections C2.1.1, C2.2.2, C2.2.3 and C3.1.

C2.2.1 **TABLE – Low Fat Tolerance Absorption**[a & b]

	Acceptable Maximum Changes		
Class	Hardness Shore A Points	Weight %	Volume %
I	±6	±5	±5
II	±15	±25	±25
III	±20	±25	±25
IV	±20	±60	±75

[a] ASTM D471 - Standard Test Method for Rubber Property - Effect of Liquids.[5] Immersion 22 ± 1/4 h at 158°F (70°C).

[b] The high fat media shall be butter oil or anhydrous milk fat meeting the composition specifications found in the General Specifications for USDA-Approved Dairy Plants, paragraphs 58.305 (b), 58.305 (c) and 58.347. Federal Register, Volume 40, No. 198–Friday, October 10, 1973.[4]

C2.2 **Absorption and Aging**

C2.2.1 **TABLE – Milk Fat Absorption**[a & b]

	Acceptable Maximum Changes		
Class	Hardness Shore A Points	Weight %	Volume %
I	±5	±5	±5
II	±5	±10	±10
III	±10	±25	±25
IV	±10	±40	±60

[a] ASTM D471 - Standard Test Method for Rubber Property - Effect of Liquids.[6] Immersion 22 ± 1/4 h at 158°F (70°C).

[b] The high fat media shall be butter oil or anhydrous milk fat meeting the composition specifications found in the General Specifications for USDA-Approved Dairy Plants, paragraphs 58.305 (b), 58.305 (c) and 58.347. Federal Register, Volume 40, No. 198–Friday, October 10, 1973.[4]

C2.2.2 **TABLE – Distilled Water Absorption**[a]

Class	Acceptable Maximum Changes Hardness Shore A Points	Weight %	Volume %
I	±5	±5	±5
II	±5	±10	±10
III	±10	±15	±15
IV	±10	±20	±25

[a] ASTM D471–Standard Test Method for Rubber Property–Effect of Liquids.[5] Immersion 22 ± 1/4 h at 158°F (70°C).

C2.2.3 **TABLE – Air Aging Stability**[a]

Class	Test Temperature	Acceptable Maximum Hardness Changes Shore A Points
I	212°F (100°C)	±10
II	212°F (100°C)	±10
III	158°F (70°C)	±10
IV	158°F (70°C)	±10

[a] ASTM D573–Standard Test Method for Rubber Deterioration in an Air Oven.[5] 166 ± 1/2 h.

C3 The minimum original physical properties of rubber and rubber-like materials, except hard rubber as determined by the test procedures specified, are the following:

C3.1 **TABLE – Original Physical Properties**[a]

Class	Acceptable Minimums Tensile Strength PSI	Elongation %
I	1200	200
II	1200	200
III	1000	100
IV	500	75

[a] ASTM D412–Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers–Tension.[5]

D COMPATIBILITY WITH CLEANING AND SANITIZING AGENTS

D1 **References**

ASTM D471–Standard Test Method for Rubber Properties - Effect of Liquids.[5] ASTM D2240–Standard Test Method for Rubber Property–Durometer Hardness.[5]

D2 **Apparatus**

Appropriate glassware, temperature controlled oven or water bath, analytical balance, and hardness measuring device for type Shore A Durometer points (ref: ASTM D2240).

D3 **Test Solution** (Accelerated Use Test Reagents): (See Appendix, Section J.)

D3.1 **Acid Cleaner Test Solutions**

D3.1.1 **Nitric Acid:** For testing Class I and Class II rubber and rubber-like materials: 0.50% Nitric acid (5.00g acid/L of solution) is prepared by volumetrically diluting 5.0 mL of 70.0% nitric acid (Sp. Gr. 1.41) to 1 L with distilled water.

D3.1.2 **Phosphoric Acid:** For testing Class III and Class IV rubber and rubber-like materials: 1.0% orthophosphoric acid (10.00g acid/L of solution) is prepared by volumetrically diluting 7.00 ml of 85.0% orthophosphoric acid (Sp. Gr.1.69) or 8.5mL of 75.0% orthophosphoric acid (Sp. Gr. 1.58) to1 L with distilled water.

D3.2 **Alkaline Cleaner Test Solution:** For all classes of rubber and rubber-like materials: 1.0% sodium hydroxide (caustic) is prepared by dissolving 1.92g sodium tripolyphosphate, 10.20g sodium hydroxide, 0.36g trisodium phosphate, 0.26g anionic-type detergent (Aerosol O.T.®) to 1 L with distilled water.

D3.3 **Chlorine Sanitizer Test Solution:** For all classes of rubber and rubber-like materials: Sodium hypochlorite solution–200 ppm available chlorine–prepared daily. Dilute a 4.0 to 6.0% sodium hypochlorite solution with distilled water in a volumetric flask to yield 200 ppm of available chlorine. Approximate dilution of sodium hypochlorite per liter with water to yield 200 ppm available chlorine percentage active chlorine.

4.0%	5.0 mL
5.0%	4.0 mL
6.0%	3.4 mL

Adjust pH of solution to 8.0 ± 0.5 with sodium bicarbonate.

D4 **Test Procedures and Acceptable Results**

D4.1 Sample preparation–see ASTM D471, 8. "Test Specimens–Change in Mass or Volume" for preparation of test samples.

D4.2 Submerge test specimens completely in loosely closed test tubes, see ASTM D471, 7. "Nonvolatile Liquids".

D4.3 "Procedure for Change in Mass", see ASTM D471, 9.

D4.4 "Procedure for Change in Volume-Water Displacement Method for Water Insoluble Liquids and Mixed Liquids", see ASTM D471, 10.

D4.5 Visual changes in the rubber material's product surface finish shall be examined by comparing test samples to a control.

D4.6 **TABLE – Nitric Acid-Class I and II** [a,b&c]

Class	Acceptable Maximum Changes Hardness Shore A Points	Weight %	Volume %
I	±5	±5	±5
II	±5	±10	±10

[a] ASTM D471, 7., 8., 9. and 10.[5] Immersion 22 ± 1/4 h at 180° ± 2 F (82° ± 1 C).
[b] Test solution D3.1.1.
[c] The surface smoothness of the tested specimens shall be equal to that of the control.

D4.7 **TABLE – Phosphoric Acid-Class III and IV** [a,b&c]

Class	Acceptable Maximum Changes Hardness Shore A Points	Weight %	Volume %
III	±10	±15	±15
IV	±10	±20	±25

[a] ASTM D471, 7., 8., 9. and 10.[5] Immersion 22 ± 1/4 h at 180° ± 2 F (82° ± 1 C).
[b] Test solution D3.1.2.
[c] The surface smoothness of the tested specimens shall be equal to that of the control.

D4.8 **TABLE – Alkaline Cleaner–All Classes** [a,b&c]

Class	Acceptable Maximum Changes Hardness Shore A Points	Weight %	Volume %
I	±5	±5	±5
II	±5	±10	±10
III	±10	±15	±15
IV	±10	±20	±25

[a] ASTM D471, 7., 8., 9. and 10.[5] Immersion 22 ± 1/4 h at 180° ± 2 F (82° ± 1 C).
[b] Test solution D3.2.
[c] The surface smoothness of the tested specimens shall be equal to that of the control.

D4.9 **TABLE – Chlorine Sanitizer–All Classes** [a,b&c]

Class	Acceptable Maximum Changes Hardness Shore A Points	Weight %	Volume %
I	±5	±5	±5
II	±5	±10	±10
III	±10	±15	±15
IV	±10	±20	±25

[a] ASTM D471, 7., 8., 9. and 10.[5] Immersion 22 ± 1/4 h at 70° ± 2 F (21° ± 1 C).
[b] Test solution D3.3.
[c] The surface smoothness of the tested specimens shall be equal to that of the control.

D5 Testing and Compliance

D5.1 Test samples of rubber and rubber-like materials for each formulation shall be tested and certified to be in compliance with the criteria herein. (See Appendix, Section G.) Test results and a statement of compliance issued by the testing laboratory shall be kept by the manufacturer. These results shall be made available to distributors, users and regulatory agents upon request. In addition, rubber and rubber-like materials shall be certified to be in compliance with the Food and Drug Administration's regulations[4] and FD&C Act of 1938, as amended, requirements.[4]

APPENDIX

E FABRICATION

Components and devices manufactured from rubber or rubber-like materials should be designed and fabricated as provided in other appropriate 3-A Sanitary Standards. Good manufacturing practices should be used in the manufacture of rubber and rubber-like components to assure quality and cleanliness.

F RUBBER CLASSES AND SELECTION

Class I: Some heat exchanger gaskets, O-rings, CIP gaskets, flange gaskets, rotary seals and hoses.

Class II: Plate heat exchanger gaskets, homogenizer seals, static seals and hoses.

Class III: Cold applications such as milk and milk products and air tubing, manhole and door gaskets, seals and hoses.

Class IV: Inflations and hoses.

For satisfactory service, it is important that the right kind of rubber materials be selected for specific dairy applications. These sanitary standards cover a large variety of rubber and rubber-like materials which have a wide range of chemical and physical characteristics. These characteristics may be measured by established ASTM tests, such as hardness, resilience, elongation, compression set, adhesion to various substrates, vapor transmission and many more tests. In order to select a suitable rubber material, it is also important to know the intended conditions of dairy use, such as composition of the dairy product, temperature of the process, pressure or vacuum conditions, and the kinds and strengths of cleaners and sanitizers. As in the selection of metal or plastic materials for construction of dairy equipment, there is no single best rubber material for all functions.

G **VERIFICATION TESTING**

Independent verification testing of these physical requirements herein, although not mandatory, should be sought by the manufacturer of a part made from rubber or rubber-like materials.

H **EXPECTED SERVICE PERIOD**

The service period of rubber and rubber-like materials is dependent on their formulation and the environment of use which in turn is influenced by the product, process temperature, cleaning and bactericidal compounds, and time of exposure. Users should frequently monitor the physical condition of the rubber material product contact surfaces. Such observations are necessary to determine the actual sanitary service period of rubber materials. It is further recommended that rubber products be replaced before surface imperfections or sloughing occurs. Routine replacement schedules should be established and followed.

I **COLOR**

The color of rubber materials will vary depending on the ingredients and formulation. The color of the final product is not of sanitary significance, provided the components used are in compliance with the applicable provisions of the FD&C Act and the Code of Federal Regulations.

J **MATERIAL/CHEMICAL LIST FOR TEST SOLUTIONS (Simulated Reagents) (Below)**

Material or Chemical	Formula	Concentrations or Grade
Aerosol O.T.[R] [a] (Dioctyl sodium sulfosuccinate) (anionic detergent)	N/A	100% dry solid
Nitric Acid 42°Be	HNO_3	ACS or reagent
Orthophosphoric acid, concentrated	H_3PO_4	ACS or reagent
Sodium hydroxide, pellets	NaOH	ACS or reagent
Sodium hypochlorite	NaOCl	4-6% available Cl_2, purified
Sodium phosphate, tripoly	$Na_5P_3O_{10}$	Purified
Trisodium phosphate (Sodium phosphate, tribasic)	$Na_3PO_4.12H_2O$	ACS or reagent
Sodium Bicarbonate	$NaHCO_3$	ACS or reagent
Butter Oil	N/A	min 99.6% fat, max 0.15% water
Anhydrous Milk Fat	N/A	min 99.8% fat, max 0.15% water

[a] Available from American Cyanamide Company, Mt. Prosped, IL 60056 (708) 827-8871 and Sigma Chemical Company, St. Louis, MO 63118 (800) 325-3010.

K TEST RESULT FORM

TEST RESULT FORM

COMPANY:			
CUSTOMER:			
PART NUMBER:		PART NAME:	
COMPOUND NUMBER		PRODUCT CLASS:	
COMMENTS:			

PROPERTIES	UNIT	SPECIFICATION	MEASURED
Tensile Strength	PSI	MIN	
Elongation at Break	%	MIN	
Hardness Shore A Durometer	PTS	+/-	

CHANGE IN PROPERTIES AFTER AGING FOR		HOURS AT	
Change in Tensile Strength	%	MAX	
Change in Elongation	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

CHANGE IN PROPERTIES AFTER IMMERSION FOR		HOURS AT	
Immersion Material:			
Change in Volume	%	MAX	
Change in Mass	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

CHANGE IN PROPERTIES AFTER IMMERSION FOR		HOURS AT	
Immersion Material:			
Change in Volume	%	MAX	
Change in Mass	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

CHANGE IN PROPERTIES AFTER IMMERSION FOR		HOURS AT	
Immersion Material:			
Change in Volume	%	MAX	
Change in Mass	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

CHANGE IN PROPERTIES AFTER IMMERSION FOR		HOURS AT	
Immersion Material:			
Change in Volume	%	MAX	
Change in Mass	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

CHANGE IN PROPERTIES AFTER IMMERSION FOR		HOURS AT	
Immersion Material:			
Change in Volume	%	MAX	
Change in Mass	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

CHANGE IN PROPERTIES AFTER IMMERSION FOR		HOURS AT	
Immersion Material:			
Change in Volume	%	MAX	
Change in Mass	%	MAX	
Change in Hardness	PTS	MAX	
Visual Change		Observation:	

TESTED BY:	DATE:
APPROVED BY:	DATE:

[1]*Procedures in Section C are serviceability requirements performed to evaluate the original physical properties of rubber or rubber-like materials.*

[2]*Procedures in Section D are not normal cleaning and bactericidal treatment tests but are accelerated use tests.*

[3]*Adapted from ASTM D 1566–Terminology relating to rubber available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187 (215) 299-5400.*

[4]*For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 783-3238.*

[5]*Available from ASTM (Annual Book of ASTM Standards Numbers 09.01 and 09.02) 1916 Race Street, Philadelphia, PA 19103-1187 (214) 299-5400.*

[6]*Available from ASTM (Annual Book of ASTM Standards Numbers 09.01 and 09.02) 1916 Race Street, Philadelphia, PA 19103-1187 (214) 299-5400.*

These 3-A Sanitary Standards shall become effective November 25, 1995 at which time, 18-00 shall become null and void.

Dairy, Food and Environmental Sanitation, Vol. 15, No. 12, Pages 769-773

3-A Sanitary Standards for Caged-Ball Valves for Milk and Milk Products

Number 66-00

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Caged-ball valve specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein.

A SCOPE

A1 These standards cover the sanitary aspects of caged-ball valves used on processing equipment and equipment and lines which hold or convey milk or milk products.

A2 In order to conform with these 3-A Sanitary Standards, caged-ball valves shall comply with the following design, material, and fabrication criteria.

B DEFINITIONS

B1 *Product:* Shall mean milk and milk products.

B2 **Equipment Components**

B2.1 *Caged-Ball Valve:* Shall mean a valve which a cage is used to position a solid ball to block a port of the valve.

B2.2 *Ball:* Shall mean a solid sphere without a passage.

B2.3 *Cage:* Shall mean the part that partially surrounds and moves the ball.

B2.4 *Bonnet:* Shall mean the assembly which mounts the valve positioning mechanism to the valve body.

B3 **Surfaces**

B3.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop or be drawn into the product.

B3.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B4 **Cleaning**

B4.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement, circulation or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B4.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B5 *Simple Hand Tools:* Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench or hammer.

B6 *Sterilization:* Shall mean a process effected by heat, chemicals, or other mechanical means that destroys all vegetative bacteria, and inactivates relevant bacterial spores.

B7 *Readily or Easily Removable:* Shall mean quickly separated from the equipment with the use of tools if necessary.

B8 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by an employee from the floor, platform or other permanent work area.

B9 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use including expected contact with product and cleaning, sanitizing or sterilization compounds or solutions.

C MATERIALS

C1 Metals

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[1] or corresponding Alloy Cast Institute[2] (ACI) types (See Appendix, Section E), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C2 Nonmetals

C2.1 Rubber and rubber-like materials may be used for gaskets, O-rings, seals, balls, ball coverings and parts having the same functional purposes.

C2.1.1 Rubber and rubber-like materials, when used for the above specified application(s), shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C2.2 Plastic materials may be used for gaskets, O- rings, seals, balls, ball coverings and parts having the same functional purposes.

C2.2.1 Plastic materials, when used for the above specified application(s), shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C2.3 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

C2.4 Rubber and rubber-like materials and plastic materials having product contact surfaces that are a bonded coating or a covering shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

C2.5 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic.[3]

C3 Sterilization

C3.1 In a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher, all materials having a product contact surface(s) used in the construction of cage-ball valves and nonmetallic component parts shall be such that they can be (1) sterilized by saturated steam or water under pressure (at least 15.3 psig or 106 kPa) at a temperature of at least 250°F (121°C) and (2) operated at the temperature required for processing.

C4 Nonproduct Contact Surfaces

C4.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 Surface Texture

D1.1 All product contact surfaces shall have a finish at least as smooth as a Nº 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form. (See Appendix, Section F.)

D2 Permanent Joints

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded. Welded areas on product contact surfaces shall be at least as smooth as a Nº 4 ground finish on stainless steel sheets, and be free of imperfections such as pits, folds, and crevices.

D3 **Cleaning and Inspectibility**

D3.1 Caged-ball valves that are to be mechanically cleaned shall be designed so that all product contact surfaces of the caged-ball valves and all nonremoved appurtenances thereto can be mechanically cleaned and are easily accessible and readily removable for inspection employing simple hand tools, if necessary.

D3.2 Product contact surfaces not designed to be mechanically cleaned shall be accessible for cleaning and inspection when in an assembled position or when removed. Demountable parts shall be readily removable using simple hand tools, if necessary.

D3.3 Caged ball valves shall have an opening space in the bonnet of at least 1 in. (25.4mm), clear for inspection.

D4 **Draining**

D4.1 The valve shall be of such design as to be self-draining in its installed position. Caged ball valves shall be permanently marked to describe positively the self-draining angle of the valve.

D4.2 In valves with a two piece O-ring retainer, the O-ring retainer shall have one or more openings at least 3/32 in. (2.38 mm) diameter in suitable area(s) located so that one opening will be at the lowest point in the installed position for the detection of leakage.

D5 **Fittings**

D5.1 All sanitary fittings and connections shall conform with the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D6 **Gaskets**

D6.1 Gaskets having a product contact surface shall be removable.

D6.2 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D6.3 Grooves in gaskets shall be no deeper than their width.

D6.4 Gasket grooves or gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in Section D5.1.

D7 **Radii**

D7.1 All internal angles of less than135° on product contact surfaces shall have radii of not less than 1/8 in. (3.18 mm) except that:

D7.1.1 The radii in gasket grooves, gasket retaining grooves, or grooves in gaskets shall be not less than 1/16 in. (1.59 mm) except for those standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D5.1.

D7.1.2 The radii in grooves for standard 1/4 in. (6.35 mm) O-rings shall not be less than 3/32 in. (2.38 mm) and for standard 1/8 in. (3.18 mm) O-rings shall be not less than 1/32 in. (0.794 mm).

D8 Plain end valve fittings used in welded sanitary pipelines shall conform to the provisions of these standards with respect to finish and construction. The inside diameter of the butt welding ends shall be the same as that of the part to which it is to be welded.

D9 **Threads**

D9.1 There shall be no threads on product contact surfaces.

D10 **Sterilization Systems**

D10.1 Caged-ball valves used in a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher shall comply with the following additional criteria:

D10.1.1 The construction shall be such that all product contact surfaces can be (1) sterilized by saturated steam or water under pressure (at least 15.3 psig or 106 kPa) at a temperature of at least 250°F (121°C) and (2) operated at the temperature required for processing.

D10.1.2 Caged-ball valves that have a product contact surface(s) to be used in such a processing system, not designed so that the system is automatically shut down if the product pressure in the system becomes less than that of the atmosphere and cannot be restarted until the system is resterilized, shall have a steam or other sterilizing medium chamber surrounding all nonpermanent joints and seals at the product contact surfaces. The caged-ball valves shall be constructed so that the steam chamber or other sterilizing medium chamber may be exposed for inspection.

D10.1.3 Where steam or other sterilizing medium is used, the connection(s) on the caged-ball valves shall be such that the steam lines or other sterilizing medium lines can be securely fastened to the caged-ball valves. The caged-ball valves shall be constructed so that the steam or other sterilizing medium chamber may may be exposed for inspection.

D11 **Powered Valve Actuators**

D11.1 Powered actuators shall be readily demountable from the valve and stem.

D12 **Nonproduct Contact Surfaces**

D12.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, and be readily cleanable, and those to be coated shall be effectively prepared for coating.

APPENDIX

E STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications[4] A351/A351M, A743/A743M and A744/A744M.

F PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum Ra of 32 µin. (0.80 µm), when measured according to the recommendations in ANSI/ASME[5] B46.1-Surface Texture, is considered to be equivalent to a Nº 4 finish.

G DIAGRAMS

These diagrams are intended to demonstrate general principles only, and are not intended to limit individual ingenuity. The design used should conform with the sanitary requirements set forth in these 3-A Sanitary Standards. The following examples are included in this Appendix:

G1 Exploded View of Caged-Ball Valve, Drawing Number - 3-A 66-00-01, Page Nº 773.
G2 Assembled View of Caged-Ball Valve, Drawing Number - 3-A 66-00-02, Page Nº 773.
G3 Cross Section - Side of Caged-Ball Valve, Drawing Number - 3-A 66-00-03, Page Nº 773.

[1]The data from this series are contained in the AISI Steel Products Manual, Stainless & Heat Resisting Steels, November 1990, Table 2-1, pp. 17-20. Available from the American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.

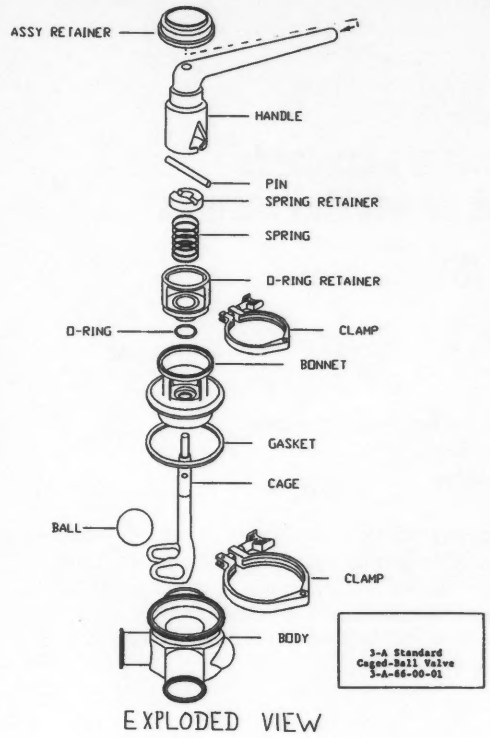
[2]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

[3]Adhesives shall comply with 21 CFR 175-Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 783-3238.

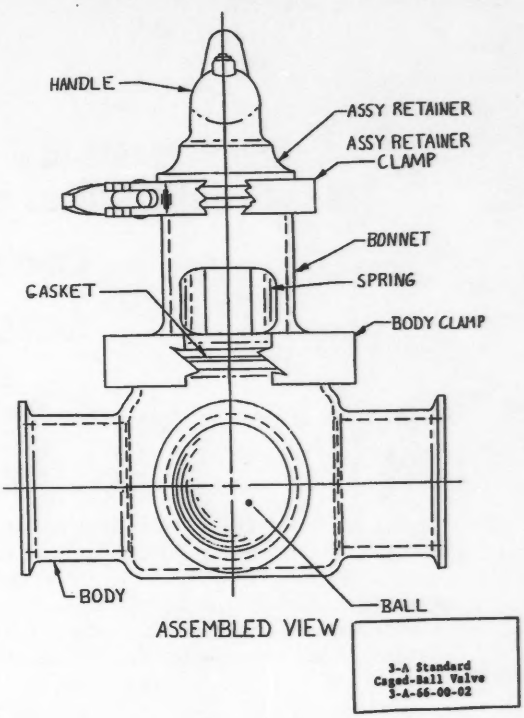
[4]Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187 (215) 299-5400.

[5]Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.

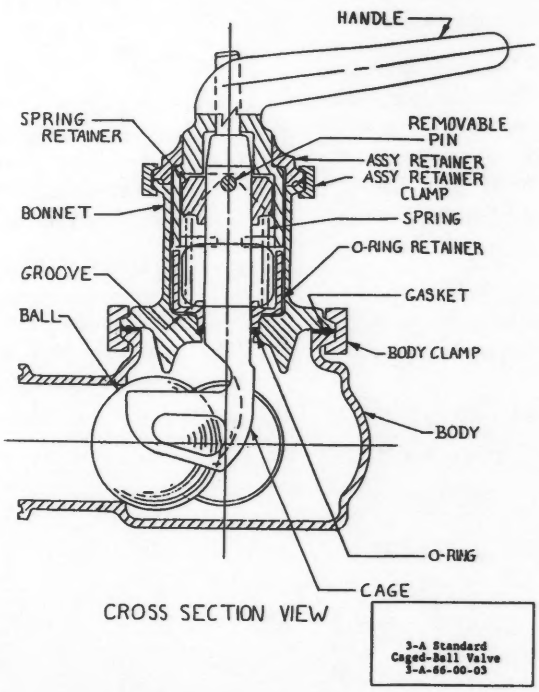
These 3-A Sanitary Standards shall become effective November 25, 1995.



EXPLODED VIEW



ASSEMBLED VIEW



CROSS SECTION VIEW

Dairy, Food and Environmental Sanitation, Vol. 15, No. 12, Pages 774-775

Amendments to 3-A Sanitary Standards for Tank Outlet Valves for Milk and Milk Products

Number 57-00

Amendment 1

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Tank outlet valve specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein.

Delete: C1.1 Optional metal alloy may be used but only in applications requiring disassembly and manual cleaning. (See Appendix Section G for the composition of an acceptable optional metal alloy.)

Add: C1.1 If functionally necessary for bodies, plugs and stems, metal alloys or metals that are as corrosion resistant as AISI 300 Series Stainless Steel, and are nontoxic and nonabsorbent under the conditions of intended use, may be used.

Delete: G OPTIONAL METAL ALLOY

An optional alloy metal having the following minimum and maximum composition is deemed to be in compliance with C1.1.

Zinc	-8% maximum
Nickel	-19 1/2% minimum
Tin	-3 1/2% minimum
Lead	-5% maximum
Iron	-1 1/2% maximum
Copper	-the Balance

An alloy of the composition given above is properly designated "nickel silver" or according to ASTM B149-70, may be entitled, "leaded nickel bronze."

Add: G **COMPOSITION OF OPTIONAL ALLOYS***

The following metal alloys or metals have been shown to be as corrosion resistant as AISI 300 Series Stainless Steel:

	UNS N08367	UNS S21800	UNS S20161	UNS N26055	UNS N26455	UNS S17400	UNS S15500	UNS S32900	UNS R20500	UNS R50400
	ASTM A743 Grade CN-3MN	ASTM A743 Grade CF-10 SMnN		ASTM A494 Grade CY5SnBiM	ASTM A494 Grade CW-2M	ASTM A747 Grade CB7Cu-1	ASTM A747 Grade CB7Cu-2		ASTM A560 Grade 50Cr-50Ni	ASTM B67 Grade C-2
C	0.03	0.10	0.15	0.05	0.02	0.07	0.07	0.20	0.10	0.10
Mn	2.00	7.00-9.00	4.00-6.00	1.5	1.00	0.70	0.70	1.00	0.30	
Si	1.00	3.50-4.50	3.00-4.00	0.5	0.80	1.00	1.00	0.75	1.00	
P	0.040	0.040	0.040	0.03	0.03	0.035	0.035	0.040	0.02	
S	0.010	0.030	0.040	0.03	0.03	0.03	0.03	0.030	0.02	
Cr	20.0-22.0	16.00-18.00	15.0-18.0	11.0-14.0	15.0-17.5	5.50-17.7	14.0-15.50	23.0-28.0	48.0-52.0	
Ni	23.5-25.5	8.00-9.00	4.00-6.00	Balance	Balance	3.60-4.60	4.50-5.50	2.50-5.00	Balance	
Mo	6.0-7.0			2.0-3.5	15.0-17.5			1.00-2.00		
Cb						0.15-0.35	0.15-0.35			
Cu	0.75					2.50-3.20	2.50-3.20			
N	0.18-0.26	0.08-0.18	0.08-0.20			0.05	0.05		0.30	
Fe	Balance	Balance	Balance	2.00	2.00	Balance	Balance	Balance	1.00	0.30
Sn				3.0-5.0						
Bi				3.0-5.0						
W					1.0					
Ti									0.50	Balance
Al									0.25	
other										H = 0.015 N = 0.03 O = 0.25

* Percentage is maximum unless range is given.

Metal alloys or metals other than the above may be as corrosion resistant as 300 Series Stainless steel. This may be shown when metal alloys or metals are tested in accordance with ASTM G31 Laboratory Immersion Corrosion Testing of Metals and have a corrosion rate of less than 20 mil per year. The test parameters such as the type of chemical(s), their concentration(s) and temperature(2) should be representative of cleaning and sanitizing conditions used in dairy equipment. Alloys containing lead, leachable copper or other toxic metals should not be used.

This Amendment to 3-A Sanitary Standards for Tank Outlet Valves for Milk and Milk Products, Number 57-00 shall become effective November 25, 1995.

Dairy, Food and Environmental Sanitation Index to Volume 15

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Advertising Index

ComingEvents

JANUARY 1996

·**3-5, American Association of Cereal Chemists,** will sponsor the following educational event, Milling for Cereal Chemists, in Manhattan, Kansas. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@ scisoc. org.

·**10-12, American Association of Cereal Chemists,** will sponsor the following educational event, Fundamentals of Food Engineering in Orlando, Florida. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@scisoc. org.

·**10-12, Calves, Heifers and Dairy Profitability: Facilities, Nutrition, and Health** will be a multidisciplinary conference that covers alternatives for the planning and operation of profitable and efficient replacement programs. Programs that result in calving at 20-22 months will be highlighted. For further information, contact NRAES, 152 Riley-Robb Hall, Ithaca, NY 14853-5701; telephone (607) 255-7654; fax (607) 255-4080; e-mail: nraes@ cornell.edu.

·**16-17, Food Industry Conference,** sponsored by Southern California Chapter of the Institute of Food Technologists. The subject will be Emerging Issues in Food Science, Nutrition, and Technology in Costa Mesa, CA. For registration and information, call (714) 432-5756.

·**17-20, International Dairy Foods Association,** will sponsor a Dairy Forum, Tucson, AZ. For more detailed information, please call (202) 737-4332.

·**20-22, ABI Winter Meeting,** Tucson, AZ. Annual meeting of the American Butter Institute to discuss current issues. For more detailed information, please call (202) 737-4332.

FEBRUARY 1996

·**2-29, University of Minnesota Plans Agricultural Tour,** to Australia and New Zealand. The agricultural emphasis of the tour is on dairying, and it will provide insight into the world's most efficient dairy operations. There will be visits to dairy farms, cattle and sheep ranches, agricultural colleges, and research facilities. For a brochure about the tour, contact Extension Special Programs, 405 Coffey Hall, University of Minnesota, St. Paul, MN 55108-6068; phone 1-800-367-5363 or (612) 625-1978.

·**7-8, Food Processors Sanitation Workshop,** held in Santa Nella, CA. Sponsored by the University of California, Davis. Contact Karen Jo Hunter, Dept. Food Science & Technology; phone (916) 752-1466; fax (916) 752-4759; e-mail: kjhunter@ uc davis.edu.

·**13-15, Institute of Food Technologists Low-Calorie Food Product Development,** Grosvenor Resort, Orlando, FL. Course co-sponsored by the IFT Continuing Education Committee and American Association of Cereal Chemists. For more information, contact Dean Duxbury, IFT's Director of Professional Development, 221 N. LaSalle St., Suite 300, Chicago, IL 60601; telephone (312) 782-8424; fax (312) 782-8348.

·**13-15, American Association of Cereal Chemists,** will sponsor the following educational events: Low Calorie Food Product Development, in Orlando, Florida; (Cosponsored by IFT) Food Extrusion in Tampa, FL. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@ scisoc. org.

·**14-16, The University of Florida Presents The Backflow Prevention Assembly Repair & Maintenance Course,** held at the TREEO center in Gainesville, FL. This is an advanced course for certified backflow technicians. Individuals wishing to register should call (904) 392-9570, ext. 112.

·**17-20, International Sweetener Colloquium,** Bonaventure Resort & Spa, Ft. Lauderdale, FL. The program will cover a variety of international and domestic issues facing the future of the sweetner industry. For more detailed information, please call (202) 737-4332.

·**17-20, Ice Cream Technology Conference,** Red Lion's La Posada Resort, Scottsdale, AZ. A concise, up-to-the minute symposium exclusively for manufacturers of frozen desserts. For more detailed information, please call (202) 737-4332.

·**21-22, The University of Florida Presents a Cross-Connection Control Course,** held at the TREEO center in Gainesville, FL. This conference will address current issues in cross-connection control and backflow prevention. Individuals wishing to register should call (904) 392-9570, ext. 112.

·**21-23, American Association of Cereal Chemists,** will sponsor the following educational event: Natural Flavors, in Orlando, FL. For more information contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097; phone (612) 454-7250; fax (612) 454-0766; e-mail aacc@ scisoc. org.

MARCH 1996

·4-5, IBC's World Summit on Agricultural Biotechnology, A comprehensive, interactive forum on utilizing biotechnology to improve agricultural processes, Santa Fe, NM. For further information call (508) 481-6400; fax (508) 481-7911.

·4-6, IBC's Second Annual International Symposium, Obesity-Advances in Understanding and Treatment, held at Washington Vista Hotel in Washington, DC. Posters will be accepted up to Feb. 12, 1996. Call (508) 481-6400 or fax (508) 481-7911–IBC for immediate registration or write IBC, USA Conferences, 225 Turnpike Road, Southborough, MA 01772-1749.

·4-8, Mold Identification Workshop, sponsored by the Food Science Dept. at Purdue University. For more information contact, James V. Chambers, Food Science Dept., 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8279.

·11-12, International Seminar on Microbiological Criteria & Risk Analysis, Wolfpassing, Austria. Further information obtainable from E. Hopkin, International Dairy Federation, 41 Square Vergote, B-1040 Brussels/Belgium, telephone +32 2 733 16 90; fax +32 2 733 04 13.

·19-20, Carolinas Association of Milk, Food and Environmental Sanitarians Annual Meeting, will be held at the Best Western-Merchandise Mart in Charlotte, NC. Please contact Kay Sigmon at (704) 663-1699 for further details.

·20, Food Industry Conference, sponsored by the Food Science Dept. at Purdue University. For more information contact, James V. Chambers, Food Science Dept., 1160 Smith Hall, Purdue University, West Lafayette, IN 47907; phone (317) 494-8279.

APRIL 1996

·3-5, Missouri Milk, Food & Environmental Health Association 1995 Annual Educational Conference, in Columbia, MO. For further details, contact Stephen St. Clair, R.S. at (314) 221-1166.

·11-13, The Association of Water Technologies Spring Conference, to be held in Anaheim, CA at the Disney Land Hotel. Please contact Mary Beth Belka at (703) 525-0905 for further information.

·14-18, The Fourth Latin American Congress on Food Microbiology & Hygiene, will be held in Lima, Peru. The program of activities includes plenary speeches by worldwide known specialists, round tables, posters and oral presentations, courses and seminars. For more information, contact Dr. Fernando Quevedo, Honorary President, 11604 Deborah Dr., Potomac, MD 20854; telephone (301) 299-9291; fax (301) 299-9448, USA; or in Peru: Santa Luisa 155, Suite 204, San Isidro, Lima 27, fax (5114) 218 317 or (5114) 373 152. President of the Congress: Dr. Alina Ratto, Av. del Ejercito 467 Miraflores, Lima, Peru Tel/fax (5114) 413 939.

MAY 1996

·6-8, Third International Conference on Residues of Veterinary Drugs in Food, Veldhoven, The Netherlands. Inquiries to Dr. N. Haagsma, Utrecht University, Faculty of Veterinary Medicine, Dept. of the Science of Food of Animal Origin, section Food Chemistry, P.O. Box 80.175, NL-3508 TD Utrecht, The Netherlands; telephone +31-30-535365/535367; fax +31-30-532365.

·12-15, Associates of Clinical Pharmacology 20th Annual Meeting, in Nashville, Tennessee. The meeting will take place at the Opryland Hotel Convention Center. For more information contact, Dr. Frederic Harwood at (202) 737-8100 or fax (202) 737-8101.

·27-31, Fourth World Congress on Environmental Health, will take place in Aberdeen, Scotland. Subjects to be covered during the Congress include Pollution Control; Food Safety; Occupational Health and Safety; Waste Management; Housing; Water; Environmental Protection; and Communicable Disease Control. For further information, call (01896) 754751; fax (01896) 757003.

JUNE 1996

·2-4, IDDA's 32nd Annual Seminar & Expo; Dairy-Deli-Bake 96, held at the Minneapolis Convention Center in Minneapolis, MN. For further information contact IDDA, PO Box 5528, Madison, WI 53705-0528; phone (608) 238-7908; fax (608) 238-6330.

·4-6, 4th ASEPT International Conference, Sécurité Alimentaire 96/Food Safety 96. Laval, France, with the ASEPT/EHEDG Symposium 1996. Contact AMGAR-ASEPT-BP49-53020 LAVAL CEDEX-France or call 33-16 43 49 22 22; fax 33-16 43 53 36 53.

·10-12, The 18th Mycotoxin Workshop, organized by the Institute of Mycrobiology and Toxicology, and held in Kulmbach, Germany. Further information available by phone +49-9221-803-221; or fax +49-9221-803-331.

JULY 1996

·12-19, Rapid Methods and Automation in Microbiology: International Workshop XVI, Kansas State University, Manhattan, KS. A mini-symposium will occur on July 12-13. Contact Dr. Daniel Y. C. Fung, Workshop Director for further information, telephone (913) 532-5654; fax (913) 532-5681.

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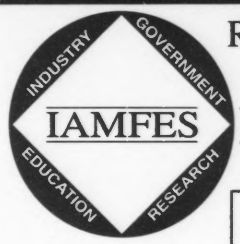

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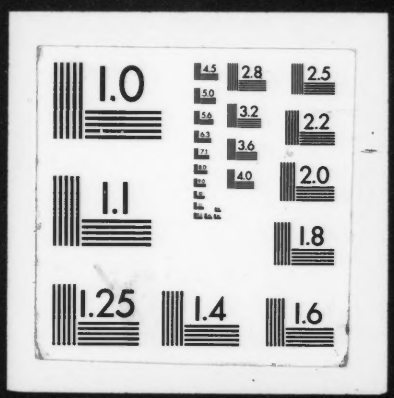
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