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# *Dairy and Food Sanitation*

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*A Publication for Sanitarians and Fieldmen*

- Ice Cream: What Really Determines the Quality?
- Computerization of Consumer Health Programs
- Limulus Amebocyte Lysate Assay - A Rapid Test for the Assessment of Raw and Pasteurized Milk Quality

70th Annual Meeting  
Marriott Pavilion  
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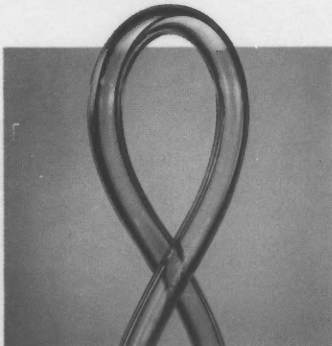
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# Dairy and Food Sanitation

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## Ice Cream: What Really Determines the Quality?

FLOYD W. BODYFELT

*It seems that nearly everyone is interested or deeply concerned about ice cream quality. Most of this concern relates to the "eating quality" of the product. Several examples of notable persons who have spoken up about ice cream and its impact on mankind are: Drama critic, Walter Kerr -- "It's a sin to eat inferior ice cream." Playwright, George Bernard Shaw -- "Be sure to get what you like -- otherwise you might begin to like what you get." Poet, Ralph Waldo Emerson (1850) -- "We dare not trust our wit for making our house pleasant to our friends so we buy ice cream." Ohio State University Dairy Technologist, John Lindamood -- "Sometimes the aggravation isn't worth the pleasure." My own contribution is, "There is frequently little relationship between the 'eating quality' and the price of ice cream."*

The primary purpose of this discussion is to react to some of the mass media exposure that ice cream has received within the last several years. I will attempt to bring a technologist's perspective to all this "hoop-de-do" over ice cream. Much of this publicity about ice cream is encouraging for the dairy industry and ice cream retailers - especially for the sale volume of premium and super-premium ice creams. However, this type of publicity tends to be misleading for consumers and many of those involved in ice cream sales. I believe many false impressions about frozen dairy desserts are created as the result of many semi-ex-

pert conducted "ice cream taste-offs," surveys, competitions, and "journalistic masterpieces."

I want to emphasize the factors that really determine the quality of ice cream. I shall also attempt to characterize or describe some of the technical and marketing strategies for ice cream. Unfortunately, I find that a good deal of our current high-priced ice cream is based on "puffery" as to its quality, disregard and naivety for the factors that actually determine ice cream quality, and a good dose of "snob appeal" thrown in for good measure.

### Types of Ice Cream

The following table illustrates four marketing classifications of ice cream, based on composition and flavoring criteria:

TABLE 1. Classifications of Ice Cream.

Group	Composition	Flavoring
Economy	Meet minimum federal composition requirements	Low levels of Category II or III
Good (Average or Regular)	Above minimum Federal Composition Requirements	Minimum or above concentrations of Category II or I
Premium	Higher milk fat and total solids %, lower overrun	Higher rate of Category I
Super-premium	Very high milk fat and total solids %, low overrun	Highest rate of Category I

### Ice Cream Labeling

Ice cream and other frozen dairy desserts require a specific form of labeling, according to the type or source of flavoring used for the product. These are based on an FDA Standard of Identity format (Table 2).

### Ice Cream Marketing Strategies

The marketing segment of the ice cream industry has tended to apply the following guides in recent years for selling or retailing ice cream:

1. Get ice cream out of the commodity category -- promote it as a fun food, snack, or a special dessert.
2. "Do what you do best -- ignore the rest." Eliminate slow movers. Emphasize certain specialties.
3. Forget 20-year product cycles -- "get in and get out" in 1 or 2 year cycles.

TABLE 2. Ice cream categories based on flavor sources.

Category	Flavor Source	Approx. Market Share
I	Pure extracts, flavorings	10-20%
II	Pure extracts, flavorings with some artificial component	75%
III	Artificial Flavors	10%

4. Use bright, new packaging -- this frequently implies the "round container" with see-through lid.

Additional observations of ice cream promotion include the following points:

1. Strong levels of advertising and promotion may affect how the customer perceives that product.
2. Even though "low" in terms of composition standards, the customer may perceive it as a "high quality" ice cream.
3. Some companies and ice cream brands have put themselves in the "super-premium" class by this method.

There are ice cream user stereotypes (consumers): i.e. the ice cream sub-culture -- junkies, -- freaks, -- connoisseurs, and -- snobs. A number of ice cream manufacturers have successfully engaged in nostalgic advertising:

Sealtest -- "ice cream parlor taste"

Breyers -- "the all natural ice cream"

Abbots Old Philadelphia -- "Since 1876"

Carnation 1880 -- part of the name

Häagen-Dazs -- "old world delight, especially for the most discerning".

#### "Fat City for Snob Ice Creams"

"Hooked" ice cream customers don't mind such prices as \$1.10 per scoop or up to \$1.90 per pint. They firmly believe that "if it's good, they'll buy it."

For all their calorie-conscious and budgetary concerns, Americans have been packing away high-milkfat, premium quality, top-price ice creams in record quantities in recent years. Various recent surveys indicate the static position of so-called "run-of-the-

mill" ice creams and the impressive growth of premium and super-premium categories of ice cream.

Noted ice cream consultant Wendell Arbuckle recently commented: "People want a genuinely good food when they buy ice cream. They think the expensive stuff is worth it because it is usually *pure* and *natural* in flavor" (as the customer perceives it).

The \$64 question is *what is pure* and *what is natural*? About 18 years ago I heard one of the country's more noted dairy industry/management consultants, Doc Lawrence, project a bright future for premium quality ice creams. He emphasized that ice cream should be promoted on the basis of the 5 E's. The 5 E's are:

1. Excellent -- quality, good, high
2. Elegant -- promotional setting
3. Exquisite -- unique
4. Exclusive -- the "class dessert"
5. Expensive -- snob, upper class

appeal

Indeed, it is "fat city-time" for snob ice creams.

#### How Do Consumers Perceive "Quality"?

Consumers generally arrive at an impression of ice cream quality in one of two ways:

1. Composition approach  
Milk fat Overrun, Total solids and Flavorings (type and level)
2. Differentiation approach

A combination -- composition, promotions, advertising, and packaging.

Frequently, through strong, effective promotion and advertising, consumers can be led to believe a product is "more than it really is".

#### What Really Determines Ice Cream Quality?

It is convenient to compare the pre-

requisites for good ice cream quality to a 4-legged milk stool. To assure high quality ice cream, the following "4 legs" or key factors are essential:

1. Dairy ingredients quality
2. The flavoring (system) quality
3. Rate of freezing and storage conditions
4. Workmanship (pride)

Several other less critical factors that help determine ice cream quality are:

1. Milk fat content
2. Overrun (percent)
3. Source(s) of sweetener
4. Overall formulation (balance)

#### High Milkfat Content is no Guarantee of Quality

One myth that seems to have prevailed about ice cream is that the higher the fat content of the product, the higher the quality. An important truism is: "High butterfat (milkfat) is not necessarily the hallmark of quality."

In the June 1981 *Consumer Reports* (CR) survey of ice cream quality a number of high fat brands ended up in the "good" category in sensory ratings. Meanwhile one of the three ice creams rated "excellent" was a mere 10% fat!

#### Use of "All Natural" Flavorings -- Overrated Factor

The use of "all natural" flavorings was not a big factor in the CR survey in determining how the sensory ratings turned out. For instance, nearly half of those judged as only "good" (8 of 17) used Category I vanilla, while one of the three top-rated ("excellent") products contained Category II Flavoring. It also contained only 10% milk fat. As you might suspect, this particular brand was also judged a "best buy," based on the combination of its "excellent" rating and its "cost per serving."

#### "Icy in Texture" Defect: A Perspective

An "Icy Texture" defect for ice cream, especially as noted in many so-called premium or super-premium ice creams tends to bother most experts on ice cream quality. An icy or

coarse texture in high quality ice creams is just not what we expect in a good, well-formulated, properly frozen and stored ice cream. The experienced judges of product quality expect "good" ice cream to be "velvety smooth, slightly chewy or resistant to the bite, and have only a modest hint of coldness, due to the ice crystals." If we really wanted otherwise, our product choice should be icemilk, sherbet, or water ice.

However, in all fairness as to what is acceptable to the majority of consumers -- all this business about "coarse/icy" and weak body may be somewhat overstated and over-emphasized.

The new rage for ice cream types seems to be for "old fashioned" or "home-made" styles. When it is promoted, advertised, and labeled as the "handcranked" variety -- it's gotta be icy! Right?

Yet a number of the conceived "super-premium" ice creams -- "all-natural" products, manufactured without stabilizers -- appear to be enjoying rapid growth in the market place. How can you argue with economic success?

#### *The Forgotten Element in Ice Cream - Dairy Ingredients*

"Usually, the most severe off-flavor defects that expert flavor judges on ice cream quality surveys reveal are serious sensory problems that are derived from inferior quality dairy ingredients. Examples of these are: high acid, lacks freshness, metallic, old ingredient, oxidized, rancid, salty, and/or whey." (Statement of Dr. Charles H. White, LSU, *Dairy Record*, Oct. 1981)

Too often, the failure of the ice cream manufacturer to screen or assess the relative quality of milk, cream, nonfat dry milk, condensed milk, whey or butter leads to a modest degree of one or more of the above listed off-flavors. Inasmuch as the dairy processor (or ice cream manufacturer) should always be the "on-hand" expert as to the relative merits of various dairy ingredients -- it merely means that we frequently do not use the resources at hand. The resource I refer to is a "set of good

tastebuds" to carefully scrutinize each and every dairy ingredient incorporated into an ice cream mix.

#### *The "Cream" in Ice Cream*

The ingredients used in ice cream mixes contribute to the flavor of the ice cream. The flavor contributed by any ingredient can be: (1) desirable or (2) undesirable, depending upon the quality of the ingredient.

The best ice cream is made when fresh, carefully screened, dairy ingredients are used. Cream, the primary milk fat source, is undoubtedly the most important ingredient in the ice cream mix. The milk fat will constitute from 26% to 38% of the total solids in a mix depending upon the mix formulation. Hence, the relative flavor quality, freshness, and freedom from deterioration of the ice cream is a prerequisite of good or exceptional flavor in ice cream.

Source of milk fat for the ice cream manufacturer include:

1. Fresh cream -- the best source. It must be free of any off-flavors, below 0.12% titratable acidity, properly refrigerated and stored in stainless steel equipment.
2. Frozen cream -- more risk of quality shortcomings. Oxidized off-flavors can develop with the extended storage time.
3. Unsalted butter -- can be used as necessary to replace 50-75% of the milk fat in a mix. Various off-flavors are possible, a "greasy texture" can frequently result in the ice cream.
4. Whole milk -- frequently used to supply modest amounts of the milk fat needed in the mix.

The various off-flavors that can stem from the fat source include:

1. High acid (sour)
2. Rancid
3. Oxidized
4. Old ingredient
5. Lacks freshness
6. Metallic

One of the dairy industry's unfortunate shortcomings is the lack of attention it gives to separating cream, cooling, storing, transporting it from

source to point of use in ice cream mix formulation. Cream is highly perishable. It is amazing how haphazardly some processors treat this most expensive ice cream ingredient (\$1.77/lb. of fat).

#### *Ice Cream Ingredients*

There are more than 1200 different flavorings, colors, stabilizers, and emulsifiers available to the commercial ice cream manufacturer. Some people are alarmed at this number of ingredients and additives available for ice cream production. However, there are probably more than 1000 different ice cream flavors possible in the U.S. That then leaves us with approximately 200 ingredients to serve such key functions as colors, stabilizers and/or emulsifiers.

#### *How Ice Cream Quality is Objectively Determined*

In spite of a number of recent ice cream quality "dip-offs," "scoop-outs," competitions, surveys, etc., it is most difficult to achieve an objective determination of the quality of various brands of ice cream. There are a number of trade association ice cream quality contests at the state, regional, and national levels. Generally, these competitions are "low key" and are for education experience and benefit. There are also numerous ice cream quality clinics, where serious defects in quality and superior workmanship are critiqued. "Quality improvement" is the primary educational thrust behind these efforts.

The American Dairy Science Association has provided the industry, quality experts, and students in dairy technology or food science with an official ice cream score card. This checklist of possible defects for flavor, body and texture, color and appearance, and melting quality of ice cream provides us with a useful tool to help evaluate ice cream. However, this process of product evaluation is more subjective than objective. The score card merely provides a checklist of comprehensive, meaningful criteria.



### Flavor Defects in Ice Cream

Flavor defects in ice cream can stem from the flavoring (system) itself, the sweetener, and/or the dairy ingredients. Sources of flavor defects for each group can be as follows:

#### Flavoring (system)

Lacks	Unnatural (atypical)
Too high	Lacks fine flavor

#### Sweetener

Syrup flavor	Too sweet
Lacks sweetness	

#### Dairy ingredients

Lacks freshness	Old ingredient
Oxidized	Metallic
Salty	Whey
Rancid	

Probably the most observed flavor defect in vanilla ice cream is "syrup flavor". This is a difficult off-flavor to combat -- since corn syrup industry suppliers do not readily admit that there is such a thing as "syrup flavor".

The functions of corn syrup in ice cream are:

1. Improved body and texture (without increasing sweetness)
2. Increased melt down resistance (heat shock protection)
3. Economics (costs less than sucrose)

Limitations of corn syrup use are:

1. Excessive lowering of freezing point (at usage rate of 25-50%)
2. Development of "syrup flavor"
3. Masking of delicate flavors
4. Excessive gummy body and related dipping problems

### Developing Your Own Evaluation Skills for Ice Cream

Fortunately, there is usually a pleasant anticipation about an opportunity to evaluate (or judge) ice cream for most people. This enthusiasm is natural and works to the evaluators advantage, which results in a more intense study of the samples.

A person should approach this exercise in as objective a manner as possible. This requires "blind tasting" and comparative evaluation of at least three or more brands of ice cream. Blind tasting implies that somebody else assists you by dipping samples of ice cream onto coded plates. It is important that the identity of each sample of product be kept "secret" until the evaluations for flavor, body and texture, color and appearance, and/or melting quality are completed.

### Suggested Sequence for Ice Cream Evaluation

**Color** -- Even though the color and appearance of an ice cream is less important than the flavor (taste) and the body and texture, this is the parameter to start with in your evaluation process. You can tell quite a bit about the workmanship of the product (and the pride) by the impression you get of the color and other appearance factors.

Is the color or hue typical for the given flavor? Is the shade of color pleasing or in some way unappetizing. No "battleship greys" or "hot pinks" please!

Probably the easiest thing to do in ice cream making is "get the color right." If the processor can't do this, I am automatically suspicious of the quality. A peachy-orange color (coupled with a friable body) usually indicates extensive use of cheddar cheese whey solids. Additionally, you can generally detect a "graham cracker" off-flavor.

**Body/Texture** -- Take note of the way that a plastic or metal spoon cuts through a scoop or a spadeful of ice cream on the plate. The product should present some resistance to cutting -- but then eventually "cut-off" clean. This indicates no "gumminess" or taffy-like stretching of the ice cream. Place a small bite of the ice cream in the mouth and take note of:

1. The relative degree of coldness, size of ice crystals.
2. The degree of resistance or slight chewiness on movement of teeth and tongue against product.
3. Absolute freedom from any graininess or grittiness (called

"sandiness"). This would be due to highly undesirable, objectionable lactose crystallization.

4. The relative freedom from a watery, non-chewy bite resistance, referred to as "weak," i.e. ice milk-like, due to low total solids content.

**Sweetness Level** -- How does the sweetness intensity seem? Does the sweetener level nicely compliment the given flavor? Is it "too sweet" or "lacking sweetness" or "just right"? Do you notice a "karo syrup" or cornsyrup (malty) sweetener off-flavor? Syrup off-flavor tends to leave an unrefreshing aftertaste.

**Flavoring System** -- Does the flavor stated on the label come through with: (1) good balance, bouquet or typical impression and (2) is it the proper intensity; too high or lacking? Is there an unnatural or atypical, harsh flavor impression? Does it just generally "lack fine flavor", i.e. flavor slightly out of balance? Is there a clean aftertaste? Do you feel like another bite?

**Dairy Ingredients** -- Is there a nice complimentary, clean, refreshing, pleasing flavor from the dairy ingredients? No aftertaste? Free of such objectionable off-flavor notes as:

Lacks freshness -- slight stale

Old ingredient -- definite stale, aftertaste

Whey -- "Graham cracker-like," slightly salty, stale condensed milk off-flavor

Oxidized -- cardboardy

Rancid -- soapy, bitter-like

High acid -- sour

Salty -- from butter (or whey solids)

Finally, is the product free of a "heated" or "cooked" flavor note.

**Melted Characteristics** -- does a spoonful of the product melt down smoothly within 10 to 12 minutes? When it melts is the liquid homogeneous and devoid of any suspicious curdiness or watery separation?

### Flavor Preference Surveys

Is there any correlation between experts' opinions and consumer preferences. In an OSU study in 1972-1973 for vanilla, chocolate, and strawberry ice creams on this very issue we noted

some interesting correlations. We found excellent correlation between the "consumer panel" preferences and the ice cream expert judgements for vanilla and strawberry ice creams, but no correlation between experts and consumers for chocolate ice creams that were evaluated.

#### *Conclusion*

In this discussion I have attempted to point out that there are some prevailing myths or misconceptions about what really determines the "eating quality" of ice cream. Some of the common overrated parameters are: fat

content, overrun percentage, flavor categories and levels, and restriction of food additives.

The more important factors that determine ice cream quality are: the freshness and relative quality of dairy ingredients, flavoring balance, overall mix formulation, and the workmanship of manufacture.

An ice cream retailer who froze his own ice cream in the back room once said: "By most standards, my ice cream would be judged as 'lousy' -- but my customers think it's great."

Be aware of misclaims or "puffery" for ice creams. High price

sometimes approximates "snob appeal" -- since there is often little relationship between the quality and the price of ice cream. The most overrated factors of ice cream quality are milkfat content, overrun, pure flavors and "only natural ingredients," and the concept of "has to be in a round package to be any good" phenomenon.

My philosophy is that two scoops of high quality ice cream at 55¢ per serving is twice as good a bargain as a \$1.10 scoop of "overrated" ice cream.

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## Limulus Amebocyte Lysate Assay- A Rapid Test for the Assessment of Raw and Pasteurized Milk Quality

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Little doubt exists that the bacteriological quality of raw milk will influence flavor and, on occasion, yield of the finished product. Heat treatments may destroy spoilage organisms but may not destroy all their enzymes. Where finished products are held for extended periods, *e. g.* UHT milk or aged cheese, flavor defects may appear which otherwise would not be evident.

Heat stable enzymes, notably proteases and lipases, are produced by psychrotrophic gram negative bacteria (GNB) principally of the genus *Pseudomonas*. These are the same organisms which as post-pasteurization contaminants are responsible for reducing shelf-life of pasteurized milk and other perishable foods.

Current tests for the detection of gram negative spoilage organisms or their metabolic products in milk are lengthy and complicated or may lack the sensitivity and accuracy desired. They often fail to predict the shelf-life of pasteurized milk products or the quality of raw milk used in their manufacture.

A test, Limulus amebocyte lysate (LAL) assay, used by the pharmaceutical industry to selectively detect within one hour very low levels of GNB in biological preparations, shows promise for the food area. This test measures the amount of lipopolysaccharides (LPS) produced by GNB. The term pyrogens or endotoxins, is used by some interchangeably with LPS. The LAL assay has been approved by the FDA for use by the drug industry. In the food area, it has received only limited attention. Danish and German workers have applied the LAL assay to milk and milk products. In the USA, Jay at Wayne State University, has employed the test as a measure of hamburger quality. Other have used it to evaluate water quality.

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The objectives of our study were (1) to apply the LAL assay to milk; (2) to determine the reliability of the test to measure levels of GNB in raw and pasteurized milk; and (3) to develop a rapid procedure to predict the keeping quality of pasteurized milk.

We have applied the LAL assay to raw and pasteurized milks and to sterile milk cultured with *Pseudomonas* organisms. For our studies we have used reagents sold by Mallinckrodt, Inc., St. Louis, MO 63134 or Cape Cod Associates, Woods Hole, MA 02543. Mallinckrodt has the test available in individual pyrogen-free tubes each containing sufficient reagent for a single determination. Bulk quantities are also sold.

The procedure followed was that recommended by the manufacturer. Usually, 0.1 ml of the lysate is mixed with 0.1 ml undiluted or diluted milk and the mixture is incubated at 37 C. At the end of one hour, all tubes showing a firm clot which is not dislodged when the tubes are inverted 180 degrees are considered positive.

The LPS titer of the milk is obtained by multiplying the highest dilution of the milk which yields a firm clot by the sensitivity of the test lysate. For example, if milk diluted 1/1000 yields a firm clot and the sensitivity of the lysate was 0.06 ng/ml, the LPS titer would be 6 ng/ml.

The test is extremely sensitive. Certain precautions must be followed when running the test. All pipets and glassware must be pyrogen-free. We use single service disposal sterile pipets and test tubes. Controls should be run to ensure that all glassware, dilution water, and reagents are pyrogen-free. A control consisting of the milk "spiked" with known endotoxin is also prepared to eliminate the possibility that the milk contains a lysate inhibitor. Although the manufacturer supplies the sensitivity of the lysate, this should be verified against a known endotoxin standard. Standards are available from lysate manufacturers or FDA.

During incubation, it is important that test samples remain in a quiescent state. Slight movement of the tubes will disrupt the clot and affect results. We use a stationary water bath. The circulating type is unsatisfactory. Because of the tenuous nature of the clot, the test can be read only

once. Repeated inversion of the tubes disrupts the clot. Ten-fold dilutions of milk samples are prepared in pyrogen-free tubes using USP sterile water for irrigation which we purchased from the Ohio State University Hospital Pharmacy.

Some of our findings are summarized below. Detailed results will be published elsewhere.

We, first, examined several current procedures for the enumeration of psychrotrophic GNB. We found that incubation of plates at 25 C for 24 hrs. yielded reliable results in the shortest time. The use of the oxidase reaction to identify pseudomonads was also helpful.

#### TEST PROCEDURE

To evaluate the LAL assay for milk systems, we inoculated sterile milk with *Pseudomonas fragi*. The inoculated milk was incubated at 21 C and, at selected time intervals, GNB counts and LPS titers were determined. At GNB counts of 1100-10,000/ml, 100% of the samples had LPS titers of <10 ng/ml. When the counts were between 11,000-100,000/ml, 71% of the samples had LPS titers  $\leq$  100 ng/ml. At the range of 110,000-1,000,000 GNB/ml, 100% of the samples had LPS titers  $\leq$  1000 ng/ml. Thus, for each log increment in GNB population, the LPS titers also increased one log cycle with a correlation coefficient of 0.88.

We observed that the LAL procedure was more sensitive than the GNB plate count method. To overcome this problem, milk samples were diluted as for the Most Probable Number technique and the LAL titers determined for each MPN tube. Average LPS values increased from 0.86 ng/ml to 4350 ng/ml as log increments of GNB/ml increased from 1.0 to 8.0 with a correlation coefficient of 0.95. The MPN technique was more sensitive than the decimal dilution method when GNB counts were <10,000/ml. However, beyond 10,000 GNB/ml no differences were observed. For all further work, we utilized the single tube decimal dilution procedure. The high cost of the MPN technique could not be justified where legal and practical considerations are for products having GNB counts in excess of 10,000/ml.

#### RAW MILK

We, next, studied the LAL assay with mixed herd raw milk. The LPS titers were correlated with GNB counts of the raw milk. A correlation coefficient of 0.97 was obtained. The fitted regression line had a slope of 0.95 indicating that a ten-fold increase in GNB resulted in an approximate ten-fold increase in LPS titer.

When the mean bacteria count at each LPS concentration was plotted a correlation coefficient of 0.99 was obtained. The widest range in LPS titers around the mean was in low count (<10,000/ml) raw milk. Where large numbers of GNB were present, a narrow range around the mean was observed. Raw milks having GNB counts between 110,000-1,000,000/ml had LPS titers of <100 ng/ml; 1,100,000-10,000,000 GNB/ml had LPS titers <1000 ng/ml;

and GNB counts of 11,000,000-100,000,000/ml had titers of <10,000 ng/ml. Thus, the LPS titers increased in a predictable manner with increased bacterial numbers.

#### HEAT TREATED MILK

Two limiting factors of the shelf-life of pasteurized milk are post-pasteurization growth of GNB in the raw milk supply in sufficient numbers to produce proteases and lipases which withstand pasteurization. Currently used GNB enumeration procedures can detect viable GNB in the product resulting from post-pasteurization contamination but not GNB which were present prior to pasteurization.

We found with the LAL assay that while pasteurization destroyed the GNB it did not affect the LPS titer. Usually counts exceeding 10,000 GNB/ml were required before LPS titers showed a marked increase. Thus, the LAL procedure can be used on pasteurized or UHT-treated milks as a measure of the quality of the raw milk supply. Where LPS titers were high (>10,000 ng/ml) in pasteurized products, there would be good circumstantial evidence that heat stable enzymes may be present. We did look at other methods, for example, the Hull test, for detection of proteases in milk and found these were slow and insensitive requiring GNB counts >100,000,000/ml to obtain any response.

#### POST PASTEURIZATION CONTAMINATION

The LAL assay can also detect post-pasteurization contamination of milk by GNB. However, the assay must be modified because (1) post-pasteurization contamination usually involves very small numbers of GNB and (2) the LPS titer of pasteurized milk is influenced by the number of GNB which were present in the raw milk supply prior to pasteurization.

When the mean bacterial counts of commercial pasteurized milk were plotted for each LPS value, a correlation coefficient of 0.99 was obtained. Large ranges in bacterial numbers were noted for pasteurized milk with LPS values of  $\leq$  600 ng/ml. At higher values, the bacterial counts showed less variability around the mean indicating that the LPS values of pasteurized milk were affected by the number of GNB present in the raw milk supply prior to pasteurization.

#### PREDICT KEEPING QUALITY

For the LAL procedure to be of value as a predictor of the keeping quality of pasteurized milk, we modified the assay. The LPS titer and GNB count of the pasteurized milk were determined immediately and the milk was then held at 13 C for 18 hrs. to encourage rapid outgrowth of any gram negative contaminants present. This approach is similar to the preliminary incubation technique used for raw milk. At 18 hrs., the LPS titer and GNB counts were again determined. Using this procedure, ten different commercial pasteurized milks obtained from retail outlets were

studied. As an additional check, we ran the Moseley keeping quality test on the same pasteurized milk stored at 7 C. We found that if the bacteria counts by the Moseley test were greater than log 6.25, the LPS titers and the GNB counts had increased at least two log cycles within 18 hrs. at 13 C. Therefore, a 2-log cycle increase in LPS titer was a good indication that the pasteurized milk would have poor keeping quality.

#### CONCLUSION

The study will be expanded to include LAL assay of the raw milk supply prior to pasteurization to determine the effect of pasteurization on LPS titer of the finished, packaged product. Our goal is to develop a field test to rapidly

screen raw and pasteurized milks on the basis of pre-determined LPS titers.

All phases of our study were collated. For 186 individual trials, a correlation coefficient of 0.98 was obtained when LPS titers were plotted against GNB counts.

We have found that LAL assay to be a rapid (1 hr.), sensitive (1,000-10,000 GNB/ml), and accurate ( $r=0.9851$ ) method to detect the number of GNB which are or were present at some point in the milk. The cost of the LAL reagents and specially treated glassware is high. However, when total labor costs and time savings are considered, the LAL assay is actually less expensive than conventional plating methods. Considerable information can be obtained in a short period of time with the LAL procedure. For UHT milk, information about the raw milk supply would minimize long range keeping quality problems.

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# COMPUTERIZATION OF CONSUMER HEALTH PROGRAMS

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## DUDLEY JOHNSON, R.S.

*Chief, Bureau of Consumer Health Protection  
Texas Department of Health  
Austin, TX*

I ran across a cartoon that showed a fortune teller peering into her computer screen and saying to her client "I find that I never use my crystal ball anymore." That cartoon may indicate the direction of consumer health programs during the next 5 to 10 years - computerization. Data processing for inspectional type programs, especially those that rely heavily upon the collection and analysis of samples to detect non-compliance with public health standards is definitely in our future.

As all of us are aware, funding is becoming harder to obtain, paperwork is increasing, and many consumer type businesses and problems are increasing. Man hours available to do those necessary public health tasks must be expanded wherever possible - this means that more time in the field and less time at a desk writing reports is a basic requirement of a successful public health inspectional type program. Perhaps success depends upon how well we will be able to find and then solve the problem or prevent potentially serious problems before they become critical. If that is true, then computerization of data will help us

find potential problem areas faster, and free the public health worker to devote the majority of his or her time to those tasks for which they have been trained.

A glimpse into the computerized future is provided by the department's milk and dairy products program. In order to fulfill its responsibility under S.B. 315, which amended the Texas milk grading and labeling law, the division of milk and dairy products has found that detailed accurate record keeping for its statewide activities is a necessity. It was determined that a centralized data processing system could provide fast, accurate record keeping and such a system is presently operable, or will be expanded, during the next few years for all laboratory analysis reports of grade "A" producer, raw milk transport, tanker, commingled raw milk, inplant commingled raw milk, retail raw milk, retail milk and milk products, single service containers and frozen dessert products.

The division, by the use of our data processing system, handles the enforcement activities involving product standard violation. Violation notices are automatically, produced by the computer upon a three part mailable form. These forms pass through the division office for verification and then are delivered directly to the mail room. All inspection reports of producer dairies, transport tankers, milk processing plants, single service manufacturing plant receiving/transfer wash stations and frozen dessert man-

ufacturing plants, as well as water supply laboratory analyses and other pertinent information are entered into permanent records by the data processing system. Records of all permits issued by the division, incorporated with a billing system for the collection of annual fees, is being used at this time.

As computer terminals become available to regional offices, all of this data will be accessible for daily use by milk program personnel. The computerization of the milk program has proceeded fairly rapidly and is being regarded as leading the way for other consumer health type programs; however, we must realize each program has its own special problems that must be fitted into a computer program before we can expect great things from the computer.

Future additions to the milk program will include routine sediment testing of producer raw milk. We expect that this program will decrease the sediment levels which will perhaps allow for a 50% improvement to shelf life of processed milk. Greater attention in the future will be given to problems of pesticide residues in milk and should prove to be useful in those areas where field crops are being sprayed for insect infestation. With the increased attention being given to the installation of nuclear power plants the future will require increased radiation analyses.

The serious problem of aflatoxin is receiving greater attention. Sampling will be conducted on a monthly basis

in an effort to determine the presence of this toxin which is produced by molds in animal feed. Perhaps the most attention grabbing advancement in the field of fresh safe milk is in the area of extended shelf life, it is anticipated that sterile or ultra high temper-

ature short time pasteurized grade "A" milk packaged in hermetically sealed containers will occupy at least 2% of the fluid milk market by 1992. This product does not require refrigeration in storage, although it must be refrigerated after the container is

opened. It is estimated that the population shift in this country will cause the milk industry to grow at a rate of approximately 2% annually for the next 10 years.

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## News and Events

### Holtgrieve Accepts Position of 3-A Symbol Council Assistant Secretary/Treasurer

Robert E. (Pinky) Holtgrieve has taken over the position of Assistant Secretary/Treasurer of the 3-A Symbol Council.

Pinky retired in November 1982 after 41 years at the Waukesha Foundry, Division of Abex Corporation in Waukesha, WI.

During his time at the Waukesha Foundry he served on the 3A Sanitary Standards Committees and as a member of the DFISA Technical Committee for more than 25 years.

In May of 1982 during the 3-A Sanitary Standards Committee Meeting, Pinky was awarded the DFISA Special Honor Certificate for his extraordinary service to the 3-A Committees and the standards program. He was instrumental in advancing the development of new E-3-A Standards for the poultry industry.

The 3-A Symbol office will be located in Waukesha, WI effective May 1, 1983. The office address and phone after May 1 will be: 3-A Symbol Council, Suite 100 W-255 N. 477 Grandview Blvd., Waukesha, WI 53186. 414-542-0200.

### Fung Presented with Faculty Service Award

Daniel Y.C. Fung, associate professor in the Department of Animal Science and Industry and chairman of the Food Science Graduate Program at Kansas State University, was presented with the Faculty Service Award at the National University Continuing Education Association's April meeting in Las Vegas.

Fung has gained an international reputation as a lecturer on rapid methods and automation in microbiology at symposia in Sweden, Germany, Great Britain, Czechoslovakia, and Washington, D.C. as well as numerous other symposia in the United States.

Fung shares his knowledge by offering a workshop in "Rapid Methods and Automation in Microbiology" at Kansas State. The workshop focuses on the practical application of conventional and new commercial systems of rapid identification of micro-organisms from medical specimens, foods, water and environment. Workshop participants receive nine days of extensive training in these procedures.

Rapid methods and automation in applied microbiology deals with the study of improved methods in the isolation, early detection, characterization and enumeration of micro-organisms and their products in the clinical, food, industrial and environmental samples.



Robert (Pinky) Holtgrieve (left) accepts the position of Assistant Secretary/Treasurer of the 3-A Symbol Council from Earl O. Wright, Secretary Treasurer.

### YERSINIOSIS OUTBREAK

J. Carroll Sellers, Senior Food Service Sanitation Specialist, U.S. Food & Drug Administration, Nashville, TN, will present the topic, YERSINIOSIS OUTBREAK during the International Association of Milk, Food and Environmental Sanitarians, Inc. 70th Annual Meeting in St. Louis, MO, August 7-11, 1983.

The presentation deals with the inspection of the milk pasteurization plant which was epidemiologically implicated in the production of milk that somehow became contaminated with *Yersinia enterocolitica*. The same serotype of *Yersinia enterocolitica* was isolated from 172 persons who drank milk from this plant and from two milk crates from this milk plant. The milk crates were on a hog farm which collected "return" milk from the milk plant and fed it to hogs. No *Yersinia enterocolitica* was isolated from raw milk, pasteurized milk, milk equipment, or other environmental sources from samples collected during the inspection and investigation.

Milk from the actual suspect lots was not available for sampling. Inspection of the plant did not identify either a breach in pasteurizing technique or an obvious source of contamination. The entire incident does demonstrate the need to produce raw milk of the best sanitary quality, the need for proper pasteurization, and the need to protect after pasteurization.

For more information contact:

Kathy R. Hathaway  
IAMFES, INC.  
PO Box 701  
Ames, IA 50010  
515-232-6699

## 27th Annual Environmental Health Institute

East Tennessee State University's twenty-seventh annual Environmental Health Institute will run June 6-August 12, 1983, and will offer both Graduate and Undergraduate credit for the two summer sessions. Subjects covered are: Water Supplies and Wastewater Treatment, Air Pollution, Solid Waste Management, Toxicology, Water Pollution, Hazardous Waste Management, Biological Analysis, Food Sanitation, Environmental Health Practice, Ergonomics, and Environmental Health Planning. The first session begins June 6th and the second session begins July 12. For further information, contact: Dr. Vay Rodman, Department of Environmental Health, Box 22960A, East Tennessee State University, Johnson City, TN 37614.

## 20th CFESA Meeting

CFESA's 1983 annual meeting, May 18-20, at the Sheraton Plaza, Chicago marks its 20th anniversary year.

Organizers are planning an "intensive program" that emphasizes two general categories: manufacturers relations and service agency operations, said Maria DiCara, Executive Director.

Registration will be held from noon to 5 p.m. on Wednesday, May 18, followed by a welcoming reception.

On Thursday, meeting sessions will feature:  
 ---a panel discussion led by manufacturers who have formed service agency advisory councils. They include David Baker of South Bend Escan Corp., Mary Gates of The Frymaster Corp., and Daniel Sutherland of the Groen Division of Dover Corp.  
 ---a discussion of product liability led by Holland C. Capper, a forerunning attorney in the field, and  
 ---tentatively scheduled, a keynote address by National Association of Food Equipment Manufacturers' President Dick Campion, to cap off a gala luncheon and salute to CFESA's 20th anniversary.

Friday, a series of roundtable workshops centering on several service agency concerns will follow a presentation by Walter Strand, chairman of Graphic Management Services, on the "four cornerstones of a successful business." Friday afternoon's agenda includes roundtable follow-up reports, the annual meeting and election of officers, and a cocktail reception that evening.

For more information, contact CFESA Headquarters at 312-763-7350.

## Food Engineering Scholarship

Dairy and Food Industries Supply Association has established an annual Food Engineering Scholarship Program to encourage deserving undergraduate students to continue to pursue a curriculum leading to a Bachelor of Science degree in Food Engineering.

In making the announcement, Fred J. Greiner, DFISA Executive Vice President, said, "Awards of \$1,500 each will be presented to two scholastically outstanding sophomores who have demonstrated leadership potential." "In addition," Mr. Greiner said, "scholarship winners will receive a travel grant of \$500 for the purpose of attending Food & Dairy Expo '83, October 22-26, at Chicago's McCormick Place.

"The DFISA Food Engineering Scholarship Program has been established in the memory of two industry members, Mr. Gordon Houran and Mr. Paul Girton, who, in their lifetime made substantial contributions to the development and application for the dairy and food processing industries," Mr. Greiner said.

Scholarship recipients will be announced by DFISA in May, 1983.

For more information contact DFISA at 301-984-1444.

## Processed Food Industry Booklet

The proceedings from an Educational Seminar for the Processed Food Industry organized by the Institute of Food Science at Cornell University are now available. The 99 page booklet includes presentations by experts from consulting organizations, industry, academia and regulatory agencies on the following topics:

- \* Consumer Attitudes Towards Processed Foods in the '80's
- \* What's New in Additives and Ingredients for Food Processors
- \* New Trends in Food Packaging
- \* Food Plant Sanitation
- \* Improving Sanitation Training Programs
- \* The USDA Total Quality Control Program
- \* A Regulatory Update from FDA (New York District) and NY State Agriculture and Markets (With the Types of Violations Being Found in New York State Plants).

The price of the booklet is \$5.00 and can be obtained by sending a check (payable to Cornell University) to: Dr. Robert B. Gravani, Institute of Food Science, Stocking Hall, Cornell University, Ithaca, NY 14850

## Workshop in Food Flavor

A course titled "Workshop in Food Flavor: A Hands on Course in Flavor Development, Manufacture and Use" will be offered at the University of Minnesota, St. Paul, MN, October 26-28, 1983.

This course is intended for individuals in either the food or flavor industry. The emphasis of this course will be in providing "hands on" experience. The course will be divided nearly equally between lecture and laboratory. Laboratory sessions will include the formulation of simple flavors, manufacture of oleoresins, essential oils and absolutes as well as flavor emulsions and spray dried products. Laboratory time will also be devoted to the correct usage of a flavor in the finished product.

This course will be taught by Drs. Paul Berry (Flavor Consultant) and Gary Reineccius (Professor). Due to the laboratory nature of this class, enrollment is limited. For more information contact: Dr. Gary Reineccius, Department of Food Science and Nutrition, University of Minnesota, St., MN 55108.

## FDA Amends Regulation for High Temperature Laminates

The Food and Drug Administration, acting on a petition and research from Reynolds Metals Company, has cleared the way for packaging a wider variety of foods in the retortable pouch.

The FDA has amended its regulation for high-temperature laminates, allowing the use of temperatures up to 135 degrees centigrade for processing foods in the retort pouch and allowing food ingredients containing eight percent ethyl alcohol.

"This opens the door to high temperature, short time processing (HTST), one of the reasons for the success of the retort pouch in Japan, and expands opportunities for the Reynolds Flex-Can retortable pouch," according to David A. Heintz, marketing director of food and beverage packaging for Reynolds Flexible Packaging Division.

He said that HTST processing "dramatically reduces the time that a food product is exposed to heat, more than 50 percent in some cases, and this can enhance food product quality while increasing productivity and reducing costs."

The FDA action permits the development of new markets for the retort pouch, including many heat sensitive products such as milk and dairy-based specialties. Mr. Heintz said, "alcohol-containing foods, wine-based sauces and desserts are now possible

candidates for the pouch, along with certain fruit items, since the HTST process should enhance their quality as well."

Reynolds is a leader in developing technology for retort pouch packaging of meats and vegetables by food producers in North America. Research supporting Reynolds Metals petition to the FDA was conducted at the Reynolds Flex-Can Processing Center, which is equipped with retorts capable of high temperature, short time processing of foods.

## Delvocid Approved for use on Natural Cheese

Delvocid®, a mold and yeast inhibitor for food products introduced by GB Fermentation Industries, Inc. to the Canadian and U.S. marketplaces in 1982, is now approved for use on the majority of natural cheese produced in the United States.

Delvocid, an antimycotic agent, has already been proven safe for use on natural cheeses by the FDA, but the preservative had been limited to application on Italian varieties by the wording of the other cheese standards.

Recently, the FDA amended nine natural cheese standards, allowing the use of "safe and suitable antimycotic agents", such as Delvocid. These updated standards were announced in the federal register on January 21, 1983.

"Delvocid is now available in the U.S. as a preservative on swiss, cheddar, blue and several other cheeses in addition to Italian varieties, for which it was approved in June of 1982. This means that over 75% of all natural cheese produced in the U.S., based on manufacturing output, can now be protected from the adverse affects of mold by using Delvocid. We expect the pasturized process cheese standards to be amended next, which will permit the use of Delvocid on these cheeses as well," said Leonard P. Smith, vice president, sales and marketing. "Since 1963, more than 20 countries around the world have approved the use of Delvocid as a food preservative. The economies, efficiencies, and effectiveness of Delvocid over existing methods means a better product for the consumer."

Delvocid, or natamycin, (also known as pimaricin), according to Mr. Smith is significantly less costly for application than other preservatives used to prevent growth of mold and yeast on cheese. It also has the unique properties of being tasteless, odorless, and colorless and does not retard normal ripening processes

or affect any other properties of the cheese being treated. Delvocid is also Kosher approved, Mr. Smith added.

Unlike other preservatives, according to Mr. Smith, Delvocid stays on the surface instead of penetrating the cheese. Since Delvocid is tasteless and odorless, this further insures that it will not affect the organoleptic properties of the cheese. Further, Delvocid is very active against virtually all molds and yeasts but not against bacteria, which are vital to the ripening of cheese.

Delvocid can be used in a dip or spray aqueous solution. The method used depends on which type of application is most economical and efficient for the individual cheese producer or best suited to a particular variety of cheese. Delvocid products need no special handling or warehousing.

## Neobakasal for Low Sodium Diets

Neobakasal has been formulated for use in foods for persons who are restricted in their use of common salt in order to reduce their intake of the sodium ion. It enhances the flavor of saltless foods that otherwise would be very bland.

Medical research has shown that sodium compounds should be eliminated from the diets of persons suffering from certain types of cardiac, renal, and other diseases in which edema is a serious complication; also diets of pregnant women are sometimes similarly restricted. Consequently, physicians often place such persons on a low sodium diet.

Considerable interest has developed in the production of commercial enriched bread and other special dietary foods containing Hilton-Davis Neobakasal as the substitute for common salt. Bakers have an opportunity to supply the demand for unsalted bread by using this seasoning agent in a specialty bread, which can be marketed in various ways; direct to consumers, through grocery stores, through "health foods" stores or sold to hospitals. Other food manufacturers can do likewise. Neobakasal is supplied to bakers and other food manufacturers packaged in 10 to 50 pound drums. It is to be used in the same way that common salt is normally used, although usually a smaller percentage of Neobakasal is required.

Neobakasal is an odorless, white crystalline powder with a taste suggestive of salt. It is not claimed to have therapeutic value; it is a seasoning agent designed to improve the flavor and palatability of bread and other

foods prepared without salt. Doughs containing it will exhibit better handling properties than unsalted doughs; it also aids in controlling fermentation.

The directions for use are simple: Use in bread and other foods at less than the usual rate for common salt, 1.0 to 1.5 percent. Experience will show how much to add to secure the flavor that is desired. Dough fermentation and proofing time may have to be shortened when salt is replaced by Neobakasal. When making unsalted, low sodium bread, be sure to omit ingredients that contain salt or other sodium compounds, such as baking soda, baking powder, certain yeast foods, etc.

Food and Drug Regulations require additional label statements on special dietary foods recommended for inclusion in low sodium diets.

Bread made with Neobakasal is expected to contain less than 10 milligrams of sodium per 100 grams of bread, whereas bread made with common salt and yeast food containing salt contains higher levels of sodium.

## Dehydrated and Powdered Foods Outlook

Though Italy and the United Kingdom may still offer expanding markets for dehydrated and powdered foods, the overall European demand for such products is expected to slow considerably over the next five years.

According to a recent study by Frost & Sullivan, the rapid market growth of the last two decades is now being checked by factors beyond the continuing recession, such as increased competition from frozen foods, aided by the increase in home freezer ownership and changing lifestyles, with more restaurant dining and emphasis on health foods.

Specifically, the report, "Dehydrated and Powdered Food Markets in Europe" (E580), predicts that the volume of the total market will grow at an average annual rate of only 1.8%, from 955,000 tons in 1980 to 1,084,000 tons by 1987. In value, the study forecasts that the market will grow from \$6.8 billion in 1980 to \$7.8 billion in 1987, at an annual rate of 2.1%, due to greater expenditure on "quality" products.

But in attempting to upgrade quality of existing products, manufacturers have been faced with cost problems. While modern techniques such as freeze drying can upgrade quality, processing costs make the final selling price uncompetitive, compared with fresh and frozen produce.

"The basic cost of using these new techniques will be brought down, but the investment needed to reduce costs

is relatively high--and therefore unlikely--until the worst of the present recession has passed," Frost & Sullivan forecasts.

Among product categories, the market research firm predicts that Dry Beverages will remain the most important sector of demand. While showing a very small growth rate due to its size and maturity. Frost & Sullivan expects the continuing decline in the Powdered Dessert market to adversely affect the performance of the Dehydrated Sauces and Mixes category.

Based on a country-by-country survey of Western Europe, the 278-page report shows Italy and the U.K. offering the best opportunities for volume growth over the next five years.

In the Netherlands, however, where expenditure on non-essentials is likely to remain curtailed and in France and Belgium, where use of fresh produce are likely to remain a tradition until dehydrated food quality improves, growth prospects will be unexciting.

For more information contact: Customer Service, Frost & Sullivan Inc., 106 Fulton St., New York NY 10038. 212-233-1080.

## Highest Documented Alfalfa Yield on Nonirrigated Land

Research agronomists at Michigan State University believe they set a yield record--an average of 10 tons of alfalfa (at 12 percent moisture) under nonirrigated conditions during 1981-82.

"Our best variety, Cal West 938, produced 10.78 tons per acre in 1982, more than three times the average yield in Michigan," says Milo B. Tesar, Agricultural Experiment Station research agronomist and professor of crop and soil sciences. "It appears that this is the highest documented alfalfa yield on nonirrigated land in the nation."

The high yield was produced on a tiled, well-drained Conover-Brookston loam fertilized with 120 pounds of phosphate and 600 pounds of potash per acre per year, which works out to a cost of \$9 per ton of hay.

Cuttings were taken in early June, July, August and October. Prior to 1982, Tesar obtained three-year average yields of 9.1 tons during 1974-76 and 9.3 tons during 1978-80.

The 10-ton yield is comparable, Tesar says, to achieving a 300 bushel corn yield. His formula for success includes:

---A moderately hardy, high-yielding alfalfa variety resistant to bacterial wilt, Phytophthora root rot and anthracnose.

---Four cuttings a year, the last cut after mid-October.

---Excellent stands on well drained, fine-textured soil with a pH of 7.0.

---Topdressing with 12 pounds of phosphate and 60 pounds potash per acre for each ton of hay that is removed, or 100 pounds off 0-12-60 for each ton of hay.

---Good control of alfalfa weevil and leafhopper with insecticides and frequent cutting.

Tesar's circle of winners, all of which produced more than 10 tons in the 1982 season, include Hiphy, Armor, Funk G2815, Duke, O's Gold Exp. 777 and Exp. 78, Voris A77, WL313, Cal West 925 and Futura.

Eight other varieties exceeded 9.5 tons per year during trials in 1981 and 1982. All were resistant to either Phytophthora or anthracnose, or both. Vernal yields were 25 percent lower than the best varieties.

Tesar says that the moderate hardiness of the top varieties is suitable for maximum yields under intensive management in southern and northern Michigan stands that will be used for two to four years. Varieties for southern Michigan should be resistant to Phytophthora and anthracnose. In northern Michigan, he says, anthracnose does not appear to be significant.

## NRA Predicts Promising Foodservice Growth

The National Restaurant Association expects 1983 to mark the third consecutive year of real growth for the foodservice industry with real sales advancing 2 percent, the largest increase since 1977. Industry wide sales are expected to reach nearly \$144 billion in 1983 - an increase of over \$10 billion and 7.8 percent over 1982.

Commenting on NRA's promising prediction for foodservice in the near term, NRA Chairman and President John G. Dankos said, "NRA's forecast for continued and improved real sales growth is based on the existence of a number of factors - the occurrence of an economic recovery during 1983, moderate gains in inflation, rising consumer income, the consumer's renewed faith in the economy and his continued desire and need for meals prepared away from home."

"Despite the expected presence of high unemployment throughout most of 1983," Dankos said, "our best economic advice is that the economy will rebound in 1983." He cited economic predictions that the real gross national product (GNP) will rise 3.2 percent in 1983, the largest real GNP gain since 1978.

"Consumers should have greater disposable income in

1983 and have a greater willingness to spend that income," Dankos said. Economists predict that personal income will rise 8.4 percent in 1983 and that real disposable income (DPI) will advance 3 percent, achieving its greatest increase since 1978. The 10 percent tax cut to take effect July 1, 1983 and a moderate level of inflation are factors contributing to the gain in real disposable income.

Not all segments of foodservice are expected to share equally in the gains of 1983. The Commercial Group, which includes eating and drinking places, foodservice contractors, and restaurants in hotels, motels and in retail establishments, accounts for 85 percent of total foodservice industry sales. Real sales in this group are expected to increase 2.2 percent in 1983, somewhat higher than the 1.6 percent increase recorded in 1982. The Institutional Group, which includes business, educational and government organizations that manage their own foodservice operations, is expected to record a somewhat slower real growth of 0.4 percent.

Food and drink sales at eating places, which account for about 60 percent of foodservice industry sales, are expected to reach \$87.4 billion and pass a real sales growth of 2.6 percent in 1983.

NRA predicts that menu prices will increase by 6 percent in 1983. The most dramatic increases should occur at the end of the year as the economy improves. This 6 percent expected increase in menu prices assumes that increases in food, labor and other operating costs will however near 1982 levels.

Food and drink sales at lodging places are expected to advance 8.9 percent in 1983, reaching a total of \$8 billion. Within this category hotel restaurants will post the most rapid growth - an increase of 9.8 percent in nominal sales and 3.8 percent in real sales.

NRA predicts that the following emerging trends will make further inroads in 1983:

- \* Foodservice operators will place greater emphasis on improving sales during non-peak demand times like weekdays, mornings and between meals.
- \* More restaurants will be combined with bookstores, bakeries, wine shops and delis as the dual retail concept becomes more popular in the industry.
- \* Menus will be expanded in order to give patrons the option of trading down rather than going to another restaurant.
- \* Carryout and off-premise catering menu items will present new opportunities for restaurant operators.
- \* Promotions stressing value rather than price will find favor within the growing value-conscious consumer.

## Best Blue Cheese Chosen

Treasure Cave Blue Cheese, manufactured by Swift & Company, recently was chosen America's best blue cheese by a panel of international cheese experts.

Treasure Cave was given a score of 96.9 out of a possible perfect score of 100 in the World Cheese Championship held in Green Bay, WI.

Judging was based on taste, texture, "finish" or appearance, and mold distribution.

Every major cheese manufacturer in the world was invited to enter the contest staged by the Cheese Makers Association of Wisconsin. There were a total of 394 entries in 11 categories from 12 countries including France and Denmark and 14 states.

Treasure Cave is aged over 120 days in whitewashed sandstone caves carved out of bluffs overlooking the Straight River in Faribault, MN. These caverns have a natural temperature that is ideal for blue cheese and are kept at a constant humidity. Skilled cheesemakers develop the rich, full flavor of the cheese and turn each wheel by hand many times during the formation stages.

Treasure Cave blue cheese is available in 4-ounce cold pack, pre-crumbed and in a 6-pound deli wheel in supermarket dairy cases, nationwide.

## California Almond Industry

1982 was another good year for California's Almond industry. That's welcome news for food manufacturers using the golden nut from the Golden State.

The 1982 crop is now estimated at 365 million meat pounds. The yield is down, according to the Almond Board of California, due to rain which occurred during the blossoming season this spring. However, packers have good inventories and still offer consumers the largest supply of almonds in history, according to the Almond Board's crop monitoring program.

Good product availability this year marks the beginning of a new era for the almond market, according to Emil Loe of the Almond Board of California. Buyers can expect a stable supply of almonds from year to year.

California's almond growers are committed to producing more and more almonds for the domestic and industrial markets. New trees come into production each year, and orchard yields continue to improve thanks to Almond Board-sponsored research. The industry predicts a 500-million pound harvest soon.

## Food Plant of the Future

The food plant of the future will be completely automated, computer controlled and powered by a small atomic cell that will need to be refueled only at eight-year intervals.

So predicts Richard H. Wegener, a nationally recognized expert on food plant design.

In a speech prepared for delivery at the International Exposition of Food Processors, Wegener, a staff consultant of The Austin Company, engineers and builders, said tomorrow's food plants would be odorless, wastefree and efficient to a degree never before attainable.

Since all aspects of operation will be actuated by computer, Wegener said, the manager of the future food plant will need only to monitor a small console that will control production, inventory and maintenance.

The workforce of this 21st Century plant, Wegener forecast, will consist of minicomputers, microprocessors, lasers and robots.

The minicomputer will manage supplies of energy, raw and finished products, and packaging materials.

The microprocessors will control such process functions as measuring, dumping and mixing.

Lasers will handle cutting, separating, dicing, chopping, peeling and slicing. And robots will replace both skilled and unskilled labor.

Since there will be virtually no operating personnel in these plants, illumination will be minimal, and temperatures will be maintained at levels that in conventional plants would be intolerable to workers.

Products will flow through the entire production sequence in a uninterrupted straight line, with materials of production moving automatically from storage to the exact point of use.

The design and construction of food plants in the next century will also involve radical use of new construction materials and engineering systems, Wegener said.

So remarkable will be these automated facilities, says Wegener, that many people will want to see them in operation. But, he adds, in order to prevent microbial contamination, spectators will not be permitted to enter the actual operating areas. Instead, special visitors' galleries will be installed so as to isolate humans from the controlled environment.

According to Wegener, most such plants will be decentralized satellite operations of large corporations, located near the sources of raw materials. But executives at the parent companies, in some cases based hundreds of miles away, will be able to keep tabs on

their slave operations through master computers at headquarters.

As envisioned by Wegener, the food plant of the future will operate 20 hours per day, seven days per week. This, he believes, will not only maximize production, but will also accelerate accounting depreciation and generate payback much faster than is now possible.

As a member of the Austin staff, Wegener has been involved in the planning and design of some of the nation's largest and most sophisticated food-processing facilities. The Austin Company is headquartered in Cleveland, OH.

## Foodservice Area Sanitizer

GAF Corporation recently announced that two of its BIOPAL Iodophor formulations have received EPA approval for use as sanitizers in food service areas.

BIOPAL NR-1 sanitizer is recommended for general use in hospitals, restaurants, and for general institutional uses, EPA Reg. 1526-24.

BIOPAL NR-11 sanitizer is recommended as a cleaner for poultry and livestock buildings and equipment, veterinary quarters and equipment, milk handling and processing equipment, and machines, EPA Reg. 1529-23.

Both BIOPAL iodophor formulations are one-step cleaner disinfectants containing iodine as the broad-spectrum germicide complexed with nonionic surfactants.

They are effective against influenza A2 (Hong Kong) and Herpes Simplex viruses on environmental surfaces at 75ppm iodine. At 1000 ppm iodine, both products can be used as disinfectants against bacteria, pathogenic fungi, and as tuberculocide on precleaned environmental surfaces.

BIOPAL NR-1 and BIOPAL NR-11 iodophors qualify as detergent sanitizers that do not require potable water rinse after use on food processing equipment and utensils as specified in the Code of Federal Regulations, Title 21, Section 178.1010, Sanitizing Solutions, Paragraph (b) (5).

For more information on BIOPAL Iodophors, please write to GAF Corporation, Specialty Surfactants, 140 West 51 Street, New York, NY 10020.



## Brucellosis Information System

Minnesota will be part of a new computerized information system, BIS (Brucellosis Information System), that will provide fast, accurate information in the state-federal brucellosis eradication effort, says University of Minnesota extension veterinarian Ray Solac.

"A remote job entry stations is being set up and training is being held for Minnesota personnel involved in the program," Solac says. "This includes people from the Minnesota Bureau of Animal Health and USDA's Animal and Plant Health Inspection Service. Information from the Minnesota brucellosis program will be fed into the computer starting March 1."

Central to BIS is a national data base located at USDA's Computer Center in Fort Collins, CO. Solac says the data base will contain records of tests taken on farms and ranches and at livestock markets and slaughtering plants. In the future, it will also include information about quarantines, herds pending test, infected herds, brucellosis ring tests and calfhood vaccinations.

"This information will be available to state and federal officials using the system, which is scheduled for completion by October 1, 1984," Solac says. "Minnesota cattle owners will receive a copy of the test record after completion of laboratory tests."

Solac says brucellosis, which causes cows to abort, was nearly eliminated from Minnesota by cattle owners conscientiously following a program of testing, quarantine, slaughter of infected animals, and vaccination. Yet, because of recent outbreaks—which have been traced to imported cattle—five quarantined herds remain in the state. He says BIS will make possible the rapid exchange of accurate information between states to help trace cattle of questionable status.

Fourteen states, including Iowa and Missouri, are now equipped to put data in the BIS system. Solac says 11 more, including Minnesota, Nebraska, Wyoming and Colorado, will be added to the system in the coming months. All states are expected to be processing large volumes of brucellosis program information by the fall of 1984.

## CPC Foodservice Announced

CPC North America has announced the formation of CPC Foodservice, a new organization to facilitate the

expansion of the company's U.S. foodservice products business. Foodservice products previously marketed by CPC's Best Foods Unit and S.B. Thomas, Inc. will not be marketed solely by CPC Foodservice headquartered in Englewood Cliffs, NJ.

Products to be sold by CPC Foodservice include: *Hellmann's* and *Best Foods* mayonnaise, *Skippy* peanut butter, *Thomas'* English muffins, *Mazola* corn oil, *Argo* corn starch, *Karo* syrups, and the *Knorr Swiss* lines of soups, sauces, desserts, and gravies.

## Process Sorghum Grain Methods

It pays to process sorghum grain before feeding it to cattle but some methods pay much more than others, according to Dr. Lowell Schake, Professor of Animal Science at Texas A & M University.

The total economic advantage of processing sorghum grain fed to cattle in Texas feedlots ranges from \$2 to \$9 per head, compared to feeding dry, rolled sorghum.

Texas feedlot managers save from \$8 million to \$28 million worth of grain per year by using one of the more popular grain processing methods, according to Schake's recently published data on research done for the Texas Agricultural Experiment Station.

The scientist explained that such savings considered all grain processing cost and stated that much of the favorable response was due to improvement in utilization (digestion) of the processed grains.

Most feedlot steers gain 450 pounds in about 140 days while consuming 3000 pounds of feed, of which two-thirds is grain.

Schake's data, published in the international scientific journal, *ENERGY IN AGRICULTURE*, indicated that not all grain processing techniques were equal.

Reconstitution, a process which brings grain from air dry (10 to 12% moisture) conditions to moisture levels of 25 to 30% over a 2 to 3 week interval while stored in large sealed silos, offered the greatest economic potential and required the least energy, (electricity, natural gas or diesel) compared to those other methods of processing.

Steam flaking sorghum required the most energy, though it was still profitable. Steam flaking requires about 20 minutes to accomplish; grain is combined with steam before being flaked by large rollers.

The two other grain processing methods investigated used early-harvested sorghum that was mature but not dry enough for conventional dry storage. Many farmers

like this alternative since their crop may be harvest 10 to 20 days sooner than harvesting dry grain.

Schake pointed out, however, that when early harvested sorghum is ground and stored in large trench silos or stored in large ricks after treatment with organic acid preservatives, neither were economically competitive, compared to either reconstitution or steam flaking. Less favorable digestion, more storage time (interest cost) at the feedlot and other factors were involved with these responses.

Estimates of net values per head were \$9.33 for reconstitution, \$2.70 for steam flaking-\$1.11 for early harvested ground sorghum stored in a trench silo, and \$4.59 for early harvested sorghum grain preserved with organic acids. Most Texas feedlots utilized either steam flaking or some form of reconstitution, Schake says.

Because of low fuel costs of reconstitution and its desirable digestibility by cattle, Schake and other scientists have been investigating ways to improve this highly desirable grain processing technique.

Since almost one-fourth of the cost of reconstitution is related to storage cost during 2 to 3 weeks of reconstitution, research has been underway to both simplify this process and shorten the time required for reconstitution, while still retaining desirable attributes.

Both cattle digestion and growth trials have recently indicated that reconstituting sorghum to 38% moisture for one day resulted in cattle performance equal to that observed for sorghum reconstituted at 28% moisture for 2 to 3 weeks. Schake explains that apparently higher grain moisture levels may effectively substitute for less time in the reconstitution process.

"Short-term reconstitution of sorghum could almost double the economic advantages of processing sorghum grain," Schake says, "while freeing yet additional grain for other markets, such as export as food for humans or feed for livestock.

## Septic Tank Systems

With more and more people moving to rural areas and building homes and businesses in the country, more attention needs to be given to the installation of septic tank systems.

"There's more to a good working septic tank system than just digging a hole and installing the unit," says Dr. Bobby Carlile.

"The first step to satisfactory performance by a

conventional septic tank system involves studying the soil and the site for the system before it's installed," points out Carlile, a soil specialists in waste management with the Texas Agricultural Extension Service, Texas A & M University System.

Failure to adequately evaluate soil and site conditions prior to construction is the main cause for failures of conventional septic tank systems, notes the specialist. Soil properties will determine the success or failure of a system. A percolation test is not sufficient.

Carlile advises evaluating such soil properties as texture, structure, drainage, depth to restrictive layers and presence of shrink-swell clays.

He also points out that various site limitations must be known: depth to seasonal or perched water tables, excessive surface or subsurface water flows, areas of cuts and fills, and topographic position of the site (how it fits in with the lay of the land).

"Only after making these evaluations can the soil loading rate be estimated and a system be designed to maximize the site's capability to handle a specified amount of waste from a home or business," says Carlile.

If soils and sites have certain limitations to the effective performance of conventional septic tank system Carlile suggests a number of possible modified or alternative systems: alternating field systems, low pressure dosing system, serial distribution system, V-trench systems, gravel-less pipe systems, partial evapotranspiration systems, mound systems, recirculating sand filters, aerobic treatment systems, spray disposal systems and oxidation ponds.

## Paperboard Carton Advantages

Paperboard cartons are cracking the glass milk bottle market all over the world. From Europe to the Pacific Rim, growing industrialization, teeming urban centers, expanding grocery outlets and increasing milk consumption are revealing the advantages paperboard offers in high volume use, making the gable-top milk carton as at home abroad as it is in the U.S.

Each country takes its own path from glass to paperboard milk packaging, but the benefits are universal. Sanitary, lightweight, disposable and nonbreakable, cartons make problems of bottle handling and sterilization obsolete. Providing space for eye-catching graphics and advertising copy, they also offer a

vital marketing edge in grocery chains where thousands of products compete for consumer's attention.

The world's fastest growing bleached paperboard market is the Pacific Rim, and San Francisco-based Potlatch Corp. is its chief supplier.

With a reputation for superior quality, as well as strategic deep water port access from Lewiston and Pomona, Potlatch has garnered more than half the Japanese and Australian bleached paperboard markets, and nearly the entire Korean market.

Japan, the company's largest overseas customer, was first to see the potential for paperboard packaging as its milk consumption and grocery outlets grew.

Japan's dairy business started with local co-ops in the early 1950's. A few years later, the government initiated a school lunch program that included milk.

With Japan's rapid industrial growth of the 1960's supermarkets boomed. Increasing in number from 5,000 in 1966 to 15,000 ten years later, they virtually created the Japanese market for paperboard milk cartons. Between 1972 and 1975, paperboard's share of milk packaging in Japan rose from 13.5 percent to more than 50 percent.

By 1975, the Japanese were consuming five times the milk and four times the dairy products they had 20 years earlier. They also had recognized the benefits of compact and combustible paperboard containers—a major improvement over non-biodegradable glass in this country where land and water conservation are crucial.

Liquid-tight cartons most often contain milk, but the Japanese are using them to package other products as well, such as high quality sake (rice wine). Small gable-top containers are used for fruit juices, flavored milks and coffees in vending machines found in every neighborhood.

Alternative uses for paperboard packaging are turning up in other parts of the Pacific Rim, too. In Australia, Potlatch's second largest export market, flavored milks in liquid-tight containers have captured nearly 20 percent of total fresh milk sales. Fruit juices in two-liter cartons also are major sellers there.

Supermarkets, replacing traditional British dairy bars and "Mom and Pop" groceries, also encouraged the switch to paperboard containers, Collier says.

Ten years ago, paperboard accounted for roughly 25 percent of milk packaging. In 1977, it had risen to nearly 50. Today, it's estimated at serving close to 80 percent of the Australian market.

The most recent growth has been in the Republic of Korea. Starting from zero five years ago, the country more than doubled its gable-top production, from 337

million cartons to 685 million in 1979 alone.

When the Korean government established a dairy in 1970 to supplement the nation's diet, Korea had virtually no dairy cows. Seoul's dairy co-op had to import them.

Several dairies had opened by 1975, and milk consumption soared in the 1980's. A school lunch program now provides milk in one "hop" (180 milliliter) paperboard containers.

Ninety percent of all the cartons in Korea are this size, an indication of the miniscule refrigeration space in Korean homes, which are scaled to fit a country even more crowded than Japan. Korea averages nearly 1,000 people per square mile, with a population of 40 million in an extremely mountainous area slightly larger than Indiana.

Japan, meanwhile, is not only developing new directions in rice wine, vinegar and soy sauce packaging, but taking America's lead in the fast food industry.

While American customers developed growing appetites from pizzas, burgers and shakes, fast-food restaurant suppliers discovered the convenience and economy of square paperboard containers for potato salad, ice cream mixes and other staples.

Since that time, the fast-food phenomenon, already emerging in Korea and prominent in Australia has hit Japan at full force, accounting for a hefty share of restaurant sales. If the Pacific Rim pattern holds, paperboard containers may soon become as Japanese as a burger with fries...to go.

## Supplemental Cattle Feeding

A systematic approach to supplemental feeding can help cattle maintain their condition while keeping a handle on costs.

Supplemental feeding is necessary since cattle can only store protein and minerals in limited amounts, points out Dr. Dennis Herd, beef cattle specialist with the Texas Agricultural Extension Service, Texas A & M University System. However, he suggests providing supplement only if the increase in performance will more than offset its cost or if it's necessary for humane treatment of cattle.

He offers the following general guidelines:

1. Cows graze selectively if given a chance. The

forage they actually consume will be slightly more digestible and contain more protein than the average of all forage in the pasture. Overstocking eliminates the potential for selective grazing and greatly increases the need for, and the expense of, supplementation. On the other hand, many pastures must be supplemented, regardless of the amount of forage, for satisfactory animal performance.

2. Keep a good salt plus 8-12 percent phosphorus mineral, of similar calcium content, out for cattle year round. An exception might be where phosphorus is supplied by complete salt-limited supplements.

3. Begin protein supplementation before cows lose a lot of weight and condition. A killing frost is a definite signal to start in the fall. Protein would also be beneficial during drought periods when grass is dry and tough. It's cheaper to save condition in late summer and fall than it is to feed a poor cow back into shape during late winter.

4. Adequate protein is essential for normal feed or energy intake and digestion. Adding .5 to 1.5 lb. of a 30 to 40 percent protein supplement to low quality forages--those with less than 6 percent crude protein--can increase forage intake as much as 30 to 60 percent and digestion 6 to 12 percent. Such supplementation where forage quantity is plentiful can turn that drastic downhill-slide into a maintenance situation.

5. Energy in 1 to 2 lb. of a high energy supplement may slightly stimulate digestibility (1 to 3 percent) and intake (5 to 10 percent) of poor forages. However, levels above 10 to 12 percent of the diet (2-3 lb. per 1,000 lb. of live weight) will generally slightly depress forage digestibility and have a substitution rather than a supplementary effect on total energy intake.

6. The best way to handle energy-deficient situations is to manage to stay away from them. Improve hay quality. Control calving seasons so quality forage is available when cows and calves need it most. Use fertilization and limited supplementation to be sure cows are in good condition starting the winter, thus greatly reducing the need for high levels of supplementation during the season.

7. Where cows are getting too poor, feed higher levels of supplement required to maintain proper condition or get ready to pay the price of reduced calf crop and weaning weights.

8. This same substitution effect also exists where hay is used to supplement pasture.

9. Use 1 to 2 pounds of a high-protein, high-energy supplement to clean up dead grass in the fall before it rots in mid-winter. Then really haul hay out to cattle as the total feed. Don't tease them with a third to half feed

of hay as it will depress pasture use. Remember that a pasture is used up long before the last bite is gone.

10. Look ahead! Try to stay out of situations calling for high levels of supplementation--it's seldom profitable. On the other hand, a little supplement (even a lot) at the right time can be a profitable management tool.

## Animal Feed Compound Market

Reflecting conditions in the European Economic Community's animal feed compounds market, sales of related additives are projected to increase modestly during the current decade.

According to a study by Frost & Sullivan, Inc., production in most categories--including antibiotics, antioxidants, coccidiostats, emulsifiers, stabilizers, surfactants, colorings, minerals, growth factors and vitamins, will escalate about 8.8% between 1980 and 1991, mirroring the increase for the compounds markets. However, two product types--flavors and preservatives, appear poised for very rapid growth.

The report, *The Marketing of Agricultural Feed Additives in the EEC*, predicts that production of flavors will jump 143% to 345,000 metric tons by 1991 from 1980's figure of 142,000 tons. Sales of crop preservatives are seen climbing 348% to 179,000 metric tons from 40,000 metric tons.

"Preservatives have found an excellent growth market in the field of fodder conservation and there is no doubt, especially in the case of the control of the fermentation process in silage making, that the silage additive has an excellent future," the marketing research firm comments. This market alone is worth about \$27 million.

As noted, growth in additives is pegged to the overall feed compounds market. The study forecasts that EEC production of compounds will eddge up 8.8% from 75.8 million metric tons in 1980 to 82.8 million metric tons by 1991.

With the exception of Italy and France, forecast to show gains of 28.3% and 22.6% respectively, production throughout the EEC is expected to remain relatively stable over the period. Frost & Sullivan explains that the current recession and the overproduction of certain products within the EEC will combine to prevent feed production from expanding to any extent until after 1985.

For more information contact: Customer Service, Frost & Sullivan, Inc., 106 Fulton St., New York, NY 10038. 212-233-1080.

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## Book Review

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**ENERGY MANAGEMENT IN FOODSERVICE.** Nan Unklesbay and Kenneth Unklesbay. AVI Publishing Company, Inc., Westport, CT. 437 pp. 1982. U.S. - \$29.50, elsewhere - \$32.50.

The interesting feature of this book is that the authors offer five energy-managerial policies relating to all aspects of procurement, operation and maintenance for traditional and innovative models of energy-consuming equipment. The five policies, ENERGY SOURCES - ENERGY EFFICIENCY - UTILITY RATES - OPERATING PROCEDURES - MAINTENANCE REQUIREMENTS, can be integrated into basic accounting procedures and managerial and employee training programs in commercial, institutional or military foodservices. This policy theme is discussed throughout the book.

The authors, who are professors at the University of Missouri-Columbia in food science and engineering, respectively, have applied their expertise to foodservice operations. In Chapter One, The National Energy Situation, the Unklesbays state: "The goal of this book is to present to the foodservice manager or prospective manager information of two types. First, information will be presented to enable readers to understand basically what energy is in its various forms, as well as facts about energy supply and demand. Second, detailed information will be presented concerning applied energy management within foodservice operations." Their comprehensive approach to energy management is indicated by topics which include basic energy concepts and laws, describe forms of energy used in foodservice operations, provide information about the energy situation in the U.S. food system, report findings from energy research studies in foodservice facilities, and offer practical techniques for managing energy conservation in foodservices.

The textbook is divided into five parts, which include 16 chapters plus a preface, table of contents and an index. Many chapters have a summary and/or a bibliography. The book contains numerous tables, figures and pictures.

Foodservice educators and practitioners will probably find the chapters in Part I, INTRODUCTORY CONCEPTS, and Part V, TECHNIQUES FOR MANAGING ENERGY CONSERVATION of immediate interest. Parts II, III and IV introduce energy principles, policies and technical information and discuss direct and indirect energy consumption in foodservice. Included are energy use in refrigeration systems; foodservice preparation technology (ovens, fryers, steamers, broilers, griddles and range tops); food holding and service options; heating, ventilation and air conditioning, and energy usage for sanitation and lighting. When it is not possible to replace existing foodservice equipment with energy-efficient models, the authors suggest procedures to modify formulations or recipes as a way to decrease energy consumption. Chapter Ten introduces the six basic principles involved. They are: ingredient temperatures, flavor development, preheating time, volume of production, efficient heat transfer and time-temperature relationships.

Although intended as a textbook, it will take some creative thought on the part of foodservice educators to integrate this text into their existing lectures and courses. The amount of technical information in some chapters can almost overwhelm the reader, yet undoubtedly, the book is a valuable reference for anyone wishing to become familiar with various aspects of energy - an increasingly important resource to manage in foodservices.

**M. Eileen Matthews**  
*Department of Food Science*  
*University of Wisconsin-Madison*  
*Madison, WI 53706*

# AFFILIATE NEWSLETTER . . .

## Scenes from Your Associations Office

Please renew on time next year **BEFORE** the deadline. Save your association time, money and Jeanine's fingers from sending out back issues to you. It's just as easy to do it on time.



*Please renew on time next year.*

Affiliate refunds and updated membership lists are handled each month by Suzanne Trcka (Turch'-ka). Affiliate officers are encouraged to call or write Suzanne with any affiliate refund questions. 515-232-6699.



*Suzanne updates and refunds affiliate officers each month.*



*Jeanine adds on new members to the Apple III Computer.*



*Suzanne updates and creates new listings.*



*Earl O. Wright, Executive Secretary.*



*Kathy R. Hathaway, Associate, hangs NMC plaque given to IAMFES for support of their mastitis program.*

## *Ralston Purina Farm Dinner and Entertainment Featured at the 70th IAMFES Annual Meeting in St. Louis, MO*



Checkerboard Square located in St. Louis, Missouri is the international headquarters of Ralston Purina Company. The company also maintains an experimental agricultural farm located outside the City of St. Louis. Through the company's hospitality, registrants at the 70th International Association of Milk, Food and Environmental Sanitarians Meeting will have the opportunity to visit the farm, take a short bus tour of the farm with brief stops at the experimental dairy farm and other appropriate locations. This will be followed by a family style country fried chicken dinner and variety show entertainment. Don't miss this one! August 7-11, 1983. Registration form included in this issue.

## New Product News

Simple and economical tamper-resistant sealing for a variety of package forms is possible with the cap-sealing systems available from Lindberg/Cycle-Dyne, A Unit of General Signal, Chicago.

Available with R.F. radio frequency or solid state power supplies, these field-proven systems combine the advantages of foil inserts with recent advances in induction heating. All forms of packaging relating to plastic, glass and paper-board are being successfully sealed using this method, including hermetic and leak-proof sealing.

The Lindberg/Cycle-Dyne system offers several significant advantages:

**Space savings:** Power generation equipment can be remotely located as much as 25 feet away from the production line using an optional remote head and transformer. Only 8 inches of on-line space is required for complete installation of the work coil.

**Versatile:** Seal caps of varying sizes and bottles of varying heights can be accommodated with a simple adjustment of the work coil. Average time to heat and seal is approximately 1/4 second per package unit. Conveyor line rates of speed can range up to 125 feet per minute.

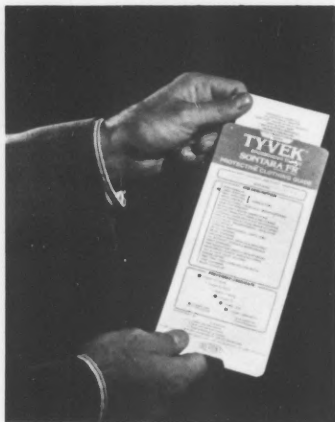
**Safe:** Lindberg/Cycle-Dyne equipment is designed to work effectively on 100 volts. The voltage is so low that the work coil can even be submerged in water; waterproofing of the remote head facilitates wash down.

For more information contact: Lindberg/Cycle-Dyne, A Unit of General Signal, 2450 W. Hubbard St., Chicago IL 60612. 312-942-2600.



*Lindberg/Cycle-Dyne Cap-Sealing System*

Protective Clothing Guide, Free from Du Pont, this handy pocket-sized "slide rule" provides quick cross reference information on hazard irritant, job description, and preferred clothing candidate. It also covers the barrier performance of "Tyvek" spunbonded olefin to a number of hazardous materials and gives permeation data and percent of penetration by fabric type. For more information write Du Pont, Room G-39715, Wilmington, DE 19898.



*Slide Rule Clothing Reference*

RefrigiWear, Inc. is pleased to announce the availability of its exciting new catalog for 1983. A complete line of insulated sub-zero work and sporting wear is featured in a brand new format, making the catalog easier to read and work with, than ever before.

For your copy, write using your letterhead to: RefrigiWear, Inc. 71 Inip Drive, Inwood, NY 11696.



The TEAT-MASTER\* teat-dip applicator, from Babson Bros. Co., builder of SURGE dairy farm equipment, combines the coverage of teat-dip cups with the convenience of teat-dip sprayers.

This new power-spray system features a nozzle to apply the teat dip and a conical-shaped cup to minimize spray drift and concentrate the teat dip on the teat. A quick squeeze of the trigger sprays teat dip upward for total coverage.

A seven-week, independent university trial recently concluded that teat spraying with SURGE TEGRAGON teat dip and the SURGE TEAT MASTER reduced the new infection rate of *Streptococcus agalactiae* by 73.4 percent.

The fresh spray each time avoids contamination and "settling out." Because the teat dip is pumped from a bulk container at a constant pressure, you don't have to stop milking to refill teat-dip dispensers. Spillage is eliminated, thus saving money.

For more information contact: Babson Bros. Co., 2100 S. York Rd., Oak Brook, IL 60521.



TEAT-MASTER from Babson Bros. Co.

The Deltangular-3, a three-gallon plastic bottle in a specially designed corrugated container, and a six-gallon Twin-Pak, are now available from Container Corporation of America. These highly economical packages offer food, agricultural chemical and janitorial compound manufacturers increased sales volume without the overflow problems of many current two and one-half gallon containers or five-gallon Twin-Paks.

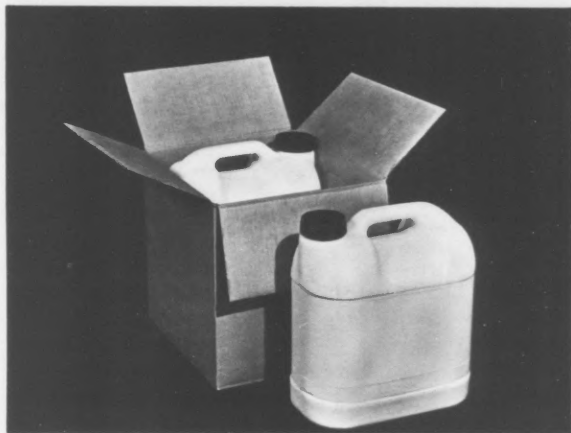
Produced by the CCA Plastics Division, the Deltangular three-gallon container is made from high density virgin polyethylene that meets current FDA standards for food packaging.

The new containers are easy to handle and fit

commercial filling equipment. Integrally-molded top handles provide easy carrying while standard openings allow easy filling and emptying. The Deltangular-3 polyethylene-corrugated combination allows high, stable stacking. A rectangular design provides high pallet efficiency.

Prominent billboard space for labeling and product identification is an advantage of the corrugated shipper. The polyethylene bottles are manufactured in yellow, natural or translucent white.

For more information contact: Amy J. Bacon, Container Corporation of America, 33 W. Monroe, Chicago IL 60603. 312-580-5375.



The Deltangular-3 from Container Corporation of America

To add a new dimension of versatility to its line of sanitary stainless steel positive displacement pumps, Waukesha Foundry Division, Abex Corp. of Waukesha, Wis., announces its new 3-way mounting option gear case. As a standard feature on Models 15-30-60-130-220, this new capability allows users to mount pumps in any of three positions without removing shafts when changing shaft positions.

By simply turning the pump over 180 degrees, the shaft can be changed from top to bottom drive. For vertical fluid flow, the pump can be mounted on its side.

Waukesha's Universal Series P.D. pumps are used extensively in the food processing, dairy, bakery, beverage and pharmaceutical industries.

For more information contact: Waukesha Foundry Div., Abex Corp., 1300 Lincoln Ave., Waukesha, WI 53186.

## St. Louis — in the heart of it all

You are invited to attend the 70th Annual Meeting of IAMFES, August 7-11, 1983 at the Marriott Pavillion in beautiful St. Louis, MO. Educational meetings, interminglings with fellow professionals and entertainment has been planned for this yearly event. You'll also enjoy the Ralston Purina Farm outing and dinner. Spouse's entertainment is once again an outstanding attraction. Don't miss it!



### ADVANCED REGISTRATION FORM for the 70th IAMFES ANNUAL MEETING August 7-11, 1983, St. Louis, MO

#### Mail Meeting Registration Today To:

Vernon R. Cupps  
Milk Control Service  
St. Louis Health Division  
PO Box 14702  
St. Louis, MO 63178  
314-658-1112

Please check where applicable:

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| <input type="checkbox"/> Affiliate Member   | <input type="checkbox"/> 30 year Member |
| <input type="checkbox"/> IAMFES Member      | <input type="checkbox"/> 50 year Member |
| <input type="checkbox"/> Past President     | <input type="checkbox"/> Non-Member     |
| <input type="checkbox"/> Executive Board    |   |

ADVANCE REGISTER NOW BEFORE JULY 1, 1983 . . . AND SAVE  
(refundable prior to June 30 if you don't attend)

Make Checks Payable to . . . IAMFES MEETING FUND

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Registration	<input type="checkbox"/> \$30	<input type="checkbox"/> \$10	Free	<input type="checkbox"/> \$40	<input type="checkbox"/> \$35	<input type="checkbox"/> \$12	Free	<input type="checkbox"/> \$45
Ralston Purina Farm Outing and Dinner	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15	<input type="checkbox"/> \$17	<input type="checkbox"/> \$17	<input type="checkbox"/> \$17	<input type="checkbox"/> \$17
Banquet & Cocktail hr.	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15	<input type="checkbox"/> \$15	<input type="checkbox"/> \$17	<input type="checkbox"/> \$17	<input type="checkbox"/> \$17	<input type="checkbox"/> \$17

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MAIL this bottom section to: Marriott Pavilion, One Broadway, St. Louis, MO 63102, 314-421-1776  
IAMFES 70th Annual Meeting August 7-11, 1983

Arrival Date & time \_\_\_\_\_ Departure Date \_\_\_\_\_

Name \_\_\_\_\_ Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

\*Arrangements have been made for a flat rate of \$48 per room with a maximum of 4 people to the room. These rooms will have 2 double beds. \$5.00 parking charge per day, includes in and out privileges.

# Calendar

May 16-20, 1983---INTERNATIONAL DAIRY FEDERATION SYMPOSIUM, Denmark. For more information contact: Canadian National Committee International Dairy Federation, 549 Sir John Carling Building, Ottawa K1A 0C5 Canada, 613-994-9537.

May 23-25, 1983---TRACE ANALYSIS OF FOODS: Flavor Problems and Contaminants. Univ. of MN, St. Paul, MN. For more information contact: Gary Reineccius, Department of Food Science and Nutrition, University of MN, St. Paul, MN 55108.

May 29-June 1---CANADIAN INSTITUTE OF FOOD SCIENCE AND TECHNOLOGY - ANNUAL CONFERENCE AND EXHIBITION. Chateau Laurier Hotel, Ottawa, Canada. For more information contact: Alex Hunt, Food Branch Industry Trade and Commerce 235 Queen Street, Ottawa, Ont. Canada K1A 0H5, 613-995-8107.

June 1-3, 1983-"ROLES OF CEREALS AND LEGUMES IN THE FOOD SUPPLY" three day symposium sponsored by the Nutritional Sciences Council of Iowa State University. For more information contact: Dr. J. Dupont, Dept. of Food and Nutrition, Iowa State University, Ames, IA 50011.

June 8, 1983-NEBRASKA DAIRY INDUSTRIES ASSOCIATION ANNUAL SPRING DAIRY OUTING, Beemer, NE. For more information contact: T. A. Evans, Executive Secretary, 134 Filley Hall, East Campus, UN-L, Lincoln, NE 68583.

June 13-14, 1983-CONFERENCES ON THE HUMAN-ANIMAL BOND, University of Minnesota. Contact: Center to Study Human-Animal Relationships and Environment 1-117 Health Sciences Unit A 515 Delaware St. S.E., Minneapolis, MN 55455.

June 17-18, 1983-CONFERENCES ON THE HUMAN-ANIMAL BOND, University of California, Irvine. Contact: California College of Medicine A121 Medical Sciences I, Irvine, CA 92717.

July 3-8, 1983---67TH ANNUAL SESSION OF THE INTERNATIONAL DAIRY FEDERATION, Oslo, Norway. For further information, contact Harold Wainess, Secretary U.S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093, 312-446-2402.

July 9-14, 1983-ANNUAL EDUCATION CONFERENCE, National Environmental Health Association, Holiday Inn Scope, Norfolk, VA. Contact: Leon F. Vinci, Director of Health, City of Middletown, Middletown, CT 06457-1300.

July 16-23, MICROBIOLOGY WORKSHOP, Kansas State Univ. For more information contact: Dr. Daniel Fung, Call Hall, KSU, Manhattan, KS 66506, 913-532-5654.

August 1-5, 1983-"BIOTECHNOLOGY: MICROBIAL PRINCIPLES AND PROCESSES FOR FUELS, CHEMICALS AND INGREDIENTS" Massachusetts Institute of Technology, Cambridge, MA 02139. Contact: Director of Summer Session, MIT, Room E 19-356, Cambridge, MA 02139.

Aug. 7-11, 1983---70th ANNUAL MEETING OF IAMFES. Marriott Pavilion, St. Louis, MO. For more information contact: Kathy R. Hathaway, IAMFES, PO Box 701, Ames, IA 50010, 515-232-6699.

Aug. 7-11, 1983---23rd ANNUAL MEETING, THE HOSPITAL, INSTITUTION, AND EDUCATIONAL FOOD SERVICE SOCIETY. Fairmont Hotel, New Orleans, LA. HIEFSS Expo '83 will be open on August 9 and 10. For more information contact: Carolyn Isch, Assistant Executive Director, HIEFSS, 4410 West Roosevelt Road, Hillside, IL 60162, 312 449-2770.

Aug. 14-19, 1983---5th WORLD CONFERENCE ON ANIMAL PRODUCTION, Nihon Toshi Center, Tokyo, Japan. For more information contact: The 5th WCAP Conference Secretariat, c/o National Institute of Animal Industry, Tsukuba Norindanchi, PO Box 5, Ibaraki 305, Japan.

Sept. 7-9---SYMPOSIUM ON LACTIC ACID BACTERIA IN FOODS: GENETICS, METABOLISM AND APPLICATIONS. Wageningen, The Netherlands. Organized by The Netherlands Society for Microbiology. For more information contact: Dr. P. M. Klapwijk, Unilever Research Laboratory, P. O. Box 114, 3130 AC Vlaardingen, The Netherlands.

Sept. 14-15, 1983 NEBRASKA DAIRY INDUSTRIES ASSOCIATION 29TH ANNUAL CONVENTION, Bellevue, NE. For more information contact: T. A. Evans, Executive Secretary, 134 Filley Hall, East Campus, UN-L, Lincoln, NE 68583.

Sept. 18-23---SIXTH WORLD CONGRESS OF FOOD SCIENCE & TECHNOLOGY, Dublin, Ireland. For more information contact: Sixth World Congress of Food Science and Technology, Congresses & Exhibition Ltd. 44, Northumberland Rd., Dublin, 4, Ireland.

Sept. 20-22---NEW YORK STATE ASSOCIATION OF MILK AND FOOD SANITATION ANNUAL MEETING. Hotel Syracuse, Syracuse, NY. For more information contact: David Bandler, Stocking Hall, Cornell University, Ithaca, NY 14853.

Oct. 22-26---FOOD AND DAIRY EXPO-83, McCormick Place, Chicago, IL. For more information contact: Dairy and Food Industries Supply Association, 6245 Executive Blvd., Rockville, MD 20852, 301-984-1444.

October 26-28---WORKSHOP IN FOOD FLAVOR: A HANDS ON COURSE IN FLAVOR DEVELOPMENT, MANUFACTURE, AND USE. For more information contact: G. Reineccius, Department of Food Science and Nutrition, Univ. of MN, St. Paul, MN 55108.

Nov. 2-4, 1983 9TH ANNUAL FOOD MICROBIOLOGY RESEARCH CONFERENCE, Chicago, IL. For more information contact: Dr. J. M. Goepfert Canada Packers, Ltd., 2211 St. Clair Avenue West, Toronto, CN M6N 1K4.

Nov. 22-24, 1984---14th ANNUAL SYMPOSIUM ON THE ANALYTICAL CHEMISTRY OF POLLUTANTS, 3rd International Congress on Analytical Techniques on Environmental Chemistry-Expoquimia, Barcelona Spain. For more information write: Av. Reina Ma. Christina Palacio No. 1, Barcelona-4 Spain.

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## 1984

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August 3-9, 1984---IAMFES ANNUAL MEETING, Edmonton, Alberta, Canada.

Nov. 22-24, 1984---14th ANNUAL SYMPOSIUM ON THE ANALYTICAL CHEMISTRY OF POLLUTANTS, 3rd International Congress on Analytical Techniques on Environmental Chemistry-Expoquimia, Barcelona Spain. For more information write: Av. Reina Ma. Christina Palacio No. 1, Barcelona-4 Spain.

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# JFP Abstracts

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**Occurrence of *Yersinia enterocolitica* in Raw and Pasteurized Milk,** Moustafa K. Moustafa, Ahmed A-H. Ahmed and Elmer H. Marth, Department of Food Science and the Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

*J. Food Prot.* 46:276-278

Raw milk (100 samples) and pasteurized milk (100 samples) were assayed for presence of *Yersinia enterocolitica*, using four different enrichment and post-enrichment techniques. Isolation of *Y. enterocolitica* was made on MacConkey agar and Cefsulodin-Irgasan-Novobiocin (CIN) agar directly from incubated broths containing the milk, and after treatment of enrichment broths with a potassium hydroxide solution. Twelve samples of raw milk and one of pasteurized milk contained *Y. enterocolitica*. Nearly all isolates were found after KOH treatment. All isolates except that obtained from the pasteurized milk sample produced detectable levels of heat-stable enterotoxin. However, none of the 13 isolates agglutinated in WA-SAA, an antiserum specific for virulent *Y. enterocolitica*.

**Microbiological Studies on Gas-Packaged Crumpets,** J. P. Smith, E. D. Jackson and B. Ooraikul, Department of Food Science, The University of Alberta, Edmonton, Alberta, Canada T6G 2P5

*J. Food Prot.* 46:279-283

English-style crumpets, a chemically leavened bakery product, had a shelf life of 14 d when packaged in a CO<sub>2</sub>:N<sub>2</sub> (3:2) gas atmosphere and stored at ambient temperature. Packages were visibly swollen after 14 d due to additional CO<sub>2</sub> production, and the product had a distinct fruity odor when opened. Initial microbiota of the product, isolated from anaerobic plates, consisted entirely of facultative anaerobic spore-forming strains of *Bacillus licheniformis*. After 7 d at 25°C the spoilage pattern changed, with lactic acid bacteria (LAB) accounting for almost 100% of the total anaerobic plate counts (TPC) on APT and MRS (pH 5.5) agar media. Subsequently, the number of LAB declined slightly in relation to the TPC, and *B. licheniformis* strains reappeared. As the LAB increased in numbers, there was a concomitant increase in CO<sub>2</sub> and lactic acid production and a drop in pH of the product. Metabolic activity continued even after the LAB were in the maximum stationary phase. *Leuconostoc mesenteroides* was subsequently identified as the major CO<sub>2</sub>-producing isolate.

**Gas Chromatographic Determination of Propionic Acid and Sodium and Calcium Propionate in Bread and Cake,**

Yasuhide Tonogai, Amara Kingkate, Wanthanee Thanissorn and Udomkiat Punthanaprat, National Institute of Hygienic Sciences, Osaka Branch, 1-1-43, Hoenzaka, Higashi-ku, Osaka, Japan, and Division of Food Analysis, Department of Medical Sciences, Yod-se, Bangkok 1, Thailand

*J. Food Prot.* 46:284-286

A simple and accurate method for determination of propionic acid and sodium and calcium propionate was developed. These compounds were simultaneously extracted with ethyl acetate made acidic with phosphoric acid. The extract was injected directly into the gas chromatograph. Calibration curves of the three compounds ranged from 25-125 µg/ml. The detection limit of these compounds were 25 ppm by this method. Commercial biscuits, breads and cakes were analyzed by this method and all of them contained less than the limit permitted by Thai regulations.

**Effect of Aerobic Storage before Vacuum Packaging on the pH, Color and Bacterial Flora of Beef,** E. A. Foegeding, H. D. Naumann and W. C. Stringer, Department of Food Science and Nutrition, University of Missouri, Columbia, Missouri 65211

*J. Food Prot.* 46:287-291

Beef was stored aerobically for 2 or 6 d at 1 ± 1°C before vacuum packaging. Total numbers of aerobic bacteria, *Pseudomonas* spp., *Brochothrix thermosphacta* and lactic acid bacteria were determined by selectively plating stored samples. Meat color was evaluated with a color difference meter and a color panel. Aerobic plate counts, numbers of pseudomonads and *B. thermosphacta*, and pH each were higher in samples held aerobically for 6 d compared with those held aerobically for 2 d. The major effect of delayed vacuum packaging was to slow the growth of lactic acid bacteria and minimize the number of pseudomonads. The variation among treatments was similar in *Pseudomonas* spp. population for 21 d and in pH for 7 d, and there was no significant effect of packaging treatment in color. Results indicate that the initial treatment variations were lost as storage time progressed.

**Prevalence of *Campylobacter jejuni* on Turkey Wings at the Supermarket Level,** Husein M. Rayes, Constantin A. Genigeorgis and Thomas B. Farver, Department of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California, Davis, California 95616

*J. Food Prot.* 46:292-294

*Campylobacter jejuni* was found on 64.1% of 184 packaged fresh and on 55.6% of 81 frozen turkey wings purchased from local supermarkets over a 2-month period. The prevalence of the agent on the wings varied with sampling day. For fresh wings (12 samplings), it varied from 33.3% to 100% and for frozen wings (9 samplings), it varied from 17% to 100%. At a detection limit of 300 cells/wing, the mean number of *C. jejuni* on the positive fresh wings was 740 cells/wing (range 616 to 832) and on the frozen wings 890 cells/wing (range 661 to 1096). All fresh wings were purchased at the time of arrival at the supermarkets. Thirty packages of wings collected from the refrigerated shelves (2 to 4-d old) had no detectable *C. jejuni*.

**Destruction of Aflatoxin B<sub>1</sub> with Sodium Bisulfite: Isolation of the Major Product Aflatoxin B<sub>1</sub>S,** Winston M. Hagler, Jr., James E. Hutchins and Pat B. Hamilton, Department of Poultry Science, North Carolina State University, Raleigh, North Carolina 27650

*J. Food Prot.* 46:295-300

The reaction between aflatoxin B<sub>1</sub> and sodium bisulfite yielded almost quantitatively a light yellow, highly fluorescent water-soluble product, aflatoxin B<sub>1</sub>S. Reverse-phase (C<sub>18</sub>) high pressure liquid chromatography (with and without the paired-ion technique), and normal- and reverse-phase thin layer chromatography revealed the ionic product at greater than 98% yield. The product's intense fluorescence, identical in color to that of aflatoxins B<sub>1</sub> and B<sub>2</sub>, supported the conclusion that the lactone of aflatoxin B<sub>1</sub> was not opened by bisulfite and that the reaction took place at some other location on the aflatoxin B<sub>1</sub> molecule. The UV spectrum of aflatoxin B<sub>1</sub>S exhibited identical absorbance maxima to aflatoxin B<sub>1</sub> and these maxima exhibited no bathochromic shift in alkaline solution. Aflatoxin B<sub>1</sub>S exhibited change to bright yellow fluorescence under 365 nm UV light after being sprayed with 20% sulfuric acid in methanol. The IR spectrum of aflatoxin B<sub>1</sub>S indicated the vinylene group of the furofuran ring system of aflatoxin B<sub>1</sub> was missing from aflatoxin B<sub>1</sub>S, whereas the coumarin-cyclopentenone ring system present in aflatoxin B<sub>1</sub> was intact in aflatoxin B<sub>1</sub>S. Furthermore, the IR spectrum suggested the presence of a sulfonate moiety in B<sub>1</sub>S. Proton NMR spectra of aflatoxin B<sub>1</sub>S also indicated that the cyclopentenone region was intact and that the furofuran had undergone reaction with bisulfite. Integration of the NMR spectrum of aflatoxin B<sub>1</sub>S revealed 12.75 to 13.25 protons, consistent with a bisulfite addition across the double bond of aflatoxin B<sub>1</sub> to form aflatoxin B<sub>1</sub>S. Aflatoxins B<sub>2</sub> and G<sub>2</sub> were not susceptible to the action of bisulfite, again supporting the conclusion that bisulfite acts at the unsaturation in the furofuran ring system of aflatoxin B<sub>1</sub>. There was no evidence that aflatoxin B<sub>2</sub> was produced in the degradation of aflatoxin B<sub>1</sub> by bisulfite under these conditions. The fact that previously reported chemical modifications of this furofuran ring system resulted in reduced toxicity support the potential utility of bisulfite as a means of detoxification of aflatoxin-contaminated commodities.

**Fate of Mycotoxins During Processing of Foodstuffs I-Aflatoxin B<sub>1</sub> During Making of Egyptian Bread,** A. A. El-Banna and P. M. Scott, Food Research Division, Health Protection Branch, Health and Welfare Canada, Ottawa, Ontario, Canada K1A 0L2

*J. Food Prot.* 46:301-304

Fate of aflatoxin B<sub>1</sub> during making of Egyptian bread from whole wheat flour spiked with aflatoxin B<sub>1</sub> (0.1 µg/g) was investigated. Determinations were made by reversed-phase high pressure liquid chromatography (HPLC) after formation of aflatoxin B<sub>2a</sub> with trifluoroacetic acid. An average of 19% of the toxin added was destroyed after preparation of fermented dough, whereas subsequent baking (350°C, 2 min) reduced the amount of toxin by an additional 36% to give a total average destruction of 55%. Thus risks remain in preparing Egyptian bread from aflatoxin-contaminated wheat flour.

**Accelerated Decrease of Enterobacteriaceae Counts During Ripening of Raw Milk Manchego Cheese by Lactic Culture Inoculation,** Pilar Gaya, Margarita Medina and M. Nunez, Departamento de Bioquímica y Microbiología, Instituto Nacional de Investigaciones Agrarias, Apartado 8111, Madrid, Spain

*J. Food Prot.* 46:305-308

Fourteen vats of Manchego cheese were manufactured from uncooled raw sheep milk; 7 experimental vats inoculated with 1% *Streptococcus lactis* culture in skim milk and 7 non-inoculated control vats were simultaneously manufactured. Experimental cheeses showed significantly lower pH values than control cheeses throughout the curing period, average differences exceeding 0.2 pH unit at all stages of ripening. Mean log counts of vat milks were 5.90 for *Enterobacteriaceae*, 5.64 for coliforms and 4.00 for fecal coliforms. After 60 d, log counts of these three microbial groups in experimental cheeses averaged 1.83, 1.46 and 1.02, respectively, while their mean values in control cheeses were 3.78, 3.60 and 2.64; differences between experimental and control cheeses were all significant at the 5% level. *Enterobacter cloacae*, *Escherichia coli* and *Hafnia alvei* were the only *Enterobacteriaceae* species detected in 60-d-old cheeses. Sensory evaluation data, salt and water content of experimental and control cheeses showed no significant differences.

**Analytical Technique for Measuring Transmission of Light Through Milk Carton Materials,** Kurt H. Nelson and William M. Cathcart, Analytical Sciences, Corporate Research Center, International Paper Company, P.O. Box 797, Tuxedo Park, New York 10987

*J. Food Prot.* 46:309-314

Light transmissions through milk carton paperboards, milk cartons, and blow-molded polyethylene containers were measured in the 350 to 800 nm region using a Cary 17D spectrophotometer equipped with a scattered transmission accessory. The paperboards had S-shaped transmission curves and were nearly opaque to wavelengths below 400 nm. Transmission at 800 nm averaged 5-3/4, 5-1/2, 4-1/2, 3, and 3% for the Eco Pak™, half-pint, quart, half-gallon, and gallon carton paperboards, respectively. Depending on wall thickness and wavelength of incident light, polyethylene containers had from 50 to 70% transmission. The effectiveness of different colored inks in reducing light transmission was compared using printed and unprinted areas of the paperboard cartons. Yellow, orange, gold, red, brown, and black inks opacified half-gallon cartons to wavelengths below 500 nm. Light transmission was reduced throughout the visible region by black, brown, and blue inks.



**Growth of Mice Fed Milk Fermented with *Lactobacillus acidophilus***, Katharine K. Grunewald and Laura K. Mitchell, Department of Foods and Nutrition, Kansas State University, Manhattan, Kansas 66506

*J. Food Prot.* 46:315-317

The effects of milk fermented by *Lactobacillus acidophilus* on growth of Swiss albino mice were tested. Mice were fed a stock diet and drinking water containing one of these milk additions: no supplementary milk (control), 10% liquid skim milk, 10% milk containing a viable culture of *L. acidophilus*, or 10% milk fermented by *L. acidophilus*. After 4 weeks mice receiving the fermented acidophilus milk had consumed more total feed and gained more weight than had the control mice, but not more than those fed the liquid skim milk or the nonfermented acidophilus milk.

**Behavior of Virulent *Yersinia enterocolitica* During Manufacture and Storage of Colby-like Cheese**, Moustafa K. Moustafa, Ahmed A-H. Ahmed and Elmer H. Marth, Department of Food Science and the Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

*J. Food Prot.* 46:318-320

The ability of *Yersinia enterocolitica* to grow and survive during manufacture and storage of Colby-like cheese was determined. Pasteurized whole milk artificially contaminated with two virulent strains of *Y. enterocolitica* (separately) was used to make cheese. *Y. enterocolitica* was enumerated by surface-plating of samples on Cefsulodin-Irgasan-Novobiocin (CIN) agar. *Y. enterocolitica* increased 1000-fold, to about  $1 \times 10^6$ /g of curd, during the manufacturing process. After this point, numbers of *Y. enterocolitica* in cheeses generally decreased over a period of weeks. One strain could not be detected in cheese after 7 weeks at  $3 \pm 1^\circ\text{C}$ . However, the other strain persisted at numbers in excess of 200/g after 8 weeks at the same temperature.

**Influence of Dissolved Oxygen on Acid Production in Buffalo Milk by Lactic Cultures**, S. Shekar and G. S. Bhat, Southern Regional Station, National Dairy Research Institute, Bangalore 560 030, India

*J. Food Prot.* 46:321-324

Rates of acid production in buffalo milk by lactic cultures increased with the decrease of oxygen content to 2.90 ppm. Rates of production in milk samples containing less than 2.90 ppm dissolved oxygen did not vary. Incorporating oxygen into milk to raise the initial oxygen content from 5.50 to 9.00 ppm strongly inhibited acid production by all lactic cultures. Development of acidity by lactic cultures was more rapid in milk subjected to

prior heat treatment and was maximum in milk heated at  $90^\circ\text{C}$  for 10 min. This was attributed to a slight decrease in oxygen content and increase in free sulfhydryls in heated milk. The free sulfhydryls and dissolved oxygen content decreased considerably in milk samples inoculated with lactic cultures but not in uninoculated control samples incubated for up to 2 h. The decrease in free sulfhydryls corresponded with the decrease in dissolved oxygen in all inoculated samples. Acidification of milk with lactic acid to the same extent as that found in inoculated milk samples showed no decrease in either free sulfhydryls or dissolved oxygen content, suggesting that lactic cultures catalyze the oxidation of free sulfhydryls with dissolved oxygen thereby effecting a more rapid rate of acid production during microbial fermentation of heated milk. The rate of decrease in free sulfhydryls and dissolved oxygen content and increase in acidity corresponded well with growth of lactics, being greatest in *Streptococcus lactis* and least in *Streptococcus thermophilus*-inoculated milk.

**Antimicrobial Properties of  $\alpha$ -Dicarbonyl and Related Compounds**, J. M. Jay, G. M. Rivers and W. E. Boisvert, Department of Biological Sciences, Wayne State University, Detroit, Michigan 48202

*J. Food Prot.* 46:325-329

By surface plating on plate count agar, 0.005 M (430 ppm) of the  $\alpha$ -dicarbonyl compound, diacetyl, inhibited 28 of 40 organisms with the medium at pH 6 but only 11 at pH 8. Diacetyl was more effective against gram-negative bacteria and yeasts than non-lactic gram-positive bacteria and least effective against lactic acid bacteria. Acetoin, butanedioldiacetate and five butanediol isomers were considerably less effective than diacetyl, although all were more effective at pH 6 than 8. Diacetylmonoxime and diacetyldioxime were more effective than the diols and were less affected by pH of medium than diacetyl. Phenylglyoxal (PG) and 1,2-cyclohexanedione (CHD) ranked closest to diacetyl but, unlike the latter, they were more effective against gram-positive bacteria and less so against fungi and gram-negative bacteria. All 12 compounds were more effective against selected organisms by pour plating and in broth culture than by surface plating. Like diacetyl, CHD and PG are  $\alpha$ ,  $\alpha$ -dicarbonyls and are widely used as arginine reactive agents resulting in the blockage of enzyme-substrate reactions. Although their antimicrobial activity may be due to this property, they apparently affect different enzymes than diacetyl because their antimicrobial spectra were different. The possibility of a class of food-use antimicrobial agents bearing  $\alpha$ -dicarbonyl groups is suggested by the findings of this study.

**Evaluation of Freeze-Drying, Pasteurization, High-Temperature Heating and Storage on Selected Enzymes, B-Vitamins and Lipids of Mature Human Milk**, B. A. Friend, K. M. Shahani, C. A. Long and E. N. Agel, Department of Food Science and Technology, University of Nebraska, Lincoln, Nebraska 68583-0919

*J. Food Prot.* 46:330-334

The effects of freeze-drying, pasteurization, high-temperature heating and storage on key enzymes, B-vitamins and lipids of pooled mature human milk were determined. Freeze-drying significantly decreased ( $P < 0.05$ ) the activity of lactoperoxidase and lysozyme but had no effect on the lipase or protease of pooled human milk. Storage after freeze-drying destroyed lactoperoxidase activity but had no apparent effect on the other enzymes. Heating at 62.5°C for 30 min or 75°C for 15 min significantly decreased ( $P < 0.05$ ) the activities of lactoperoxidase, lipase and protease. Lysozyme was inactivated significantly only by heating at 75°C. Storage at -25°C following pasteurization had no significant effect on enzyme activity. Biotin, niacin and pantothenic acid appeared to be quite stable and were not significantly altered by freeze-drying, heating and/or storage. Similarly, there were no significant differences in lipid components following processing and storage.

**Use of Salt-Tolerant Lactic Acid Bacteria for Manufacture of White Pickled Cheese (Domiat) Ripened Without Salted Whey in Sealed Polyethylene Pouches,** S. M. El-Gendy, H. Abdel-Galil, Y. Shahin and F. Z. Hegazi, Department of Food Science, University of Assiut, Assiut, Egypt

*J. Food Prot.* 46:335-338

White pickled cheeses of the Domiat type were made from a 1:1 mixture of raw cows' and buffaloes' milk (5.5% fat) with and without heating momentarily to 72°C. To cheese milk were added: (a) 6.5% salt + 2% *Lactobacillus casei* subsp. *pseudoplantarium* 333C starter, (b) 9% salt + 2% *Lactobacillus casei* starter, (c) 9% salt + 2% *Pediococcus* sp. 452 starter, (d) 9% salt + 2% *Leuconostoc paramesenteroides* II47 starter; control cheeses were made from raw milk with either 6.5 or 9% salt. Finished cheeses were sealed in polyethylene pouches without salted whey and ripened at ambient temperature (10-25°C) for up to 5 months. Pouch-cheeses ripened without salted whey were generally attractive, uniform creamy in color, had a firm body, waxy buttery smooth texture and a pleasant flavor. Milk with 6.5% salt appeared to be preferable to milk with 9% salt for making the cheese. The highest organoleptic scores were achieved by cheese made from milk heated momentarily to 72°C and which received 6.5% salt and 2% *L. casei* starter. Inoculation of both raw and heated milk containing 9% salt with either *L. casei* subsp. *pseudoplantarium* 333C, *Pediococcus* sp. 452 or *L. paramesenteroides* II47 improved cheese flavor. Limburger cheese flavor was occasionally and yeasty flavor most frequently encountered. All cheeses had high DM, fat, total and soluble N, and amino acid N, with only little loss of their nutritive constituents when compared with reported values for cheese ripened in the normal way. Increasing the salt percentage in cheese milk reduced the total protein recovered in cheese. None of the cheese components examined seemed to be associated with high flavor scores. No correlation could be established between the number and types of lactic acid bacteria found and flavor intensity.

**Origin and Prevalence of *Campylobacter jejuni* in Poultry Processing,** J. Oosterom, S. Notermans, Hetty Karman and G. B. Engels, National Institute of Public Health, Laboratory for Zoonoses and Food Microbiology, 3720 BA Bilthoven, The Netherlands

*J. Food Prot.* 46:339-344

Investigations of two chicken processing plants in The Netherlands have shown that large contamination with *Campylobacter jejuni* can exist on birds, equipment, hands of processing-line workers and in air samples from the processing facility. This contamination appeared only to be of intestinal origin. Intestinal contents of birds to be processed contained up to  $10^7$  *C. jejuni* per gram. Contamination of birds was reduced during scalding at 58°C, but this reduction was not always observed at 51.8°C. The number of *C. jejuni* on carcasses increased during defeathering and evisceration. Large numbers of *C. jejuni* were washed off the carcasses when a spinchiller was used. When air-cooling was employed, *C. jejuni* in some instances died off, probably due to drying. End-products from these chicken processing plants contained *C. jejuni* in 50% of carcasses and 75% of livers.

**Methods to Detect Viruses in Foods: Testing and Interpretation of Results,** D. O. Cliver, R. D. Ellender and M. D. Sobsey, Food Research Institute, W. H. O. Collaborating Centre on Food Virology, and Department of Bacteriology, University of Wisconsin, Madison, Wisconsin 53706; Department of Microbiology, Institute of Genetics, University of Southern Mississippi, Hattiesburg, Mississippi 39401; and Department of Environmental Science and Engineering, University of North Carolina, Chapel Hill, North Carolina 27514

*J. Food Prot.* 46:345-357

Viruses that may be detected in foods should be considered pathogenic and treated with appropriate caution. In this discussion, specific procedures for extracting viruses from shellfish are presented for each of the major commercial species of bivalve molluscs. Other foods for which specific extraction methods are detailed include lettuce, frozen strawberries, ground beef and raw milk. Viruses that may be detected by the methods described are those which are capable of producing a perceptible effect while replicating in cultured primate cells. Both results that are apparently positive and those that are apparently negative require careful interpretation; one must be extremely skeptical if large numbers of food samples obtained at the market appear to yield viruses. The procedures that are now available have some important limitations, including inability to detect the viruses that cause most of the reported foodborne disease. Approaches to surmounting these limitations include use of serologic methods to detect viruses that do not cause perceptible effects in cell cultures and improvement of procedures for extracting all viruses from food samples.

**Fermented Foods of Egypt and the Middle East,** Shaker M. El-Gendy, Department of Food Science, Faculty of Agriculture, University of Assiut, Assiut, Egypt

*J. Food Prot.* 46:358-367

Fermented foods in Egypt are quite representative of those found in the Arabic countries and in many other countries in the Middle East. Some of these are given different national names in the Arabic and other countries in this area. Fermented foods constitute a part of the diet of most people in Egypt. One or more of these foods is/are involved in the daily meals and thus provides an important source of a digestible protein. The fermented foods are reviewed with reference to the traditional processes adopted for their manufacture. These products comprise sour milk, Karish cheese, Mish cheese, Laban Zeer, Kishk, Zabady, Shamsy bread and some Sudan fermented foods.

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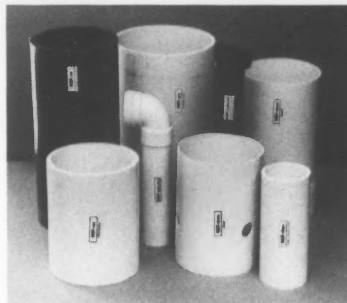
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