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Thoughts From the President . . .

By
Robert B. Gravani, Ph.D.

Are you a leader in the field of food safety, sanitation or public health? Do you play an active role in your IAMFES affiliate?

Leadership is the most popular area of training in the U.S. today. Corporations, small businesses, government agencies, trade associations and universities are all interested in learning more about how their interested and involved employees can become effective leaders.

Have you thought about leadership? If you have, some questions have probably come to mind:

*Aren't leaders born?
*Can leadership really be taught?
*How can I learn more about being an effective leader?

Well, according to the experts, leadership is not necessarily a trait that people are born with, but it can be taught. There are many opportunities for leadership training courses and programs around the country in both the public and private sectors. These programs vary in length and in the type of skills that they teach, but their main purpose is to provide information on how to be a more effective leader.

You might be wondering, "What are the characteristics and attributes that leaders usually possess?" Well, here are a few of their characteristics and qualities:

*Integrity and Character -
They are honest, forthright and are of good character.

*Credibility and Trust -
They have a good working knowledge of their subject area and work hard to gain the respect and trust of people around them.

*Good Communications Skills -
They are able to speak and write effectively and communicate important messages. They are also good listeners.

*Good Interpersonal Skills -
They get along well with other people and are able to deal with all types of situations with tact and diplomacy.

*Positive Thinkers -
They are usually optimists who see the glass being half full, not half empty. They see problems as challenges that can be solved.

*Effective Problem Solvers -
They work hard to solve problems, not treat the symptoms and hope that the difficulties will go away.

*Toughness and Compassion -
They are skillful negotiators and are tough but understanding.

*Enthusiasm and Energy -
They are enthusiastic about what they do and usually use their energy to convince others to the importance of their tasks.

*A Sense of Humor -
They usually have the ability to step back and laugh when something is funny. Laughter is a great elixir!

Leaders usually have a broad knowledge of a particular subject or topic and use it in combination with the characteristics above. They develop objectives and formulate goals and then strive to achieve them in their daily activities.

There are a wide variety of courses that provide training in the skills mentioned above. If you are at a point in your career where you are interested in learning more about leadership, I encourage you to seek more information from your local or state colleges, universities, chambers of commerce, and professional organizations regarding leadership training. These skills can be easily applied to every area that you deal with; family, job, community, etc. You may find that these problems will enhance many of your strong points and sharpen other areas of interest.

Robert B. Gravani, IAMFES President
8A Stocking Hall
Cornell University
Ithaca, NY 14883

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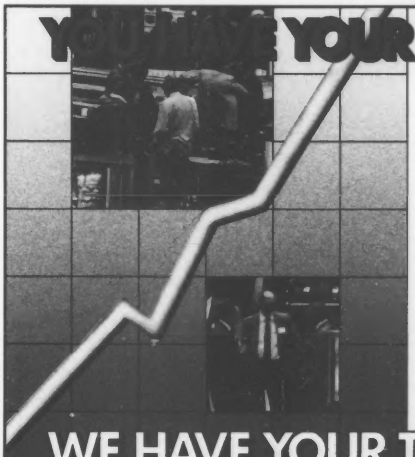

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Dairy, Food and Environmental Sanitation CONTENTS

Articles:

ABOUT THE COVER...*For those of you in cold, wintry climates, this cover will give you hope for spring and remind you of the warm weather to come. Cover photo of Sanibel Island, Florida taken by Kathy R. Hathaway, Executive Mgr., IAMFES.*

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The Preliminary Incubation Count - Is It Good Enough?

by

J. Russell Bishop

Department of Food Science & Technology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061

The Applied Laboratory Methods Committee of the International Association of Milk, Food and Environmental Sanitarians, Inc. suggested the author prepare this paper as a part of the committee's activities. (Chair of the Committee: Helen H. Carr)

Introduction

The dairy industry continues to develop and adopt new production and processing practices and testing methods that will assure consumers of the best quality milk and dairy products. Industry laboratory evaluation of the microbial quality of raw milk presents a major challenge[2,4,6]. Some of the problems are time required to get results after initiating the test, cost of labor and materials, and lack of precision of the final results. Maxcy and Paul[6] stated that new methods are burdened by being compared to imprecise presently used standard methods. Lack of agreement between the standard reference method and a newly proposed method commonly was viewed as an imperfection in the proposed method without considering the inherent imprecision and inaccuracy of the reference method. They reported that, "Repetition of all tests on milk from individual farms indicated that inherent variation in quality at the farm, sampling, testing, and evaluating the results showed the extreme inadequacy of the presently established methods of grading raw milk."

Bigalke[2] described an ideal test to determine raw milk microbiological quality that would include the following factors: 1) rapid, 2) economical, and 3) reflects the total number of organisms in the milk sample, 4) the number of psychrotrophic organisms, 5) conditions of production on the farm, and 6) the time and temperature of raw milk storage. "Obviously, it would be very difficult for one test to reflect all the parameters."

The Standard Plate Count (32°C for 48 h - SPC) does not accurately measure the conditions of production or the psychrotrophic content of the milk[2]. Barnard[1] and Harley, et al.[4] indicate that the SPC rarely, if ever, is closely correlated with production conditions. In addition, the Laboratory Pasteurized Count (63°C for 30 min, then SPC - LPC) is used less frequently because it relates poorly to raw milk quality.

Table 1. Microbiological methods used for quality assessment of raw milk.

Method	Pre-treatment	Incubation
Standard Plate Count - SPC		32°C/48h
Lab Pasteurized Count - LPC	63°C/30min	32°C/48h
Psychrotrophic Bacteria Count - PBC		7°C/10d
Preliminary Incubation Count - PIC	13°C/18h	32°C/48h
modified PBC - mPBC		21°C/25 or 48*
modified PIC - mPIC	13°C/18h	21°C/25 or 48*
PI/mPBC	21°C/18h	21°C/25 or 48*

*Agar or Petrifilm methods.

Psychrotrophic Bacteria

There is general agreement that the Psychrotrophic Bacteria Count (7°C for 10 d - PBC) is the most reliable method of indicating conditions of production on the farm. The disadvantage of this method is the time required. It is the belief of many dairy scientists that the PBC can best reflect raw milk microbiological quality since many psychrotrophs found in raw milk are usually gram-negative bacteria capable of producing heat-stable enzymes which produce off-flavors prior to, and after, processing[2].

Considerable research has been conducted to determine rapid and more cost-effective methods, taking into consideration such things as outlined by Bigalke[2] earlier in this discussion. Three approaches have been used to resolve these criteria:

(1)Use of selective media to inhibit gram-positive bacteria and promote growth of gram-negative organisms.

(2)Methods such as Oxidase Positive count, electrical impedance, and automated catalase detection.

(3)Methods concerning elevated incubation temperatures for milk samples and/or plating media plates[2]. One of such methods is the Preliminary Incubation Count.

Preliminary Incubation Count

Preliminary incubation (PI), as studied by Johns[5], is based upon the theory that as the temperature of holding is lowered, a point is reached in the milk where the udder flora no longer multiply while many of the psychrotrophic contaminants grow actively. Therefore, he introduced the Preliminary Incubation Count (PIC) which suggested PI at 13°C (55°F) for 18 h, followed by the SPC (32°C for 48 h) to reflect careless production practices. In essence, the PIC was designed to detect sanitation problems.

Barnard[1] insists that there is a much better correlation between the PIC and farm conditions than there is with the SPC. In addition, the PIC provides a better picture of how long the raw milk will keep. Ryan, et al.[9] concurs by stating, "The PIC is clearly superior to the SPC in evaluating the microbiological quality of raw milk." Johns[5] indicates that SPC limits as low as 10,000 cfu/ml give little assurance that the milk was produced under sanitary conditions. Richter[8] goes further to illustrate that a high SPC obtained from raw milk will indicate poor cooling or gross contamination from unsanitary milk handling practices, or both. However, the inverse is not necessarily true. A low SPC does not necessarily mean milk is of high quality or that sanitary conditions were adequate. The milk might contain a significant number of psychrotrophic bacteria, with their significance based on production of heat-stable enzymes capable of product quality degradation.

If the Preliminary Incubation Count is used for regulatory purposes, an acceptable level of PI counts must be established that will realistically reflect the level that can be achieved by acceptable sanitation practices and indicate high quality milk while not establishing unrealistic goals for milk producers[8]. A goal of <20,000 cfu/ml would seem reasonable[1]. However, the use of the PIC for regulatory purposes appears questionable. The 1983 National Conference on Interstate Milk Shipments recommended to accept the PIC as an alternative to the SPC as a standard for raw milk from dairy farms. The effective date was delayed to allow for further study by the Food and Drug Administration. Evaluation of the data does not favor either procedure (PIC or SPC) as being a better indicator of sanitary and production conditions on dairy farms due to inconsistency of results[10].

The parameters of the Preliminary Incubation Count may hold the key to these inconsistencies. The period of 18h for PI seems reasonable for it "has definite advantages in that it may be started at such an hour that bacteriological testing can be completed within normal working hours the next day"[5]. The temperature of 13°C as stated earlier, is used for outgrowth of psychrotrophic bacteria. The glaring problem lies in the fact that this is followed by a 32°C incubation for SPC. It is not reasonable to expect psychrotrophic bacteria to adequately grow at both 13 and 32°C. Herein would appear to be a major cause of inconsistent results.

Modified Preliminary Incubation Count

Oliveria and Parmalee[7] introduced a modified (rapid) Psychrotrophic Bacteria Count (mPBC) which requires incubation of SPC agar at 21°C for 25 h (48 h on Petrifilm) and is highly correlated to the standard PBC (R = 0.992). This is possible because optimum psychrotrophic growth occurs between 20 and 30°C. The lower temperature of the range is chosen to prevent as much mesophilic growth as possible. Attempting to enumerate psychrotrophs and not mesophiles, this would appear to be the preferred temperature of agar plate incubation. Bishop and Juan[3] reported on such a method whereby PI was conducted at 13°C for 18h, followed by the mPBC at 21°C for 25 h. Not only were the calculated values acceptable (r = 0.938, mean log difference = 0.044, slope = 0.991, and y-intercept = 0.169), it was conducted in 2 days instead of 3.

The next parameter of the PIC to be evaluated is the PI temperature of 13°C. If one is, in fact, attempting to enumerate psychrotrophic bacteria, why not also PI of 21°C? Another question might be, why did Johns choose 13°C? He found that at temperatures above 13°C, counts jumped sharply - not surprising, considering the group of bacteria one is working with. He states, "Obviously PI at a temperature above 13°C would require much higher count limits for acceptable milk. These might be construed as meaning a lowering of standards"[5]. As is apparent from the study of Bishop and Juan[3], the mean log values of the discussed methods prove the point of higher numbers. The PI count, modified PI count, and PI/mPBC methods produced mean log values (cfu/ml) of 5.34, 5.07, and 6.08, respectively, with a sample size of 203. But do these higher numbers alert one to the true potential psychrotrophic contamination of the raw milk sample? Bishop and Juan[3] stated that this method of a 21°C PI followed by mPBC "proved successful in monitoring raw milk quality, but resultant data was approximately 5-10 times higher than corresponding PIC data, therefore a need would exist to re-evaluate acceptable bacterial levels."

Summary and Conclusions

There is no doubt that the use of the Preliminary Incubation Count for assessing raw milk, instead of the Standard Plate Count, has done a great deal to improve quality. It has taken microbiological testing from the point of a total, aerobic, mesophilic count to that of estimating the potential psychrotrophic contamination. As our knowledge of psychrotrophic bacteria and their optimum growth conditions increases, we will develop methods better able to determine present raw milk quality and the keeping quality or shelf-life of pasteurized dairy products. The use of 21°C incubation could be a step in this direction.

References

1. Barnard, S.E. 1986. What bacteria counts tell you. Hoard's Dairyman. 131:47-50.
2. Bigalke, D. 1984. Methods used for monitoring the microbiological quality of raw milk. Dairy and Food Sanit. 4:189-192.

3. Bishop, J.R. and J.-Y. Juan. 1988. Improved methods for quality assessment of raw milk. Accepted for publication by J. Food Prot.
4. Hartley, J.C., G.W. Reinbold, E.R. Vedamuthu, and W.S. Clark. 1968. Bacterial test results of Grade A. raw milk samples as a measure of farm production conditions. J. Milk Food Technol. 31:388-392.
5. Johns, C.K. 1960. Preliminary incubation for raw milk samples. J. Milk Food Technol. 23:137-141.
6. Maxcy, R.B. and R.J. Paul. 1987. Evaluation of the microbial quality of raw milk. J. Food Prot. 50:47-50.
7. Oliveria, J.S. and C.E. Parmalee. 1976. Rapid enumeration of psychrotrophic bacteria in raw milk and pasteurized milk. J. Milk Food Technol. 39:269-272.
8. Richter, R.L. 1983. PI test fills SPC test gaps. Dairy Field. 166:61.
9. Ryan, J.J., R.H. Gough, and C.H. White. 1984. Preliminary incubation count as an index of raw milk microbiological quality during storage. J. Food Prot. 47:206-208.
10. Sanders, R.L. 1986. Preliminary incubation study report. J. Food Prot. 49:852 (Abstract).

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U.S. Milk Utilization, and Dairy International Trade, ...Situation and Implications

by

Dr. Truman Graf
Professor Emeritus, University of Wisconsin-Madison, Madison, WI 53706

Milk Utilization

How the Milk Supply is Utilized:

Milk utilization increased 27 billion pounds (23.8%) since 1970, and 14.2 billion pounds (11.2%) since 1980. However the increase was largely attributable to increased utilization of milk in cheese, ...+92.3% for American cheese since 1970, and +19.7% since 1980. Milk utilization in cheeses other than American cheese increased even more, +194.3% since 1970, and +52.9% since 1980. Milk utilization in fluid products increased only 1.4 billion pounds (2.7%) since 1970, and 2.5 billion pounds (4.9%) since 1980. Utilization of milk in butter *decreased* 2.8 billion pounds (11.7%) since 1970, and 1.7 billion pounds (7.5%) since 1980. Milk utilization in cottage cheese, decreased since 1970, and 1980, while utilization in dry whole milk and frozen dairy products increased in both time periods (Table 1).

The proportion of milk utilized in *manufactured products* increased from 52.9% in 1970 to 58.7% in 1986, while the proportion utilized in *fluid products* decreased from 45.8% in 1970, to 37.2% in 1986 (Figure 1).

Within the *fluid product category* the proportion of milk utilized in lowfat and skim items increased from 20.9% in 1971, to 48.8% in 1986, the percent used in whole milk decreased from 77.1% to 48.0%, and the percent used in cream items increased from 1.9% to 3.2% (Figure 2). Per capita consumption of fluid cream increased 45.5% during 1978-86 (from 3.3 pounds to 4.8 pounds). (Agricultural Outlook, USDA, ERS, A-O-141, May 1988).

Within the *manufactured dairy product category*, production of American cheese almost doubled, and the production of other cheese more than tripled since 1970. Whole milk production more than doubled, and ice cream and ice milk production increased about one-sixth since 1970. The production of other manufactured dairy products declined, ...including butter and nonfat dry milk, even though they were price supported by USDA (Table 2 and Figure 3).

Commercial utilization of dairy products increased an average of approximately 1% annually during the 1970's and early 1980's, and over 2.6% annually since the law mandating a 15 cent per hundredweight farmer checkoff for dairy promotion went into effect (1984-87). However, commercial utilization declined 1.5% in the fourth quarter of 1987, and 1.3% in the first quarter of 1988 compared to the same period a year earlier. Commercial utilization is therefore slowing down after four years of unprecedented increases, and seventeen years of increases averaging over 1% annually (Table 3 and Figures 4, 5 and 6).

Even though commercial utilization of dairy products has been increasing, total *milk supply far exceeded commercial use* during recent years. Supply exceeded commercial utilization by a range of from approximately 35 billion pounds in 1983, to 20 billion pounds in 1987. Government donations and stocks and commercial stocks of these magnitudes were needed to "balance the market" (Figure 7).

Milk utilization has been adversely affected by *competition from soft drinks and other drinks. Per capita consumption of fluid milk was 15.9 pounds above per capita consumption of soft drinks in 1978, as contrasted to 36.8 pounds below soft drinks in 1986. Per capita consumption of* fluid milk decreased *by 20.6 pounds in the 1978-86 period, compared to an* increase *of 32.1 pounds for* soft drinks. *Therefore, the differential between the per capita consumption of soft drinks* and fluid milk increased by 52.7 pounds in the 1978-86 period (Table 4).

Per capita consumption of soft drinks, coffee, and citrus juices combined, exceeded per capita consumption of fluid milk by 258 pounds (114.1%) in 1986, ...an increase of 48.3 pounds in the differential in the 1978-86 period (Table 4).

Per capita utilization of *fluid milk* has been *decreasing*, while per capita utilization of *soft drinks* and *other drinks* has been *increasing*.

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Utilization of *whey products* increased 831 million pounds (102.7%) since 1970 and 392 million pounds (31.4%) since 1980. Dry whey for human food increased 666 million pounds (226.5%) since 1970, and 345 million pounds (56.1%) since 1980 (Table 5). However, the proportion of whey utilized remained flat, even though poundage utilization increased, since cheese production (and therefore whey volume) increased so substantially.

Utilization Forecasts By Major Products And Reasons For Changes:

(1) *Cheese*: The 26.2% increase in milk utilization for cheese and 52.9% increase in milk utilization for cheeses other than American cheese since 1980, projects substantial continued increased milk utilization for cheese. Annual increases of 2-3% over the next two to five years appear entirely attainable, with even larger increases likely for other than American cheeses. Utilization for Italian type cheeses alone increased 10% in 1987, and likely will continue to lead in increased utilization, ...particularly Mozzarella, including "string" cheese. Provolone and Ricotta will also increase rapidly. Other cheeses likely to experience substantial increases in milk utilization include low fat cheese, Brick, Neufchatel, Gorgonzola, Baby Swiss, Camambert, Brie, Havarti, and Blue Cheese. American Cheese utilization will also likely continue to increase, but not as rapidly as the foreign and ethnic type cheeses highlighted above, because of its more mature position and history in the U.S. market.

Substantial increases in milk utilization for cheese are likely to occur because of changing life styles, and consumer demand, involving more use of cheese because of more fast foods, pizza, dining out, ethnic dishes, gourmet meals, fondues, specialty foods, and home patio entertaining. The "yuppie" factor will also result in more cheese utilization. The push for "low fat" cheese and "reduced fat" standards and labeling will also help increase cheese utilization.

Cheese is also a versatile convenient food with a variety of uses. Cheese will therefore likely continue to be the primary cause of increases in milk utilization during the next two to five years.

(2) *Frozen Dairy Products*: The 22.7% increase in milk utilization for frozen dairy products since 1970, and 13.4% increase since 1980 projects to likely annual increases of 1-2% in milk utilization for frozen desserts during the next two to five years. Yogurt particularly appears headed for substantial increases since utilization has been increasing approximately 10% annually. High fat gourmet ice creams will also likely continue their surge in increased utilization, as will ice milk.

Changing life styles, and almost universal emphasis on dieting account for yogurt's continued popularity, while the prestige and yuppie factor are primarily responsible for increased utilization of high fat ice creams. Increased use of fast food outlets, and dairy bars by consumers will continue to expand ice milk utilization, and also contribute heavily to increased utilization of yogurt.

(3) *Whey Products*: Utilization of whey for human food increased 56.1% since 1980, and all whey products increased 31.4% since 1980. However the proportion of total whey utilized remained at 46% in 1987, ...the same proportion as in 1980 because of the substantial increase in whey volume generated by increased cheese production.

Utilization of whey products will likely continue to increase in the next two to five years, ...at about 2-3% annually. However, if world markets for whey products remain tight as they have been for over a year because of supply management by major dairy countries, and environmental concerns, and if international exchange rates remain favorable, whey product utilization could increase even more. Dry whey prices have generally been in the $.20 to $.30 per pound price range during the past year, which has made whey a profitable item for dairy plants, ...and accounted for a large portion of plant profits over the past year. Continuation of the price situation will encourage increased utilization of whey because of its profitability. Procuring additional whey to increase whey product utilization will not be a problem, since less than one-half of available whey it utilized.

Major emphasis on research to expand uses, and develop new uses for whey will also contribute to increased utilization. Also the sheer increase in whey volume generated by increased cheese utilization, coupled with increased emphasis on environmental regulation, will pressure the dairy industry to continue to expand whey utilization.

(4) *Dry Whole and Nonfat Dry Milk*: Utilization of these two products has been heading in opposite directions in recent years, ...dry whole milk production is up 75% since 1980, and nonfat dry milk production is down 10% since 1980. Furthermore, USDA price support purchases averaged 58.3% of nonfat dry milk production during the past decade. On the surface, this would appear to project decreased commercial utilization for nonfat dry milk during the next two to five years. However, reduced commercial prices for nonfat dry milk during much of this decade (because of reduction in price support levels) has resulted in favorable priced relationships for nonfat dry milk with substitute proteins. This coupled with favorable international exchange rates, and light supplies on the world markets, has created a strong market for nonfat dry milk in turn encouraging increased utilization. As a result USDA currently has *zero* nonfat dry milk inventory. Furthermore, USDA is not purchasing any nonfat dry milk under the price support program, because the commercial market is absorbing all of the production. Dry whole milk markets are tight for the same reasons.

Therefore, unless the international and domestic market situations change radically, utilization of both nonfat dry milk and dry whole milk can both be expected to increase an average of at least 2% annually during the next two to five years.

(5) *Fluid Milk*: Fluid milk utilization, and fluid lowfat milk utilization, are going in opposite directions. During the

1978-86 period per capita consumption of fluid whole milk *decreased* 28.4% compared to an *increase* of 29.7% for fluid lowfat milk (same source as Table 4). Utilization of "lite" fluid milk is increasing, ...but not enough to offset the decrease for fluid whole milk. As a result total fluid milk consumption declined from 246.8 pounds per capita in 1978, to 226.2 pounds in 1986. Butterfat utilization in fluid milk decreased even more, because of the shift from whole to lowfat fluid milk.

Fluid milk utilization is likely to continue to decrease, ...probably about 1% annually for the next two to five years unless new or modified fluid milks are successfully marketed. Two such products which hold considerable promise are currently being developed and researched by UDIA and DRINC. They are (a) High-Calcium Milk, and (b) Carbonated Flavored Milk.

Dairy products supplied approximately three-fourths of the calcium in the U.S. food supply during the past three decades, but the proportion and volume has been declining. The proportion and volume supplied by fluid milks has also declined, ...from 62% in 1957-59, to 52% in 1983 (Figures 8 and 9).

Utilization of an additional 400 million to 9.4 billion pounds of skim milk annually is projected for UDIA-DRINC's high-calcium milk. (Source: May 1987 "Economic Potential For High Calcium Milk" DRINC Analysis).

UDIA-DRINC's coconut, pina colada, and plain carbonated milk would retail for approximately $.15, $.44, and $.96 less per case (24, 10-ounce cans) respectively than cola in cans. (Source: October 1987 "Carbonated Flavored Milk" DRINC Analysis). Carbonated milk would therefore be very price competitive with cola in cans, and could therefore also increase fluid milk utilization.

However, unless new or modified fluid milks are successfully marketed, utilization of fluid milk is likely to continue to decline in the next two to five years. As indicated above, the decline could approach 1% annually.

(6) *Cream:* Cream items increased from 1.9% of fluid utilization in 1971, to 3.2% in 1986, and per capita consumption increased 45.5% during 1978-86. However, cream utilization declined in the past year (7/87-6/88). Therefore, increases in cream utilization may have run their course for the time being, and increases in the next two to five years may be difficult to achieve.

(7) *Butter:* Utilization of milk for butter declined 11.7% in the 1970-87 period, and 7.5% in the 1980-87 period. Further declines are occurring in 1988; and help account for the overall decline in milk utilization so far this year. Therefore, unless a dramatic change in consumer perception of butter can be achieved by the dairy industry, a 1% annual reduction in butter utilization during the next two to five years appears likely.

Capitalizing on the "light" dairy product emphasis by consumers, could help in reversing the decline in butter utilization. UDIA-DRINC's butterlike spread containing approximately 50% butterfat is one such product. This product is projected to increase total butter sales $65 million to $1.4 billion over a five year period. (Source: January 1987 "Economic Potential For Butterlike Spread" DRINC Analysis).

However, unless new or modified butter is successfully marketed, butter utilization can be expected to decline approximately 1% annually during the next two to five years.

(8) *Overall Milk Utilization:* Even though commercial utilization of milk increased over 1.6% annually during the past four years, continuation of this trend is highly unlikely. Utilization increases for cheese, frozen dairy products, whey products and milk powder, will likely be at least partially offset by decreases for fluid milk and butter. Thus overall milk utilization will likely not increase more than an annual average of about .5% during the next two to five years.

Dairy International Trade

Dairy Import-Export Trends:

Major factors confronting the U.S. with respect to dairy imports and exports are: (1) Dairy imports and exports both represent only a small proportion of U.S. milk production, --currently less than 2% for imports, and only about 1% for exports (Table 6). (2) Although the U.S. ranks third in world milk production (15.5% in 1988), it exports less butter and cheese than either Australia or New Zealand which have 1.5% and .2% of world milk production respectively (Tables 7, 8 and 9). (3) U.S. has only 1.2% of world butter exports, but produces 7.8% of world butter. Cheese is even worse, for the U.S. -- .6% of exports, and 24.3% of production. U.S. nonfat dry milk exports have been more proportionate to production, but until 1988 were largely noncommercial (Table 8). The U.S. therefore, ranks low world wide in dairy exports. (4) In sharp contrast, Australia, New Zealand and the European Community (EC) have approximately 88% of world exports of butter compared to 34% of world production, 84% of cheese exports compared to 44% of production, and 79% of nonfat dry milk exports compared to 54% of production (Table 9). (5) U.S. dairy exports are insignificant compared to those of Australia, New Zealand, and EC because export subsidies of these countries drive world prices far below U.S. support prices. Current world prices of approximately $.59 per pound for butter, and $.67 per pound for cheese are 44.7%, and 57.8%, respectively below U.S. support prices for these products (Table 10). World prices for nonfat dry milk were also far below U.S. support prices. (6) U.S. casein imports were 68.7% of U.S production of nonfat dry milk on a protein equivalent basis in 1987, and averaged 56% during the past four years (Table 11). Although they declined in recent months because of tight dry milk markets, imported casein remains potentially very substitutable for domestic milk solids. Approximately seven-eighths of imported casein is utilized in food and feed which domestic milk solids could otherwise be used for. Imitation cheese alone totals approximately 7% of U.S. cheese production. (7) Casein import prices are approximately seven-eighths of domestic nonfat dry milk protein equivalent prices

($2.15 per pound compared to $2.44 per pound ...Table 12). However, for over a decade, imported casein had been selling for approximately one-half the price of nonfat dry milk on a protein equivalent basis (until the recent world wide shortage of nonfat dry milk shifted casein production to nonfat dry milk, thereby reducing casein production and increasing its price). Therefore, imported casein is highly price competitive with domestic milk supplies. As a result dairy farmers are proposing casein import quotas at 50% of the annual average volume of casein imports during the 1981-85 period. Casein and lactose are the only two dairy products that do not have import quotas.

Dairy Import-Export Forecasts:

Some improvement in the U.S. import-export situation is likely in the next two to five years, because our major competitors are attempting to reduce their dairy surpluses through various types of supply management programs. For example EC instituted a five year milk production quota system in April 1984 which turned a 3-4% annual increase in milk production in 1982 and 1983 into a 5% decrease by 1985. Since this was not enough to solve the EC milk surplus problem, production quotas were reduced 2% in 1987/88, and a further 1% in 1988/89.

Also, in an attempt to reduce dairy surpluses, Australian domestic support prices for dairy products will be phased down to the export price for each product, plus 30%, until at least 1991.

Finally, New Zealand imposed a ban on new entrants into dairy farming in June, 1985, renewed the ban in June, 1986, and as a result produced 5% less milk in 1987-88 than in 1985-86.

Therefore, competition from subsidized dairy exports from EC, Australia, and New Zealand, will be less severe in the next two to five years than has been the case in the past. However, dairy export competition will still be severe because of likely continued EC, Australian, and New Zealand milk surpluses, even with their corrective measures. Thus, they will likely continue some type of direct or indirect export subsidy program.

Therefore, although some increase in U.S. commercial dairy exports is likely in the next two to five years, exports will not likely exceed 2% of U.S. milk production, ...double the 1987 level. Therefore, dairy exports, --particularly cheese exports, will continue to be only a very minor portion of total dairy product sales for U.S. dairy firms. Utilization of governmental export assistance programs such as the dairy export incentive program, (to offset likely continued export subsidization by EC, Australia and New Zealand) offers the best prospects for U.S. firms to increase dairy exports during the coming two to five years.

U.S. firms will likely continue to have considerable protection against most imported dairy products during the coming two to five years. Milk equivalent import quotas are only about 1.7% of U.S. milk production, and cheese import quotas only about 5% of U.S. cheese production, and will likely remain low for the foreseeable future.

Government Policy Trends and Forecasts:

Major policy factors confronting the dairy industry with respect to dairy international trade are: (1) removal of the "Section 22 Waiver" authorizing quotas on dairy imports if they threaten effective operation of the price support program. This proposal is "on the table" at current GATT (General Agreement on Tariff and Trade) negotiations in Geneva, Switzerland. However, U.S. dairy farmers as well as high government officials including U.S. Secretary of Agriculture Richard Lyng are strongly objecting to removal of the Section 22 waiver, unless other countries eliminate all farm subsidies and import barriers world wide (including those on dairy products) by the year 2000.

Even though EC officially is pushing for partial elimination, the likelihood of action on this proposal is almost nil. For example, Reagan's last economic summit before leaving office (in Toronto, Canada in June 1988) did not endorse either the goal of an end to farm subsidies, or a timetable to achieve this goal. In fact Japan, West Germany, France, Great Britain, and EC all strongly objected to Reagan's proposal. Thus when Reagan leaves office in January 1989, his proposal automatically terminates. Therefore, little or no change in dairy export subsidies or import regulations is likely in the next two to five years. (3) The U.S.-Canada Free Trade Agreement was signed by President Reagan and Prime Minister Mulroney in January 1988, eliminating most tariffs and trade barriers to the annual $166 billion in goods and services traded between the U.S. and Canada. The U.S. House of Representatives approved the agreement in August 1988, but it has not yet been ratified by the U.S. Senate and Canadian Parliament. However, because of opposition by both the U.S. and Canadian dairy industry, milk and dairy products were largely excluded from the agreement. The U.S.-Canada Free Trade Agreement will therefore not have a noticeable impact on the U.S. dairy industry. (4) The 1988 Trade Bill (signed into law in August) establishing a more aggressive trade policy, and requiring the President to retaliate against unfair trade practices including excessive export subsidies by other countries. Important dairy provisions include: (a) $2.5 billion agricultural export enhancement (export subsidies) program, ...also requiring dairy export subsidies (of the difference between U.S. domestic prices, and world prices) be made in the form of generic commodity certificates which can be redeemed for government stocks, (b) changing casein's classification in the tariff schedule from "industrial" to "human food and animal feed."

This Bill also authorizes an expansion of government assisted dairy exports above the 330 million pounds annually, and 65,000 dairy cattle, provided for in previous legislation. It also makes it easier to impose "Section 22" import restrictions on casein; since casein is now designated as a "food and feed," rather than an "industrial" product.

The 1988 Trade Bill will therefore aid in increasing dairy exports, and deter dairy imports. However, as indicated earlier, continued world wide surpluses of dairy products will likely limit increases in dairy exports to about double the 1987 level, ...resulting in about 2% of U.S. milk production being exported in the next two to five years.

Table 1
UTILIZATION OF MILK 1970-87

	1970	1980	1987	1970/87	1980/87
		Percent of Total Utilization[a]		Percent Change in Pounds Utilization	
Fluid Products	45.8%	40.3%	38.0%	+ 2.7%	+ 4.9%
Butter	21.1	18.1	15.0	- 11.7	- 7.5
American Cheese	12.5	18.1	19.4	+ 92.3	+ 19.7
Other Cheese	4.7	8.1	11.1	+194.3	+ 52.9
Creamed Cottage Cheese	1.1	0.8	0.6	- 25.0	- 10.0
Evaporated and Condensed Milk	2.9	1.7	1.6	- 33.3	+ 4.8
Dry Whole Milk	0.1	0.5	0.8	+120.0	+ 83.3
Frozen Dairy Product	9.7	9.4	9.6	+ 22.7	+ 13.4
Other Factory Products	0.1	0.7	0.4	0.0	- 44.4
Miscellaneous	1.3	1.7	3.6	+240.0	+142.9
Total Utilization (Bil. Pds.)	113.5	126.3	140.5	+ 27.0	+ 14.2

Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS 414 and 415, April and July 1988.
[a]Totals do not add to 100% due to rounding to nearest .1%.

Table 2
Production of Manufactured Dairy Products 1970-87

	1970	1980	1987	1970/87	1980/87
		Million Pounds[a]		% change	
Butter	1,137	1,145	1,113	- 2.1%	- 2.8%
American Cheese	1,423	2,376	2,741	+ 92.6	+15.4
Other Cheese	778	1,609	2,577	+231.2	+60.2
Cottage Cheese	1,039	1,004	934	- 10.1	- 7.0
Canned Milk	1,268	725	568	- 55.2	-21.7
Dry Whole Milk	69	83	145	+110.1	+74.7
Nonfat Dry Milk	1,444	1,161	1,039	- 28.1	-10.5
Ice Cream	762	830	893	+ 17.2	+ 7.6
Ice Milk	287	293	333	+ 16.0	+13.7

Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS-414, April 1988.
[a]Million gallons for ice cream and ice milk.

Table 3
Commercial Utilization, Total Milk

		Change From Previous Period			Change From Previous Year			Change From Previous Year
				Billion Pounds				
1970	109.2		1984	126.9	+4.4	4th Quarter 1986	34.4	
1975	113.8	+4.6	1985	130.6	+3.7	4th Quarter 1987	33.9	- .5
1980	119.0	+5.2	1986	133.3	+2.7	1st Quarter 1987	31.8	
1983	122.5	+3.5	1987	135.3	+2.0	1st Quarter 1988	31.4	- .4

Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS 414 and 415, April and July 1988.

Table 4
U.S. Per Capita Consumption of Fluid Milk Compared to Drinks, 1978-86[a]

	Fluid Milk Total[b]	Soft Drinks	Drinks Total[c]	Drinks Exceed Fluid Milks By:		1978/86 Lbs. Change Milk	Soft Drinks	Drinks Total
	(lbs)	(lbs)	(lbs)	(lbs)	(%)			
1978	246.8	230.9	456.5	209.7	85.0			
1979	241.6	234.4	475.9	234.3	97.0			
1980	238.2	235.3	459.1	220.9	92.7			
1981	232.5	235.3	456.5	224.0	96.3			
1982	227.2	233.5	454.6	227.4	100.1			
1983	226.7	233.5	459.0	232.3	102.5			
1984	225.6	236.1	452.6	227.0	100.6			
1985	227.4	252.6	476.6	249.2	109.6			
1986	226.2	263.0	484.2	258.0	114.1			
AVERAGE	232.5	239.4	463.9	231.4	99.5	-20.6	+32.1	+27.7

[a]Source: *Agricultural Outlook*, USDA, ERS, AO-141, May 1988.
[b]Plain and flavored fluid whole milk, fluid lowfat and skim milk, flavored milk drinks, and buttermilk.
[c]Soft drinks, coffee, and frozen, chilled, and canned citrus juices.

Table 5
Whey Products Production 1970-87

	1970	1980	1987	1970/87	1980/87
	Million pounds			% change	
Dry Whey For Human Food	294	615	960	+226.5%	+56.1%
Dry Whey For Animal Feed	327	268	278	- 15.0	+ 3.7
Condensed Whey	90	81	116	+ 28.9	+43.2
Lactose	98	140	152	+ 58.2	+ 8.6
Wet Whey Solids	--	144	134	--	- 6.9
Total	809	1,248	1,640	+102.7	+31.4
Whey Solids Utilized	49%	46%	46%		

Source: *Dairy Situation and Outlook Report:* USDA, ERS, DS-416, September 1988.

Table 6
U.S. Dairy Imports and Exports Compared to U.S. Milk Production, 1977-87

	Imports	Exports
	Percent of U.S. Milk Production	
1977	1.6%	.4%
1980	1.6	.3
1985	1.9	1.9
1986	1.9	1.0
1987	1.7	1.0

Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS-415, July 1988.

Table 7
Milk Production, Major Dairy Countries, 1988

	Billion Pounds	Percent of total for 38 countries
European Community	235.8	25.4%
USSR	230.8	24.9
U.S.	143.7	15.5
East Europe	93.3	10.1
India	40.7	4.4
Brazil	25.3	2.7
Mexico	21.3	2.3
Canada	17.6	1.9
Australia	14.1[a]	1.5
China	9.5	1.0
New Zealand	1.8[b]	.2
Total for 38 Major Dairy Countries	927.7	

Source: *World Production and Trade*, USDA, FAS, WR45-87, November 12, 1987. (Forecast Data).

Table 8
U.S. Production and Export of Butter, Cheese, and Nonfat Dry Milk, Compared to World Production and Exports, 1988

	U.S. Production As % of World Production	U.S. Exports As % of World Exports
Butter	7.8%	1.2%
Cheese	24.3	.6
Nonfat Dry Milk	13.6	13.0

Souce: *World Dairy Situation*, USDA, FAS, FD 1-87, November 1987. (Forecast Data).

Table 9
European Community, Australia, and New Zealand, Production and Export of Butter, Cheese, and Nonfat Dry Milk, Compared to World Production, and Exports 1988

	Production As A Percent of World Production			Exports As A Percent of World Exports		
	Butter	Cheese	Nonfat Dry Milk	Butter	Cheese	Nonfat Dry Milk
European Community	27.8%	40.8%	44.6%	64.7%	75.3%	63.8%
Austraila	1.5	1.8	3.4	3.3	3.6	4.2
New Zealand	4.4	1.2	5.7	20.2	5.4	11.0

Source: *World Dairy Situation*, USDA, FAS, FD1-87, November, 1987 (Forecast Data).

Table 10
World and U.S. Support Prices For Butter, Cheese, and Nonfat Dry Milk, July 1988

	Mid Point World Prices[a]	U.S. Support Prices[b]	World Prices As % of U.S. Support Prices
		Dollars Per Pound	
Butter	$.5900	$1.32	44.7%
Cheddar Cheese	$.6663	$1.1525[c]	57.8%
Nonfat Dry Milk	$.7600	$ .7275	104.5%

[a]Source: *Dairy Market News*, USDA, AMS, Dairy Division, Vol. 55, No. 30, 7/22/88.
[b]Source: *Dairy Market News*, USDA, AMS, Dairy Division, Vol. 54, No. 2, 1/4/88.
[c]40 pound blocks.

Table 11
Casein Imports and Nonfat Dry Milk Protein Equivalents, 1984-87

	Casein Imports[a]	Nonfat Dry Milk Protein Equivalent[b]	
	-------Million Pounds-------		% of U.S. Production
1984	192.3	576.9	49.7%
1985	231.4	694.2	49.9
1986	238.0	714.0	55.6
1987	238.4	715.2	68.8

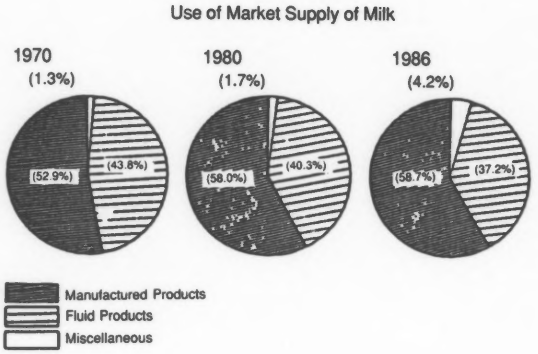
[a]Source: *Dairy Market News*, USDA, AMS, Dairy Division, Vol. 55, Report No. 27, June 27, 1988.
[b]3 pounds nonfat dry milk to get same protein as 1 pound casein.

Table 12
Casein Import Price, Compared to U.S. Nonfat Dry Milk Protein Equivalent Price, July 1988

	Dollars Per Pound
Casein Import Price	$2.15
Nonfat Protein Equivalent Price	$2.44[a]
Casein/Nonfat Price Differential	$-.29

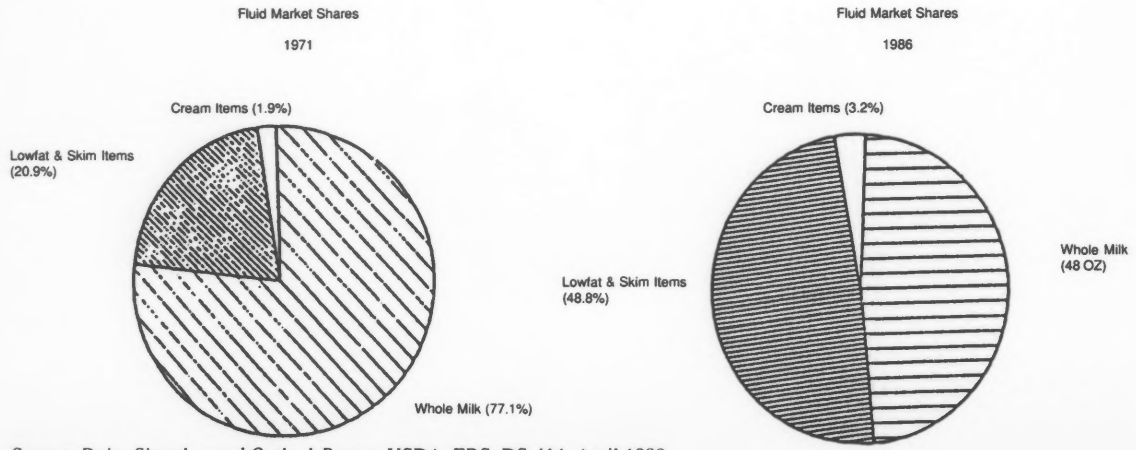
Source: *Dairy Market News*, USDA, AMS, Dairy Division, Vol. 55, Report No. 30, July 22, 1988.
[a]3 pounds nonfat dry milk to get same protein as 1 pound casin.

Figure 1



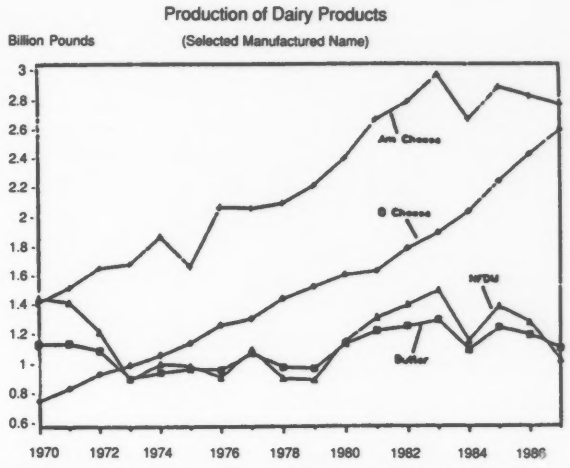
Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS-414, April 1988.

Figure 2



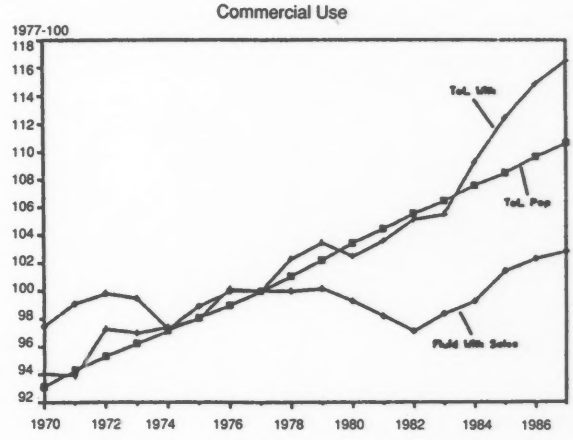
Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS-414, April 1988.

Figure 3



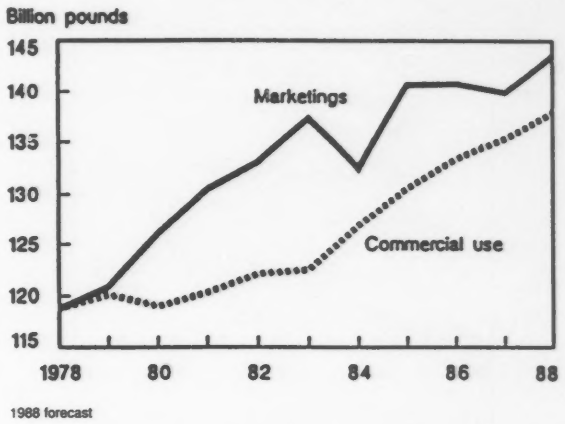
Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS-414, April 1988.

Figure 4



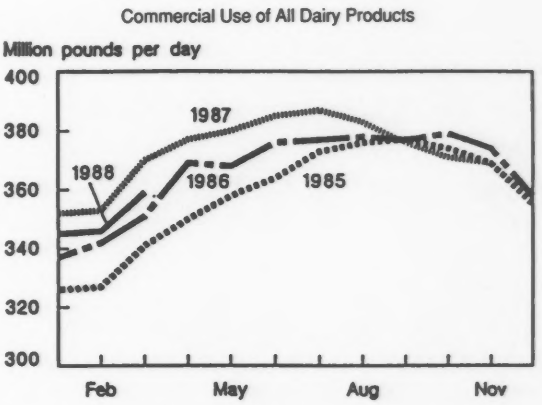
Source: *Dairy Situation and Outlook Report*, USDA, ERS DS-414, April 1988.

Figure 5



Source: *Dairy Situation and Outlook Report*, USDA, ERS DS-414, April 1988.

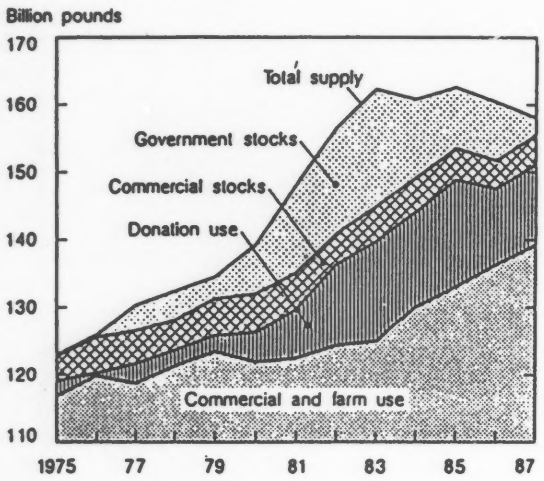
Figure 6



Source: *Dairy Situation and Outlook Report*, USDA, ERS, DS-415, July 1988.

Figure 7

Milk Supply, Use, and Stocks

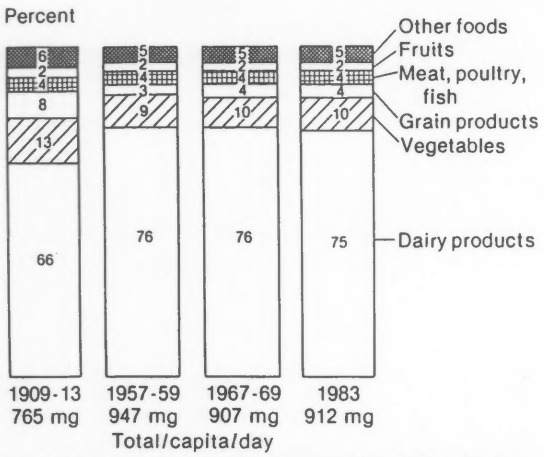


1987 forecast. Stocks as of December 31.

Source: 1988 *Agricultural Chartbook*, USDA, Agricultural Handbook No. 673, April, 1988.

Figure 8

Sources of Calcium in the U.S. Food Supply

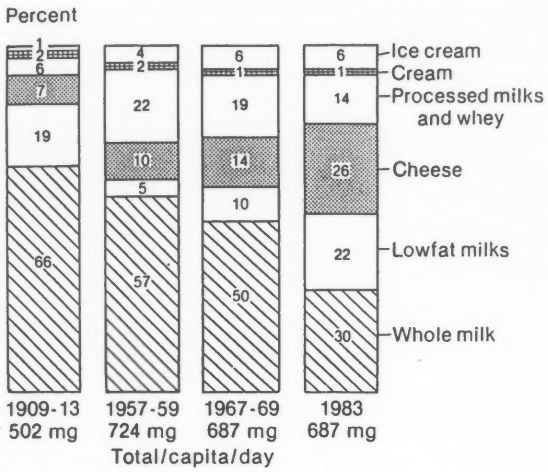


Percentages may not add to 100 due to rounding. Other foods include eggs, fats and oils, sugar and sweeteners, and miscellaneous. Vegetables include potatoes, dried beans, peas, nuts, and soy products.

Source: *Agricultural Chartbook*, USDA, ES, April 1985.

Figure 9

Calcium from Dairy Products



Percentages may not add to 100 due to rounding.

Source: *Agricultural Chartbook*, USDA, ES, April 1985.

Dairy, Food and Environmental Sanitation, Vol. 9, No. 3, Pages 135-137 (March 1989)

Setting Safe Limits on Pesticide Residues

by

Dixie Farley

Our food may contain synthetic poisons called pesticides.

Our food is free of hazardous pesticide residues.

Those statements may seem contradictory. They're really not. "Pesticides are indeed poisons, but the amounts we find in foods are very low - generally well below established safety standards - and we believe that their residues in food do not constitute a public health hazard," says Pat Lombardo of the Food and Drug Administration's Center for Food Safety and Applied Nutrition. FDA believes that fear of pesticides in foods - food safety fear No. 1 in recent surveys - is misplaced. Here's why.

Where We Are Today

It's estimated that pests destroy about a third of the world's food crops every year - a cost in the United States alone of nearly $20 billion, even with extensive pesticide use. The problem is, while pest control is necessary to ensure an adequate food supply, the presence of pesticide residues in foods raises concerns. Some of these chemicals, for example, have caused birth defects, sterility, tumors, organ damage, and injury to the central nervous system in laboratory animals; some persist in the environment for many years.

Federal agencies have struggled with the tension posed by pesticides - the need for them versus their potential risks - since regulation of pesticides began in 1910. (Inorganic chemicals such as lead arsenate constituted the first pesticides. Many synthetic organic pesticides were ushered in after World War II on the coattails of DDT's wartime success against disease-carrying pests, such as lice.) As a result of that struggle, pesticides have been studied extensively and are tightly controlled and monitored.

The Environmental Protection Agency regulates the manufacture, use and labeling of pesticides and monitors their presence in the environment. Before marketing a pesticide, a manufacturer must conduct studies to show that the product works as intended and won't pose unreasonable risks to people or the environment. There must be extensive safety studies to support the company's request for a food tolerance. On the basis of such data, EPA registers pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act and sets tolerances (the maximum level allowed) for pesticide residues in foods under the Federal Food, Drug, and Cosmetic Act. The tolerances are enforced by FDA except for meat and poultry, for which the U.S. Department of Agriculture is responsible.

For agricultural use, EPA tolerances specify residue limits for about 10,000 pesticide-food combinations involving about 300 pesticide active ingredients. Roughly two-thirds of those active ingredients are in common use in the United States. And, of those, a good number have very specialized uses - three or four herbicides are limited to rice, for instance. EPA may restrict or even ban the food use of a pesticide if new facts indicate the risks are greater than originally believed. An example is chlordimeform, which was once used on foods but was limited to cotton crops in 1978 when it was found to cause animal tumors.

A tolerance isn't necessarily the maximum safe level of a pesticide in a food, for EPA sets tolerances no higher than needed for the product's intended use, according to EPA's Douglas Campt, director of that agency's Office of Pesticide Programs. "They also," he said, "do not represent the actual residue levels expected on crops, but the maximum legal residue. Actual residues are much lower.

A Healthy Respect For Tolerances

No pesticide use is completely without risk of adverse effects, but this risk is related to the level of exposure. In general, dietary exposures are much lower and certainly less hazardous than certain occupational exposures, such as might be experienced by a commercial pesticide applicator. Indeed, pesticide tolerances in foods reflect a very conservative margin of safety - normally more than 100 to 1,000 times lower than the level that caused "no effect" in test animals - to allow for the uncertainty inherent in calculating human risk on the basis of animal data and the possibility that some people may be extra sensitive to a pesticide.

Most pesticide tolerances are for the whole raw food product (through a separate limit may be set for a processed food if residues are known to concentrate in that food during processing or if the pesticide is applied to the processed food). By the time a food is washed, cut, cooked and consumed, residues commonly diminish to far less than their EPA tolerance level. Still, EPA Commissioner Frank E. Young, M.D., Ph.D., recently noted in testimony before Congress: "Pesticides are biological poisons, and I share everyone's concern about the potential health effects of residues that may remain on foods from the agricultural use of these chemicals."

Should FDA find an illegal pesticide residue in a food, the law provides ways to remove the food from the market. "We will do whatever is necessary to make sure consumers are not exposed to excessive levels of pesticides," said Dr. Catherine Carnevale, associate director of FDA's contaminants policy staff. This may mean enlisting help from state officials. The agency routinely shares information on pesticides with EPA and other involved government agencies for any follow-up concerning the cause of the illegal residue.

A highly unusual, serious problem involving the pesticide heptachlor occurred in 1986. Heptachlor was banned in 1983 from *all* food uses because it causes cancer in animals and may cause cancer in humans, too.

Yet FDA discovered that a Van Buren, Ark., firm was using discarded seed treated with heptachlor and other pesticides to make fuel-grade alcohol and was then selling a leftover "mash" as animal feed to dairy farmers. The heptachlor traveled up the food chain to milk. FDA analysis of feeds and milk in the area showed heptachlor levels over 1,000 times that allowed in feeds and over 120 times that allowed in milk. By November, the four individuals responsible were indicted by a federal grand jury. Their sentencing on July 22, 1987, included jail terms and fines up to $7,500. (See "From Tainted Feed to Mother's Milk" in the March 1987 *FDA Consumer*.)

Sampling Strategies

To ensure conformance with established safety standards, FDA annually tests for pesticide residues in some 15,000 shipments of food. Consistently, FDA's sampling shows that 96 percent to 98 percent of the tested foods - both imported and domestic - are in compliance with the law. Of the few samples found with illegal residues, most involve pesticides approved for use on other foods, but not on that particular food. In most cases, the residues found are well below the tolerances for the same pesticide on the other foods.

An increase in food imports over the past few years has prompted increased FDA attention to pesticide residues in such foods, mainly fresh produce. (Pesticide residue tolerances that apply to domestic foods apply equally to imports.) In 1987, for instance, the number of import shipments FDA sampled for residues was 7,995, up from 5,748 in 1986 and nearly double the number sampled in 1982. Also, in 1986, FDA and EPA bought access to the Battelle World Agrochemical Data Bank, a computerized information system on worldwide pesticide use. FDA uses this information and U.S. Census Bureau data - which lists imported foods by volume, exporting country, and entry port - to help plan its import monitoring program.

Agency investigators spot-check foods, domestic and imports alike, with what is called *surveillance sampling* - monitoring conducted even though FDA has no suspicion that illegal residues may be present. This involves:

tests that can detect over 100 different pesticides in a single sample;

an emphasis on raw, rather than processed, foods because raw foods usually have higher levels of pesticide residues;

obtaining information on local pesticide use so investigators know which foods to sample and which residues FDA laboratories should test for; and

an emphasis on foods of major dietary importance, such as fruits, vegetables, eggs and milk.

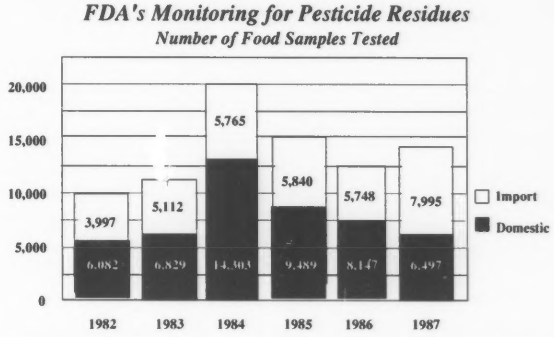
FDA determines the relative monitoring priority of different pesticides and commodities, said Ellis Gunderson of the division of contaminants chemistry, in FDA's Center for Food Safety and Applied Nutrition. "A pesticide," he explained, "that merits further monitoring and that isn't detected by our routine multiresidue methods may be periodically surveyed with a single-residue method specific for that pesticide." Illegal domestic products may be seized; imports may be refused entry.

When FDA has reason to believe certain pesticide uses on certain foods may be exceeding tolerances, it applies more intense scrutiny through what it calls *compliance sampling*. If FDA finds problems and suspects they may continue, it may seek an injunction to stop further interstate shipping of the problem foods. With imports, FDA may invoke automatic detention based on the finding of a single illegal shipment. Subsequent shipments of those foods from those importers may be admitted into the country only with a certificate from a qualified laboratory stating that testing indicates no illegal residues of the pesticide.

FDA also conducts *selective surveys* if more data are needed on a pesticide or if a commodity is of special interest, as in December 1986 when agency field offices were told to sample greenhouse-grown hydroponic vegetables. This method of growing vegetables in greenhouses in water instead of soil has been increasing, since it is more efficient. So, FDA decided to check for pesticide residues in such foods. A small proportion contained illegal levels and were promptly taken off the market.

Total Diet Study

Another important sampling program is FDA's total diet study. Each year, the agency goes shopping in supermarkets to buy foods (including imports) typical of the American diet, prepares them in the usual ways, and then analyzes them for pesticides and other chemicals. Results show that, of the pesticides analyzed, residues are at very low and diminishing levels and are consistently well below daily intakes found acceptable by the World Health Organization. (An "accept-



An unusually large increase in sampling occurred in 1984 and 1985 in response to concern over ethylene dibromide. Sampling in 1986 for domestic foods was high largely because of the heptachlor incident, and for imports because of illegal residues of procymidone in Chilean grapes.

able'' daily intake is one that appears to present no appreciable risk to health if consumed every day over a lifetime.)

The total diet studies check for more than 150 pesticides with food tolerances. FDA believes these studies accurately reflect overall dietary exposure to pesticides. FDA's Carnevale compares the studies to another sampling technique: ''The Gallup Poll doesn't need to question every eligible voter in the United States to accurately predict election results,'' she says. ''We believe these studies, over the many years they've been carried out, demonstrate that pesticide residues in foods are at safe levels.''

Dixie Farley is a member of FDA's public affairs staff. A reprint from the FDA Consumer/October 1988.

Dairy, Food and Environmental Sanitation, Vol. 9, No. 3, Pages 138-141 (March 1989)

Recent Changes in Environmental Regulations

by

John Zirschky[1], Ph.D., P.E. and Barbara Winter Watson[2]

Abstract

The Community Right-to-Know (CRTK) Program of SARA Title III and the Water Quality Act are the primary regulatory programs which both affect the food processing industry and in which significant changes occurred during 1988. The Water Quality Act will significantly affect storm water runoff, sludge disposal, and penalties for non-compliance with NPDES discharge permits. The CRTK program requires food processing industries to report the presence and release of toxic chemicals from their facility. A discussion of both environmental programs is presented herein.

Introduction

Compared to 1986 and 1987, 1988 was a relatively light year for new federal environmental legislation. The Water Quality Act (WQA) of 1987, and the Superfund Amendment and Reauthorization Act of 1986, however, are now beginning to or will soon substantially impact the food processing industry. The U.S. Environmental Protection Agency (EPA) is making substantial progress in the implementation of these regulations. In this paper, the status of these regulations, particularly the WQA regulations, are reviewed.

The Water Quality Act

Passed in 1987, the Water Quality Act will have a substantial impact on many food processors, particularly those that operate their own wastewater treatment plants. This Act affects permitting, operation of wastewater treatment plants (particularly with respect to sludge disposal), and penalties for non-compliance. A broad overview of this Act was presented at the 1987 Food Processing Waste Conference[1]. A more recent overview is presented by Henrichs[2]. A general overview of this Act is thus not provided herein.

[1]*ERM-Southeast, Inc., 2629 Sandy Plains Road, Marietta, GA 30066*
[2]*ERM, Inc., 855 Springdale Drive, Exton, PA 19341*

Sludge Regulations

Current Status

The WQA requires that EPA develop a comprehensive set of sludge regulations. The goal of these regulations is to identify toxic pollutants in wastewater treatment sludges and to set appropriate limits for these pollutants. The limits and compounds regulated may vary depending upon the sludge disposal method selected. The regulations associated with these goals were to have been issued by August 31, 1987. As of August 1, 1988, however, these regulations have not been issued. As a result, the National Resources Defense Council has sued EPA in hopes of forcing a more rapid development of these regulations. It is now currently envisioned by EPA that the proposed regulations will be available by April of 1989, with final regulations promulgated sometime in 1991.

A fourth goal of the WQA was to develop a permitting system for sludge disposal. A draft "Strategy for Interim Implementation of Sludge Requirements Issued to POTW'S" has been distributed to the EPA Regions and to the states. This draft strategy provides guidance to the states and regions on:

1. boilerplate information for new and existing permits,
2. setting interim permit requirements for sludge, and
3. co-ordination between EPA and the states.

Copies of this draft strategy may be obtained from Martha Kirkpatrick at the U.S. Environmental Protection Agency (202/475-9592).

Pollutants and Disposal Options

The WQA amended section 405 of the Clean Water Act to require the EPA Administrator to develop regulations which will:

1. identify uses for sludge, including disposal;
2. specify factors to be taken into account in determining the measures and practices applicable to each such use or disposal (including publications of information on costs); and
3. identify concentrations of pollutants which interfere with each such use or disposal.

One of the first steps towards satisfying these goals was to compile existing state and federal standards. This compilation was completed in early July 1988. These standards will then be used to help EPA set national standards.

Four broad categories of sludge disposal options to be evaluated are (1) landfilling, (2) incineration, (3) land application, and (4) ocean disposal. Landfilling will be subdivided into two subcategories: co-disposal with solid waste and monofills. Sludges co-disposed with municipal solid waste will be regulated under Subtitle D of the Resource Conservation and Recovery Act (RCRA). When these regulations are promulgated (they were to have been proposed in January 1988), these regulations will be published in 40 CFR 258. Proposal of these regulations is still expected this year. For sludges disposed in monofills, new regulations are expected in April 1989. It is anticipated that performance standards for monofills will be established as part of the new WQA regulations. Net precipitation and the travel time from the bottom of the monofill to the ground water are two factors which may be used as performance standards[3].

Maximum allowable levels of pollutants in sludge for incineration will be based upon minimizing the risk to the Most Exposed Individual (MEI) and the aggregate risk to the surrounding populations. Heavy metals, particularly hexavalent chromium and then cadmium, arsenic, and nickel (all carcinogens when inhaled), are believed to be the metals that will primarily affect the feasibility of using incineration.

Land application will be divided into four categories: agriculture, silviculture, land reclamation, and dedicated land for disposal. It is anticipated that the new regulations will be an expansion to the current regulations under 40 CFR 257. EPA currently regulates land application by defining "Processes to Significantly Reduce Pathogens (PSRP)" and "Processes to Further Reduce Pathogens (PFRP)." In addition to pathogens, as many as 32 to 33 compounds may be regulated. At present, heavy metals are the primary compounds regulated.

Finally, ocean disposal will be restricted. Approximately 15 compounds will be regulated. Concentration of these compounds will be limited to approximately 1/100th of the LD50 (Lethal Dose to 50% of the target organisms).

Sampling

Obviously, if there are new limits, there will be increased requirements for sampling. Sludges are already subject to the sampling requirements of RCRA. EPA and the states are to identify 'high priority' facilities. High priority facilities are those facilities believed to pose a 'greater risk.' These facilities will be required to perform at least annual analyses for at least 126 priority pollutants. Sampling requirements for lower priority facilities may be similar.

Impact on Industry

The effect of these regulations will be to increase the costs of wastewater treatment for anyone who discharges to or operates a system which produces sludge. A facility need not have an NPDES permit to be subject to these regulations. Individual states may also use other permit programs to enforce the requirements of the Clean Water Act. Industries which discharge to municipal treatment plants will likely be faced with higher user charges as the municipalities pass on their costs of compliance.

Industries using land treatment for their wastewater, however, may avoid much of the impact of these regulations. Except for the sludge produced by any preapplication treatment requirements (e.g., sedimentation prior to spray application), no biological sludges are produced by land treatment processes. Biological solids are produced by most land treatment processes; these solids are in the form of grass, corn, trees, or other crops and as such are not sludges. It is not anticipated that such crops will be regulated by EPA under the WQA.

Compliance

National Municipal Policy

National Municipal Policy required essentially municipal treatment facilities to be in compliance with their permits by July 1, 1988. If the treatment plant cannot meet their permit, the treatment plant must be upgraded. Wastewater treatment authorities often do not have sufficient funds for such upgrades. As a result, industry may be approached to help finance (either directly or through increased user fees) treatment plant upgrades. Alternatively, more stringent permit limits may be placed on industrial dischargers. Increased pretreatment may be necessary.

Penalties

Penalties for failure to comply with the WQA have been increased. Civil penalties range from $10,000 to $25,000 per day of violations, while criminal penalties range from $25,000 to $50,000 per day plus up to three years in prison. Civil penalties can be assessed after administrative hearings, thus, EPA need not go to court to penalize violators of the CWA.

Citizens Suits

The WQA gave private citizens the right to sue a permittee for failure to comply with its permit conditions (Section 505(a)). On December 1, 1987, the U.S. Supreme Court ruled that citizen suits provisions are not applicable to cases of past violations, but instead are limited to cases where the citizen-plaintiff can show that the violations will continue in the future. While this limits the scope of citizens suits, this decision does nothing to protect industries from future prosecution. Since each permittee must sign and file Discharge Monitoring Reports (DMR's) which in effect are the evidence of non-compliance, industries should place a high priority on maintaining compliance.

Sara Title III

Toxic Chemical

Release Reporting

Section 313 of the Emergency Planning and Community Right-To-Know Act (Title III of SARA) requires annual reporting of routine and accidental releases of toxic chemi-

cals. This information will be made available to the public. EPA proposed rules for implementing the toxic chemical release reporting requirement on 4 June 1987. EPA issued the final rule on 16 February 1988.

Table 1. SIC Groups
Subject to Section 313

20	Food	32	Stone, Clay, and Glass
21	Tobacco	33	Primary Metals
22	Textiles	34	Fabricated Metals
23	Apparel	35	Machinery (excluding electrical)
24	Lumber and Wood	36	Electrical and Electronic Equipment
25	Furniture	37	Transportation Equipment
26	Paper	38	Instruments
27	Printing and Publishing	39	Miscellaneous Manufacturing
28	Chemicals		
29	Petroleum and Coal		
30	Rubber and Plastics		
31	Leather		

Applicability

Toxic Chemical Release Reporting requirements apply to any facility which meets the following criteria:

-The facility is in Standard Industrial Classification (SIC) codes 20-39 (Table 1);

-the facility has 10 or more full-time employees; and

-the facility manufactures or processes a toxic chemical in excess of 75,000 pounds in 1987 (50,000 pounds in 1988; 25,000 pounds in 1989 and thereafter) or uses a toxic chemical in excess of 10,000 pounds in any calendar year.

Reporting Requirements

A covered facility must complete an EPA Toxic Chemical Release Inventory Reporting Form (Form R) for each toxic chemical which is manufactured (or imported), processed, or otherwise used in excess of appropriate threshold amounts during the reporting calendar year. One Form R must be completed for each reportable toxic chemical and sent to EPA and the State Governor's designee by 1 July of each year beginning 1988. Copies of all reports, and documentation used to prepare such reports, must be maintained at the facility for at least three years.

Revisions and Clarifications in Final Rule

Full-time Employee: A "full-time employee" is equivalent to 2,000 hours per year of employment. The number of full-time employees equals the total number of hours worked during the calendar year by all employees (including contract employees) divided by 2,000 hours.

SIC Code Determination: A facility meets the SIC code criteria based on the primary SIC code for the establishment(s) that comprises the facility. The determination of coverage must be made for the entire facility, but each establishment within the facility may report separately.

Toxic Chemical List: EPA has clarified the qualifying statement regarding the form or handling of the substance which is subject to the reporting requirements. For example, isopropyl alcohol has a qualifying statement which reads "mfg. --strong acid process." EPA interprets this qualifier to mean that only persons that manufacture isopropyl alcohol by the strong acid process are required to report.

De minimis Exemption: If a toxic chemical is present as a component of a mixture in a concentration of less than 1% of the mixture, or 0.1% in the case of a toxic chemical which is a carcinogen, you are not required to consider the quantity of the toxic chemical present in this mixture when determining whether an applicable threshold has been exceeded.

Exemption for Articles: You need not consider the quantity of a toxic chemical present in an "article" for threshold determinations. An article is defined as a manufactured item formed to a specific shape or design which has end use functions dependent in whole, or in part, upon its shape or design and which does not release a toxic chemical under normal conditions of processing or use of that item at the facility.

Exemption for Specific Uses: The following specific uses of a toxic chemical are exempted from consideration in threshold calculation.

-Use of a structural component;

-use of products for routine janitorial or facility grounds maintenance;

-personal use by employees or other persons at the facility of foods, drugs, cosmetics, or other personal items containing toxic chemicals;

-use of products containing toxic chemicals for facility vehicle maintenance; and

-use of toxic chemicals present in process water and non-contact cooling water as drawn from the environment or municipal sources, or toxic chemicals present in air used as either compressed air or as part of combustion.

Laboratories: The manufacture, process or use of toxic chemicals in laboratories under the supervision of technically qualified individuals need not be considered in threshold determinations. This exemption does not apply to specialty chemical production, pilot plant scale operations, and activities conducted outside of the laboratory.

Supplier Notification: Suppliers of mixtures and trade name products which are, or contain, listed toxic chemicals must notify their customers of the presence and composition of these chemicals. If a Material Safety Data Sheet (MSDS) is required for the product, the supplier must attach a written notification statement to the MSDS with the first shipment of the product in 1989. Until the supplier notification goes into effect, users and processors of mixtures and trade name products are required to use only readily available data for reporting.

Revisions to Form R

Each facility should indicate on Form R a public contact

person (for responding to general information requests) as well as a technical contact for the facility.

Latitude and longitude information must be reported for the calendar year 1987 report (due July 1, 1988) only if available. This information will be required on all forms beginning 1 July 1989.

Total annual releases of less than 1,000 pounds (to a particular environmental medium) may be reported in ranges for calendar years, 1987, 1988, and 1989.

Form R no longer requires an indication of whether any portion of a total annual release was a Title III, Section 304, emergency release or a permitted release.

The new Form R allows a facility to report on discharges to multiple receiving streams.

The total release of a toxic chemical to surface waters must include the contribution from stormwater if the facility's permit includes stormwater sources.

Keeping Up With Changes

Keeping abreast of changes in federal regulations is difficult as almost everyday new changes appear in the Federal Register. Several firms publish lengthy environmental newsletters, which often are as voluminous as the Federal Register. An alternate method of keeping up with changes is to use an on-line computer database such as DIALOG (1-800-3-DIALOG) or in-house computer search systems (ENFLEX, 1-215-524-3600). By entering a few key words, the data base can be searched for topics of interest (at a nominal cost) while avoiding the need to search through every issue of the Federal Register.

References

1. Zirschky, J. "Overview of Recent Environmental Regulations" *Proc. 1987 Food Processing Waste Conference*, Georgia Tech Research Institute, Atlanta, GA.
2. Henrichs, R. "Law" *J. Water Pollution Control Federation*, 60:748-751 (1988).
3. Darcey, S. "EPA Issues Interim Sludge Regulations" *Biocycle*, 29:31-33 (1988).

If you are interested in receiving a list of significant changes to the federal regulations from January 1 to August 1, 1988, please contact: Margie Marble, IAMFES, PO Box 701, Ames, IA 50010.

News

Guide to Pumping Viscous Products

The Guide to Pumping Viscous Products is an 8-page handbook available from APV Crepaco. A basic overview of pump operations under viscous conditions is offered. Included are such topics as types of viscosity, apparent viscosity, viscosity measurement, centrifugal and rotary pump operation factors, and pump selection considerations.

For a copy of this handbook, write to APV Crepaco, Inc., Marketing Communications Dept., 100 South CP Ave., Lake Mills, WI 53551.

Free: Handy Guide on "How to Handle Ammonia"

For those who use anhydrous ammonia, or would like to know more about its uses and further information, a helpful, 4-page brochure is being offered free by Hamler Industries, Inc.

Included in the brochure are properties, applications, handy hints, safety checks, and general facts regarding the use of this important chemical. Up-to-date data about "what you should know about ammonia" makes it a handy reference guide.

Hamler Industries is one of the largest, independent purveyors of metallurgical grade highest purity ammonia now available. With a background of over one hundred years in this business, Hamler has branches in most major cities throughout the Eastern, Southern and Central regions of the U.S., where its branches appear in many of the yellow pages of telephone directories. Many of the nation's largest dairy, meat, fish, fruit and vegetable packers and packagers use Hamler ammonia in their production operations.

Write: Hamler Industries, Inc., 400 E. 16th Street, Chicago Heights, IL 60411.

Management of ACDPI Consolidated in Washington Offices; Interim President Named

The American Cultured Dairy Products Institute (ACDPI) Board of Directors has consolidated the management of ACDPI in its Washington offices and named Tom Balmer as its interim president.

ACDPI Chairman Earl Carter described the change of leadership as a "new opportunity for ACDPI, one in which we can build on our past successes, look to the future, and strive for greater service and achievements in the cultured dairy foods industry."

In the past, ACDPI's management was divided between the staff of the Milk Industry Foundation (MIF) and additional staff in Florida. The ACDPI Board believed that this division of responsibilities made it difficult to properly achieve the goals and fulfill the purpose of the organization. The administrative changes will streamline ACDPI's operations and facilitate better coordination of the Institute's activities.

In taking this action at their October Board meeting, the ACDPI Board of Directors accepted the resignations of both President Glenn Witte and Vice President and Secretary Bronson Lane, and acknowledged their outstanding services to the institute.

Balmer, who has served as ACDPI's assistant treasurer since March of 1988, will execute the previously divided duties of president, vice president, and secretary. He will serve as interim president until the Board reconvenes in March.

Balmer is also on the staff of MIF & IICA (the International Ice Cream Association). As these associations' manager of special projects, he has "demonstrated his abilities in all aspects of association management and his qualifications to provide the level of leadership that will move ACDPI forward," said Carter.

Over 40,000 Expected to Attend

The Pennsylvania Restaurant Association will sponsor three trade shows across the state. These shows continue to gain momentum yearly, and draw exhibitors and attendees not only from the Commonwealth of Pennsylvania, but from surrounding states and across the country as well.

This year winners of the menu contest will be highlighted, and new demonstrations and seminars are planned at all three shows. A popular event, the ice carving contest will be held at the Harrisburg Show.

The 1989 Restaurant Food & Equipment shows offer the restaurant owner an opportunity to see and taste new food products, to be introduced to new sources of products, services and suppliers, and to view the latest equipment on the market. Don't miss out - mark your calendar today.

Pittsburgh Restaurant Food & Equipment Show. The Expo Mart, Monroeville, PA, March 19 & 20, - 11:00 am to 7:00 pm.

Harrisburg Restaurant Food & Equipment Show. The Farm Show Complex, Harrisburg, PA, April 11 & 12 - 11:00 am to 7:00 pm.

Philadelphia Restaurant Food & Equipment Show. Valley Forge Convention & Exhibit Center, King of Prussia, April 23 & 24 - 11:00 am to 7:00 pm, April 25 - 11:00 am to 5:00 pm.

WHO Redesignates Food Research Institute - A Collaborating Center for Food Virology

The World Health Organization has redesignated the University of Wisconsin-Madison's Food Research Institute as a Collaborating Center for Food Virology.

Professor Dean Cliver, who studies the transmission of viruses in food and water, heads the center, which is the only one in the world the WHO recognizes.

As a Collaborating Center for Food Virology, the Food Research Institute will help the WHO keep its information on food virology up to date, will conduct laboratory research in food virology and will accept WHO-sponsored trainees in food virology.

The Food Research Institute has been recognized as a Collaborating Center for Food Virology continuously since it was designated as one in 1975. The redesignation extends the agreement until November 1992.

AFFI Expands Into Refrigerated Foods, Establishes Committee to Study Vital Issues

The American Frozen Food Institute (AFFI) has established a Refrigerated Foods Committee to deal with the issues facing this growing segment of the food industry.

The AFFI Board of Directors approved the action on Oct. 8, 1988 following a report by the organization's Refrigerated Task Force. The task force, chaired by Steven A. McNeil of Campbell Soup Company, was appointed by the AFFI Executive Committee to study AFFI's involvement with refrigerated foods.

"We view this as a very positive step towards recognizing the many issues impacting refrigerated foods," said AFFI President Thomas B. House. "AFFI is the ideal association to address these temperature-controlled products because we have the experience and expertise in the areas most important to refrigerated food processors."

"It's our view that the work of this important committee will include issues of immediate concern as well as those that may lead to a much larger role in the future, not excluding a full-fledged reorganization of what is now AFFI," House added.

AFFI Chairman Preston C. Williams, Southern Frozen Foods, has appointed McNeil chairman of the Refrigerated Foods Committee.

Williams also appointed representatives from the following companies to serve on the committee: McCormick & Company, Inc.; Freezer Queen Foods, Inc,; Carnation Company; Nestle; Coca-Cola Foods; Sysco Corporation; ConAgra, Inc.; General Foods Corporation; Clear Springs Trout Company; and Christian Salvesen.

Serving as Ex Officio committee members will be John W. Farquhar of Food Marketing Institute, and J. William Hudson of International Association of Refrigerated Warehouses.

AFFI Is a membership-driven organization that has served the frozen food industry for over 40 years.

In Memory of Harold Heiskell

Harold Heiskell of Sacramento California passed away December 22, 1988. He is survived by his wife, Mildred, two daughters, Jo Ann Samson of Marysville and Virginia English of Carmichael, six grandchildren and two great grandchildren.

Harold began his career as a commissioned milking machine salesman for Babson Brothers Company in Joplin, Missouri. During the following 45 years with Babson, he managed the Kansas City Branch and then became a successful dealer in the state of Arizona. He managed and directed the company's entire sales and service operation in the state of California and the western region. Heiskell is recognized for his major contributions to the dairy industry in the areas of pipeline milking and sanitation. He was awarded the 1983 California Sanitarian of the Year Award.

Harold was a long standing member with the International Association of Milk, Food and Environmental Sanitarians as well as the California Affiliate of the International.

Correspondence to the family may be addressed to: Mrs. Mildred B. Heiskell, 3380 Sierra Oaks Dr., Sacramento, CA 95864.

AIDS Program Introduced for Primary and Intermediate Students

Health enthusiast Slim Goodbody is the host of a timely new video program that presents the facts about AIDS. Available from the Agency for Instructional Technology (AIT), "**Protection against Infection: The Inside Story of the Immune System and AIDS,**" employs vivid props and appropriate, sensitive language to help students in primary and intermediate grades understand the nature of the AIDS virus and the ways in which it can-and cannot-be transmitted.

Surrounded by models of viruses and red and white blood cells, Slim demonstrates how the immune system works normally and how it is affected by the AIDS virus. He describes the two main ways people risk catching the AIDS virus - illegal drug use and sexual intercourse.

The 15-minute program illustrates how shared needles and syringes pass the infected blood of a person with AIDS into the bloodstream of another. "You should never take any drug that's not given to you by a doctor or by your parents," Slim warns.

While the program treats sexual intercourse as a normal part of adult life, Slim encourages young viewers to talk with their parents about healthy sexual development. Slim warns that students may someday be pressured to participate in sexual intercourse before they are adults. He urges young viewers to learn how to avoid AIDS before they become sexually active.

"**Protection against Infection**" reassures children who may be confused and frightened by AIDS that they have the power to protect their bodies. Slim answers troubling questions such as "Can I get AIDS by sitting next to someone on a bus?" "Can I get AIDS by kissing?" "Can I be friends with someone who has AIDS?" In conclusion, Slim challenges viewers to avoid AIDS by being their own best friend, by making healthy choices, and by avoiding risky behaviors.

Accompanying "**Protection against Infection**" is a teacher's guide featuring a list of AIDS-related vocabulary, a program summary, pre- and post-viewing activities and suggested readings. Printed lyrics allow students to sing along with Slim as he energetically emphasizes the importance of the body's immune system.

"**Protection against Infection,**" produced in association with the Slim Goodbody Corporation, is being distributed as part of the widely used series *The Inside Story* with Slim Goodbody, produced by the Wisconsin Public Television Network. Programs from *The Inside Story* have won the NAEB Gold Award, a CPB Award, a Silver Medal at the Houston International Film Festival and the Ohio State Award. Each of the nine 15-minute programs is a celebration of the parts and systems of the human body for children in primary and intermediate grades.

"**Protection against Infection: The Inside Story of the Immune System and AIDS**" is available for broadcast or videocassette purchase. Previewing is recommended due to the sensitive nature of the program. Previews are provided at no charge except for return postage. For information contact the Agency for Instructional Technology, Box A, Bloomington, IN 47402, or call 800/457-4509 or 812/339-2003.

Over 600 Computer Products Listed In New Directory Published by Educational Foundation

Over 600 computer soft- and hardware products developed with the foodservice industry's particular needs in mind are cataloged in the *1988/89 Directory of Hardware and Software for the Foodservice Industry*, recently released by The Educational Foundation of the National Restaurant Association.

Programs listed in this, the only foodservice-specific hardware/software reference book, fill a broad range of foodservice professionals' requirements including purchasing; fine dining seating and reservation systems; general restaurant accounting with inventory, payroll, accounts receivable, accounts payable and many other options; labor scheduling and hundreds of other applications.

Organized under uniform headings for consistency in product evaluation and analysis, a series of checklists guides the user in selection of appropriate systems. Industry computer consultants are also listed.

The easy to use, cross-indexed, 500-page directory was designed as a reference guide for foodservice owners, operators, accountants, architects, chefs, consultants, designers, educators, students, publishers, writers, and software/hardware developers and dealers.

Products are listed for a variety of operations including full-service and fast-food; bars and clubs; caterers; hotels; and institutional foodservice.

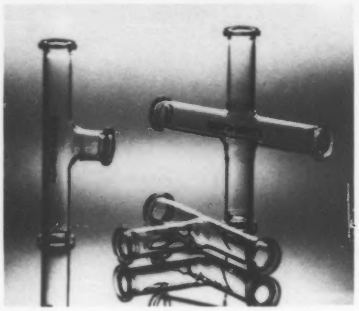
Each program listing includes a brief product description, the vendor's name, price, program applications, brand/model compatibility, configurations, operating systems, software language used, installation, training, updates, warranty availability, and required memory and disk space.

The book's author, Joel Chaban, is a principal with FOOD ABCS of Sausalito, CA. Since 1981, he has been a consultant, programmer and seminar leader in foodservice computers and software. Chaban's background also includes operations experience at over a dozen restaurants.

The 1988/89 Directory of Hardware and Software for the Foodservice Industry is available through The Educational Foundation of the National Restaurant Association, 250 South Wacker Drive, Suite 1400, Chicago, IL 60606. The cost is $25 for National Restaurant Association members and $30 for non-members. Phone orders can be made through the Foundation's customer service department at 312/715-1010 or 800/522-7578.

The Educational Foundation of the National Restaurant Association was formed on January 1, 1987, through consolidation of the National Institute for the Foodservice Industry (NIFI) and the educational and training activities of the National Restaurant Association.

Industry Products



A variety of crystal clear Sani-Pro G sanitary glass systems fittings are available for mini or maxi non-metallic or universal stainless steel tubing systems.

Clear, Sanitary Glass Tubing and Fittings Offer Adaptability in Pilot Plant Processing Design by ***Sani-Tech***

Crystal-clear sanitary Sani-Pro G glass systems offer an optically clear, inert contact surface ideal for use in biotechnology research and mammalian cell growth in smaller diameter mini pilot process systems.

Sani-Pro G tubing and fittings are available in a variety of Tees, elbows and reducing Tees in pre-flanged spool pieces or lengths from 3 inches to 12 feet with IDs from 0.560" to 0.856". Sani-Pro G fittings are interchangable with mini and maxi sanitary **Sani-Tech** nonmetallic or universal sanitary stainless steel systems and valves. Full glass systems are available

Sani-Pro G fittings meet FDA, USDA and Pharamacopoeia XXI Class VI standards. A suspension support system is available.

Please circle No. 281
on your Reader Service Card

New Multicomponent Monitoring System - (MMS)

Continuous in-line standarization is now available from **Foss Food Technology Corporation** using the Multicomponent Monitoring System to measure fat, protein, lactose, and solids. Measurements are possible on one, two, or three process lines by a single unit. By utilizing this information precise control and standardization can be a normal procedure. Rapid and accurate protein measurements allow precise control of cheese milk. The fat to protein (casein) ratio can be precisely controlled regardless of the variation in protein content of the raw product due to seasonal and other variations in the protein content.

Initially, the MMS was designed for the standardization of cheese milk. Without modification, it can be utilized for the manfuacturing of whole-milk powder and condensed milk.

The microprocessor automatically controls zero point checks, alarms for preset limits, and cleaning of the unit is carried out at user-programed sample intervals. With the unique single infra-red beam system used in the MMS measuring unit, an accuracy of SD 0.04 and repeatability of SD 0.02 is obtained for all three components: fat, protein, and lactose on raw milk.

Please circle No. 282
on your Reader Service Card

Bomem, Inc.

For the first time ever you can equip your laboratory with all the capabilities of mid-range FT-IR spectrometers at entry level system prices. New Michelson MB FT-IR Spectrometers for under $25,000.

A new universal bench offers three sampling positions.

The main sample compartment accommodates routine liquid and solid samples.

The 4x microbeam sample compartment uses a more highly focused beam for small sample analysis.

An external beam can be added as an option for large accessories.

The MB series gives the spectroscopist a wide range of resolution from 1 cm^{-1} to 16 cm^{-1}, and makes changeover of detectors, such as DTGS, MCT, InSb and Pas easier than ever before.

The instruments have been designed so that the sample compartments and the interferometer are separately purged. All sampling accessories are equipped for kinematic mounts.

Specialized software and spectral libraries are also available from **Bomem, Inc.**

Please circle No. 283
on your Reader Service Card

Massive Amounts of Hot Water and Steam - Where and When You Need It

Hotline, a unique new service for industry, has recently begun operations. **Hotline** consists of a fleet of trucks capable of providing large amounts of hot water and steam at high pressure. Perhaps best of all, the service is mobile.

Common applications of **Hotline's** services include chemical stripping, tank cleaning, pipeline purging and thawing, pressure testing, and general decontamination. **Hotline's** high pressure steam may also be used for emergency steam heat for buildings or temporary process steam for manufacturing.

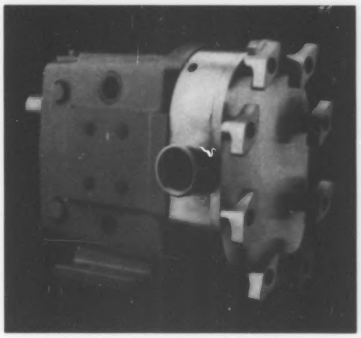
Please circle No. 284
on your Reader Service Card

New Convertamatic Trac® 280

The new Convertamatic Trac® 280 maximizes labor savings and minimizes down time. The 35 gallon (132L) solution and recovery tanks allow for long scrubbing time between refills. It has wheel-drive self-propelling for maximum ease of operation and transport of a 28-inch (71 cm) cleaning swath making it possible to scrub 30,000 square feet (2760m^2) per hour.

Manufactured by **Advance Machine Company**.

Please circle No. 241
on your Reader Service Card



Hydraulically Powered Pressure Washer

MBC/Friedrichs is proud to announce its introduction to the first series of a new generation of high pressure water pumps. These pumps are axial ceramic plunger pumps. The pumps have a patended seal design and drive system that surpasses present available triplex plunger pumps in durability, performance, and reliability.

Please circle No. 243
on your Reader Service Card

Waukesha Pumps *Introduces New Matched-To-The-Job LIne of Stainless Steel Rotary Pumps for Sanitary and Industrial Service*

A new matched-to-the-job line of stainless steel rotary P.D. pumps for sanitary and industrial service is announced by **Waukesha Pumps**. The CDL-4000 Series pumps feature a simplified fluid end with 3A Approved non-metallic lobe style non-galling rotors operating in a 316 stainless steel pump body.

According to the firm, the CDL-4000 Series is designed to meet the market need for an economical sanitary and industrial pump to supplement its Universal Series where the performance and capability of the pump needs to be closely matched with the investment and application it serves. This is generally in less demanding applications involving lower pressure, temperature and abrasion requirements. It is also well suited for the gentle handling of delicate products or fluids with high particulate content.

Please circle No. 242
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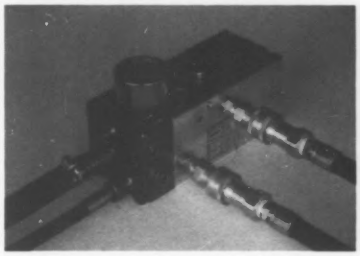


Busch, Inc. *Features R5 Series Vacuum Pumps and Systems For Laboratory Applications*

Busch pumps are capable of handling most chemical laboratory applications where belt drive pumps are currently used. Belt drive pumps are usually selected because they have large oil sumps that become contaminated less quickly than hi-vac direct drive pumps. **Busch** direct drive pumps are designed to operate at temperatures that permit most gases and water vapor to pass through the pump without contaminating the oil. This assures successful operation and longer pump life.

Considered one of the most rugged and dependable vacuum pumps in the world market, these single-stage, air-cooled, direct driven units are used to provide vacuum for distillation, filtration, extraction, degassing, drying, etc. in laboratory applications.

Please circle No. 244
on your Reader Service Card

Garland *Develops Hi-Build H.S. Epoxy Coating*

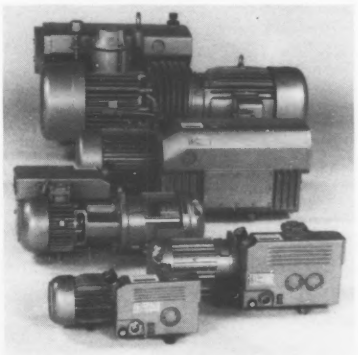
Garland Floor Company is now offering Hi-Build H.S., developed for floors that are too rough for a thin film coating or sealer, but have not deteriorated to the point that heavy-duty floor resurfacing is needed to repair them.

To insure good adhesion, the floor must be blasted before coatings of Hi-Build H.S. are applied. The first coat of the product seals the floor, levels the contours and removes any imperfections. The second coat, a finish coat, which can be applied by roller or with a notched squeegee, leaves a smooth, high-gloss, durable finish. A non-slip finish is also available. Although generally applied at a thickness of approximately 30 mils, Hi-Build H.S. can be applied thicker or thinner to meet individual flooring needs.

Recommended for areas involving light manufacturing or light traffic, hangars, pedestrian walkways and clean rooms, Hi-Build H.S. coating is available in clear or any of Garland's standard colors, providing excellent appearance at a moderate cost. It also offers chemical resistance and is V.O.C. compliant in California.

Founded in 1959, **Garland Floor Company** is an innovator in the protective flooring industry. It is unique among flooring system companies because it provides a full complement of flooring needs from full service resurfacing installations to factory pre-measured kits of easy-to-use, do-it-yourself materials.

Please circle No. 245
on your Reader Service Card



Sani-Tech Tygon Sanitary Tubing Assemblies

The **Supply Corporation** offers new "Sani-Tech" Tygon Sanitary Tubing Assemblies. Available in sizes up to 2" I.D., these clear, flexible and sanitary assemblies are ideal for handling all types of beverages and food products. "Sani-Tech" tubing assemblies are compatible with all stainless steel sanitary processing systems including "Tri-Clamp", "I-Line", "Q-Line", and bevel seat fittings.

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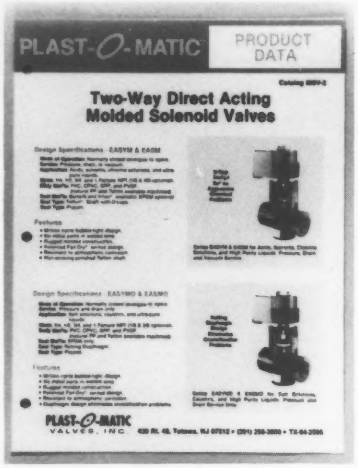
on your Reader Service Card



*New **Plast-O-Matic** Catalog Features Solenoid Valves for Corrosive and Ultra-Pure Liquids*

Plast-O-Matic Valves, Inc. announces the publication of it's new catalog of molded solenoid valves, for corrosive and ultra-pure liquid systems.

The two-color literature features detailed information on U-cup and rolling diaphragm models, designed to solve aggressive chemical or crystallization problems. Included are cutaway illustrations, materials of construction, dimensions specifications and pressure ratings for all models.

Please circle No. 247
on your Reader Service Card

Biodegradable Carbonized Soil Remover and Degreaser

Amtex Chemical Co. has formulated a totally biodegradable solvent designed to replace the harzardous chlorinated solvents presently in use. AMTEX-WC has been used in soak tank operations to remove carbonized food soils in a time period of 8 to 16 hours.

After use, AMTEX-WC can be washed directly to the sewer, eliminating expensive disposal costs. The product has a pleasant odor, is non-irritating to the hands and eyes, and does not harm metals even with extended soaking.

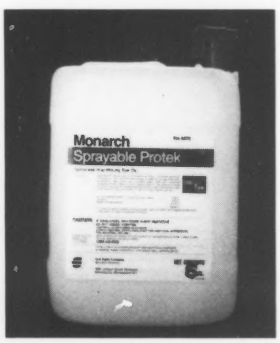
Please circle No. 249
on your Reader Service Card

Effective Rodent Control with Patented Sweet Corn Bait

New TRAP-N-A-SAK® rodenticide offers farmers a simple but highly effective tool to improve their rodent control program. TRAP-N-A-SAK is so unique it is patented by **Anchor**.

The challenge has been for manufacturers to develop baits that the rodents will eat continually without developing bait shyness. All rodenticides work, the problem is enticing them to consume enough to have an effect. Instead of formulating with chemical attractants or cereal blends, **Anchor** TRAP-N-A-SAK pursues the obvious and gives rodents what they like to eat...sweet corn.

Please circle No. 250
on your Reader Service Card



Monarch Introduces Sprayable Protek® Teat Dip

Chlorhexidine-based sprayable Protek® teat dip has been introduced by the **Monarch Division** of **H. B. Fuller Company.**

Sprayable Protek® teat dip with glycerin is a non-iodine, non-acid, non-irritating post-milking teat dip. It has excellent germicidal properties and will not irritate sensitive teat skin. The emollients in sprayable Protek® teat dip help condition teat skin, enhancing the natural defenses. It can be dispensed with both automatic and hand-spray devices.

Please circle No. 248
on your Reader Service Card

"Concept to Completion" FIBERGRATE Brochure of Fiberglass Structural Systems Including Containment of Hazardous Chemical Spills.

*New **Fibergrate** Brochure*

New **Fibergrate** Brochure 259A focuses attention to a unique special service offered by Dallas-based **Fibergrate Corporation** --the "concept to completion" development of tough, cost-effective, corrosion-resistant fiberglass structural systems, including (1) design, (2) engineering, (3) fabrication, and (4) installation of elevated flooring systems, access systems, safety ladder and handrail-protected walkway systems, and framework systems tailored to special needs of chemical, electronics, plating, pulp and paper, aircraft, water and waste treatment, food, beverage, and railway industries. #8 <----

Please circle No. 251
on your Reader Service Card

***CRS, Inc.** Introduces New Series of Vision Products*

Computer Recognition Systems, Inc. has introduced their newest line of machine vision systems to the U.S. market. The systems are based on the CRS 1000 "engine" and include:

TRACKER for high speed object location, indentification and alignment operations. This system represents a major advance in pattern and feature recognition due to proprietary algorithms and specialized hardware developed by CRS. #4 <---

READER for optical character recognition and verification. The CRS system is designed to read characters as well as verify the correctness or legibility of a known character string. It does this by performing a syntax check against a knowledge base of allowable formats.

Please circle No. 252
on your Reader Service Card

Tamper Evident Top

Plastofilm Industries, Wheaton, Illinois, recently developed a custom fold-over top for McKesson Corporation. This PVC foldover is designed to conform to the spritzer dispenser and act as a tamper evident guard.

The top is formed in one piece and hinged at the bottom. These tamper evident tops are placed on the spritzer in-line and heat sealed.

Please circle No. 253
on your Reader Service Card

New Strainer Bag for Stomacher®

Tekmar now offers the Strainer Bag for their popular Stomacher 400 Lab Blender. It consists of an outer polyethylene bag, and an inner nylon mesh bag. The nylon mesh bag allows food samples to be pipetted after Stomaching without debris clogging the pipette.

The nylon bag also provides added strength allowing hard samples to be processed that may have pierced the standard Stomacher Bag.

The Stomacher is a proven instrument for the removal of intact micro-organisms from food samples. Because blending takes place in a sterile plastic bag, there is no clean-up between samples, and no chance of cross contamination. Processing generally takes only 30 seconds to one minute.

Please circle No. 254
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Hydro Systems' New Omniclean Streamline Series Provides Consistent Proportioning and Dispensing in Low Profile Cabinet

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Food and Environmental Hazards To Health

Update - Listeriosis and Pastuerized MIlk

Listeria monocytogenes can be cultured from approximately 5% of raw (unpasteurized) milk samples, and case reports have shown that disease in humans can be caused by consumption of unpasteurized contaminated milk. Other reports suggesting that *L. monocytogenes* is relatively resistant to heat have raised concern about the effectiveness of pasteurization for eliminating this organism from milk. In an outbreak of listeriosis that occurred in Massachusetts in 1983, pasteurized whole or 2% milk was implicated as the source of infection. An inspection of the milk-producing plant detected no apparent breach in the pasteurization process, thereby prompting further interest in the effectiveness of pasteurization. Since then, several studies have shown that *L. monocytogenes* is inactivated by standard pasteurization practices. This report summarizes information regarding the effectiveness of pasteurization in eliminating *L. monocytogenes* from milk.

Current state and local regulations throughout the United States specify time and temperature conditions for pasteurization. These regulations call for milk to be heated to at least 71.7°C for 15 seconds (i.e., high-temperature short-time [HTST] process) or to 62.8°C for 30 minutes. In one study using milk artifically inoculated with *L. monocytogenes*, investigators found that 0.9 seconds at 71.7°C is needed for each one $\log^{10}$ reduction in the number of *L. monocytogenes* organisms. Other studies of artificially inoculated milk have concluded that at the same temperature, a period of 2.75 to 3.1 seconds is needed for each $\log^{10}$ reduction. Since the concentration of *L. monocytogenes* likely to be present in contaminated raw milk is estimated to be approximately 10 organisms per mL, these data suggest that there is a substantial margin of safety in the HTST pasteurization process. Another study found that at 62°C, each $\log^{10}$ reduction in the number of surviving *L. monocytogenes* organisms could be achieved in 6 to 20 seconds, well within the 30 minutes required for pasteurization at this temperature. Other investigators also have concluded that *L. monocytogenes* will not survive the normal milk pasteurization process and have questioned previously reported methods that suggested *L. monocytogenes* could survive pasteurization.

In a pasteurization study designed to simulate the natural situation more closely, milk from cows that had been purposefully infected with *L. monocytogenes* was used, along with several different *L. monocytogenes* isolation procedures. Viable *L. monocytogenes* could be recovered after minimum HTST treatment (71.7°C for 15 seconds), although not after treatment at 76.4°C-77.8°C for 15 seconds. This survival was attributed in part to protection of *L. monocytogenes* within leukocytes in milk (intracellular *L. monocytogenes* organisms are found in milk from infected cows but not in artificially inoculated milk). Because this milk had *L. monocytogenes* concentrations of 10^3 to 10^4 per mL, higher concentrations than are usually found when *L. monocytogenes* is present in raw milk, these findings may not be applicable to usual production conditions. In another study in which investigators identified cows that had been naturally infected with *L. monocytogenes*, proper pasteurization was found to inactivate *L. monocytogenes* in milk contaminated through natural infection as well as in artifically inoculated milk.

After reviewing these studies, a World Health Organization Working Group on foodborne listeriosis recently concluded that "pasteurization is a safe process which reduces the number of *L. monocytogenes* occurring in raw milk to levels that do not pose an appreciable risk to human health."

Editorial Note: Improperly performed pasteurization and the occurrence of contamination after pasteurization are the most likely explanations for the presence of *L. monocytogenes* in pasteurized milk. Two percent of pasteurized milk samples from more than 700 U.S. milk-producing plants were culture-positive for *Listeria* species, primarily *L. monocytogenes*, in a survey conducted during 1987 and 1988 as part of the Food and Drug Administration's (FDA's) Dairy Product Safety Initiatives. Even when pasteurized milk is proven to be contaminated by bacteria, the exact source and mode of contamination may be difficult to identify. For example, in a recent large epidemic of salmonellosis in Illinois, the epidemic strain of *Salmonella typhimurium* was isolated from patients and the implicated pasteurized milk products they had drunk. However, an inspection of the plant by a task force of FDA officials and other experts could not prove how the milk was contaminated. Efforts to ensure that milk is safe from *L. monocytogenes* contamination should focus on promoting proper methods of pasteurization and on identifying and eliminating sources of postpasteurization contamination.

MMWR - 12/16/88

Food Service Code Interpretations

by
Homer Emery
Food Service Interpretations Committee

(Interpretation: "To explain, to translate, to give one's own conception of".)

As a new county Sanitarian, some years ago, I looked forward to my first district supervisor's meeting. At last I would have the chance to consult with experienced Sanitarians on the correct interpretation and application of our state food code.

When the agenda reached food sanitation I received my first lesson in code interpretation: "Code requirements that are based on sound public health principles and are well defined (e.g. 45 degrees F or below and 140 degrees F or above) leave little to debate. Requirements that are not based on sound public health principles and not well defined will always be debated and have varying interpretations."

My District Sanitarian announced that a Mayor of one of our major cities had recently found a hair in his salad served at a local restaurant. This had resulted in a letter to the State Board of Health and a local health director being replaced.

The following comments on hair restraints summarize the discussion that lasted the rest of the afternoon:

- "A hair in food isn't a public health problem and we don't enforce it."
- "We haven't had any illness caused from hair falling in food."
- "Hair control is a management problem not a health problem."
- "The salad wasn't a potentially hazardous food, so why all the concern."
- "In our county we require all personnel to wear caps no matter what they do."
- "We require a #16 mesh hair net for all employees."
- "We make all the long hair college kids wear hats."
- "We make the cooks wear something but don't bother with counter personnel."
- "We let employees use hair spray, it's an effective hair restraint."

Today, I'm sure that the same debate would take place on what constitutes effective hair restraint and how the requirement for controlling hair should be applied. We would like to hear how IAMFES members (both regulatory and industry) interpret and apply this code requirement. By the way, how many readers have found hair in their food during the last year?

Send your responses and other questions on code interpretations to: Food Service Interpretation Committee, PO Box 1832, Frederick, Maryland 21701. Next month we'll see how IAMFES members are interpreting and applying requirements for manager training and certification.

Homer Emery, R.S.
Chairman, IAMFES FDA Interpretations Committee

Affiliate News

NYSAMFS Holds Annual Meeting

The 65th Annual Conference was another success! The amount of team effort in our association is exceptional, which equates to our success.

The Conference was started off with an informative, interesting and well received presentation on communication by David Simpson, of the American Institute of Cooperation located in Washington, D.C. At the general session on Wednesday morning, I presented the Presidential Address regarding the Sanitarian's changing role in the 20th Century and the responsibility of industry, regulatory and academic and fulfilling that role. The Presidential Address was followed by the keynote speakers Dr. Herbert Woolf, Director of Biotech Wessanen USA and Dr. Richard Theuer, PhD., President of Beech-Nut Nutrition Corporation who addressed current issues of Biotechnology and Corporate Quality.

The Wednesday and Thursday laboratory sessions were well attended; especially when taking into consideration the traveling restrictions placed on the State agencies by budget constraints. Topics ranged from "Loss of Butter Fat in Processing" to "Trends in Food Retailing and Food Service."

The highlight of the Conference was the Awards Banquet held in the Grand Ballroom on Wednesday evening despite the fact that the President could not recall his wife's name during the introduction of guests at the head table.

The Awards Committee did an outstanding job in their selection of the award recipients. The recipients acceptances were moving, entertaining and appreciated. The Hickey Award was presented to Dr.Crowell, Director of the Food Inspection Service of N.Y.S. Ag. & Markets.

The spouses had a full program thanks to the efforts of Elaine Baxter, Nancy Bartell and Jean Wolff. The program included a tour of the Arts and Science Roberson Center, lunch at "The Atrium" and the "Magic World of Make-Up" presented by Irene Congdon, wife of member Robert Congdon.

New approaches tried at the Conference were the location of the supplier exhibits in the main traffic pattern, replacing the dairy bar location with two, and having the Hospitality Suites located in the conference area instead of throughout the hotel.

The Annual Conference is essential to the Association in providing a format for education and regulatory updating of the membership. With this in mind, officers of the Association will be meeting with the Commissioner of Ag. & Markets to discuss our current partnership and future participation of N.Y.S. Ag & Markets members in the Association.

I wish to thank each and every one of you for your participation in the 65th Conference and the help given to me during my Presidency.

John Baxter, Immediate Past President, NYSAMFS

Upcoming IAMFES Affiliate Meetings

1989

APRIL

5-7, Missouri Milk, Food and Environmental Health Association, to be held at the Ramada Inn, 1100 Vandiver Drive, Columbia, Missouri. For more information, contact: Gregg Fast, Mo. DOH, NE District, 250 E. Patton, Macon, MO 63552, 816/385-3125.

MAY

15-17, PA Association of Dairy Sanitarians and Dairy Laboratory Analysts, will hold its annual conference at Penn State University, University Park, PA. The person to contact for more information is: Sid Barnard, 8 Borland Lab, University Park, PA 16802 814/863-3915.

SEPTEMBER

19-21, New York State Association of Milk and Food Sanitarians, to be held in Buffalo, New York, at the Sheraton-Buffalo Airport Hotel. For more information, contact: Paul Dersam, 27 Sullivan Rd, Alden, NY 14004, 716/937-3432.

N.M.C.
NATIONAL MASTITIS COUNCIL

No effective treatment for mycoplasma

Mycoplasma are a special kind of bacteria causing mastitis. *Mycoplasma bovis* and several other mycoplasma are involved. The major problems have been in New York, California, Arizona, and Florida, but many other areas throughout the United States have been affected.

Mycoplasma mastitis is usually severe and long lasting. Often several or all quarters are involved. Flakes and tan discoloration of milk appear first; thereafter, serum separates from clots of fibrin and cells. The udder is hard and swollen, but the cow usually eats well and has a normal temperature. The symptoms may last for days, weeks, or months, sometimes even into the next lactation. Milk production may return, possibly reduced, in the same or next lactation.

It spreads on infected milking machines and hands during milking, or when careless treatment procedures are used. To prevent the spread of mycoplasma mastitis, an effective udder hygiene program must be followed. Teat dipping and other sanitary practices should be carried out, and mastitic cows should be milked last. It is especially important that intramammary treatment be carried out with great attention to sanitation as infection is easily carried from one cow to another on contaminated hands, syringes, and cannulas.

Purchased cows or heifers may carry the infection. A good safety precaution against introduction from other herds is to have a bulk tank milk sampling of the herd of origin cultured for mycoplasma and to culture milk of individual animals at time of purchase or before they enter the milking herd.

There is no effective treatment for mycoplasma mastitis, but it can be eradicated from herds. To do so, follow the preventative measures which have been listed. Furthermore, the entire herd must be cultured for mycoplasma. Infected cows should be segregated from all others at least for that lactation, and be mycoplasma free on culture before returning to the herd. Consider culling *M. bovis* infected cows. Be sure not to buy infected replacements.

This article is one of a continuing series made available by the National Mastitis Council.

1840 Wilson Blvd.
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Authors Wanted

Dairy, Food and Environmental Sanitation is looking for individuals interested in writing articles for our journal. If you are interested, please contact IAMFES for more information,

P.O. Box 701
Ames, IA 50010
Attn: Margie Marble

ADVANCE REGISTRATION FORM

IAMFES

76TH ANNUAL MEETING REGISTRATION
August 13-17, 1989
Hyatt Regency Crown Center
KANSAS CITY, MISSOURI

REGISTRATION FEES

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On-site registration	$90	$119	$20	$_____

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MON., AUG. 14 10 a.m.-noon	Hallmark Center Tour	FREE	_____	-0-
MON., AUG. 14 Evening	Kansas City Gala	$25.00 adults	_____	_____
		$12.50 children (under 12)	_____	_____
TUES., AUG. 15 10 a.m.-3 p.m.	Kansas City Sightseeing	$22.50 adults	_____	_____
		$12.50 children (under 12)	_____	_____
WED., AUG. 16 10:30 a.m.-noon	Candyland Tour	$5.50	_____	_____
WED., AUG. 16 Evening	IAMFES Awards Banquet & Reception	$25.00 adults	_____	_____
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IAMFES

76th Annual Meeting
Special Events Program

HALLMARK CENTER TOUR
August 14, Monday
10:00 a.m. - Noon

A guided tour of world famous Hallmark Cards production center. Seeing greeting cards being made is just the beginning of this tour. You can watch craftsmen at work, make your own ribbon bow or hear greetings in various languages. Located in the Crown Center Complex, adjacent to the Hyatt Regency, the Hallmark Visitors Center brings you the sights and sounds of Hallmark through 12 extraordinary exhibits. Hallmark produces 11 million greeting cards and 1.5 million other products each day. There is a special area of entertainment for children ages 5-12 called Kaleidoscope. You will exit onto the Crown Center Shopping Center where you may take lunch on your own at any of the many eateries, and get acquainted with the shopping complex. An all-weather skywalk will return you to your hotel. Cost: Adults *FREE*; Children *FREE*.

A DAY OF KANSAS CITY SIGHTSEEING
August 15, Tuesday
10:00 a.m. - 3:00 p.m.

A bus tour of historical westport district, the famous Plaza shopping area with its many fountains. Lunch at the Rozzelle Court Restaurant (Gourmet). A guided tour of the world famous Nelson-Atkins Museum Of Art. Time to browse the Plaza shops. Cost: Adults *$22.50*; Children (12 and under) *$12.50*.

CANDYLAND TOUR
August 16, Wednesday
10:30 a.m. - Noon

Your host will guide you through the plant where you can learn how chocolate is made and sample treats right off the production line. Witness the making of a batch of old-fashioned peanut brittle (and enjoy a complimentary bag of this specialty) Cost: *$5.50* Per Person.

OTHER SPECIAL EVENTS

We will have an information booth available for events you may attend on your own. Events in which you may be interested include Worlds of Fun and Oceans of Fun, K.C. Royals baseball game, American Heartland Theatre (Broadway Productions), Movie Theatre Playings at Crown Center, famous restaurants, etc. Remember, you will be in the heart of a beautiful complex with many things to see. We did not want to over schedule so you would have time to enjoy Crown Center. The Crown Center is only a 2 block walk from the Hyatt Regency.

SOCIAL EVENTS THROUGHOUT THE MEETING

Cheese & Wine Reception with Exhibits, Sunday Evening
K.C. Gala, Monday Evening A festive occasion
(You will enjoy the tastes and sounds of Kansas City)
Awards Banquet & Reception, Wednesday Evening

New IAMFES Members

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Sidney E. Rodgers
Alabama Dept. Corrections
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Arkansas

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Riceland Foods
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Dairy, Food and Environmental Sanitation Instructions for Authors

Nature of the Magazine

Dairy, Food and Environmental Sanitation is a monthly publication of the International Association of Milk, Food and Environmental Sanitarians, Inc. (IAMFES). It is targeted for persons working in industry, regulatory agencies, or teaching in milk, food and environmental protection.

The major emphases include: 1) practical articles in milk, food and environmental protection, 2) new product information, 3) news of activities and individuals in the field, 4) news of IAMFES affiliate groups and their members, 5) 3-A and E-3-A Sanitary Standards, amendments, and lists of symbol holders, 6) excerpts of articles and information from other publications of interest to the readership.

Anyone with questions about the suitability of material for publication should contact the editor.

Submitting Articles

All manuscripts and letters should be submitted to the Editor, Kathy R. Hathaway, IAMFES, P.O. Box 701, Ames, Iowa 50010.

Articles are reviewed by two members of the editorial board. After review, the article is generally returned to the author for revision in accordance with reviewer's suggestions. Authors can hasten publication of their articles by revising and returning them promptly. With authors' cooperation articles are usually published within three to six months after they are received and may appear sooner.

Membership in IAMFES is not a prerequisite for acceptance of an article.

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Types of Articles

Dairy, Food and Environmental Sanitation readers include persons working as sanitarians, fieldmen or quality control persons for industry, regulatory agencies, or in education. *Dairy, Food and Environmental Sanitation* serves this readership by publishing a variety of papers of interest and usefulness to these persons. The following types of articles and information are acceptable for publication in *Dairy, Food and Environmental Sanitation.*

General Interest

Dairy, Food and Environmental Sanitation regularly publishes nontechnical articles as a service to those readers who are not involved in the technical aspects of milk, food and environmental protection. These articles deal with such topics as the organization and application of a milk or food control program or quality control program, ways of solving a particular problem in the field, organization and application of an educational program, management skills, use of visual aids, and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest nontechnical articles are invited to correspond with the editor if they have questions about the suitability of their material.

Book Reviews

Authors and publishers of books in the fields covered by *Dairy, Food and Environmental Sanitation* are invited to submit their books to the editor. Books will then be reviewed and the review will be published in an issue of *Dairy, Food and Environmental Sanitation.*

Preparation of Articles

All manuscripts should be typed, double-spaced, on 8-1/2 by 11 inch paper. Side margins should be one inch wide.

The title of the article should appear at the top of the first page. It should be as brief as possible and contain no abbreviations.

Names of authors and their professions should follow under the title. If an author has changed location since the article was completed, his new address should be given in a footnote.

Illustrations, Photographs, Figures

Wherever possible, submission of photos, graphics, or drawings to illustrate the article will help the article. The nature of *Dairy, Food and Environmental Sanitation* allows liberal use of such illustrations, and interesting photographs or drawings often increase the number of persons who are attracted to and read the article.

Photographs which are submitted should have sharp images, with good contrast.

Examples of Proper Bibliographic Citations

Paper in a journal

Alderman, G. G. and E. H. Marth. 1974. Experimental production of aflatoxin in citrus juice and peel. J. Milk Food Technol. 37:308-313.

Paper in a book

Marth, E. H. 1974. Fermentations. pp. 771-882. In B. H. Webb, A. H. Johnson, and J. A. Alford (eds.), Fundamentals of dairy chemistry (2nd ed.), AVI Publishing Co., Westport, CT.

Book

Fennema, O. R., W. D. Powrie, and E. H. Marth. 1973. Low-temperature preservation of foods and living matter. Marcel Dekker, Inc., New York. 598 p.

Patent

Hussong, R. V., E. H. Marth, and D. G. Vakaleris. 1964. Manufacture of cottage cheese. U. S. Pat. 3,117,870. Jan. 14.

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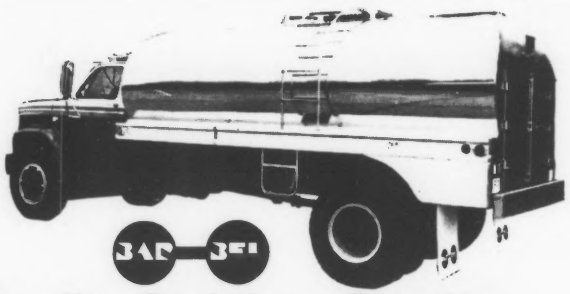

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JFP Abstracts

Abstracts of papers in the March Journal of Food Protection

To receive the* Journal of Food Protection *in its entirety each month call 1-800-525-5223, ext. A or 515-232-6699, ext. A in Iowa.

Survival of *Listeria monocytogenes* in Low pH Model Broth Systems, Mickey E. Parish and Dianne P. Higgins, University of Florida, IFAS Citrus Research and Education Center, 700 Experiment Station Road, Lake Alfred, FL 33850

J. Food Prot. 52:144-147

Four strains of *Listeria monocytogenes* were studied for pH tolerance in pH-adjusted tryptic soy broth supplemented with yeast extract. After incubation at 30°C, all strains grew at pH 4.5 and above. Survival of strain F5069(4b) was further investigated in sterile orange serum in which pH was adjusted from 3.6 to 5.0 in 0.2 unit increments. At 4°C, viable cells were reduced from 10^6 cfu/ml to less than 25 cfu/ml in 25 d at pH 3.6, 43 d at pH 4.0, and 81 d at pH 4.6. Viable cell populations remained at levels about 10^2 after 90 d in orange serum at pH 4.8 and 5.0. At 30°C, the same reductions were observed at 5 d at pH 3.6 and 4.0 and 8 d at pH 5.0. Growth in orange serum was observed prior to the reduction in viable cell numbers at pH 4.8 and 5.0 for both storage temperatures.

Recovery and Serotype Distribution of *Listeria monocytogenes* from Broiler Chickens in the Southeastern United States, J. S. Bailey, D. L. Fletcher and N. A. Cox, Department of Poultry Science, University of Georgia, Athens, Georgia 30602 and USDA, Agricultural Research Service, Russell Research Center, Athens, Georgia 30613

J. Food Prot. 52:148-150

A total of ninety broiler carcasses from three processing plants were obtained from retail stores in the southeastern United States. The optimum plating medium was determined and carcasses were rinse sampled and the recovery of *Listeria monocytogenes* and other *Listeria* species determined. Presumptive *L. monocytogenes* isolates were serotyped. *Listeria* were recovered from 34 of 90 (38%) of the carcasses sampled, while *L. monocytogenes* were recovered from 21 of 90 (23%) of the carcasses sampled. Of the 35 *L. monocytogenes* isolates serotyped, 21 (64%) were confirmed to be serotype 1/2 b and 6 (18%) were confirmed to be serotype 1/2 c. Although there is no epidemiological evidence to suggest a relationship between consumption of chicken and listeriosis, the presence of *L. monocytogenes* on 23% of sampled broilers emphasizes the importance of maintaining hygienic practices in production, processing and preparation of fresh broilers.

The Antimicrobial Activity of Phenolic Compounds Against *Listeria monocytogenes* and Their Effectiveness in a Model Milk System, Kim D. Payne, Emilia Rico-Munoz and P. M. Davidson, Department of Food Technology and Science, P.O. Box 1071, University of Tennessee, Knoxville, TN 37901

J. Food Prot. 52:151-153

The minimum inhibitory concentration (MIC) of several phenolic compounds against eight strains of *Listeria monocytogenes* in tryptose phosphate agar (TPA) was determined. Based upon concentration, the most effective compound was the phenolic antioxidant tertiary butylhydroquinone (TBHQ) which had a MIC of 64 µg/ml. Among the FDA approved food antimicrobials, the most effective was propyl paraben with a MIC of 512 µg/ml. Propyl paraben and TBHQ were then compared to potassium sorbate, a commonly used food antimicrobial, in a model milk system containing 10% nonfat milk solids. In this study, only one strain of the test microorganisms, Scott A, was used and two levels of inoculum, 10 and 1000 CFU/ml, were tested. As expected with the basic pH of the model system, both phenolic compounds were significantly more effective than potassium sorbate against *L. monocytogenes* at 35°C. Both compounds caused a noticeable increase in lag phase of this microorganism. There was about a three log difference in viable cell counts between propyl paraben and TBHQ and the control. The TBHQ was inconsistent in its activity. The inhibitory action of propyl paraben was not affected by the level of inoculum and had consistent activity throughout testing.

Comparison of Four Procedures to Detect *Listeria* spp. in Foods, Judy E. Heisick, Fannie M. Harrell, Eugene H. Peterson, Sallie McClaughlin, Dean E. Wagner, Irene V. Wesley and John Bryner, Center for Microbiological Investigations, Food and Drug Administration, Minneapolis, MN 55401 and U.S. Department of Agricultural, National Animal Disease Center, Ames, Iowa 50010

J. Food Prot. 52:154-157

A comparison was made of four procedures to detect *Listeria* spp. in two food categories. The study comprised 309 assays, 71 on milk from both infected and uninfected cows, and 238 on ten types of fresh vegetables. A sample was considered positive if it could be detected by at least a single method and if isolates could be confirmed as *Listeria* spp. The procedures detected 98-100% of the positive milk samples. Recovery from vegetable samples ranged from 45 to 86%, probably because of low levels of *Listeria* spp. in the presence of mixed flora. The ELISA procedure of the Organon Teknika® corporation detected 68% of the 44 positive vegetable samples: the GENE-TRAK®DNA probe, 45%; the U.S. Food and Drug Administration (FDA) culture procedure, 75%; and the FDA probe procedure, 86%. Recovery was higher with LiCl-phenylethanol-moxalactam agar (FDA probe procedure) than with modified McBride Agar (FDA culture procedure).

Effect of Different Levels of Nitrite and Nitrate on the Survival of *Listeria monocytogenes* During the Manufacture of Fermented Sausage, Jaana Junttila, Jorma Hirn, Pauli Hill and Esko Nurmi

J. Food Prot. 52:158-161

The fate of *L. monocytogenes* during the fermentation of Finnish fermented sausage was examined. *L. monocytogenes* was able to survive during a 21 d fermentation of sausage with levels of nitrite and salt commonly used in the meat industry today (120 ppm $NaNO_2$ and 3.0% NaCl). Initial numbers of *Listeria* (10^3 CFU/g and 10^5 CFU/g) decreased approximately 1 log 10 CFU/g during the manufacture. Increasing the levels of nitrite/nitrate to those used 30 years ago in meat products had a marked effect on the elimination of *Listeria*. The numbers of survivors in the sausages was reduced 2.0 log 10 CFU/g during the fermentation of 3 weeks with a combination of 200 ppm $NaNO_2$ and 300 ppm KNO_3. With 1000 ppm KNO_3, the decrease was 3.3 log 10 CFU/g. *L. monocytogenes* could not be totally eliminated from highly contaminated sausage by increasing only the levels of nitrite and nitrate. Levels of these additives with best bacteriostatic effect on *Listeria* are no longer permitted in food.

Inexpensive, Disposable Presence-Absence Test for Coliforms and *Escherichia coli* in Water, Ruby M. Lee and Paul A. Hartman, Department of Microbiology, Iowa State University, Ames, Iowa 50011-3211

J. Food Prot. 52:162-164

Six-ounce (151-g) Whirl-Pak® bags containing 3.05 g of dehydrated Presence-Absence (P-A) Broth and 5 mg of 4-methylumbelliferyl-ß-D-glucuronide (MUG) were pasteurized with 10 kGy of gamma irradiation. To conduct a "bag" P-A test, 100 ml of water sample were added to a bag. The bag was closed, the medium was dissolved by massaging the bag for about 15 sec, and the bag was then placed in a rack for incubation. The bag method was compared with P-A tests conducted in 160-ml glass bottles and 200-ml polysulfone bottles, as well as with a 5-tube Lauryl Tryptose Broth (LTB) most-probable-number (MPN) method. Twenty-nine surface-water samples (11 streams, 7 rivers, and 11 lakes), 9 well-water samples, and 2 sewage effluents were examined. Chi-square analyses of the results revealed that no significant difference ($P \leq 0.1$) existed among the different P-A tests. The hydrolysis of MUG provided excellent *Escherichia coli* detection and was easiest to determine in the bags.

Growth and Survival of *Flavobacterium aurantiacum* in Peanut Milk, D. Y.-Y Hao and R. E. Brackett, Department of Food Science and Technology, University of Georgia, Agricultural Experiment Station, Griffin, GA 30223-1797

J. Food Prot. 52:165-168

Tryptone-yeast extract-glucose (TYG) and trypticase soy broth (TSB) were evaluated for production and recovery of *Flavobacterium aurantiacum* stationary phase cells. In addition, growth of *F. aurantiacum* in peanut milk was tested. Trypticase soy broth was chosen as the best medium for producing stationary phase cells. Both non-defatted peanut milk (NDPM) and partially defatted peanut milk (PDPM) supported growth of *F. aurantiacum*. The growth of *F. aurantiacum* in both kinds of peanut milk was not inhibited by aflatoxin B_1 (1 mg/ml). About 10^9 stationary phase cells were inoculated in 0.067 M phosphate buffer (PB) at pH 5.0, 5.5, 6.0, 6.5, and 7.0, and in both peanut milks (pH 6.3 and 6.9). After a 24-h incubation period, the viable cell number decreased slightly in PB (pH 7.0, 30°C), but decreased 2-3 logs in other buffers. About 0.6-0.8 log decrease was observed in NDPM and PDPM. Phosphate buffer (0.067 M, pH 7.0), NDPM and PDPM were determined to be adequate for use in studies to investigate the removal of aflatoxin B_1 by *F. aurantiacum*.

Inhibitory Effect of *Lactobacillus plantarum* on *Salmonella infantis*, *Enterobacter aerogenes* and *Escherichia coli* during Tempeh Fermentation, Mogessie Ashenafi and Martin Busse, Bakteriologisches Institut, Sueddeutsche Versuchs- und Forschungsanstalt fuer Milchwirtschaft Weihenstephan, Technische Universitaet Muenchen, 8050 Freising, Weihenstephan Federal Republic of Germany

J. Food Prot. 52:169-172

Growth and inhibition of *Salmonella infantis*, *Enterobacter aerogenes* and *Escherichia coli* in fermenting soybeans during tempeh production were studied in presence and absence of *Lactobacillus plantarum*. In fermenting unacidified soybeans *S. infantis* grew by 7 log units in 40 h. *E. coli* and *E. aerogenes* grew by 6 and 7 log units respectively. A similar pattern of growth of the three test organisms in fermenting acidified beans was also noted. Further inoculation of unacidified cooked beans with *L. plantarum* at a level of 10^6/g resulted in a complete inhibition of the test organisms in the product. On acidified cooked beans a lower level of *L. plantarum* inoculum (10^2/g) was enough to show a complete inhibitory effect. The lowering of the pH in fermenting beans by *L. plantarum* might have played a role in the destruction of the test organisms.

Attachment and Proliferation of Bacteria on Meat, King-Thom Chung, James S. Dickson and John D. Crouse, USDA/ARS, Roman L. Hruska U.S. Meat Animal Research Center, P.O. Box 166, Clay Center, NE 68933

J. Food Prot. 52:173-177

The attachment of bacteria (*Serratia marcescens*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Salmonella arizonae*, *Pseudomonas aeruginosa*, and *Listeria monocytogenes*). to lean muscle tissue and fat tissue was investigated. The number of cells attached to the meat was directly proportional to the initial cell concentrations present. There was no significant difference in the number of cells attached between the lean muscle tissue and fat tissues among the organisms tested. All bacteria tested except *P. aeruginosa*

proliferated better on the lean muscle tissues than on the fat tissue at ambient temperature for 72 h. No significant attachment competition to tissue samples was seen between *L. monocytogenes and P. aeruginosa*, however, the numbers of *P. aeruginosa* were greater than *L. monocytogenes* (after 24 h). Similarly, no competitive attachments between *S. aureus* and *S. marcescens*, *S. faecalis* and *S. arizonae* were observed; but the numbers of *S. marcescens* were greater than *S. aureus*, and *S. arizonae* were greater than *S. faecalis*. when the inoculated meat was incubated at room temperature for 24 h.

Acidification Process Technology to Control Thermophilic Spoilage in Canned Mushrooms, R. B. Beelman, M. E. Witowski, S. Doores, A. Kilara and G. D. Kuhn, Department of Food Science, The Pennsylvania State University, University Park, PA 16802

J. Food Prot. 52:178-183

Alternative processes involving the use of citric acid and/or EDTA in mushroom canning operations were evaluated and compared to a standard commercial process as means to control thermophilic spoilage. An average of 68% thermophilic spoilage was observed with the standard control process. Spoilage was reduced to an average of 23.9% by the addition of citric acid to the can brine, and to 16.8% when 500 ppm EDTA was also added to the can brine. However, the best results, 2.4% average spoilage, were observed when mushrooms were vacuum hydrated in a buffered citric acid solution (0.05M, pH 3.5) and EDTA was added to the can brine at 200 ppm equilibrium concentration. This treatment was as the Acid-Vacuum Hydration-Chelation (A-VH-C) Process.

Bacteriological evaluation indicated that the A-VH-C Process caused no significant reduction in product spore load counts (after blanching) compared to the control, but did reduce spore load counts after thermal processing. However, cans from all treatments contained viable spores. Outgrowth studies conducted with spores that survived thermal processing and inoculated into Beef Extract Tryptone Iron (BETI) both indicated that spores from cans processed with the A-VH-C Process had the longest generation time. Similar experiments where the BETI broth was treated to simulate the conditions in the cans indicated that the addition of EDTA to the medium had the greatest effect on reducing outgrowth rate of surviving spores.

Enumeration of *Bacillus* and *Bacillus cereus* Spores in Food from Spain, Mª Angeles Mosso, Mª Luisa García Arribas, José A. Cuena and Mª Carmen De La Rosa, Departamento de Microbiología, Facultad de Farmacia, Universidad Complutense, 28040-Madrid-Spain

J. Food Prot. 52:184-188

The *Bacillus* and *B. cereus* spore populations of 102 samples of food (salad dressing, dried soups, sweet desserts, milk and milk products, rice dishes, pasta and flour), 93 collected from retail markets of Madrid and 9 from chinese restaurants have been studied. *Bacillus* spores were detected in 82.4% of the samples, while the incidence of *B. cereus* spores was 14.7%. In salad dressing and dried soups the contamination rate by species of *Bacillus* was 100% and also both showed the highest contamination of *B. cereus* spores (25% and 50% respectively). No samples of rice dishes and pasta exhibited *B. cereus* spore contamination although these were contaminated by other *Bacillus* species. All the samples studies showed less than 10^4 and 10^5 c.f.u./g or ml *B. cereus* and *Bacillus* spores respectively. Twenty-four strains of *B. cereus* isolated were characterized by morphology and biochemical properties and showed most of the characteristics of the type strain. Enterotoxin, phospholipase C and hemolysin production were present in 13 of the isolated strains showing different degrees of production. The vascular permeability reaction (VPR) was used for determining enterotoxin activity. The enterotoxigenic strains showed a positive VPR; 6 of them caused necrosis and 12 positive mouse lethal tests.

Nitrosoheme Pigment Formation and Light Effects on Color Properties of Semidry, Nonfermented and Fermented Sausages, Thomas W. Demasi, Lawrence W. Grimes, Rhoda L. Dick and James C. Acton, Department of Food Science, South Carolina Agricultural Experiment Station, Clemson University, Clemson, SC 29634-0371

J. Food Prot. 52:189-193

Development of the nitrosoheme pigment responsible for visual color properties was studied in the preparation of cured, semidry nonfermented and fermented sausages. Color stability of vacuum packaged sausages differing in pH was also evaluated during 6 weeks of light exposure, and after 6 weeks in dark storage. Total pigment conversion to nitrosoheme increased ($P<0.05$) during 9.75 h of fermentation at 38°C. The maximum pigment conversion attained upon heat processing to 60°C appeared dependent on prior nitrosoheme formation during fermentation. Judd-Hunter tristimulus coordinates of semidry sausages showed higher ($P<0.05$) initial +a (redness) values when the pH was 4.85 or 4.65 as compared to pH 5.30 or 6.00. During 6 weeks of light exposure, sausage pH, and time in display were significant factors for each color property. By the fourth and sixth weeks of light exposure, nonfermented sausages (pH 6.0) had maintained redness characteristics better than all fermented sausages (pH 5.30, 4.85, and 4.65) as shown by higher +a and lower hue angle (θ) values. After 6 weeks of light exposure or dark storage, there were no differences ($P>0.05$) in any color property or nitrosoheme pigment content for nonfermented sausages. However, light exposure, as compared to dark storage, altered ($P<0.05$) all color properties and reduced ($P<0.05$) the nitrosoheme pigment content for fermented sausages.

Production of Toxic Metabolites by *Penicillium italicum* and *P. digitatum* Isolated from Citrus Fruits, Mohamed Faid and Abdelrhafour Tantaoui-Elaraki, Departement de Microbiologie Alimentaire et Biotechnologie, Institut Agronomique et Veterinaire Hassan II, B. P. 6202, Rabat-Instituts, Morocco

J. Food Prot. 52:194-197

Ninety-six mold isolates were obtained from naturally rotten citrus fruits. Among them, forty were identified as *Penicillium italicum* and twenty-four as *P. digitatum*. Twenty-four isolates of the former and twenty of the latter were tested for toxigenesis. They were first grown on Yeast Extract Sucrose (YES) broth for ten d at 22°C. Then, after mycelium removal, the cultures were sterilized by Millipore filtration and the toxicity of the sterile filtrates tested by four different bioassays; i.e. a bacterial test with *Bacillus megaterium*, a plant test with *Lepidium sativum*, a test with the brine shrimp *Artemia salina* and the chick *(Gallus domesticus)* embryo test. In *P. digitatum*, 95% of the filtrates were toxic to *B. megaterium*, 100% caused strong inhibition of seed germination in *L. sativum*, 75% showed acute toxicity to the brine shrimp and 65% were toxic to the chick embryo, while the figures for *P. italicum* filtrates were about 96%, 71%, 87%, and 42%, respectively. The results observed with the four different tests didn't always correlate.

A Microbial Assay System for the Confirmation of Results of Receptor Assays for Antibiotic Residues in Milk, Marietta Sue Brady and Stanley E. Katz, Department of Biochemistry and Microbiology, Cook College, New Jersey Agricultural Experiment Station, Rutgers-The State University of New Jersey, New Brunswick, New Jersey 08903

J. Food Prot. 52:198-201

A microbial assay system has been devised as a unified confirmation procedure for antibiotic residues found in milk using the Charm II receptor assay. Chlortetracycline, streptomycin, erythromycin, penicillin and chloramphenicol residues are assayed using three organisms and five types of agar. Assay specificity is achieved by making use of the differences in the antibiotics' activity at selected pH's and differences in stability with regard to enzymes and temperatures, as well as differences in the sensitivity of the organisms to different antibiotics. The system has the flexibility to be used piecemeal when only one or two residues require confirmation, or in its entirety when confirmation of multiple residues is needed.

***Salmonella* in the Mesenteric Lymph Nodes and Cecal Contents of Slaughtered Sows,** Samuel C. K. Tay, Robert A. Robinson and Michael M. Pullen, Division of Veterinary Epidemiology, Public Health and Food Hygiene, College of Veterinary Medicine, University of Minnesota St. Paul, MN 55108

J. Food Prot. 52:202-203

From August 1983 to February 1984, sampling was conducted on 200 slaughtered sows for *Salmonella*. The sampling was to determine the presence of *Salmonella* in cull sows at a Minnesota slaughtering establishment. The weight range of the sows varied from 300 to 400 lb. Two samples (mesenteric lymph nodes and cecal contents) were collected from each sow. Conventional methods, using enrichment and plating onto selective media followed by biochemical and serological analyses, were used to isolate and identify *Salmonella* serotypes. Salmonellae were isolated from the mesenteric lymph nodes and cecal contents of 167/200 (84%) sows. Nine *Salmonella* serotypes were identified. The four most frequently identified *Salmonella* serotypes *(S. agona, S. anatum, S. derby, S. java)* accounted for 71% (141/200) of the *Salmonella*-positive sows. *Salmonella* were isolated from 131/200 (66%) of the mesenteric lymph nodes examined and 60/200 (30%) of the cecal contents examined.

Essential Elements in Dry and Canned Butter Beans *(Phaseolus limensis L.)*, Anthony Lopez and Harriet L. Williams, Department of Food Science and Technology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061

J. Food Prot. 52:204-206

Ten essential elements were determined in dry and canned butter beans *(Phaseolus limensis L.)* by atomic absorption spectrophotometry. Samples were taken at different stages during the canning process to determine where changes in element content occurred. The content of each sample was compared statistically to other samples taken within the process. Element retention, excluding chloride and sodium, ranged from 51 to 84% on a dry weight basis, and 14 to 24% on wet weight basis.

Methods and Media to Isolate and Enumerate *Listeria monocytogenes:* A Review, Pamela K. Cassiday and Robert E. Brackett, Department of Food Science and Technology, University of Georgia, Agricultural Experiment Station, Griffin, GA 30223-1797 USA

J. Food Prot. 52:207-214

Although long known to be harmful to livestock, *Listeria monocytogenes* has only recently been recognized as a serious food-borne pathogen in humans. Isolation of this organism from contaminated foods is often difficult due to the presence of naturally occurring microflora. Methods used to isolate *L. monocytogenes* have included cold incubation of samples, use of oblique lighting to examine the color of colonies, use of selective enrichment and plating media, and techniques in molecular biology. All of these methods have inherent disadvantages. A brief review of the methods and media used by various workers is presented in this paper.

Coming Events

1989

APRIL

• **3-5, Descriptive Analysis. Developing a descriptive capability; subject selection and training; test design and analyses, comparison of QDA, Flavor Profile, Texture Profile and other methods** to be held in Palo Alto, California. For more information contact: Marjorie Sterling Stone 415/365-1833.

• **5-7, Missouri Milk, Food and Environmental Health Association will hold its annual meeting** in Columbia at the Ramada Inn, 1100 Vandiver Drive. For more information concerning the conference, contact: Greg Fast, MO DOH, NE District, 250 E. Patton, Macon, MO 63552, 816/385-3125.

• **10-11, Pests Associated with Food Industry and Environmental Sanitation Seminar,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **10-11, Harrisburg Restaurant Food & Equipment Show,** The Farm Show Complex, Harrisburg, PA. For more information, contact: Connie Mallios, Show Director 717/697-4183

• **12, 38th Annual University of Maryland Ice Cream Conference.** For more information, contact: Dr. James T. Marshall, Dept. of Animal Sciences, University of Maryland, College Park, MD 20742 301/454-7843.

• **12-13, Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, Il. Contact: Geroge Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **12-14, California Environmental Health Association Annual Educational Symposium,** will be be held at the Red Lion Inn, Costa Mesa, California. For more information contact Donna Vilalta, Riverside County Environmental Health, 46209 Oasis Ave., Indio, California 92201, Room 207, 619/342-8875.

• **17-20, Better Process Control School** to be held at Purdue University. For information, contact: James V. Chambers, Food Science Dept., Smith Hall, Purdue University, West Lafayette, IN 47907 317/494-8279.

• **18-20, Special Problems in Milk Plants** will be held at the Holiday Inn-Emerald Beach, 1102 South Shoreline Blvd, Corpus Christi, TX. For more information, contact: Ms. Janie F. Park, TAMFES, PO Box 2363, Cedar Park, TX 78641-2363 512/458-7281.

• **18-20, First Exposition/Conference of Personal Computers in Process Control** to be held at the McCormick Place, Chicago. For more information, contact: Sandi Eberhard 212/557-6950.

• **23-25, Philadelphia Restaurant Food & Equipment Show,** Valley Forge Convention & Exhibit Center, King of Prussia, PA. For more information, contact: Connie Mallios, Show Director 717/697-4183.

• **26-29, International Frozen Food Association announces that the 1989 International Food Conference** will be held at the Hyatt Regency Waikiki in Honolulu, Hawaii. For more information, contact the International Frozen Food Association, 1764 Old Meadow Lane, Suite 350, McLean, VA 22102 703/821-0770.

MAY

• **15-17, PA Association of Dairy Sanitarians and Dairy Laboratory Analysts, will hold its annual conference** at Penn State University, University Park. For more information, contact: Sid Barnard, 8 Borland Lab, University Park, PA 16802 814/863-3915.

• **15-18, Aseptic Processing and Packaging Workshop.** Enrollment is limited to 40 for this class to be held at Purdue University. For information, contact: James V. Chambers, Food Science Dept., Smith Hall, Purdue University, West Lafayette, IN 47907 317/494-8279.

• **16-18, Basic Pasteurization Course** will be held at the Holiday Inn, 1575 Regal Row, Dallas, TX. For more information, contact: Ms. Janie F. Park, TAMFES, PO Box 2363, Cedar Park, TX 78641-2363 512/458-7281.

JUNE

• **5, Pesticide Applicator Certification Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: Geroge Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **6, Fumigation Seminar 1989,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: Geroge Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **13-15, Hazardous Materials Management International Conference and Exhibition '89** will be held at the Atlantic City Convention Center, Atlantic City, New Jersey. For additional information, contact: Mary Jo McGuire, Group Show Director, Tower Conference Management Co., 800 Roosevent Rd., Bldg E -- Suite 408, Glen Ellyn, IL 60137-5835 312/469-3373.

JULY

• **7-14, 9th International Workshop on Rapid Methods & Automation in Microbiology** to be held at Kansas State University, Manhattan, Kansas. For more information, contact: Dr. Daniel Y. C. Fung, 913/532-5654. Certified by the American Society for Microbiology.

• **9-12, International Conference on Technical Innovations in Freezing and Refrigeration of Fruits and Vegetables.** For more information, contact: Robert C. Pearl, Food Science & Technology, University of California, Davis, CA 95616 916/752-0981.

AUGUST

• **13-18, The Society for Industrial Microbiology announces the 1989 Annual Meeting** to be held at the Westin Hotel, Seattle, Washington. For more information, contact: Mrs. Ann Kulback, Business Secretary, Society for Industrial Microbiology, PO Box 12534, Arlington, VA 22209-8534 703/941-5373.

• **14-18, Biotechnology: Principles and Processes** to be held at the Massachusetts Institute of Technology, Cambridge, Massachusetts. For more information, contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139 or Anthony J. Sinskey, Dept. of Biology, MIT, Cambridge, MA 02139 617/253-6721.

SEPTEMBER

• **11, Pesticide Applicator Certification Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **12-14, Basic Pasteurization Course** to be held at Howard Johnson, 8887 Gateway West, El Paso. For more information, contact: Ms. Janie F. Park, TAMFES, PO Box 2363, Cedar Park, TX 78641-2363 512/458-7281.

• **19-21, New York State Association of Milk and Food Sanitarians will hold its annual meeting** in Buffalo at the Shertaon-Buffalo Airport Hotel. For information concerning the meeting, contact: Paul Dersam, 27 Sullivan Rd., Alden, NY 14004, 716/937-3432.

• **25-27, Acceptance Testing.** Developing a product acceptance capability; qualification of employees and consumers; procedures for laboratory, central location, and home-use testing; design and analysis of acceptance tests. For more information contact: Marjorie Sterling Stone 415/365-1833.

• **27-28, The 1989 Annual Convention of the South Dakota Dairy Association** will be held at the Ramkota Inn, Sioux Falls, SD. For information, contact: Dr. John Parsons, Dairy Science Dept., SDSU, Box 2104, Brookings, SD 57007 605/688-4116.

• **27-29, Liquitec Expo '89.** For more information contact: Carolyn Mesce, Marketing Manager, Liquitec Expo Inc., PO Box 630, West Paterson, New Jersey 07424 201/256-0011.

OCTOBER

• **23-24, Pests Associated with Food Industry and Environmental Sanitation Seminar,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **23-25, Quality Control and Stability Testing.** Organizational approaches to establishing product quality monitoring systems within manufacturing and R&D: methods for measuring product quality and stability, including design and analysis. For more information, contact: Marjorie Sterling Stone 415/365-1833.

• **25-26, Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

NOVEMBER

• **11-15, Dairy and Food Industries Supply Assoc., Inc.** McCormick Place, Chicago, Illinois.

DECEMBER

• **4, Pesticide Applicator Certification Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **5-6, Pests Associated with Food Industry and Environmental Sanitation Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **7-8, Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

1990

DECEMBER

• **12-18, American Society of Agricultural Engineers will be sponsoring the International Symposium on Agricultural and Food Processing Wastes.** For more information contact: Jon Hiler, American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MO 49085 616/429-0300.

To insure that your meeting time is published, send announcements at least 90 days in advance to: K.R. Hathaway, Editor, IAMFES, PO Box 701, Ames, IA 50010.

From the Ames Office . . .

By Kathy R. Hathaway

By now you will have received the IAMFES Award Nomination form in the mail. This is the only form you will need for the IAMFES Awards. The form was changed this year to simplify the nomination process for you. You may photocopy the form for each award you wish to nominate a person for. These completed nomination forms with documentation need to be in the Ames office by April 1, 1989. Please take the time to nominate deserving colleagues for these prestigious awards. The IAMFES Awards are presented at the banquet during the IAMFES Annual Meeting, August 13-17, 1989 in Kansas City, Missouri.

The voting ballot for the IAMFES Secretary was also mailed to you. Voting is one of your membership privileges. Both candidates for the IAMFES Board would be a positive addition to the IAMFES Board. DON'T FORGET TO VOTE! The votes are due in the Ames office by May 15, 1989.

Please take this time to complete the bottom portion of this page. If any information, i.e. address, company name, phone number, etc., has changed from last years' IAMFES Directory. If the information in last years' Directory is correct, you need not send in this form. Please send in any changes or additions for the Directory no later than May 1, 1989. Office phone numbers are appreciated.

Affiliate groups are encouraged to bid on hosting the upcoming IAMFES Annual Meetings. Affiliate bids are taken during the IAMFES Board Meeting at the IAMFES Annual Meeting. This year the IAMFES Board will be taking affiliate bids for the 1992 Annual Meeting. If your affiliate wishes to bid, please call or write the Ames office by June 1 with the selected city. The Ames office will contact hotels within your area, check flights from the selected city's airport and relay that information to you for your presentation during the IAMFES Board Meeting. The affiliate host receives a portion of the table top exhibit monies as well as a 50-50 meeting profit split with IAMFES.

Scheduled Annual Meetings at this time are:

1989 Kansas City, Missouri
1990 Chicago, Illinois
1991 Louisville, Kentucky
1992 Open

Register now for the 1989 IAMFES Annual Meeting, August 13-17, Kansas City, Missouri. Early reservations at the Hyatt Regency Crown Center are encouraged. Both meeting and hotel forms are available in this issue of the journals.

Until next time.

Sincerely,

Kathy R. Hathaway

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Enjoy... the 76th IAMFES

Annual Meeting August 13-17, 1989

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AT CROWN CENTER

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Meeting & Hotel Registration Forms on pages 154 & 155

Fact Sheet

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Marcrolides	Erythromycin	20	200	200
Chloramphenicol	Chloramphenicol	50	3000	10,000

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