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FDA's Global Reach to Protect Public Health

Dixie Farley
(A Member of FDA's Public Affairs Staff)

Reprinted from the November 1986 FDA Consumer

The thermometer reads 95 degrees. Not a breath of breeze stirs the air on this sultry August day. A woman rolls a shopping cart into a supermarket and then pauses to enjoy the air conditioning. To her right are neat piles of fruits and vegetables. Delicate mushrooms and cherry tomatoes lie protected in cardboard cartons with cellophane wrappers. For loose produce, plastic bags on a roll are available for shopping convenience as well as food safety. Throughout the rest of the store, meat, dairy products, canned goods, and other items are arrayed in their separate "departments." Labeling clearly identifies each product, and perishables are properly refrigerated. This is an ordinary American grocery.

In another part of the world, a different scenario unfolds. The temperature here is also 95 degrees, but the air is so humid its moisture is nearly visible. A child leads a goat through a shifting throng of people gathered in the tight, sweltering aisle of an outdoor market. No cooled air or refrigerator units here.

As the day wears on, buzzing clouds of flies and gnats hover above fruit that is rapidly over-ripening in the heat. On a table holding raw and cooked meat, chicken blood seeps through paper wrapping and flows beneath a sausage ring.

A dog rolls in the dirt beside a basket of produce and then moves on. Reaching and turning, a shopper accidentally knocks several heads of lettuce to the ground where the dog has been. A vendor picks up the vegetables, shakes them a bit, and puts them back on the table.

Those scenes of grocery shopping in America and elsewhere are fictitious, but they depict marketing practices that are worlds apart in ensuring product safety.

The U.S. Food and Drug Administration sees to it that all FDA-regulated products sold in the United States, including products made domestically as well as those imported, meet the highest safety standards. In fact, FDA is recognized internationally as the leading food and drug regulatory agency in the world. Many developing countries seek FDA's help in improving their products' safety, too. Not only does this better protect their own popula-

tions, it also increases the potential for exportation of those countries' food and drug commodities. Because the U.S. government understands such goals and the benefits they could bring to America's consumers, it makes available FDA's technical assistance to countries throughout the world. That assistance is one of the many international activities coordinated by FDA's International Affairs Staff in the Office of Health Affairs.

At the August 1985 Inter-American Conference on Food Protection in Washington, D.C., representatives of 38 countries in this hemisphere discussed their current problems with food contamination. The consensus was that the problems are largely due to inadequacies in the countries' food control systems.

Subsequently, the Pan American Health Organization (PAHO) and FDA agreed to select two countries in the region, one English-speaking and one Spanish-speaking, for assistance. Jamaica and Costa Rica were targeted as possible selections with the intention that their strengthened food-control systems become models to be followed in neighboring countries. The International Affairs Staff is coordinating study missions to the two countries. FDA and PAHO sent a joint study mission to Costa Rica in November 1985 and to Jamaica in February 1986; follow-up activities are being planned. Because stronger food control in the Caribbean will mean safer food products, trade between those countries and America will likely increase, one of the objectives of President Reagan's Caribbean Basin Initiative. That inadequate food control in these countries adversely affects trade income is evidenced by the fact that, in 1985 alone, \$71 million was lost due to detentions of problem food products imported from Latin America and the Caribbean.

Through the International Affairs Staff, FDA is involved in other technical assistance projects in Nigeria, Saudi Arabia, Egypt, Tunisia, Israel and the People's Republic of China.

FDA regularly samples and tests food, drugs, medical devices, and other regulated products entering the United States from foreign countries. FDA inspectors also travel

abroad to check the facilities of foreign manufacturers and distributors, just as they do with domestic firms. In some cases, agreements have been reached with other countries so that inspections are mutually accepted and resource expenditures are reduced, while public health protection is maintained. Agreements with Sweden, Switzerland and Canada, for example, ensure that GMP (Good Manufacturing Practice) inspections of drug plants conducted by officials of those governments are equivalent to FDA's. Under similar agreements with several countries, FDA and the country recognize one another's laboratory practices as being substantially equal and accept one another's laboratory inspection reports and safety test data. When such an agreement is prepared, the International Affairs Staff ensures that it meets with State Department approval.

Some international agreements focus on specific products. For example, seven nations - Canada, Japan, the Republic of Korea, Iceland, Mexico, England and New Zealand - have agreed to abide by standards set by the U.S. National Shellfish Sanitation Program, a joint effort of state health agencies, the shellfish industry, and FDA. All oysters, clams and mussels sold in the United States must meet these standards.

Unfortunately, other imported seafood, such as shrimp, often does not meet U.S. standards; when this is the case, the seafood may not enter this country. FDA's International Affairs Staff works with foreign countries that want to improve the quality of specific export foods, such as shrimp.

A major part of the problem with shrimp is that it is usually harvested, not by those well-trained in food sanitation, but by cottage industry fishermen unfamiliar with modern refrigeration and preservation methods. According to International Affairs Staff director Jack Harty, "It is not uncommon for shrimp to be brought in on their boats and unloaded onto the ground, where it may remain in the hot sun for an extended period of time. You can imagine the high rate of decomposition. And, even if the shrimp goes into a good processing plant at that point, it may already be too late." Harty says FDA tries to persuade the foreign governments to educate their firms that, if they want the United States to accept their shrimp, they need to improve their sanitation practices.

One success story, says Harty, involved Bangladesh, which effectively trained its industry to meet FDA's standards. In 1984, Howard Pipin of FDA's Center for Food Safety and Applied Nutrition accompanied Harty on a four-week trip through Bangladesh and six other Asian countries to hold FDA food-control seminars on shrimp, coffee, canned vegetables, and other products exported to the United States. Harty says, "Foreign firms are very eager to know our compliance policies and regulations so that they can meet our standards. As with Bangladesh, getting their products into this country would open up the market for them."

A computerized communications link with the Department of State allows FDA to keep in close touch with

foreign countries via cables sent to U.S. embassies. The International Affairs Staff also maintains close contact with foreign embassies here in Washington. This link with foreign countries serves several purposes.

For instance, when FDA publishes a particularly significant regulation, the staff notifies the foreign embassies in Washington, sending them copies of the regulation and background information such as a press release. Recent communications have included information about the FDA regulation on irradiated food and the labeling change that requires a Reye syndrome warning on aspirin products. (See *FDA Consumer*, "Reye Syndrome Spells Caution to Parents" in October 1982 and "New Warnings on Rye-Aspirin Link" in April 1985.)

That special international link through the State Department is also used to monitor the effectiveness of foreign product recalls. FDA does this domestically through field staff who contact distributors of the problem product to ensure that they have followed the recall instructions. For recalls of exported products, the International Affairs Staff cables the U.S. embassy in each country that received the product. Embassy staff check with the foreign distributors to determine the effectiveness of the recall and then cable back their findings.

The International Affairs Staff keeps foreign governments informed, directly or through American embassies overseas, about other significant health issues, too. A recent example is last February's emergency in which a woman in the United States died after taking a cyanide-contaminated Tylenol capsule. Initially, because FDA wasn't sure whether any of the suspect lots of Tylenol had been shipped abroad, the International Affairs Staff quickly cabled information about the situation to all U.S. diplomatic posts to help answer questions from consumers and government officials in foreign countries. This evidently was successful, because the staff received only one or two foreign inquiries about the problem.

Through the International Affairs Staff, FDA works in close cooperation with its counterpart public health authorities in foreign countries. For example, the staff coordinates an annual tripartite meeting between Canada, the United Kingdom, and the United States, at which each nation's senior food and drug officials discuss mutual public health issues.

Several years ago, the tripartite meeting provided a forum for the three countries to confront a health emergency in which contaminated American-canned Alaskan salmon was being shipped domestically and abroad. Because the salmon had caused a number of deaths from botulism poisoning, FDA conducted an extensive investigation that scrutinized the entire 1980 and 1981 Alaskan salmon output, as well as the equipment used. Nearly 60 million cans were recalled.

The crux of the problem turned out to be defective reforming machines that tore a tiny hole in some cans. (The cans were shipped flat to processing plants and then re-formed there.) *Clostridium botulinum* bacteria could enter the can while it cooled during sterilization. AI-

though a salmon fragment might later seal the hole, botulism spores already inside could grow in the oxygen-free environment and cause botulism toxins to form. To prevent a recurrence of the problem, the re-forming machines were modified and plant personnel trained in using the equipment properly.

Ultimately, a chart classifying can defects was produced by the Association of Official Analytical Chemists in cooperation with FDA's Center for Food Safety and Applied Nutrition. By showing where to look and what to look for, it presented a uniform can-defect "road map" for use by food workers and government inspectors in all three countries. The World Health Organization has accepted the chart as a reference document.

In cooperation with the International Rescue Committee last year, the International Affairs Staff coordinated 90-day assignments of FDA personnel to refugee camps near the eastern border of Africa's drought-stricken Sudan. Dr. Gerald Moy of the International Affairs Staff describes the Ethiopian refugee population as in very poor health, "with over half of the children under age 5 below 80 percent of appropriate weight for height."

Richard Eubanks of the Denver district office and H. Tom Warwick of the Albuquerque resident post - both sanitarians - were selected from more than 60 FDA volunteers. Four other Public Health Service volunteers - three nurses and one other sanitarian - completed the team. Both Eubanks and Warwick had previous experience working in the rugged environment of developing countries where food water, medicine, fuel and vehicles are in short supply. As sanitarians, they helped establish clean water systems and other sanitary facilities. Their efforts helped control a cholera outbreak that within two weeks had caused more than 600 cases, including 50 deaths.

"The ultimate frustration - the ultimate irony," said Warwick, "was the weather itself. On the one hand, the rainy season was ending the drought and the cause for much of the human misery. On the other, it was causing outbreaks of cholera and malaria and making it almost impossible to supply the camps with food rations, drugs and sanitation supplies." Because of mud and rain, he said, one supply trip by truck took him three days to cover a mere 80 miles.

In 1985, the International Affairs Staff provided training, conducted briefings, coordinated FDA participation in international conferences, and oversaw visits to FDA by about 375 foreign government officials from 54 countries. Over the years, this unique staff's global reach has literally encircled the world with FDA's wide expertise.

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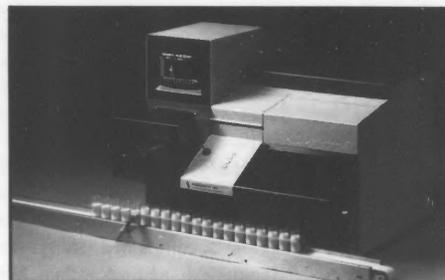


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The Future of the National Conference on Interstate Milk Shipments

(The following four papers present ideas on the future of the NCIMS from the milk producers, milk processors, state regulatory, and the Food Drug Administration aspects.)

by
James I. Kennedy
Executive Secretary
Missouri State Milk Board
and
Chairman, NCIMS

A very interesting and important subject. Since its very beginning in 1950 (37 years ago), many people have asked the same question from time to time. Before we discuss the future though, we *need* to briefly review the past and present status of the NCIMS. I think that will better prepare us to discuss what we believe may be in the future relative to the program. Since the beginning of my affiliation with the Conference 21 years ago, not a single biennial Conference has gone by without some issue or concern causing some participant to predict the **sudden** and violent demise of the Conference. Fortunately though, it always seems to survive these perceived crisis situations. Not only does it survive, but it continues to successfully gain the respect and confidence of more and more people from all segments of our vast fluid milk industry. Representatives from 47 states participated in our last Conference.

I think there are several important reasons for this. I will discuss a few of them with you.

The first is its organization statement, and I quote "The Conference shall be directed by and shall be in control of the various states who join together to stipulate the Conferences' procedures." Those various participating states are those who send official delegates to the Conference. It is my strong opinion that it is this very thing that allows the Conference to successfully achieve its objectives with very few problems.

Its prime objective, as you perhaps already know, is to "Promote the Best Possible Milk Supply for All the People" and of course provide for its unrestricted availability.

Other objectives are:

- a. Adopting sound uniform procedures which will be *accepted* by milk sanitation agencies.
- b. Promoting mutual respect and trust between milk sanitation agencies of producing and receiving states.
- c. Utilizing the FDA for training programs and as a

channel for the dissemination of information among state agencies.

The participation of FDA in the program in my opinion is in itself another reason for the success of the Conference. Officials from FDA have expressed support repeatedly for the NCIMS as one of its cooperative programs. FDA is a well-respected federal agency made up by and large of highly trained, skilled, and qualified personnel. This is especially true of the Milk Safety Branch, the State Training Branch, the Laboratory Quality Assurance Branch, and certainly the Regional Milk Specialists. Bob Wilson, the senior milk specialist in my home region VII, has through the years been literally a store house of milk sanitation information for all the states in his region. I know that other PHS regions have been similarly blessed with high quality milk specialists. These folks have perhaps done more for uniformity in milk sanitation than all the rest of us put together.

Some very specific and important functions are assigned to the PHS/FDA in the procedures governing the Cooperative State-Public Health Service/Food and Drug Administration program for the Certification of Interstate Milk Shippers. Certainly not the least of these is the conduct of Federal Check Ratings on interstate listed milk sources. Any way you look at it, there is bound to be a positive trickle-down effect from a properly conducted check rating. This positive effect not only involves the industry, but also the rating and enforcement agency within the state. Certainly properly conducted federal check ratings strengthen confidence in the Interstate Milk Shipments program in the minds of milk control officials in receiving states. This is true regardless of the outcome of the check rating. If the outcome is good - fine. The milk continues to be accepted by receiving states. If the findings are adverse and result in loss of certification, the shipment to other states of the milk involved stops until a new acceptable rating is established under the procedures. It strengthens the program when officials in re-

ceiving states are staunch on insisting that sources of milk from other states meet IMS standards in all respects. Not taking such action would be sure disaster for the Conference and its objectives and principles.

Another strong point of the NCIMS is its unique system of Council deliberation which obtains input into the overall program from all segments of the industry. Yet, the final decision-making process is left in the hands of the Conference voting delegates who are state rating and regulatory officials. These final decisions, of course, are made in collaboration with FDA under a Memorandum of Understanding which requires mutual agreement on matters resulting in changes in the procedures of the Conference, the PMO and other related documents. This sometimes becomes a long drawn out, laborious process. It is one which has been criticized by some people as being too deliberate, but one in which I personally take great comfort. To make substantive changes in a system as well established and respected as our Interstate Milk Shipments program without a complete thorough review of the issue by the Conference participants and with acceptance by the delegates and FDA could result in a complete reversal of what the NCIMS has tried so desperately to develop through its years of existence - providing for the unrestricted availability of high quality milk in interstate shipment.

Some people today are convinced that we will never return to any major extent to the days when trade barriers, protectionist legislation and the like hampered the movement of perfectly acceptable milk and milk products from one state to another. Ladies and gentlemen, I am just as firmly convinced that if actions of the NCIMS become unacceptable in the minds of milk control officials in receiving states that we most certainly will see these barriers reestablished. This *can* occur with the adoption of unacceptable features within the Conference procedure as an on-going program, and most certainly would occur if the Conference program were to be abandoned all together. In either case, the result would be added expense to the industry, to regulatory agencies and of course to the consumers of dairy products.

I must say to you that although governments in my home state of Missouri at one time were absolutely notorious in not accepting reciprocity relating to milk sanitation and certification, it is certainly not our desire to return again to those conditions. Let me give you an example of how notorious our former non-reciprocity really was. As recently as the early nineteen seventies, 31 producer farms located near Oregon, Wisconsin, were supplying milk to a processing plant in St. Louis. The St. Louis Health Division had each of those farms under permit and under *routine* inspection. They wouldn't even consider accepting Wisconsin's inspection and certification of the farms. I was a state milk sanitation survey officer at that time in Missouri and we would actually travel to Wisconsin and conduct our own survey on those farms for IMS listing. An extremely expensive proposition to say the least and one that is just not at all necessary under the program of the NCIMS.

Fortunately since then we in Missouri have come to recognize the complete acceptability of the National Conference program as it now exists and we now practice complete reciprocity under that program. It is certainly our desire now that the Conference program and procedures remain intact and in a condition that will allow us to maintain the complete confidence and trust that we have developed in the features of that program.

I am convinced that many milk sanitation control officials from the states now participating in the National Conference program are of the same persuasion.

For the future then of the NCIMS in our minds, we see continuing good results from the application of its procedures in our nation as long as those procedures are sound and are uniformly applied.

It is further our belief that, in spite of the horrendous problems the dairy industry has encountered in the last couple of years, there are adequate tools within the Conference procedures, the PMO and related documents to protect the health of the consumers of the dairy products presently covered under the scope of the Conference. We also believe that through the proper application of those documents as they now exist, the NCIMS can continue to maintain the respect of all segments of the dairy industry and it will continue to be the instrument that facilitates the unrestricted availability of high quality milk in our nation.

From this you can easily discern the fact that as an individual my own personal approach to the National Conference is one of conservatism.

This comes from a convert and from one who has complete confidence in today's program. I would say to you that "If it works, don't fix it!"

Now I will hasten to tell you that if proposed changes in Conference procedure, the PMO and other documents tend to tighten the screws a little and to necessitate closer compliance with the rules in our enforcement programs, our state ratings and federal check ratings, and the like, then I can assure you that I will give my total support to those proposed changes. This may well be just what we need to combat the *Listeria*, *Salmonella*, *Yersinia*, etc. problems we have recently experienced. If so, let's get on with it!

We should, however, continue to quickly and resoundingly defeat efforts to weaken the NCIMS program in ways that tend to favor milk exporting states at the expense of receiving states or to lessen in any way the Public Health protection it now affords. The same should be said for any efforts to wrest the direction and control of the Conference from the voting delegates of the various participating states who join together to stipulate the Conference's procedures.

It is my firm conviction that when effecting future changes within the Conference, we may compromise only on those matters which *will not* adversely affect the accomplishment of the objectives of the Conference or will not adversely affect the health of the consumers of products handled under its scope.

The Future of NCIMA

By John Allen

The Southland Corp.

When Glenn asked me to give my perspective as a processor on the future of the IMS Conference, I had no problem with the subject. I believe - and - I think most processors believe - that a strong and effective IMS Conference can be vital to the efficient processing of safe dairy products.

But the fact that the future of the IMS Conference is being discussed today at this forum is evidence that many people are concerned about the status of the conference. The recent outbreaks of dairy products contamination at Hillfarm in Chicago and Jalisco Cheese in California, and FDA's findings under the dairy initiatives, have caused a lot of people to question the effectiveness of the IMS programs.

Some people who have been actively involved with the conference over the past few years were asking questions even before these events.

There is an old saying used by a lot of managers when people start talking about change: "If it ain't broke, don't fix it."

Before the *Salmonella* outbreaks in Chicago, many people felt that the IMS Conference wasn't broke. I think all of us will agree today that while it ain't broke, it does need repair.

Now is the time to make these repairs. The continued existence of the dairy industry - and its future growth - depends on our ability to process products that are safe for the consuming public.

Fortunately, one of the industry's greatest strengths always has been the confidence that consumers place in our products. And the IMS Conference has played a big role in helping the industry earn this confidence.

The concept of a uniform, cooperative effort on the part of regulatory, producers, and processors to insure the safety of dairy products is valid.

This cooperative effort depends on each group sharing the responsibility of the safety of dairy products:

- The responsibility that regulatory has to consumers;
- The responsibility that producers have to processors;
- And, the responsibility that processors have to their customers.

While we all have the same goal - safe dairy products - we each have our own ideas on how to attain that goal.

It is during the conference that we share these ideas, debate the issues, and finally, formulate the regulations that will govern our industry.

It is through the IMS Conference that the input of the processor is heard. If regulations become obsolete or are no longer effective, we have this mechanism to initiate the changes that are needed.

Without the IMS Conference, the processor probably would lose this mechanism - and much of his voice in the regulatory process.

The state regulatory agencies also need support through the IMS program. With budget restraints in almost every state, these agencies are in constant jeopardy of losing their funding.

Many state legislatures are asking why they should fund milk programs, and why FDA can't be responsible for the safety of dairy products.

The answer to that question is simple. FDA alone cannot do what the states are doing. The state agencies act as a regulatory layer between the processor and FDA. Their knowledge and expertise in dealing with the local plants is crucial to the effectiveness of the regulatory process.

If the IMS Conference is so important to the regulatory agencies, producers and to the processor, why are we here today discussing its future?

The reason is that over the past several years, the conference may have lost light of its mission.

That mission is:

"To insure the safety of dairy products through uniform regulations."

Instead, much of the Conference's time and energy has been spent debating economic issues - issues that do not really relate to the safety of our products.

The Conference needs to reaffirm its mission and its focus. It needs to take a more active role in addressing emergency problems that confront this industry.

To do that, the IMS Conference has to establish some procedures that enable it to conduct its business in between its biennial meetings.

This may involve changes in the constitution and by-laws of the Conference. It may also mean a somewhat radical departure from the passive role that the conference has taken in the past.

It certainly means that all participants in the conference must not attempt to use or manipulate the Conference for self-serving intentions.

The issue of non-IMS products, such as frozen desserts, will need to be explored. The Conference should be involved in helping to establish model regulations for the processing of these non-IMS products.

There is no reason or justification to modify the pasteurized milk ordinance to include frozen desserts.

Specific and appropriate regulations necessary to insure the safety of these products should be developed and examined.

These specifications should relate to safety - politics, economics and even quality considerations should not be allowed to interfere with safety.

The future of the IMS Conference represents a challenge to the strength and purpose of those involved.

Its future will be determined by the ability of the Conference to work together in a cooperative manner, setting aside any self-serving intentions that would distract the Conference from its real mission.

As a processor, I feel the time is right, the need is certainly there and I believe the desire is there to meet this challenge.

The Future of the NCIMS

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Dairy producers concur whole-heartedly with the basic purpose of the Conference on Interstate Milk Shipments IMS which has been stated as being a cooperative, federal-state program to insure the sanitary quality of milk and milk products shipped interstate. Producers recognize another value and purpose for the existence of the Interstate Milk Shippers (IMS) Conference.

An adequate supply of milk of proper sanitary quality relates directly to the availability of acceptable markets which are influenced by the ability of milk and milk products to move freely from state to state without duplication of inspections, conflicting regulations and/or conflicting interpretation of regulations. It is very disruptive and costly when different regulations or interpretations are implemented on the same milk supply. Dairy producers aggressively supported the concept which caused the Conference on Interstate Milk Shipment to be born, that being the necessity of uniform regulations and inspections with reciprocity between states. The necessity which caused the IMS to be born is just as pressing today in 1987. Thus our needs today can be simply stated that the IMS structure which remains intact and functionable must continue to revise a document known to all as the Grade A Pasteurized Milk Ordinance (PMO) in order that it effectively addresses pertinent issues and procedures for the production and processing of safe and wholesome milk.

After appropriate and timely revisions of the PMO, it must be adopted and administered by each state in a manner consistent with its intent. The net result is, everyone wins; the consumer receives a product which is safe and wholesome and the producers of milk and milk products have the opportunity to freely market their products without costly, confusing or even inhibitory regulatory actions.

But the continued achievement of these objectives will not come easy. One of the major issues to be addressed is "money."

As stated, for the program to work, each state must execute the PMO as agreed within the IMS Conference and to do this, each state must provide the appropriate funds. Thus far, all of the states have been able to satisfactorily implement the program as described in the PMO but one cannot keep from being concerned for the future.

The program could also be jeopardized at the Federal level if the Milk Safety Branch of the Food and Drug Administration (FDA) were not funded at the level neces-

sary to conduct their responsibilities as mutually agreed, such as check-ratings and training. It is through the oversight activities of the Milk Safety Branch that the credibility of the state programs are verified and thereby nullifying any need for Grade A milk and milk products to be addressed by other regulatory agencies such as the enforcement branch of the FDA.

A priority equal to "money" is the timely revision and execution of necessary revisions of the PMO. This point is best illustrated by the necessity of the Food and Drug Administration to implement the dairy initiatives in 1986. Would it have been more appropriate for there to have been a new initiative in the PMO and then implemented by the states?

But even more disturbing, could the states have implemented the initiatives because of current budgeting constraints?

One can then proceed with the next question. If FDA has to continue implementing initiatives for the purpose of evaluating and affirming the adequacy of state programs, how far are we from a Federal milk control program? This scenario then proceeds to ask if there were a Federal program, what would happen to the state programs and consequently the free movement of milk and milk products?

Consequently, some hard issues are on the table. How do we maintain appropriate funding for agreed programs? Should there be a means whereby the PMO could be revised more frequently than the current procedure of every two years? If the answer is yes, how can this come about? Options which could be considered include the following:

- a) Convene the Conference more often
- b) Never adjourn the Conference
- c) Use mail ballots to solicit opinions of the delegates
- d) Place more authority in the hands of the executive committee

These and other difficult questions will be addressed and undoubtedly resolved at the next conference on Interstate Milk Shipments which convenes in May, 1987.

The Future of the NCIMS

By Jerome J. Kozak, M.P.H.

Chief, Milk Safety Branch

Center for Food Safety and Applied Nutrition

U.S. Food and Drug Administration

The topic of "The Future of the Interstate Milk Shippers Program" presents an extremely formidable challenge. The challenge of following three other panelists and expressing something new and interesting adds to the task.

The "future" is defined as "that yet to come" or "to happen". For the next few minutes I would like to take you on a cerebral journey into the future and postulate what the dairy industry will be like 10-15 years from now and then from a strategic management standpoint examine how the Interstate Milk Shippers Program (IMS) will have to adapt to meet the challenges and public health concerns of the dairy industry of the future.

There are two schools of thought when attempting an analysis such as I propose. One is that you reach back in the past to see where you were and how you arrived at this point, and the other is to blindly focus on where you want to go. My technique falls somewhere in the middle - be cognizant of where you came from, but don't allow the past or the present to prevent forging new paths for the future.

The dairy industry of the future may look something like this: There will be fewer processing plants but larger plants and larger operations.

- Products will be shipped even greater distances.
- There will be a tremendous variety of new dairy products and the utilization of dairy products into other foods.
- There will be more highly specialized plants.
- Fluid milk and traditional dairy products will play a less important role in the total volume of new dairy products.
- The demand by consumers for fresh products will increase.
- There will be more "simulated" dairy products and less rigid standards of identity.
- There will be a continued upsurge for nutritional and quality products.
- The number of farms will continue to decrease, but remaining farms will continue to increase in size.
- Farms will become more mechanized and incorporate new technologies and in some cases become "mini-plants".
- Economic price support and surplus programs will decrease and create the need for more innovation in order to stimulate competition both domestically and internationally.
- New technological advances will continue to push the dairy industry into further complexity and sophistication.
- Pasteurization and sterilization methods will be refined and practices such as terminal sterilization will be employed for producing and processing foods for selected populations and high risk groups.
- New laboratory techniques will continue to increase the ability to detect smaller levels of organisms and other contaminants.
- The "pseudosterile" environment or "clean room" method for manufacturing dairy foods will become a reality.

Strategic management planning is anticipating trends, problems and technical advances which are likely to im-

pact on us. We want to fix them as early as possible and deal with them by having more time than is available than under a crisis situation. It is the capability of minimal redirection without knee-jerk reaction. It is the direction of resources toward the problems of greatest concern. It is taking into account the operating environment of the future when making today's decisions. It is the definition of rules, goals, objectives and *mission* and the subsequent allocation of resources to accomplish that mission. In summary, a strategic management plan, is the analysis of past performance, present problems and future needs anticipated.

When NCIMS was formed in 1950 the objective was to provide for the free flow of milk among various states. In 1978 that was changed to discussing and voting on changes in the PMO and the "Procedures". What should the objectives of IMS be in 1987 and the year 2000? Does the Conference have a predilection to fulfilling objectives established 37 years ago which addressed a dairy industry of 1950? Has the Conference adapted to the dairy industry of today? And how will it adapt to the one of tomorrow? Is the present structure of the IMS Program designed in such a way that will allow adaptability and change? How well is the IMS Program serving public health, government and industry?

I think the time has come to address some of these issues. The IMS Program must be willing to temper the successes of the past with a sincere examination of its failures. The IMS Program must formulate a strategic management plan for the future. The Program must recognize that the future of the dairy industry is *today*. We entered a new threshold in the dairy industry sometime ago, but the IMS Program never recognized it until Hill-farm and Jalisco.

The Conference was formed at a time when fluid milk and a few other traditional products were the major products of the dairy industry. A few minutes ago we looked into our crystal ball concerning the dairy industry of the future. How will the IMS Program address the new dairy products of today and tomorrow? Can we continue to separate Grade A and Non-Grade A dairy product and maintain different standards and regulations? Is a fragmented approach to the dairy industry the best way of facilitating a safe and wholesome dairy product?

The subliminal beauty of the IMS Program is government (Federal, State and Local) working cooperatively with industry in a preventive public health approach. Let's not wait until the next dairy crisis before we realize that the IMS Programs deviation into economic issues, the creation of marketing constraints, and sanitation minutia will only serve to prevent solving the genuine public health concerns facing us today and in the future. The Conferences' original mission of providing the *best* possible *milk* supply in 1950 was a sound and appropriate mission. When we examine the future, maybe the mission should now be providing the *safest dairy* product.

An Evaluation of Reference Test Results of Dairy Farm Herd Milk Supplies Used in a Component Analysis Control Program

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Introduction

Dairy Quality Control Institute, Inc. analyses herd milk supplies by reference test methods for purposes of providing control samples used in calibration and monitoring of infra-red milk testing devices. Herds are selected to reflect a wide range in component level. Samples are tested and made available at weekly intervals. Test results of reference methods for fat, protein, lactose, and total solids (with solids-not-fat obtained by difference) are retained on computer disk for record-keeping purposes. Such information offers a rather unique data pool for assessing relationships between various milk components. At the same time, it seems appropriate to evaluate such data at regular intervals as a gauge of the applicability of milk supplies used as control samples. Recent reports (9, 10) by Federal Milk Market Administrative staff provide a basis of comparison and affirm the need for research in this area generally.

BACKGROUND AND METHODS

The following evaluation is based upon data taken over one full year. It represents 50 separate sets of control samples assembled and tested at about weekly intervals from June 3, 1985 through June 2, 1986. The analysis was done only on unaltered herd milk supplies. A total of 282 such samples originating on 26 different farms were included in this study. The farms were purposely selected for the relatively wide range of component levels reflected in the milk supplies.

All milk was tested for fat by both Babcock and Mojonnier analyses. Protein was determined by Tecator micro Kjeldahl apparatus (Tecator, Inc., P.O. Box 405, Herndon, Virginia 22070), and lactose by high perfor-

mance liquid chromatography (2). Total solids were measured by the oven method, i.e. Method 1, Association of Official Analytical Chemists (1).

Average Test

The unweighted average percentage of components for these samples was: fat 3.96, protein 3.42, lactose 4.83, solids-not-fat (SNF) 8.91, and total solids 12.87. These data should not be taken as averages based upon randomly-selected herds, but rather those herd supplies specifically selected to reflect wide variations in component level. These averages along with equivalent data taken during 1984-85 are shown in Table 1. For comparison purposes, regional weighted averages for the Upper Midwest Marketing Area are also provided for 1984-85. Because control samples must reflect the widest possible component levels, the herd milk supplies selected for this purpose might be expected to range somewhat higher in overall average level of components than regional averages. These samples reflect that fact.

The reader will perhaps note that only one average fat test is shown although, in fact, two methods were used in analyzing fat content. In this particular case, the average value was identical for both tests. DQCI, Inc. uses a Babcock procedure slightly modified from that outlined in Standard Methods for the Examination of Dairy Products (8). An adjustment is made in milk temperature to 15.5°C (60°F), and in specific gravity of sulfuric acid to 1.825. Temperature of the acid is maintained at 17.7°C (64°F) prior to addition to milk, and precisely 17.5 ml of acid is added. These data and data from a previous study (6) indicate that these modifications in test procedure produce generally better agreement between Bab-

cock and Mojonner analyses than would otherwise be expected (3, 4, 5).

Average Level of Components at 3.5% Fat, 3.2% Protein, and 8.75% SNF

Although true multi-component milk pricing, with differentials above and below given bases has not been implemented as yet, many dairy organizations have been and continue to provide premiums for milk suppliers based on certain high standards for milk quality and certain base levels of components other than fat. The base for protein is commonly 3.2%. This level is usually considered to be at or near the average content of protein in U.S. milk supplies. It might or might not be the level of protein associated with milk of 3.5% fat content (the current base for pricing milk). The same might be said for the SNF base of 8.75% commonly used in premium pricing programs.

Because milk component levels are interrelated, and because such interrelationships enter into milk processing issues, it is of interest to note average level and range in level of various components at given levels of one component. Such information is also important in terms of breeding and feeding practices on dairy farms.

Data in Table 2 show these relationships. In general the data agree very well with similar data found in the Upper Midwest Federal Order study (9). Both studies indicate that a base at 3.5% fat is somewhat more readily achievable than bases of 3.2% protein or 8.75% SNF. Total solids content of milk supplies at 3.5% fat, 3.2% protein and 8.75% SNF were found to be 12.14, 12.34, and 12.40%, respectively. Similar data from the Upper Midwest study show total solids levels of 12.09, 12.31, and 12.48%, respectively. A comparison of the two sets of data also suggest that the farm supplies used for control samples are, indeed, reasonably representative of milk supplies common to the entire Upper Midwest regional marketing area.

Averages, of course, can be deceiving. They express nothing with regard to individual farm supplies of milk and individual variations in component levels that may exist in any one farm or at any one time. Table 3 shows the range in component levels in milk supplies testing 3.5, 3.2, and 8.75% fat, protein, and SNF, respectively. These data give ample evidence of the very wide variations that do exist at given levels of various components. As example, one milk supply, testing 3.50% fat, had protein, lactose, SNF and total solids content of 2.94, 4.56, 8.14 and 11.64%, respectively. Another supply, at 3.54% fat, contained these latter components at percentages of 3.37, 4.87, 8.86 and 12.40, respectively. Granted the fat test was in fact 0.04% higher, on average, than the former supply, the level of protein, lactose, SNF and total solids was 0.43, 0.29, 0.62 and 0.76%, respectively, higher in the latter supply. This would certainly appear to reconfirm the fact that milk supplies do vary greatly from one supply/farm to another at equivalent fat levels. And it likely should not be lost to our attention that even a very stable component like lactose does in-

deed show wide variations (a difference in this case of 0.29% between the two milk supplies). In a pricing program based on SNF (or total solids), lactose content becomes significant in its contribution to solids while remaining a component of rather weak market potential.

As with fat content, wide variations in components occur at equivalent levels of protein. At 3.2% average protein level, fat content varied from a low of 3.11% to a high of 4.13%, a 1.02% difference. The lowest total solids test at 3.2% protein was 11.79%, the highest, 12.78%. The difference is 0.99% solids. Here, again, lactose content varies by 0.29%, a not-insignificant amount. Because lactose makes up such a large share of SNF, and because considerable variability does exist, it seems important to emphasize the need for precise lactose measurement in control samples used for IR calibration and adjustment. To date, three different methods of lactose measurement are recognized by the Association of Official Analytical Chemists (AOAC). These include the polarimeter, copper sulfate gravimetric analysis, and an enzymatic procedure. Little consideration has been given the fact that lactose in milk exists in a hydrated state, with water of hydration averaging about 5% of total lactose. In addition, high performance liquid chromatography (HPLC) offers potential for lactose measurement possibly more precise than the three methods listed above. An earlier study of the precision of the HPLC analysis of duplicate tests of lactose showed a mean difference of 0.024 and a standard deviation of difference of 0.072% (7). Lactose is a major component of milk. In infra-red analysis, accurate lactose measurements are an absolute.

Estimating SNF by Equation

Regression analysis was used to develop a formula that can be used to estimate SNF content when level of protein and lactose are known. For these data, that formula is: $SNF = 2.002 + 1.089(P) + 0.6578(L)$, where P is percent protein, and L is percent lactose. No improvement in the formula could be obtained by including the fat component as well.

The same formula derived from the Upper Midwest study (9) is: $SNF = .13 + 1.0115(P) + 1.1026(L)$. Again, no improvement could be made by including fat in the equation.

Because a much larger number of samples was analyzed in the Upper Midwest than the present study, the former would be expected to yield somewhat more precise estimates of SNF. Nevertheless, SNF estimates by both equations yield values that are quite comparable. For example, at protein content of 3.15% and lactose content of 4.78%, equations for the Upper Midwest and this study estimate SNF to be 8.59 and 8.58%, respectively.

Estimating Total Solids by Equation

Regression analysis was also used to derive an equation for estimating total solids (TS) from fat, protein, and lactose content. This equation is: $TS = 2.013 + 0.9972(F) + 1.094(P) + 0.6546(L)$.

At fat, protein, and lactose percentages of 3.5, 3.15, and 4.78 respectively, the equation estimates TS to be 12.08%. By difference, then, mineral content is 0.65%. This value is well within expected levels for this component in cows' milk.

In Summary

Data from this study suggest that farm milk supplies currently used for producing control samples for calibrating and monitoring infra-red instruments reflect closely the component relationships found in milk supplies over the upper midwest region generally. The data also emphasize the fact that well established relationships do exist between various components of milk, but that wide variations from the norm may occur from one farm supply to another.

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TABLE 1. Average component levels of farm herd milk supplies selected for use in a component control sample program.

Component	Average, By Year		Weighted Regional Average*
	1984-85 N = 196	1985-86 N = 282	
Fat	3.87	3.96	3.70
Protein	3.29	3.42	3.24
Lactose	4.76	4.83	4.81
SNF	8.74	8.91	8.71
Total Solids	12.62	12.87	12.41

*Date taken from reference number 9.

TABLE 2. Average percentage of other milk components at fat, protein, and solids-not-fat levels of 3.5, 3.2, and 8.7%, respectively.

	Fat	Protein	Lactose	SNF	Total Solids
Fat at 3.5% (N = 22)	(3.46-3.54)	3.18	4.80	8.63	12.14
Protein at 3.2% (N = 45)	3.66	(3.15-3.24)	4.83	8.67	12.34
SNF at 8.75% (N = N)	3.65	3.26	4.83	(8.75)	12.40

TABLE 3. Range in component test values at fat, protein, and solids-not-fat levels of 3.5, 3.2, and 8.7%, respectively.

	Range in Test (%)				
	Fat	Protein	Lactose	SNF	Total Solids
Fat at 3.5% (N = 22)	(3.46-3.54)	2.94-3.39	4.52-4.95	8.14-8.90	11.64-12.40
Protein at 3.2% (N = 45)	3.11-4.13	(3.15-3.24)	4.70-4.99	8.53-8.81	11.79-12.78
SNF at 8.75% (N = 7)	3.35-3.80	3.21-3.30	4.73-4.88	(8.75)	12.10-12.55

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U.S. Dairy Forum Sponsor Schedules 1988 Meeting

The Milk Industry Foundation (MIF) and International Ice Cream Association (IICA) today announced the scheduling of its fourth industry-wide U.S. DAIRY FORUM to be held at the Innisbrook in Tarpon Springs, FL, Jan. 20-23, 1988.*

"Dairy industry leaders have come to view the annual U.S. DAIRY FORUM as an excellent way to air policy proposals and gauge industry reaction," says MIF & IICA President and U.S. DAIRY FORUM Chairman John F. Speer, Jr. "MIF and IICA are committed to continuing this dialogue among all segments of the dairy industry and helping broaden individuals' perspectives."

More than 200 dairy industry leaders attended the 1987 U.S. DAIRY FORUM held last month in Ft. Lauderdale, FL. Like previous U.S. DAIRY FORUMS, it brought together the entire spectrum of the dairy industry, including producer cooperative members and leaders, milk processors, ice cream and cheese manufacturers, industry suppliers and distributors, trade press editors, government officials and leading university researchers and economists, to discuss current industry issues.

MIF and IICA are national trade associations representing milk processors and ice cream manufacturers. Activities range from legislative and regulatory advocacy to market research. MIF has 225 member companies that process 75 percent of the fluid milk and fluid milk products consumed nationwide. IICA has 210 member companies that manufacture and distribute an estimated 85 percent of the ice cream and ice cream-related products consumed in the United States.

Due to a scheduling conflict, the 1988 U.S. DAIRY FORUM will be held Jan. 20-23, not Jan. 27-30 as was announced at last month's FORUM.

1987 Mold Count School To Be Held At Purdue In July

David McShane, Chairman of the Food Technology Committee for the Indiana Food Processors Association, Inc., (IFPA) announced today that the 53rd Annual Canners Mold Count School will be held July 13 - 17, 1987.

According to McShane, the use of the Howard Mold Count and Machinery Mold Detection methods is considered to be an integral part of the Sanitation and Quality Control program of most food processing plants across the country. Personnel involved in Mold Count work should have a complete understanding of the methods and their applications.

McShane added that the school will be sponsored by IFPA and hosted by the Department of Food Science at Smith Hall on the Purdue University Campus in West Lafayette.

Mold Counting for beginners will begin Monday, July 13 and run through July 17. Experienced Counters will begin instruction on July 15 and conclude July 17. Certificates of completion will be awarded to attendees successfully completing the program.

New Warnings Required For Sulfites

The Food and Drug Administration has announced that warning statements on labels will be required when sulfiting agents are used in processed and packaged foods in amounts of 10 parts per million or greater.

"This will be good news for the approximately one-half million people who are sulfite-sensitive, many of whom are asthmatics," says Mary K. Sweeten, nutritionist with the Texas A&M University Agricultural Extension Service.

She says physical symptoms reported by those who are adversely affected by sulfites include difficulty in breathing, wheezing, vomiting, nausea, diarrhea, cramps, hives and unconsciousness.

Sulfiting agents include sulfur dioxide, sodium sulfite, sodium and potassium bisulfite and sodium and potassium metabisulfite. These compounds are used to prevent food discoloration and spoilage.

In August 1986, the FDA prohibited adding sulfites to fruits and vegetables. Use of sulfites on fresh vegetables and fruits in restaurant salad bars was common until that date.

By June 3, 1987, the label warning will be extended to prescription drugs. Over 1,100 prescription drugs contain sulfiting agents to prevent deterioration.

The warning also will be extended to include labels of alcoholic beverages by January 1988, according to the U.S. Bureau of Alcohol, Tobacco and Firearms.

"The consumer who is sulfite-sensitive should become a label reader to avoid exposure to the compounds," Sweeten urges.

Course on Microbial Principles and Processes for Fuels, Chemicals and Biologicals

A one-week, extensive course on "Biotechnology: Microbial Principles and Processes for Fuels, Chemicals and Biologicals" will be given at the Massachusetts Institute of Technology, Cambridge, Massachusetts, August 17-21, 1987.

The purpose of the course is to impart a fundamental understanding of microbial principles and processes for utilizing biological systems for manufacture of fuels, chemicals and biologicals. The emphasis throughout is on basic principles of physiology, biochemistry and genetics of microorganisms that are useful for biochemical processes. Applications of molecular biology procedures for protein engineering and DNA detection procedures are presented. Discussion of current research areas in this field, as well as future needs will be presented. Lectures on important biochemical engineering principles are also covered.

Lectures are by Dr. C.A. Batt, Dr. C.L. Cooney, Dr. A. Kossiakoff, Dr. L.L. McKay, Dr. O.P. Peoples, Dr. C.K. Rha, Dr. A.J. Sinskey, Dr. R.T. Thauer, Dr. G.C. Walker and Dr. G.M. Whitesides. The program is intended for biologists, chemists, biochemists, engineers, food scientists and managers who are interested in recent development in biotechnology.

If you are interested in obtaining further information, please contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139 or Anthony J. Sinskey, Professor of Applied Microbiology, MIT, Cambridge, MA 02139. Telephone: 617-253-6721; Telex 921473 MIT CAM.

Processing Fluid Milk

Prevent food poisoning and spoilage bacteria in dairy products. Help train your dairy plant personnel in processing procedures to meet federal and state regulations and standards with Penn State College of Agriculture's new slide/tape set.

More than 15 federal and state regulatory and industry representatives have helped develop "Processing Fluid Milk". This 140 slide program is accompanied by a 30-minute tape with 1000 Hz pulses for automatic slide changing, plus a script. Script writing and coordination was done by Sidney E. Barnard, Extension Food Science Specialist-Dairy

at Penn State. Photography is by Ronald Matason, photographer for the College's Ag Information Services.

This slide set, including tape and script is available for \$100. A purchase order or check made payable to The Pennsylvania State University should be sent to: Agricultural Information Services; Audio-Visual Production, The Pennsylvania State University, 119 Ag. Admin. Bldg., University Park, PA 16802.

New Label Regulations For Lean Meat and Poultry

New guidelines established by the U.S. Department of Agriculture require processors to follow labeling regulations for claims about the fat and lean content of meat and poultry products by March, 1987.

"Although some processors have already complied with the regulations, industry-wide labeling will mean that consumers can compare all products," says Dr. Alice Hunt, nutritionist with the Texas A&M University Agricultural Extension Service.

According to the regulations, "lean" and "low fat" may be used only for products that contain no more than 10 percent fat. "Extra lean" is reserved for products that contain no more than 5 percent fat.

"Light," "lite," and "lightly" may be used on meat and poultry products that have a 25 percent reduction in fat, salt, sodium or breeding from similar products.

"Even more important for consumers is the fact that labels which carry these terms must also clarify the product claim," says Hunt. "The actual amount of fat, for example, must accompany the claim, or be noted with an asterisk and placed elsewhere on the package."

The nutritionist says that comparative expressions of the lean or fat content of products, such as "leaner ground beef" must also carry an explanation on the label.

The explanation must tell the fat content and the basis for comparison, such as "this product contains 20 percent fat, which is one-third less fat than allowed by the USDA standard for ground beef."

When buying lean or light meat or poultry products, especially those that are breaded, Hunt advises to consumers to consider how they will cook the food as well. If you take "light" chicken patties home and then fry them, she says, "you just add back the fat you cut by buying the light product."

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DAIRY AND FOOD SANITATION/MAY 1987

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New Product News

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

Computerized Health Inspection System

• Now sanitarians can generate printed health inspection reports while in the field, thanks to the computerized health inspection system designed and programmed by Oregon Digital Systems, Inc.

The heart of the system is a Hewlett-Packard HP-71 Handheld Computer which stores common violation phrases and required corrections. The sanitarian simply types the three-digit violation code into the computer and adds any further information to clarify the violation or correction. The rugged and lightweight computer fits easily into the sanitarian's hand during the inspection.

The computer automatically prints the text for violation and correction descriptions, places the most critical violations at the beginning of the report, and calculates the point totals if necessary.

At the end of the inspection, the computer is connected to the battery-powered HP ThinkJet Printer, and in less than one minute, the report is printed - in a neat, easy-to-read format.

Designed for convenience, the entire system fits into a briefcase, and includes the handheld computer and printer.

All inspection information is saved by the computer and can be transferred directly to an office personal computer, where an Oregon Digital-designed data base program generates monthly reports. No additional personnel are required for data entry.

Because the Oregon Digital health inspection system saves on report-writing time, sanitarian productivity is increased. In fact, according to David Bowman, Oregon Digital Director of Sales, "We estimate that the system saves enough time that it should pay for itself in six to eight months."

Example inspection systems might include: restaurant quality assurance, retail food protection, pools and spas, housing and building inspections, pest control, nursing homes, underground tanks, etc.

For more information, contact: David Bowman at 503-752-0448.

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Brochure Describes Refrigeration Oils For Food Processing And Beverage Industries

• Properties and application data for Suniso® refrigeration oils suited to the special lubrication requirements of compressors used in the

food processing and beverage industries are described in a 16-page brochure offered by Witco Corporation.

The Suniso oils are manufactured to meet the specifications required by compressors employed in air conditioning and refrigeration systems. User industries include the dairy, meat processing, poultry, brewery and bottling fields.

The brochure presents detailed information on the different Suniso oil grades and provides a group of four-color charts that show the miscibility and viscosity of mixtures of the oils and commonly used halocarbon refrigerants.

For more information, contact: Jacalyn Langenthal or Conrad Carstens, Sonneborn Division, Witco Corporation, 520 Madison Avenue, New York, NY 10022-4236. Telephone: 212-605-3666 or 212-887-8050, respectively.

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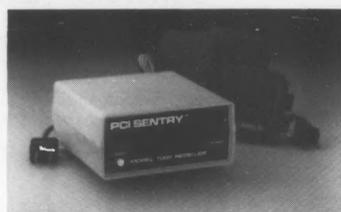
Economical Chlorinated Alkaline Detergent Cleans and Brightens Quickly

• Powerful detergent action makes Oakite® FiSan-Pep an effective general-purpose cleaner for use on equipment, floors, walls, and other surfaces. This highly concentrated, chlorinated alkaline powder penetrates and emulsifies protein and fatty soils, rinsing them quickly away. Its available chlorine brightens stainless steel as it cleans, and helps to control odors.

FiSan-Pep was designed for manual application but is equally well suited to portable spray washers. It is used in numerous cleaning tasks in bakeries, breweries, bottling plants, canneries, dairies, ice cream plants, and meat and poultry plants. When used as directed, it is also safe on rubber and plastic.

Biodegradable FiSan-Pep is authorized by the USDA and CDA, contains ingredients acceptable to the FDA, and is color-coded to prevent confusion with food ingredients. For more information, contact: J.S. Rupp, Oakite Products, Inc., 50 Valley Road, Berkeley Heights, NJ 07922. Telephone: 201-464-6900, ext. 266; 800-526-4473; TWX 710-984-5459.

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Friend Lab Sets Up New Pathogen Scan

• Due to increases of food-borne illness, there have been improvements in monitoring the quality control practices of food manufacturers. Organisms such as *Listeria monocytogenes*, *Yersinia enterocolitica*, *Staphylococcus aureus* CP., *Salmonella* and *Campylobacter*, when present in food, can cause extensive health damage and destroy company public relations. That is why Friend Lab Inc. has set up the "Pathogen Scan", which would aid industrial monitoring, for the presence of these organisms in the workplace environment, on food contact surfaces, or in the finished product.

The Pathogen Scan system was designed to isolate pathogens from environmental swabs as well as from finished products. The single sample is split into 5 subsamples and subsequently analyzed using aseptic technique. The first step for *Salmonella*, *Yersinia*, and *Listeria* is to selectively enrich; eliminate undesirable microbes; and promote the growth of the pathogen in question. Then, using the most sensitive isolation media available, the organism is isolated by its specific characteristics. Confirmatory biochemical tests or serological tests are then performed to positively identify the organism. We have incorporated the newest AOAC approved DNA probe method for *Salmonella*. This allows a 2 day test result if presumptively negative. Research in the DNA probe techniques are also being applied to the identification of the *Listeria* organism.

Staphylococcus aureus is isolated on a solid media and confirmed with coagulase plasma test. *Campylobacter* is enriched under micro-aerophilic conditions and identified utilizing the *Skirrow Campylobacter agar* and confirmed with various biochemical tests.

Friend Lab has the newest FDA procedures as well as trained professional bacteriologists who network with government agencies to provide top quality analyses. For more information, contact: Friend Lab, Inc., 446 Broad Street, Waverly, NY 14892. Telephone: 607-565-2893.

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Nitragin Introduces New Rodenticides

• The Nitragin Company has entered the rodenticide market with a line of products developed for agricultural uses.

The new products include **BOOT HILL[®]** Paraffinized Pellets and **BOOT HILL[®]** Paraffin Block for agricultural consumers and **GROUND FORCE[®]** Zinc Phosphide Pellets and **GROUND FORCE[®]** Paraffinized Pellets for bulk program rodenticide users. All four rodenticide products will be marketed through Nitragin dealers and distributors who also handle the company's legume inoculants, seed treatments and foliar fungicides.

The **BOOT HILL[®]** line contains bromadiolone, a second-generation anticoagulant that kills even warfarin-resistant Norway rats and house mice with just one feeding. It may be used in agricultural buildings and in and around residential and commercial buildings, including USDA-inspected food plants.

Bromadiolone was developed and patented by Lipha Chemicals, Inc., Nitragin's parent company. It is highly palatable to rodents and represents a low hazard to humans and nontarget animals.

BOOT HILL[®] Paraffinized Pellets are packaged in convenient 1.5-ounce place packs, while **BOOT HILL[®]** Paraffin Block is a one-pound block. Both forms contain 0.005 percent active ingredient and are very resistant to moisture and molding.

GROUND FORCE[®] Zinc Phosphide Pellets are effective against a wide range of rodents. Consumption of a single pellet of this acute rodenticide usually is sufficient to kill rats, meadow voles, pine voles, prairie dogs, ground squirrels, pocket gophers and moles.

Because of its broad control, **GROUND FORCE[®]** Zinc Phosphide Pellets are ideal for use on non-bearing fruit trees, ornamentals and sugarcane, as well as in orchards, vineyards, nurseries, rangelands, forests and other non-crop areas.

"Nitragin is the only basic rodenticide producer that is researching and developing its own products. This in-house expertise means we can provide excellent technical service to our rodenticide customers," says Peter C. Anderson, Nitragin marketing services manager.

For more information, contact: Peter C. Anderson, The Nitragin Company, 3101 West Custer, Milwaukee WI 53209. Telephone: 414-462-7600; or Karen L. Potratz, Sargent & Potratz, Inc. Telephone: 414-272-6655.

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New "Wireless" Monitor

• The new PCI SENTRY model 1000 monitors up to 999 events or pieces of equipment, marking a 10-fold increase over earlier model

capacities. The system operates by transmitting coded signals through a dairy's existing power wiring, thereby eliminating the expense and inconvenience associated with dedicated "hard wiring," according to Phil Alward, President of Precision Controls, Inc.

The system consists of one Central Receiver unit and up to 999 Remote Transmitter units that detect the closure of virtually any type of sensor switch such as a pressure sensor, temperature sensor, photoelectric sensor, level sensor, or immersion aquastat. Sensor switches either exist or are installed on the item to be monitored, and are wired directly to Remote Transmitters which are simply plugged into any standard wall outlet. The Central Receiver is also plugged into any standard wall outlet in the building.

Transmission accuracy and reliability are achieved with random phase digital circuitry which is not affected by electrical noise on the power lines, according to the manufacturer which also states that signal transmission through power lines does not interfere with computers or other electrical devices in the building. The system costs considerably less than standard wired systems, and can be reused at other locations.

For a color brochure and information, contact: David Brodie, Director of Marketing, Precision Controls Inc., 14 Doty Road, Haskell, NJ 07420. Telephone: 201-835-5000.

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New Economy Version of ChemPro

• Now there is a version of Fisher ChemPro especially for use with the inexpensive IBM personal computer XT that provides the same authoritative information on 4,100 hazardous chemicals as the AT-based system Fisher introduced in mid-1986.

The new software is designed for use in manufacturing, medical, educational, public safety and research facilities that do not require the ultra high speed of original ChemPro, or its electronic access via modem to the National Library of Medicine, where ChemPro's information resides.

The new version provides search-and-find data on substance identification, toxicity, flammability, biodegradability, chemical and physical properties, environmental impact, biological warning signs, hazardous reactions, in-

structions for manufacturing, use, storage and handling, and more.

An easy-to-use "window"-and-menu system (Fisher claims it is the simplest such system available to date) assists the operator.

Three special keys (FIRE, SPILL, POISON) instantly call up emergency screens for fire-fighting, decontamination, and first aid.

For more information, contact: Harry Schwalb, Fisher Scientific, 711 Forbes Avenue, Pittsburgh, PA 15219. Telephone: 412-562-8468.

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Ryan Introduces New TempMentor

• Ryan Instruments has introduced the TempMentor, a new digital temperature recorder for monitoring cold chain temperatures, with quick retrieval of data through your PC. The TempMentor records temperatures, digitizes the data, and communicates to your computer for charting and analysis.

The Ryan TempMentor makes accurate temperature recording and charting easy and economical. It records up to 6,361 temperatures with 0.1°C resolution. It's easily portable, so you can record temperatures in trucks, warehouses, on-line processing, cold storage facilities and in-transit shipments.

Your recorded temperature data is easy to download into your IBM PC and PC-compatible computers. You interface through an RS232C connector in the TempMentor. The information can be charted on your computer using ASCII or DIF disk file formats for use with utility programs such as Lotus 1,2,3 and Visicalc. You record temperatures using a local sensor or a remote sensor of any length. You can read real-time temperatures through the LCD display on the face of the instrument.

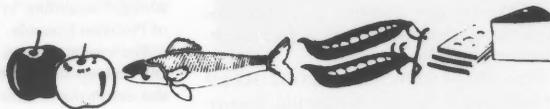
The Ryan TempMentor is already in use by Swift Foods, Cutter Labs and MIT.

For more information, contact: Bill Evans, Ryan Instruments, PO Box 599, Kirkland, WA 98083. Telephone: 206-827-9572.

**Please circle No. 248
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Food Science Facts

For The Sanitarian



Dr. Robert B. Gravani
Cornell University
Ithaca, NY

PARASITIC AND VIRAL FOODBORNE DISEASES

Parasites are organisms that depend on a living host to provide food and shelter (1). There are many parasites that can live in plants and animals used for food and cause foodborne disease in humans (1,2). According to the Centers for Disease Control (CDC), parasites were responsible for approximately 8.0% of the confirmed foodborne disease outbreaks between 1972 and 1978 (3,4). Although parasites are not responsible for a great number of outbreaks, diseases resulting from them can cause discomfort and in some cases, even death.

In order for a parasite to perpetuate itself, there must be a continuous cycle of reinfection of both the food and the people who consume it (2). Even with very strict environmental requirements, host specificity and complicated life cycles, parasites are able to survive and cause disease (2).

There are two major classes of human foodborne parasites - the intestinal worms (collectively referred to as helminths) and protozoan parasites. This review will cover the most widely known parasitic foodborne diseases and the organisms that cause them.

Trichinosis

Probably the best known and most important foodborne parasite is the delicate, threadlike roundworm, *Trichinella spiralis* which causes trichinosis in humans (2,5). This parasite is found around the world in pigs, bears, rats, dogs, cats and other domestic and wild animals. Among the meat producing animals, pigs are the greatest single source of trichinosis in humans (2). The life cycle of *Trichinella spiralis* is quite simple. Pigs become infected by eating scraps of meat from infected animals that harbor the live worm in their muscles. After slaughter, the infected and inadequately cooked pork is consumed by a person. The *Trichinella* larvae, which are protected by a capsular cyst, are released during digestion and mature in the stomach in about 5 days (1,2). The adult worms then invade the lining of the small intestine where they

reproduce. The new offspring enter the bloodstream of the person and are carried to all parts of the body. They then penetrate the striated muscles, form cysts and remain alive and infective for months (2). The life cycle is completed when another animal eats the muscle(s) containing the live *Trichinella spiralis* larvae (1,2).

The symptoms of trichinosis usually appear about 4 to 9 days after eating the infected meat, but this time can vary from 3 to 30 days (2,5). The symptoms are divided into three distinct stages that follow the cycle of the parasite in the body. They are: 1) the intestinal stage, 2) the muscle-invasion stage and 3) the convalescent stage (6).

In the intestinal stage, the first symptoms are nausea, vomiting, diarrhea and abdominal pain. These symptoms are often confused with bacterial foodborne diseases and appear when the trichinae invade the intestines. In the muscle-invasion stage, the symptoms are fever, edema of the eyes, profuse sweating, weakness, muscular pain and prostration. The convalescent stage occurs when the larvae become encapsulated in the muscles. It is characterized by generalized toxemia and myocarditis. Death may occur in severe cases (1,2,5,6,7). The severity of human trichinosis is somewhat dependent upon the number of muscle larvae ingested. The ingestion of 500 or more larvae can produce moderate to severe and even life-threatening illness (8).

Although the prevalence of trichinosis in swine in the U.S. is low (about 1 hog/1000), it is high enough to be a public health concern (8). From 1975 to 1981, there were 1,066 cases of trichinosis reported to the CDC (7). For those cases where an infective meat item was identified, pork products were incriminated in 79.1%, while meat from wild animals was responsible for 13.9% and ground beef caused 7.0% (7,8). Since cattle only eat plant materials and are not naturally infected with trichinosis, the ground beef products may have been adulterated with pork through the intentional or inadvertent mixing of beef and pork (7). The infected meat was purchased from a local supermarket, butcher shop or other commercial outlet in 63% of the cases, hunted or trapped in 15%, purchased directly from the farm in 10% and purchased from a restaurant in 6%. The sources of the remaining 6% were unknown (7,8).

The largest outbreaks of human trichinosis traditionally occur among those ethnic groups with preferences for raw or only partially cooked pork and pork products (7,8). In 1981, there was an outbreak in New York City involving eight Italian-Americans who consumed uncooked or slightly fried home-made, dried pork sausage. One death resulted from this outbreak (9).

Trichinosis can be prevented in several ways.

- 1) Prevent contamination on the farm by thoroughly cooking all garbage fed to swine. This will kill any trichinae present in meat scraps. In addition, the rodent population (rats and mice) should be kept under control.
- 2) Avoid cross contamination of raw pork with other meat products.
- 3) Destroy trichinae by properly handling pork. Assume all pork may be infected and therefore should be either:
 - thoroughly cooked, so that every part of the meat reaches a temperature of 160°F (71.1°C) (10);
 - frozen, using selected time/temperature combinations as shown in Table 1 (8,11); or
 - cured using approved methods based on salt content, drying time and temperature, and type and size of products (11).

TABLE 1. Storage times and temperatures required for the destruction of *Trichinella spiralis* in pork (8,11).

Temperature	Days of storage required	
	Pork 6" or less thick	Pork 6" to 27" thick
5°F (-15°C)	20	30
-10°F (-23°C)	10	20
-20°F (-30°C)	6	12

Other Foodborne Parasites

Other helminth parasites that sometimes cause sporadic problems in the U.S. include beef, pork and fish tapeworms (2). These tapeworms may cause disease in humans when larvae-infested meat is eaten raw or is insufficiently cooked (2). The diseases can occur when human wastes contaminate fresh water streams and lakes, animal pastures or feed. These parasitic diseases occur infrequently due to good sanitation, proper sewage disposal and thorough cooking procedures (2).

Anisakis simplex is a roundworm contaminant of marine fish that can cause human illness if infected fish are eaten raw or are inadequately cooked (2,12). *Anisakis* larvae are inactivated by freezing at -4°F (-20°C) or lower for at least 24-48 hours or by thorough cooking of the fish (5,13).

Protozoan parasites that cause human disease and are disseminated in fecally contaminated food or water include *Entamoeba histolytica*, *Giardia lamblia* and *Dientamoeba fragilis* (2,12). Outbreaks caused by these parasites occur when human excrement is used for fertilizer and contaminates raw vegetables, when water supplies become fecally contaminated or when poor personal

hygiene spreads the parasite through fecal to oral transmission (2,12). Although the diseases caused by these protozoan parasites do not occur frequently in the U.S., sporadic outbreaks have been reported (2).

The selection of foods from approved and inspected sources coupled with thorough cooking, will minimize the risk of parasitic foodborne disease.

Viral Foodborne Disease

The word virus probably brings to mind the cause of an illness that nearly everyone has experienced. Actually, viruses are noncellular parasites that invade the cells of people, animals, plants and bacteria and cause disease (14,15). They are so small that they cannot be seen under an ordinary microscope, but must be viewed under the powerful electron microscope (16).

Viruses are inert and do not carry out any functions outside of a cell; they begin to replicate after invading living cells. New viruses are then liberated and infect other cells. Viruses vary in size, shape, chemical composition, cells they infect and kinds of damage they do to cells. They cause a variety of diseases, including colds, influenza, mononucleosis, infectious hepatitis, rabies, measles, mumps, polio, smallpox and many more (14,15).

Some viruses can be transmitted through foods that become contaminated in their growing environment, during processing, storage, distribution or at the time of their final preparation. These viruses are found in the intestinal tracts of infected humans and are transmitted from person to person through food that has been contaminated with fecal material (14). Although four intestinal viruses including hepatitis A, Norwalk-like agents, polio viruses and echovirus 4 have been transmitted via foods in the U.S., hepatitis A continues to be responsible for most viral foodborne outbreaks (17). This viral foodborne disease will be described below.

Hepatitis A Virus

Hepatitis A virus causes a disease of the liver called infectious hepatitis (18). This virus can be found in water that has been contaminated with raw sewage and in shellfish harvested from fecally contaminated waters. Shellfish, such as clams and oysters, are filter feeders and can accumulate viruses from polluted water. In food processing plants and during storage, contamination of products can take place when polluted water is used or through infestations of fecally contaminated insects and rodents. Infectious hepatitis can also be a problem in foodservice operations, delicatessens, sandwich shops, bakeries, homes and other places where prepared foods are intimately handled by an infected person(s) and then consumed without cooking (14,16).

Foods incriminated in viral foodborne disease outbreaks include water, milk, sliced luncheon meats, salads, sandwiches, fruits, raw clams and oysters, and bakery products (14,18). The hepatitis A virus does not grow or multiply in food, but is carried on food and is transmitted to people who consume the product(s).

The symptoms of infectious hepatitis occur 15-50 days (usually 28-30 days) after eating the contaminated food (18,19). The symptoms include fever, malaise, nausea, vomiting and abdominal discomfort followed by enlargement of the liver. Jaundice, or a yellowing of the skin, occurs in many cases and is due to the way the virus affects the liver. Prolonged disability is common but death is rare (18,19).

An infected person begins to shed the virus 7-10 days before the onset of symptoms and fecal levels of virus decline rapidly after the disease begins (19). Many of those infected do not show symptoms at all (19).

Although viruses were responsible for only about 3% of the confirmed foodborne disease outbreaks from 1972 to 1978 (3), it is an area where education and awareness can reduce the statistic even further.

Infectious hepatitis and other viral infections can easily be prevented by:

- identifying people who are obviously ill and not permitting them to handle food;
- practicing good personal hygiene and instructing people to wash hands often, but especially after using the toilet;
- handling food with utensils;
- properly cooking foods; and
- obtaining shellfish from approved, inspected sources and not from fecally contaminated waters.

Summary

This and previous issues of *Food Science Facts for Sanitarians* have attempted to classify and describe the most common bacterial, chemical, parasitic and viral foodborne diseases in the U.S. and identify their causative agents and ways to prevent them from occurring. The safeness of food depends on all people: those who produce and process it, those who transport and distribute it and last, but not least, those who prepare it. Only through education, awareness and by following the common sense rules of food safety and sanitation will the level of foodborne disease be reduced.

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United States Food Laws, Regulations, and Standards, Volumes I and II. Edited by: Y.H. Hui, John Wiley and Sons. 1986. 1,396 Pages.

Y.H. Hui has produced the second edition of United States Food Laws, Regulations, and Standards. Hui's compendium of government agencies, laws, and standards dealing with food is a unique reference that can be used by a wide range of professionals. It is an excellent guide to the complex maze of federal bureaucracy and legislation dealing with the production, preparation, and serving of food in the U.S.

Volume one describes the organization and functions of the following agencies: Federal Trade Commission, Postal Service, Department of Agriculture, and the U.S. Customs Service. Volume two unravels the mysteries of the Food and Drug Administration, Interstate Commerce Commission, and the Occupational Safety and Health Administration. Also included in volume two is a discussion of the role of trade associations in the promulgation of federal food regulations.

These two volumes represent the only single-source reference to federal statutes dealing with food. Professionals that would find this set useful include: instructors, regulatory officials, public health scientists and researchers, corporate officers in food industries, and attorneys involved in food related litigation. For libraries supporting schools of public health, nutrition, and food science, this publication is a must.

Y.H. Hui can truly claim a unique and useful reference to an important and complex subject. I would highly recommend United States Food Laws, Regulations, and Standards to sanitarians involved in the regulation of the food industry.

Homer C. Emery, Ph.D.

LTC MS US Army
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Development Laboratory
Fort Detrick, MD 21701

Analysis of Food Carbohydrates. Edited by: G. G. Birch, Elsevier Applied Science Publishers, New York.

Analysis of Food Carbohydrates affords the reader a good introduction into the problems and the complexity of analyzing carbohydrates in foods. Editor Birch in his introduction points to factors one must consider to fully analyze the impact of carbohydrates in foods. In addition to measuring amounts of the various carbohydrates, one must also take into account items such as conformation of the various isomers, physiological factors like sweetness and the nutritional response to carbohydrates and how to measure it.

The second chapter serves as an introduction to some of the methods available for the analysis of carbohydrates. Presented in this chapter are the basic principles involved in such physical methods as polarimetry, refractometry and chromatography. Also discussed are chemical methods such as reducing sugar determinations and some biochemical approaches to carbohydrate analysis. This chapter, as with other chapters in the book, is not of how to do it nature, but would serve as a guide to what approaches one may take.

The next five chapters are each devoted to a discussion of a different technique for the analysis of various types of carbohydrates in both foods and model systems. The techniques discussed are monochromatic polarimetry, high performance liquid chromatography, gas liquid chromatography, thin layer chromatography and nuclear magnetic resonance spectroscopy. The common denominator in all of these chapters is that the author of each chapter presents a discussion of the method and the theory behind it. These discussions of the methods would be informative to anyone wanting an introduction to these methods. For example, the chapter on high performance liquid chromatography outlines steps involved in applying this method to a sugar containing system. The author goes from extraction, to clean up and separation and finally detection. Then appropriate options available for each of these steps are discussed. The end of the chapter deals with specific applications of the method. This same basic format is followed in each of these five chapters.

The emphasis of the final two chapters shifts from this methodology approach to addressing more specific topics. The first of these chapters deals with food glycosides. The authors first discuss the concept of glycosides and then document the variety and complexity of these compounds in foods. Most of the chapter is devoted to discussing how to analyze for specific glycosides and the problems associated with these analyses.

The final chapter deals with analyses for carbohydrates in the human alimentary tract. The emphasis of the chapter is placed on fiber analysis. While by no means all inclusive, the author does list a number of available techniques.

Overall, this book would serve as a good starting point for one interested or concerned with the analysis of carbohydrates in foods. One does, however, need to have a sound organic chemistry background when reading this book. The reader will find the chapters to be well referenced and the index, while not extensive, is adequate. One must be cautioned that *Analysis of Food Carbohydrates* by G. G. Birch is an overview and not a catalogue of techniques for carbohydrate analysis.

David Smith

Dept. of Food Science & Nutrition
University of Minnesota
St. Paul, MN

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Texas Affiliate Meeting To Be Held In June

The Texas Association of Milk, Food and Environmental Sanitarians meeting will be held June 8, 9, and 10, 1987 at the Austin South Plaza in Austin, Texas.

To start off this years event there will be a Texas Scramble Golf Tournament Monday, June 8, starting at 1:00 p.m.

The Tuesday afternoon, June 9th session will be a joint program beginning at 1:00 p.m. Speakers and topics will include: The Honorable Ann Cooper, District 47, Texas House of Representatives, San Marcos, Texas - (topic) "Updates and Progress Concerning Recent Public Health Legislation from the Texas Legislature". Mr. Robert A. Elliott, Editor-Publisher, Dairy Field Magazine, Downers Grove, ILL. - (topic) "What to do When the Press Call". Rick Bradstreet, Ph.D., Director of Psychological Services, Austin Police Department - (topic) "Psychological Profiles in Consumer Product Tampering". Damion Gabis, Ph.D., Silliker Laboratories, Chicago Heights, ILL. (topic) "Current Procedures for Testing Pathogenic Bacteria".

Wednesday, June 10, 1987 beginning at 8:30 there will be a break out of Milk and Food Sessions. Milk topics include: "State Health Department Update", Kirmon C. Smith, Director, Division of Milk and Dairy Products, Texas Department of Health, Austin, Texas, "I.M.S. Conference", Mr. Rodney Bridge, Senior Regional Milk Specialist, Food and Drug Administration, Dallas, Texas, "WMT vs. Electronic Somatic Cell Count", Don Rollins, D.V.M., President, Animal Health & Nutrition Services Inc., Springfield, MO, "Controlling Environmental Pathogens (Listeria)", Kathy Donalley, Ph.D., Research Assistant Professor, University of Vermont, Burlington, Vermont.

Food topics include: "State Update", Mr. Neil B. Travis, Chief, Bureau of Consumer Health Protection, Texas Department of Health, "FDA Update", Mr. Gerald E. Vince, District Director, Food and Drug Administration, Dallas District, Dallas, Texas, "Epidemiology/Investigation", Dennis Perotta, Ph.D., Director, Division of Environmental Epidemiology, Texas Department of Health, Austin, Texas, "Medical Risks of Pesticide and other Environmental Chemical Exposures", Dr. Wayne R. Snodgrass, M.D., Ph.D., Medical Director, The University of Texas Medical Branch, Galveston, Texas.

Tuesday evening a Texas style BBQ and dance will take place out of doors at the Manchaca Volunteer Fire Department. Transportation will be provided. For more information on the Conference contact: Janie Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363, or call: (512) 458-7281 between 7:00 a.m. - 4:00 p.m.

Affiliate Calendar

1987

May 18-20, THE PA DAIRY SANITARIANS & LABORATORY DIRECTORS ANNUAL MEETING, to be held at Penn State University, J. O. Keller Convention Center, State College, PA. For more information contact: Sidney Barnard, Food Science Extension Specialist-Dairy, 8 Borland Laboratory, The Penn State University, University Park, PA 16802. 814-863-3915.

June 8-10, TAMFES ANNUAL MEETING, to be held at the Austin South Plaza in Austin, TX. For more information contact: Janie Park, TAMFES, P.O. Box 2363, Cedar Park, TX 78613-2363. 512-458-7281.

August 2-7, CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS BUSINESS MEETING, to be held at the Disneyland Hotel in Anaheim, CA. For more information contact: Richard Harrell at 213-757-9719 or Austin Olinger at 818-968-9621.

September 15-16, 1987 ANNUAL CONVENTION OF THE SOUTH DAKOTA STATE DAIRY ASSOCIATION, to be held at Howard Johnson's, Sioux Falls, SD. For more information contact: Shirley W. Seas, South Dakota State Dairy Association, University Dairy Building, Brookings, SD 57007. 605-688-5420.

September 17-18, MINNESOTA SANITARIANS ASSOCIATION ANNUAL MEETING, to be held at the Earle Brown Center, Univ. of Minnesota, St. Paul Campus. For more information contact: Roy E. Ginn, Dairy Quality Control Inst., 2353 N. Rice St., Room 110, St. Paul, MN 55113. 612-484-7269.

September 21-23, NEW YORK STATE ASSOCIATION OF MILK & FOOD SANITARIANS ANNUAL MEETING, to be held at the Sheraton Inn Syracuse, (Liverpool, NY). For more information contact: Paul J. Dersam. 716-937-3432.

September 30-October 2, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING, to be held at the Holidome in Lawrence, Kansas. For more information contact: John M. Davis. 316-268-8351.

NEW IAMFES COMMITTEES

Four new IAMFES Committees have been formed to enhance and enlarge the already existing IAMFES Committees.

The new committees and chairpersons are
FOOD SERVICE COMMITTEE

Dr. Bennett Armstrong
703-47-3465

EDUCATION AND TRAINING COMMITTEE
Joe Simpson and Ulfert Esen 901-766-3978

WATER QUALITY AND WASTE DISPOSAL COMMITTEE

Dr. Robert R. Zall
607-256-3112

FDA INTERPRETATIONS COMMITTEE

Mr. Pete Cook
301-443-4368

For more information on these committees, call the IAMFES Office or the chairpersons of the individual committees.

Health Risks of Raw Milk

Although I enjoyed your April 1986 edition with its cover story, "A Closer Look at Dairy Safety," I am somewhat mystified at your exclusion of the continuing outbreak of deaths and illnesses due to raw and raw certified milk in California. FDA held hearings on this matter and concluded that there are significant health risks to consuming raw and raw certified milk.

This is a problem that has affected hundreds of people over the last few years, especially regarding infections with *Salmonella dublin*. This organism is not a benign one. Approximately 80 percent of its victims end up in the hospital and approximately one-quarter of them die. Of the total number of cases, approximately 45 percent are consumers of "certified" raw milk.

John C. Bolton, M.D.

Mill Valley/San Francisco, Calif.

Editor comment: The April article dealt with problems encountered with dairy products that were supposed to have been pasteurized and, therefore, did not discuss raw milk.

The Health Hazard Evaluation Board of FDA's Center for Food Safety and Applied Nutrition concluded last May that any food that receives no further heat treatment and is contaminated with *Salmonella dublin* should be regarded as a "life-threatening hazard." There are some 1,800 species of *Salmonella*, and in the past the board had classified their hazard potential as ranging from "limited-acute" to "severe-acute," depending on the age, physical condition, and susceptibility of an individual who consumed a *Salmonella*-contaminated product. But *Salmonella dublin* differs from other types of *Salmonella* because of its more traumatic effects on those it infects. As the board noted, "*Salmonella dublin* attacks persons over 40 with underlying disorders, resulting in hospitalization of 80 percent of affected individuals and 25 percent mortality." Other species of *Salmonella* generally result in hospitalization "in 5 percent of affected individuals and mortality in less than 1/2 percent."

The classification of *Salmonella dublin* as a life-threatening hazard affects regulatory actions taken by FDA, such as the way in which recalls are conducted when *Salmonella dublin* is found in food. FDA's position is that people who drink raw milk - certified or not - are exposing themselves to a health risk, including the risk of exposure to *Salmonella dublin*.

FDA Consumer Sept. 1986

SALMONELLA NIMA IN BRITISH COLUMBIA

Beginning 16 December 1985 and continuing sporadically through to 8 September 1986, a total of 13 isola-

tions of *Salmonella nima* have been identified by the Enteric Bacteriology Section, British Columbia Division of Laboratories, Vancouver, and confirmed by the National Enteric Reference Centre, LCDC, Ottawa. The peak occurrence (11 cases) occurred between mid-December and mid-January. All of the cases were from scattered geographical areas of the province, i.e., Vancouver Island, Lower Mainland and the Kootenays, with no apparent contact between any of the families involved.

Because this serotype was new to British Columbia, and most of the rest of Canada, with only 1 isolation made from a snake in Ontario in 1970, an intensive investigation was undertaken to discover its source. Moreover, there have only been 2 isolations of this serotype made in the United States: 1 in the 1975-1981 period and 1 in 1984. Therefore, it was felt that it should be possible to trace such a rare serotype to its origin. The accumulated information revealed one common feature about the index case in each family: this was a child between 2 and 4 years of age who was often the only family member positive for the organism.

A telephone questionnaire of the families involved was undertaken to try and determine a common source for this serotype. Initially, a particular brand of cheddar cheese was suspected on the basis of food history data of the children who were positive for *Salmonella nima*. However, once case controls were surveyed, no differences were observed between the 2 groups. Attempts at isolating this serotype from batches of cheese, raw milk starter culture, colour and rennet involved in its manufacture, and environmental swabs of the cheese factory were all unsuccessful.

In the meantime, Alberta, Saskatchewan, Manitoba and Ontario also reported *Salmonella nima* (a total of 16 isolations), and 3 were identified in the United Kingdom.

Following the latest isolation made in British Columbia on 8 September, the family of the 4-year old female involved was contacted regarding a possible source of the organism. Chocolate coins were mentioned and 2 of these were still available for testing. The coins were tested as a composite sample because of their small size by the Food Poisoning Section, British Columbia Division of Laboratories. The *Salmonella* isolated was serotyped as *Samonella nima* by the Enteric Bacteriology Section. Upon further investigation, it was learned that these chocolate coins had been imported from Belgium. Subsequently, unopened bags of the coins, 9-11 coins per bag, as well as large chocolate medallions were obtained from a local store, part of the single, 1985 shipment from the Vancouver distributor. Testing was performed by the Food Poisoning Section, and also by the federal Health Protection Branch Laboratory in Vancouver. *Salmonella nima* was isolated from coins from one of these bags. Further testing of the 1986 shipment of chocolate coins and medallions stored in a local warehouse is underway.

Retrospectively, imported chocolate coins as the vehicle of transmission of this rare serotype appear to fit the following observed facts: 1) the majority of the cases oc-

curred in the 2 weeks before and after Christmas, 2) the index case in each family was often a child under 4 years of age, and 3) the cases were from widespread geographical locations with no apparent contact between them.

Editorial Comment: The above 2 chocolate products were distributed to various food and specialty stores in western Canada and as far east as Thunder Bay. On 3 October 1986, Health and Welfare Canada announced that the Vancouver distributor is voluntarily recalling these products. Any new cases of *Salmonella nima* should be questioned about consumption of these or other chocolates. Information on new cases should be forwarded through the Provincial/Territorial Epidemiologists. Can. Dis. Weekly Report 10-11-86

Group-A, -B Hemolytic Streptococcus Skin Infection in a Meat-Packing Plant - Oregon

In the period October 17, 1985 - January 9, 1986, 44 episodes of pyoderma occurred among 32 workers in an Oregon meat-packing plant. Most of the 44 reports involved impetigo-like lesions on the hand, wrist, and forearm, but six episodes of cellulitis and two of lymphangitis were also reported. The same epidemic strain of Group-A, -B hemolytic *Streptococcus* (GAS) isolated from skin lesions was also isolated from meat in the plant.

In November 1985, emergency-room personnel in Pendleton, Oregon, reported to the Umatilla County Health Department a cluster of skin infections affecting three employees in a meat-packing plant, all from the same small, family-owned facility. After the Oregon State Health Division was asked to investigate, all 69 persons employed in the plant were interviewed for a history of and examined for the presence of pustular, draining, or inflamed skin lesions.

Seventy lesions were cultured, representing the initial 44 episodes of infection and 14 later sporadic cases. GAS, only was isolated from 26%; both GAS and *Staphylococcus aureus* from 54%; and *Staphylococcus aureus*, only, from 17%. Whereas multiple phase types of *Staphylococcus aureus* were isolated from patients and meat, a single strain of GAS, MNT T14 SOR, was identified in 24 group A streptococcal isolates serotyped.

Between October 17, 1985, and January 9, 1986, all but four of the 32 ill meat packers worked at least part-time on the kill floor or on the boning line or both. The attack rate for boners/killers was 74%, compared with 13% for workers who were never involved in killing or boning (relative risk (CL) < 2.9-11.3).

The epidemic investigation suggested that meat was a vehicle of transmission of GAS between workers. Cultures of two pork loins revealed the same epidemic strain

(MNT T14 SOR) as did isolates from patients. An increased risk for acquiring infection could not be shown for other exposures. Workers who became infected did not share knives or gloves more often than did uninfected workers. Meat packers usually own and maintain their own knives.

Recommendation to the meat-packing plant included an increased emphasis on worker safety; an increased emphasis on worker hygiene, e.g., covering skin lacerations; removal of workers with untreated skin infections from the meat-processing line; and improved surveillance of skin injuries and infections, including modifying sick-leave benefits to encourage reporting.

Editorial Note: This is the second reported outbreak of GAS skin infections among U.S. meat packers. During a similar outbreak in a Vermont meat-packing plant involving 18 of 59 employees, a worker with a chronic impetiginous lesion may have introduced GAS into the plant, and meat was postulated as one mode of transmission. Epidemic and sporadic cases of GAS skin infections among meat workers have been recognized in Great Britain since the mid-1970s. In the Oregon outbreak, it is also likely that meat was the vehicle of transmission after initial contamination by an infected human. Knife use is probably the significant risk shared by killers and boners vs. other meat workers. Bone has also been recognized as a source of skin injury among meat workers. GAS might spread from a meat-packing plant outside to non-plant workers, although there is no evidence of such transmission in the Oregon outbreak. In Great Britain, retail butchers and restaurant workers have been infected with epidemic GAS strains during outbreaks in meat-packing plants, presumably by handling contaminated meat. Improved surveillance of skin infections in the meat-packing industry may document more accurately the occurrence of such outbreaks in the United States.

MMWR 10-10-86

EPIDEMIC OF HEPATITIS A - QUEBEC

Between 23 January and 4 February 1986, the Community Health Department of the Beauce Regional Hospital Centre received notification of 11 cases of hepatitis. An epidemiological investigation was immediately initiated after the first 5 cases (all hepatitis A) were reported on 23 and 24 January. Investigation revealed that 8 of the total 11 cases had consumed food prepared by a local caterer between 25 November and 15 December 1985; 6 of these had attended a Christmas reception on 14 December given by a local manufacturer of restaurant equipment for the employees. Forty people had attended this party, so the attack rate was 15%. As a result of these findings, subsequent investigations focused on the possibility of a common source of food contamination by the caterer involved.

The food served at the reception consisted mainly of sandwiches and cold meats; no shellfish or other seafood had been served. Because there was such a long time period between the date when the food was consumed and the appearance of symptoms, it was impossible to identify any specific food item as a possible source of infection. All cases had suffered icterus, fatigue and general malaise; 3 had to be hospitalized. All diagnoses were confirmed by the presence of serum hepatitis A specific IGM.

Inspection of the caterer's premises revealed good sanitary practices and adherence to proper food handling and preparation techniques. Wholesale establishments supplying food products to the caterer also met the required standards. None of the caterer's 11 foodhandlers had experienced any symptoms compatible with hepatitis A in recent months. All of their serum tests were negative for hepatitis A specific IGM. However, this testing was done in mid-February and the results could have been negative despite the presence of a case of hepatitis A in early December.

Considering the incubation period for hepatitis A, 8 of the 9 cases probably had the same common source. The ninth case was onset of symptoms during the week of 2 February was most likely a secondary case. This individual had attended the reception of 14 December and was also a work contact of some of the cases that had onset of illness during the week of 5 to 12 January. The tenth case of the total 11 was another hepatitis A contracted during a stay in Algeria, and the remaining 1 was hepatitis B.

There was a considerable time lag between the appearance of symptoms in the first case and notification, partly because the attending physicians were less familiar with hepatitis A and were considering hepatitis B or other causes for icterus. Once the initial diagnosis was made, subsequent cases were diagnosed very quickly.

Twenty family contacts of cases (11 adults, including 1 pregnant woman, and 9 children) were given immune globulin in a prophylactic dose of 0.0mg/kg. One of the cases worked in an extended care facility for the elderly. The 20 people with whom she had direct contact during the 2 weeks prior to her icterus were also given immune globulin.

The last case was reported on 7 February. It is possible, however, that there were some asymptomatic cases related to consumption of food served by the suspect caterer or secondary to direct contact with declared cases.

Although there is not conclusive evidence, it is likely that this epidemic was foodborne. It also appears that the prophylactic measures taken were effective in preventing secondary cases.

Can. Dis. Weekly Report 9-6-86.

OUTBREAK OF ENTERIC INFECTION FOLLOWING A FIELD TRIP - ONTARIO

On June 13, 1986, a local primary school principal re-

ported that 36 of 50 grade 1 students from 2 classes at his school had become ill with cramps, diarrhea and fever following a visit to a local farm on 10 June. All of the children had taken their own lunches but most of them had drunk water from a hose at the farm. Two of the children had been ill with "stomach aches" the day before the trip but had decided to go anyway. One of these 2 children became quite ill following the visit to the farm.

On arriving at the farm, the children went for a wagon ride to see the cows in the pasture and then were allowed to play with the baby chicks in the hen house. Following that, most of them went to a pond where they collected tadpoles and frogs. During the course of the day, most of the children drank water from a garden hose connected to a drilled well and some rinsed their hands from the same source of water prior to eating their lunch. Thirty-five of 41 children who had drunk water at the farm became ill.

On 13 June, water samples were collected from the hose and the faucet connected to the well. On 16 June, the laboratory reported that the water samples were grossly contaminated. It was also learned that 4 of the children had been hospitalized during the previous week-end with an enteric infection. *Campylobacter jejuni* had been isolated from their stools.

On 18 June, excavation of the well revealed that the sanitary seal was loose and that the access hole to the well was full of water. It was obvious that ground water was seeping in the well. Water samples for *Campylobacter*, bacterial and nitrogen-cycle analysis were collected and sent to the appropriate laboratories. The owner of the farm was advised to disinfect the well and repair the sanitary seal. The well is located near the hen house which is over 131 meters from the sewage disposal system of the house. On the same day, parents of all the children who had gone on the field trip were interviewed and were requested to submit stool samples from their children as soon as possible. Discussion with the parents indicated that none of the children had drunk water from the pond. However, those who had used the hose had placed their mouth over the end when drinking.

On 19 June, health inspectors returned to the farm and collected water samples from both ends of the pond and manure samples from the horse pen and the area of the hen house occupied by the baby chicks. A final series of water samples were taken from the well on 3 July.

All water samples taken from different outlets from the well showed a total coliform count > 160 and a fecal coliform count > 60. However, all water samples both from the well and the pond, and manure samples were negative for *Campylobacter*. This is compatible with previous reports that this organism is rarely isolated from suspected sources. Chemical analysis of the water from the well revealed an ammonia level of 0.21 ppm, nitrite 0.014, an nitrate 0.06. The probable cause of the illness was the well water.

C. jejuni was isolated from the stools of 24 of the 37

children who submitted specimens. Only 2 of the positive ones were not ill and only 4 who were ill had negative stools.

Because those involved were children between the ages 6 and 7, the information obtained may not be completely accurate. Many tended to answer "no" to all questions until they felt relaxed and convinced that they had not done something wrong.

Recommendations: Other visits by school children to this farm had been planned for the week of 18 June. It was recommended that these visits be cancelled until the investigation had been completed.

It was stressed to the owner of the farm that in spite of the fact that the family lives in the nearby city and uses the farm house only as an occasional or summer residence, the well water should be checked on a semi-annual basis.

From a public health standpoint, the health unit plans to circulate this report to the area school boards and encourage the teachers to inform the unit in advance of any such field trips so that the inspectors can make a pre-visit inspection and make any necessary recommendations.

Can. Dis. Weekly Report 9-20-86

SALMONELLA JAVA ASSOCIATED WITH THE CONSUMPTION OF CRACKED EGGS - QUEBEC

On 15 October 1985, the Community Health Department of the Beauce Regional Hospital Centre (BRHC) received a report of *Salmonella* infection in a 6-month-old female. An investigation was initiated immediately.

The infant had initially suffered diarrhea on 30 September 1985. During subsequent days, the stool became sanguinous and the patient developed a slight fever (38°C). At this point she was hospitalized for 5 days and the diagnosis of salmonellosis was made. Investigation revealed that during the day the infant was in the care of an uncle who kept chickens. Other children were also present in the uncle's house including a 1, a 5 and a 12-year-old. There were a total of 11 persons who could have been considered close contacts of the infant: 6 adults and 5 children. Stool specimens from 4 of the 5 children and 2 of the 6 adults, analyzed in the BRHC laboratory, were positive for *Salmonella*, identified as *paratyphi B*. However, the infant was the only one that was symptomatic, and with symptoms that were only slightly compatible with a *paratyphi B* infection. Consequently, samples from 5 of the total 7 that were positive were also sent to the Quebec City Public Health Laboratory and the Laboratory Centre for Disease Control in Ottawa for confirmation. LCDC reported *S. java* in all the samples submitted.

A food questionnaire revealed that cracked eggs were regularly consumed on the uncle's farm; these eggs were

kept for home consumption, the uncracked ones were sold. Moreover, the young chicks were kept in the basement of the house where the children regularly played with them. Following recommendations made during the investigation, cracked eggs were no longer to be used in the household and chicks were to be kept outside. This episode also emphasizes the importance of reference laboratories where *Salmonellae* can be serotyped precisely. *S. paratyphi B* and *S. java* are quite similar antigenetically, but differ considerably in some biochemical characteristics and potential pathogenicity.

Unfortunately, samples of chicken fluff, droppings and eggs were only analyzed on 18 November; they were all found negative for *Salmonella*. It is probable that this incident was caused by the bad dietary practice discovered during the investigation, although the organism was no doubt acquired through person-to-person transmission in some of the asymptomatic contacts.

By the end of January 1986, all of the positive stools were negative and there has been no recurrence since that time.

Can. Dis. Weekly Report 9-20-86.

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Preventing Bacterial Growth

by Robert E. Harrington (Assistant Director of Technical Services and Safety for the National Restaurant Association)

Reprinted with permission from the National Restaurant Association magazine *Restaurants USA* (formerly *NRA News*). This is part II of a four-part series.

You should begin your SAFE survey by reviewing your menu and recipes so you can concentrate on foods that have a greater risk of bacterial contamination. Although a few species can survive in extreme conditions, most bacteria require specific amounts of food, moisture, slightly acid pH, oxygen and warmth. You must consider these factors when you set up your critical control points.

Food: Pathogenic bacteria can grow in just about any food humans can digest, but they are particularly fond of protein foods, such as meats, poultry, seafoods, eggs and dairy products as well as high protein vegetables, such as beans, and cooked cereal grains, such as rice.

Many high-protein foods are naturally contaminated in their raw state so establish separate areas to store and handle raw and cooked products. If cooked and raw products are handled on the same surface, cross contamination can transfer not just one cell but several hundred thousand bacteria.

The bacteria, however, need time to "rest" and adapt to their new environment. So for a good period of time there may be no growth (less than one hour or several days, depending on the bacteria, the food and the temperature). This no-growth period is called "lag phase," and it is at this point that you can best control bacterial growth *before it starts!* When bacteria are allowed to grow, they do so geometrically, with each cell division doubling the population

- sometimes as rapidly as every 20 minutes.

Because people all carry their own personal load of bacteria as well, your SAFE program should emphasize personal hygiene, especially frequent and thorough handwashing whenever employees handle different food products.

Moisture: In the presence of water, most foods will support bacterial growth. Bacteria need free water to dissolve and digest food. For example, dried milk powder will not support bacterial growth until it is reconstituted with water. Salt or sugar can inhibit bacterial growth by "trapping" the available water, as in salt-cured meats or sugared fruit preserves. However, do not attempt "do it yourself" preservation because water activity can vary greatly with other factors.

Acidity: Foods with a pH above 4.6 will support bacteria growth and require constant temperature control. PH is a measure of acidity and alkalinity. Seven is neutral, above seven is alkaline, and below seven is acidic. Bacterial growth is stopped or inhibited in strongly acidic foods, such as citrus fruits or vinegar. Do not count on making foods safe just by adding acid because the pH balance is a delicate one.

Oxygen: Most disease bacteria can grow either with or without free oxygen. Some, such as the bacteria which cause botulism, grow only in the absence of oxygen, as in a vacuum-sealed jar or in the center of a deep pot of food. Therefore, to be SAFE, only use commercially canned food products and cool food rapidly in shallow pans. If you suspect that a canned product is spoiled, notify the distributor and your local health department or discard the product without opening it! Botulism toxin is a very dangerous poison, and even a small taste can be fatal.

Unless you have a professional

food technologist and a well-equipped laboratory at your disposal, there is not much that can be done in a restaurant kitchen to alter nutrients, pH, water and oxygen. But, you do have control over the final limitation on bacterial growth, and that is the heart of your SAFE program.

Best way to prevent bacterial growth...

Warmth: The best way to prevent bacterial growth in potentially hazardous foods is to limit the time that foods spend at growth temperatures. As with other SAFE processes, you are probably already following these common-sense procedures: Refrigerating food below 45°F to show bacterial growth, holding hot food above 140°F to virtually stop growth and heating food above 165°F to kill most pathogens.

When heating or cooling foods, you must move them through the danger zone between 45° and 140°F as rapidly as possible. Use shallow pans to promote cooling to 45°F within four hours and, heat foods rapidly (steam tables and warmers do not heat rapidly). When re-heating foods, be sure to take them to 165°F in the center.

Multiple cycles of heating, cooling and reheating will result in bacterial growth, so limit exposures to the danger zone. Also, avoid preparing foods long before they are to be served as this adds to holding problems.

Some foods may change from potentially hazardous to stable and back again. For example, although the milk and eggs in a cake batter are potentially hazardous, mixing with other ingredients and baking renders them stable. But, if a custard filling is added, the finished cake is again potentially hazardous and must be refrigerated to maintain safety and quality.

"Potentially hazardous defined"

The FDA Model Foodservice Sanitation Ordinance (and most state and local codes) defines "potentially hazardous foods" as "...any food that consists in whole or in part of milk or milk products, eggs, meats, poultry, fish, shellfish, edible crustacea (shrimp, lobster, crab, etc.) or other ingredients, including synthetic ingredients, in a form capable of supporting rapid and progressive growth of infectious or toxigenic microorganisms. The term does not include clean, whole, uncracked, odor-free shell eggs, or foods which have a pH level of 4.6 or below or a water activity value of .85 or less." (Eggs are potentially hazardous once the shell has been broken.) These foods must be stored below 45°F or above 140°F, and should be cooked to an internal temperature that will kill any pathogens.

Investigation of some recent outbreaks of food poisoning has also shown that some seemingly innocuous foods can support microbial growth: sprouts, cooked rice, cooked potatoes and lightly sauteed onions, among others. If a food has a natural "skin," such as a vegetable, that skin protects the food against entry of bacteria. Once the skin is broken or damaged by preparation and cooking, the food is potentially hazardous and must be stored below 45°F or above 140°F.

Also, commercially canned products, such as sauces, stews, gravies, etc., become potentially hazardous once their containers have been opened. With virtually all foods, refrigeration slows bacterial growth and oxidation, thus increasing shelf life and safety. Very few items can be damaged by refrigeration.

When you plan your SAFE survey, you must consider the entire handling process, step-by-step. Your goal is to determine those areas where foods might be contaminated or where bacteria might survive and grow, and to establish preventative practices at these points. For the first one or two surveys, utilize flowcharts, noting times and temperatures to help you keep things straight. Later you can simply monitor conditions against your own production schedule and standards.

To recap...

To reduce the risk of foodborne disease, pay special attention to:

1. *potentially hazardous foods* - moist, high protein foods that are neutral or mildly acidic.
2. *multiple handling steps*. The more preparation steps a food goes

through, the greater its exposure to contamination. Be particularly alert for cross-contamination from one class of foods to another, such as from raw to cooked.

3. *high-volume products*. The larger the amount you prepare and serve, the larger the number of people at risk.

4. *temperature changes*. Whenever a food is removed from the refrigerator, heated, cooled, or reheated, it passes into the bacterial incubation "danger zone." Minimize the time foods spend in this zone (45°F to 140°F), store foods out of this zone and heat potentially hazardous foods to 165°F to kill harmful bacteria.

Next month: Major foodborne diseases and their characteristics.

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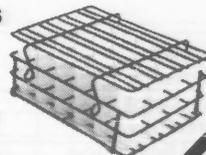
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Heat Resistance of *Listeria monocytogenes* in Artificially-Inoculated and Naturally-Contaminated Raw Milk, Jeffrey M. Farber*, Gregory W. Sanders, Douglas B. Emmons⁺ and Robin C. McKellar⁺, Bureau of Microbial Hazards, Health Protection Branch, Tunney's Pasture, Ottawa, Ontario K1A 0L2 and ⁺Food Research Center, Central Experimental Farm, Agriculture Canada, Ottawa, Ontario K1A 0C6.

The outbreak of listeriosis in Massachusetts in 1983, in which the incriminating vehicle was pasteurized whole or 2% milk, has prompted investigators to question whether or not *Listeria monocytogenes* can actually survive pasteurization. The objective of this study was to examine the heat resistance of *Listeria* in artificially-inoculated and naturally-contaminated raw milk.

In initial studies, *Listeria monocytogenes* (mixture of 10 strains; 10⁴ organisms/ml) was inoculated into 1200 litres of raw, whole milk. Temperatures ranging from 72°C to 60°C (16s) were examined using a Junior Paraflow, APV-Crepaco regenerative plate unit. It was demonstrated that the organism could survive temperatures up to 67.5°C, but could not survive pasteurization. In the next phase of our study, milk naturally-contaminated with *Listeria monocytogenes* was used. Positive bulk-tank samples in the Ottawa area, led to a farm containing a cow secreting *Listeria monocytogenes* in its milk. The cow's milk was pooled for 2-3 days and then run through the pasteurizer. Preliminary results indicate that *Listeria monocytogenes* will not survive proper pasteurization treatment in naturally-contaminated raw milk.

The Cost of Regulatory Court Action and Legal Suits to the Food Industry, Ewen C. D. Todd, Bureau of Microbial Hazards, Health Protection Branch, Tunney's Pasture, Ottawa, Ontario, Canada K1A 0L2.

Problem in food processing or foodservice that lead to spoilage, illness or contamination by pathogens or extraneous matter can be costly in terms of legal settlements to the companies involved. Although industry and public health officials have been aware of these risks, the extent and types of costs involved are not usually publicized. This paper gives examples of seizures, fines and settlements. The type of amounts given may depend on severity and length of illness and also whether or not the settlement is determined by Workers' Compensation Board, court or out-of-court action. In court cases these settlements represent an average of about two thirds of the total costs, the other amounts being for legal and court expenses. Because some of these awards are becoming prohibitively high for industries, insurance companies and the taxpayer, there are government moves to limit these to \$100,000 and prevent excessive legal fees. The opposition to this will probably be strong enough to prevent any rapid change to the settlement system, and legal action will remain an important component in the economy of the food industry.

The Occurrence and Significance of Molds and Mold Growth in Foods, Lloyd B. Bullerman, University of Nebraska-Lincoln, Department of Food Science & Technology, 134

Filley Hall, East Campus, Lincoln, NE 68583-0919.

Molds and mold growth on foods are containing problems in the area of food microbiology and food safety, which demand constant attention and efforts to control. Mold growth in food affects the safety and quality of the food, but does not always mean that the food must automatically be discarded. Guidelines have been developed which can be used to do risk analyses and determine if a food exhibiting mold growth must be discarded, or if the mold can safely be removed and the remainder of the food salvaged. A number of environmental factors affect mold growth. Control of these factors can lead to prevention and control of mold growth in foods. This paper discusses the factors that must be controlled to prevent mold growth in foods, and the basis for guidelines used to determine when a food can be safely trimmed of mold growth and when it should be discarded.

Automatic Grease/Oils/Fats Removal Units for Food-Processing Facility Effluent Treatment Applications, W. C. Batten, Thermaco, Inc., P.O. Box 2548, 113 Trade Street, Asheboro, North Carolina 27204-2548.

Automatic grease/oils removal units do the job that no one wants to manually do. As unemployment rates decline, federal funds for sewer projects/repairs vanish, landfill dumping restrictions increase, and commercial areas continue to develop, the use of automatic grease/oils removal units will increase. Sewer utility surcharges and use restrictions, coupled with the already high costs of servicing large in-ground grease traps will necessitate greater usage of automatic grease/oils removal units, particularly in densely populated business districts and on sites where septic tanks or small wastewater treatment plants are utilized. Environmentally, the removed products are suitable for sale to existing recycling companies (rendering companies), leading to reduced amounts of grease/fats/oils being dumped in landfills.

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Orange-eye: a sex-linked recessive mutation in *Ephesia cautella* (Walker) (Lepidoptera: Pyralidae), Z S AL-HAKKAK *et al.*
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Abstracts of papers in the May Journal of Food Protection

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Fate of *Listeria monocytogenes* During the Manufacture of Ripening of Camembert Cheese, Elliot T. Ryser and Elmer H. Marth, Department of Food Science and The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 50:372-378

The ability of *Listeria monocytogenes* to survive the Camembert cheese-making process and grow during ripening of the cheese was examined. Pasteurized whole milk was inoculated to contain about 500 *L. monocytogenes* [strain Scott A, V7, California, (CA) or Ohio (OH)] CFU/ml and made into Camembert cheese according to standard procedures. All wheels of cheese were ripened at 6°C following 10 d of storage at 15-16°C to allow proper growth of *Penicillium camemberti*. Duplicate wedge (pie-shaped), surface and interior cheese samples were analyzed for numbers of *L. monocytogenes* by surface-plating appropriate dilutions made in Tryptose Broth (TB) on McBride Listeria Agar (MLA). Initial TB dilutions were stored at 3°C and surface-plated on MLA after 2, 4, 6 or 8 weeks if the organism was not quantitated in the original sample. Selected *Listeria* colonies from duplicate samples were confirmed biochemically. Results showed that numbers of *Listeria* in cheese increased 5- to 10-fold 24 h after its manufacture. *Listeria* counts for strains Scott A, CA and OH decreased to <10 to 100 CFU/g in all cheese samples taken during the first 18 d of ripening. In contrast, numbers of strain V7 remained unchanged during this period. All *L. monocytogenes* strains initiated growth in cheese after 18 d of ripening. Maximum *Listeria* counts of ca. 1×10^6 to 5×10^7 CFU/g were attained after 65 d of ripening. Generally, a 10- to 100-fold increase in numbers of *Listeria* occurred in wedge or surface as compared to interior cheese samples taken during the latter half of ripening. During this period, *Listeria* growth paralleled the increase in pH of the cheese during ripening.

Comparison of *Salmonella* Bio-EnzaBead™ Immunoassay Method and Conventional Culture Procedure for Detection of *Salmonella* in Foods, Karl F. Eckner, Russell S. Flowers, Barbara J. Robison, Jerome A. Mattingly, Damien A. Gabis and John H. Silliker, Silliker Laboratories, Chicago Heights, Illinois; Organon Teknika Corporation, 800 Capitola Drive, Durham, North Carolina 27713; Bionetic Research, Inc., Rockville, Maryland; and Silliker Laboratories, Carson, California

J. Food Prot. 50:379-385

A rapid enzyme immunoassay screening procedure (EIA) utilizing two monoclonal antibodies specific for salmonellae was compared to the standard culture method (BAM/AOAC) on 1,289 samples representing 26 food types. The samples consisted of 760 artificially inoculated, 150 naturally contaminated, and 379 uninoculated food samples. There were 594 samples positive by the EIA (optical densities greater than 0.2 at 405 nm), of which 568 were confirmed culturally from M-broth. A total of 570 samples was positive by the BAM/AOAC procedure. Of the foods tested, there was no significant difference between the two methods, with the exception of cake mix and raw shrimp. The EIA was significantly better for detecting *Salmonella* in cake mix, while the culture procedure was more productive for shrimp. The method employed a 24 ± 2-h pre-enrichment, an 18-h selective enrichment, and a 6-h M-broth post-enrichment. The EIA assay required an additional 2 h for a total of 48 h, compared to a minimum of 4 d by BAM/AOAC.

Comparison of *Salmonella* Bio-EnzaBead™ Immunoassay Method and Conventional Culture Procedure for Detection of *Salmonella* in Crustaceans, Russell S. Flowers, Kuang-Hua Chen, Barbara J. Robison, Jerome A. Mattingly, Damien A. Gabis and John H. Silliker, Silliker Laboratories, Chicago Heights, Illinois; Organon Teknika Corporation, 800 Capitola Drive, Durham, North Carolina 27713; Bionetics Research, Inc., Rockville, Maryland; and Silliker Laboratories, Carson, California

J. Food Prot. 50:386-389

The sensitivity of the Bio-EnzaBead™ enzyme immunoassay (EIA) for recovery of *Salmonella* in crustaceans was compared to a standard cultural method. Presumptive positive samples by the EIA procedure were confirmed culturally by plating their respective selective enrichments and post-enrichment M-broth cultures on bismuth sulfite, xylose desoxycholate, and Hektoen enteric agars. Use of tetrathionate, selenite cystine, and M-broth cultures was necessary for reliable confirmation of positive EIA reactions. Of 287 samples tested, 129 were positive by culture, while 130 were EIA-positive and were confirmed from the M-broth and/or the selective enrichments. When M-broth alone was used for confirmation of positive EIA readings, only 112 samples were shown to be positive, while 127 were confirmed from tetrathionate and selenite cystine. The importance of using all three media to confirm positive EIA readings was clearly demonstrated. There was a large number (76) of positive EIA assays which could not be confirmed culturally. These unconfirmed positives were probably due to a cross-reacting organism present in the lot of material tested.

Quantitative Evaluation of *Clostridium botulinum* Nonproteolytic Types B, E and F Growth Risk in Fresh Salmon tissue Homogenates Stored under Modified Atmospheres, Genaro Garcia and Constantin Genigeorgis, Department of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California, Davis, California 95616

J. Food Prot. 50:390-397

The potential risk of *C. botulinum* growth in fresh fish stored under modified atmospheres (MA) remains unclear, as few qualitative studies have identified certain conditions leading to toxigenesis. This is the second paper of a series attempting to quantify the effect of selected parameters on the probability (P) of toxigenesis by one spore in fish. The factorially designed experiments included fresh salmon tissue homogenate with 3 levels of initial microbial flora (IMF) inoculated with a pool of spores of 13 nonproteolytic type B, E and F strains at 7 levels (10^2 - 10^4 /3-g sample) and incubated at 1, 4, 8, 12, 16, and 30°C under 3 MA (vacuum, 100% CO₂, 70% CO₂ + 30% air) for up to 60 d. The earliest we observed toxicity at 30, 16, 12, 8 and 4°C irrespective of MA were 1, 2, 6, 9-12 and 15->60 days and required 10^0 , 10^3 - 10^4 , 10^2 - 10^3 , 10^1 - 10^4 and 10^4 spores/sample, respectively. The probability of toxigenesis was affected significantly ($P < 0.05$) by IMF, MA, storage temperature (T), storage time (ST) and the interactions T×ST, MA×T, MA×ST, and IMF×T. Only type B toxin was detected in toxic samples. Using linear and logistic regression models, equations were derived which could estimate the length of the lag phase and the P of toxigenesis by one spore under a particular storage condition.

Chocolate-Flavored Drink from Sweet Whey-Milk Blend Sweetened with Date Puree, Ahmed M. Hamad, Hamad A. Al-Kanhal and Sameer S. Al-Sheikh, Department of Food Science and Technology, College of Agricultural and Food Sciences, King Faisal University, P.O. Box 420, Al-Hassa 31982, Saudi Arabia

J. Food Prot. 50:398-400

A chocolate-flavored dairy drink sweetened with date puree was prepared by using equal parts each of sweet whey and whole milk. The blend was combined with 1.50% cocoa powder, 6% sugar (60% from date puree and 40% from table sugar), 0.05% stabilizer and 0.01% vanilla. The drink was compared with a control prepared with the same formulation except table sugar was used as a sweetener. Both products were heated to 60°C, mixed in a Waring Blender for 2 min, pas-

teurized at 85°C for 30 min and cooled to 4°C. Sedimentation, pH, acidity and acceptability tests were determined. The chocolate-flavored drink prepared with sweet whey-milk blend and partially sweetened with date puree appeared to be stable and highly acceptable. Chemical and physical properties of the finished product were within normal ranges.

Survey of the Microbiological Quality of Whole, Black Pepper and Turmeric Powder Sold in Retail Shops in Bombay, H. Geeta and P. R. Kulkarni, Food and Fermentation Technology Division, Department of Chemical Technology, University of Bombay, Bombay-400 019, India

J. Food Prot. 50:401-403

Microbiological analysis of loosely packed, whole, black pepper and turmeric powder obtained from retail shops in the city of Bombay revealed that the samples of both spices were highly contaminated. Aerobic plate counts of black pepper ranged from 12.1×10^7 to 81.9×10^8 c.f.u. per gram and turmeric powder from 4.1×10^7 to 73.6×10^8 c.f.u. per g. In both spices, mesophilic sporeformers like *Bacillus* occurred. Coliforms ranged in counts from 10^2 - 10^3 per g. Fungal counts ranged from 0.6×10^4 to 16×10^5 per g for black pepper and from 0.5×10^3 to 11.1×10^5 per g for turmeric powder. Fungal flora included mainly *Aspergillus* spp. with the occurrence of *Mucor* in some of the samples. No other organisms were observed in the dilutions plated. The extent of contamination was slightly greater in pepper than in turmeric, although both spices were of a poor quality when compared with international standards.

Growth of Osmotolerant Yeasts at Different Water Activity Values, Marco F. G. Jermini and Wilhelm Schmidt-Lorenz, Food Microbiology Laboratory, Department of Food Science, Swiss Federal Institute of Technology, (ETH), CH-8092 Zürich, Switzerland

J. Food Prot. 50:404-410

The influence of water activity (a_w) on growth (lag-phase, mean generation time and cell yield) of osmotolerant yeasts was determined by culturing 7 strains in broths at 10 different a_w values in the range of 0.998 to 0.626 and by counting the Colony Forming Unit (CFU) per ml. Broths were adjusted to the desired a_w by means of fructose. None of the tested strains could grow at a_w 0.701 and 30°C. During 60 d of incubation at this a_w and temperature, slight reductions of the initial CFU/ml counts were noted. By incubation at a_w <0.701 these reductions were larger. Six strains of *Zygosaccharomyces rouxii* grew at a_w 0.760, whilst a strain of *Zygosaccharomyces bailii* could not grow at a_w <0.858. For six strains the optimum a_w for growth was in the range of 0.958 to 0.998. A single strain of *Z. rouxii* showed optimum a_w for growth in the range of 0.913-0.958. Therefore, it was appropriate to redefine it as "osmophilic". Because of high dehydration, cells actively grown at a_w 0.837 were approximately 30% smaller than cells actively grown at a_w 0.998.

Antioxidant Activity of Onion and Garlic Juices in Stored Cooked Ground Lamb, Dalal Jurdi-Haldeman, Joseph H. Macneil and Dalal M. Yared, Department of Food Science, Pennsylvania State University, University Park, Pennsylvania 16802 and Faculty of Agricultural and Food Sciences, American University of Beirut, Lebanon

J. Food Prot. 50:411-413

The effects of onion juice on several characteristics of cooked ground lamb were investigated. Onion juice was a more effective antioxidant than garlic juice in reducing development of rancidity in meat. TBA values for onion-treated samples were lower ($P < 0.05$) after storage when the distillation method of TBA measurement was used. The extraction method may be a less sensitive test for rancidity. Taste panelists were able to discriminate between the onion-treated samples and the control, but onion samples were not preferred ($P > 0.05$). Mean hedonic scores were higher ($P < 0.05$) for the onion-treated samples, indicating a more acceptable flavor after storage.

Influence of Frozen Storage and Thaw-Freeze Stresses on the Viability of Osmotolerant Yeasts, Marco F. G. Jermini and Wilhelm Schmidt-Lorenz, Food Microbiology Laboratory, Department of Food Science, Swiss Federal Institute of Technology (ETH), CH-8092 Zürich, Switzerland

J. Food Prot. 50:414-417

The influence of frozen storage at -25°C as well as repeated thaw-freeze stresses on the viability of osmotolerant yeast was investigated using cell suspensions in 20% (v/v) glycerol. Osmotolerant yeasts were particularly sensitive to both frozen storage and thaw-freeze stresses.

Microbial Profile of Cumin Seeds and Chili Powder Sold in Retail Shops in the City of Bombay, Rekha Bhat, H. Geeta and P. R. Kulkarni, Food and Fermentation Technology Division, Department of Chemical Technology, University of Bombay, Bombay 400 019, India

J. Food Prot. 50:418-420

A detailed evaluation of the microbial profile of 2 spices, viz. cumin seeds and chili powder, sold in retail shops in the city of Bombay, revealed high aerobic plate counts ranging from $2 \times 10^6/g$ - $2 \times 10^8/g$ for chili powder and $1.0 \times 10^6/g$ to $1.0 \times 10^8/g$ for cumin. Among the bacteria present, 50-95% constituted sporeformers, which included amylolytic and proteolytic bacilli in both the spices. *Aspergillus* group was predominant among fungi in chili powder samples. No fungi were found in cumin seed samples examined. *Salmonella*, *Shigella* and *Vibrio* were completely missing from chili and cumin samples. However, *Staphylococcus aureus* and *Bacillus cereus* were found in chili powder.

Foodborne and Waterborne Disease in Canada — 1980 Annual Summary, E. C. D. Todd, Bureau of Microbial Hazards, Food Directorate, Health Protection Branch, Health and Welfare Canada, Ottawa, Ontario, K1A 0L2, Canada

J. Food Prot. 50:421-429

Data on foodborne disease in Canada in 1980 are compared with those for 1979. A total of 759 incidents, comprising 621 outbreaks and 138 single cases, caused illnesses in 7,122 persons in 1980. Compared with 1979, fewer incidents but more cases occurred. *Salmonella*, *Staphylococcus aureus*, *Clostridium perfringens* and *Bacillus cereus* caused most illnesses. The main

Salmonella serovars involved were *S. typhimurium*, *S. heidelberg* and *S. enteritidis*. *Campylobacter* and *Citrobacter* infections were reported for the first time. Seven episodes of paralytic shellfish poisoning occurred, more than twice the number in 1979. There were also 53 incidents and 100 cases of chemical origin; rancid compounds, extraneous matter and metals were the main chemicals involved. Unusual chemical problems included turkey contaminated with calcium chloride brine, ammonia deliberately added to a beverage to induce sickness, ammonia-soaked frozen potato puffs, chocolates contaminated with phenol disinfectant and toluene in popcorn twists. There were nine deaths from salmonellosis, paralytic shellfish poisonings and hemolytic uremic syndrome. About 34% of incidents and 51% of cases were associated with meat and poultry. Vegetables, fruits, Chinese food, marine food and bakery products were also vehicles that contributed significantly to foodborne disease. Mishandling of food took place mainly in foodservice establishments (41.2% of incidents, 74.3% of cases), homes (15.8% of incidents, 6.0% of cases) and food processing establishments (10.1% of incidents, 8.7% of cases). Food processors were responsible for salmonellosis from turkey rolls (440 cases) and staphylococcal intoxication from cheese curds (62 cases) and many small outbreaks and single cases. Most incidents occurred in Ontario (43.9%) and British Columbia (21.7%), but on a 100,000 population basis, British Columbia recorded more incidents (6.2) than Nova Scotia and Yukon (both 4.5) and Ontario (3.9). Narrative reports of seven foodborne disease incidents are presented. Four incidents of waterborne disease were documented in 1980, the same number as in 1979. All were

caused by bacterial agents, with *Campylobacter* and *Salmonella* responsible for most cases. *Pseudomonas aeruginosa* infected the skin of 10 persons in a whirlpool bath.

Review of Evidence of Zoonotic Listeriosis, David W. Hird, Department of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California-Davis, Davis, California 95616

J. Food Prot. 50:430-434

Foodborne transmission, especially by milk and milk products and raw vegetables, appears to be the major means of zoonotic transmission of listeriosis. Four major foodborne outbreaks of listeriosis were reported in the United States and Canada 1979-1985. Implicated foods were cabbage, pasteurized milk, and Mexican-style soft cheese. Circumstances of the outbreaks and the implicated foods support the concept of zoonotic transmission of listeriosis.

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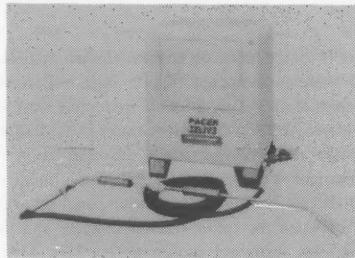


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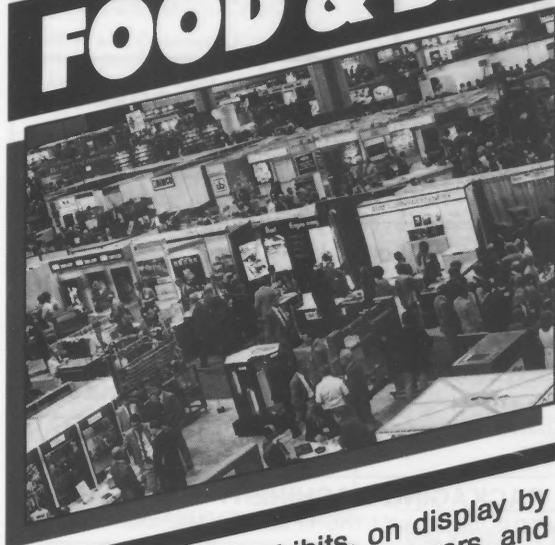
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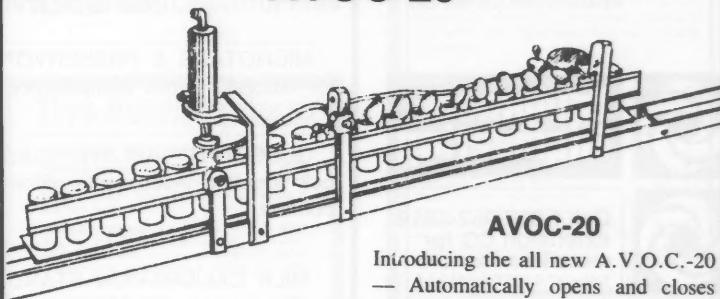
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1987

May 17-19, 23RD ANNUAL SEMINAR AND EXPO OF THE INTERNATIONAL DAIRY-DELI ASSOCIATION, to be held in Miami Beach, FL. For more information, contact: The International Dairy-Deli Association, P.O. Box 5501, Madison, WI 53705. 608-238-7908.

May 17-20, CANADIAN INSTITUTE FOR FOOD SCIENCE & TECHNOLOGY ANNUAL MEETING, to be held at the Hamilton Convention Centre, Hamilton, Ontario. Theme: Biotechnology - Challenge for the Food Industry. For more information, contact: Dr. V. F. Rasper, Conference Chairman, Department of Food Science, University of Guelph, Guelph, Ontario N1G 2W1. 519-824-4120.

May 17-20, DAIRY INSTITUTE OF CALIFORNIA ANNUAL SPRING MEETING, to be held at La Quinta Resort in Palm Springs, CA. For more information, contact: Robert D. Boynton, Suite 718, 1127 - 11th Street, Sacramento, CA 95814.

May 18-20, EVALUATION AND CONTROL OF PROCESS HAZARDS, to be held in New Jersey. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

May 18-20, THE PA DAIRY SANITARIAN'S AND LABORATORY DIRECTORS MEETING, to be held in the J. O. Keller Conference Center, The Pennsylvania State University, State College, PA. For more information, contact: Sidney E. Barnard, Food Science Extension Specialist-Dairy, 8 Borland Laboratory, The Pennsylvania State University, University Park, PA 16802. 814-863-3915.

May 19-21, THE ADMINISTRATIVE ASSISTANT, to be held in Chicago, IL. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

May 19-21, BASIC PASTEURIZATION COURSE, to be held at the Travelodge in El Paso, Texas, 915-544-3333. For more information, contact: Ms. Janie Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363. 512-458-7281.

May 27-29, AQUATIC TOXICITY REDUCTION IN INDUSTRIAL EFFLUENTS, to be held in New Jersey. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

May 31-June 3, NEW YORK STATE DAIRY FOODS INC. ANNUAL MEETING, to be held at the Nevele Country Club, Ellenville, NY. For more information, contact: Edmund J. Towle, 41 State Street, Albany, NY 12207.

May 31-June 4, AMERICAN SOCIETY OF BREWING CHEMISTS 53RD ANNUAL MEETING, to be held at the Hyatt Regency in Cincinnati, Ohio. For more information, contact: ASBC Headquarters, 3340 Pilot Knob Road, St. Paul, MN 55121. 612-454-7250 or Telex (MCI/WUI) 6502439657.

June 1-4, HAZARDOUS WASTE MANAGEMENT, to be held in Los Angeles, CA. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

June 1-4, INCINERATION OF HAZARDOUS AND NON-HAZARDOUS WASTE, to be held in Chicago, IL. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

June 1-5, INDUSTRIAL EMISSION AND AIR QUALITY MONITORING, to be held in Atlanta, GA. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

June 2-3, SAFETY WORKSHOP FOR THE MEAT AND POULTRY INDUSTRIES, TO BE HELD AT Georgia Teach Research Institute in Atlanta, GA. For more information contact: Ann Harbert, Environmental, Health and Safety Division, Georgia Tech Research Inst., Atlanta, GA 404-894-3806.

June 2-4, THE ADMINISTRATIVE ASSISTANT, to be held in the San Francisco Bay Area, CA. For more information, contact: The Center For Professional Advancement, 46 West Ferris Street, East Brunswick, NJ 08816. 201-238-1600.

June 13-17, NEHA's 50TH BIRTHDAY PARTY ANNUAL EDUCATIONAL CONFERENCE, to be held at the Sheraton Harbor Island East Hotel, San Diego, CA. For more information contact: Mel Monkalis. 303-756-9090.

June 15-17, FLORIDA DAIRY PRODUCTS ASSOCIATION ANNUAL CONVENTION, to be held at the Boca Raton Hotel & Club, Boca Raton, FL. For more information, contact: J. R. Antink, 14 E. Washington St., Suite 315, Orlando, FL 32801.

June 15-18, BASIC FOOD PLANT MICROBIOLOGY, to be held in Manhattan, Kansas. For more information, contact: Melinda Enns at 1-800-633-5137 or write: Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, Kansas 66502.

June 17-19, ARKANSAS DAIRY PRODUCTS ASSOCIATION 52ND ANNUAL CONVENTION, to be held at the Holiday Inn Lake Hamilton, Hot Springs, AR. For more information, contact: Floyd Smith, P.O. Box 4187, Asher Ave. Station, Little Rock, AR 72214.

July 10-18, SEVENTH INTERNATIONAL WORKSHOP ON RAPID METHODS AND AUTOMATION IN MICROBIOLOGY, to be held at Kansas State University, Manhattan, KS. For more information, contact: Dr. Daniel Y.C. Fung, Director of the workshop. 913-532-5654.

July 14-16, BASIC PASTEURIZATION COURSE, to be held in San Antonio, Texas.

Location to be announced. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363. 512-458-7281.

July 27-30, LIQUITEC EXPO '87 TECHNICAL WORKSHOPS AND EDUCATIONAL SEMINARS, to be held at the Philadelphia Civic Center. For more information, contact: Liquitec Expo '87, Box 630, West Paterson, NJ 07424. 201-256-0011.

August 2-4, WEST VIRGINIA DAIRY PRODUCTS ASSOCIATION ANNUAL MEETING (75TH ANNIVERSARY), to be held at the Greenbrier, White Sulphur Springs, WV. For more information contact: Paul M. Smith, Room 1054 Ag. Sci. Bldg., Box 6108, Morgantown, WV 26506-6108.

August 2-6, IAMFES 74TH ANNUAL MEETING, to be held at the Disneyland Hotel, Anaheim, California. For more information, contact: Kathy R. Hathaway, IAMFES, Inc., PO Box 701, Ames, IA 50010. 800-525-5223, in Iowa 515-232-6699.

August 2-7, CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS BUSINESS MEETING, to be held at the Disneyland Hotel in Anaheim, CA. For more information, contact: Richard Harrell at 213-757-9719 or Austin Olinger at 818-968-9621.

August 5-7, IOWA DAIRY FOODS ASSOCIATION ANNUAL CONVENTION, to be held at the Village West, Lake Okoboji, IA. For more information, contact: John R. Brockway, 1805 74th Street, Des Moines, IA 50322.

August 9-14, ANNUAL MEETING OF THE SOCIETY FOR INDUSTRIAL MICROBIOLOGY, to be held at The Hyatt Regency Hotel, Baltimore, Maryland. For more information, contact: Mrs. Ann Kulback, SIM, P.O. Box 12534, Arlington, VA 22209. 703-941-5373.

August 16-18, WISCONSIN DAIRY PRODUCTS ASSOCIATION, INC. JOINT ANNUAL MEETING & CONVENTION WITH MIDWEST DAIRY PRODUCTS ASSOCIATION, INC., to be held at The Abbey on Lake Geneva, Fontana, WI. For more information, contact: Norm E. Kirschbaum, 1400 E. Washington Ave., Suite 185, Madison, WI 53703.

August 16-18, MICHIGAN DAIRY FOODS ASSOCIATION ANNUAL CONVENTION, to be held at Boyne Highlands Resort, Harbor Springs, MI. For more information, contact: Frank Koval, 748 N. Cedar St., Lansing, MI 48906.

August 17-21, BIOTECHNOLOGY: MICROBIAL PRINCIPLES AND PROCESSES FOR FUELS, CHEMICAL AND BIOLOGICALS, to be held at the Massachusetts Institute of Technology, Cambridge, MA. For more information, contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.

August 31-September 4, 71ST ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION, to be held in Helsinki, Finland. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

September, WAMFES ANNUAL MEETING, to be held in Eau Claire, WI. For more information, contact: Randy Dags. 608-266-9376.

September 1-2, FOOD PROCESSING WASTE CONFERENCE, Radisson Hotel, Atlanta, GA. For more information, contact: Edd Valentine or Chuck Ross, Georgia Tech Research Inst., Economic Development Laboratory, Environmental, Health and Safety Division, O'Keefe Building, Atlanta, GA 30332. 404-894-3412.

September 8-10, BASIC PASTEURIZATION COURSE, to be held at the Viscount Hotel in Houston, Texas, 713-526-4571. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, TX 78613-2363. 512-458-7281.

September 9-10, NEBRASKA DAIRY INDUSTRIES ASSOCIATION ANNUAL CONVENTION, to be held at the Best Western Regency West, Omaha, NE. For more information, contact: Michael Liewen, 134 Filley Hall, University of Nebraska, Lincoln, NE 68583-0919.

September 9-10, UNITED DAIRY INDUSTRY ASSOCIATION ANNUAL MEETING, to be held at the Marriott O'Hare, Chicago, IL. For more information, contact: Edward A. Peterson, 6300 N. River Road, Rosemont, IL 60018.

September 10-13, DAIRY PRODUCTS INSTITUTE OF TEXAS FALL BOARD OUTING, to be held at Horseshoe Bay Resort, TX. For more information, contact: Glenn R. Brown, 201 Vaughn Building, Austin, TX 78701.

September 14-15, ASSOCIATED ILLINOIS MILK, FOOD, AND ENVIRONMENTAL SANITARIANS FALL SEMINAR AND ANNUAL MEETING, a joint conference with the Chicago Dairy Technology Society. For more information, contact: Dr. Clem Honer, Secretary Associated Milk, Food and Environmental Sanitarians, Gorman Publishing Co., 8750 W. Bryn Mawr, Chicago, IL 60631. 312-693-3200.

September 14-17, AOAC TO HOLD 101ST ANNUAL INTERNATIONAL MEETING, to be held at The Cathedral Hill Hotel, in San Francisco. For more information, contact: the AAOAC office at 1111 N. 19th St., Suite 210, Arlington, VA 22209. 703-522-3032.

September 14-18, FOOD MICROBIOLOGY SHORT COURSE, sponsored by the University of California and University Extension. To be held at the Department of Food Science and Technology, Cruess Hall, UC Davis Campus. For further information, contact: Kathryn J. Boor, Food Science and Technology, University of California, Davis, CA 95616. 916-752-1478.

September 15-16, 1987 ANNUAL CONVENTION OF THE SOUTH DAKOTA STATE DAIRY ASSOCIATION, to be held at Howard Johnson's, Sioux Falls, SD. For more information, contact: Shirley W. Seas, South Dakota State Dairy Association, University Dairy Building, Brookings, SD 57007. 605-688-5420.

September 17-18, MINNESOTA SANITARIANS ASSOCIATION ANNUAL MEETING, to be held at the Earle Brown Center, Univ. of Minnesota, St. Paul Campus. For more information, contact: Roy E. Ginn, Dairy Quality Control Inst., 2353 N. Rice St., Room 110, St. Paul, MN 55113. 612-484-7269.

September 20-23, NATIONAL DAIRY COUNCIL OF CANADA 70TH ANNUAL CONVENTION, to be held at the Quebec Hilton, Quebec, Canada. For more information, contact: Dale A. Tulloch, 141 Laurier Avenue West, Ottawa, Ontario, Canada K1P 5J3.

September 21-23, NEW YORK STATE ASSOCIATION OF MILK & FOOD SANITARIANS ANNUAL MEETING, to be held at the Sheraton Inn Syracuse, (Liverpool, NY). For more information, contact: Paul J. Dersam. 716-937-3432.

September 24-25, SWEETENERS IN FOODS: SENSORY, PROCESSING AND HEALTH ASPECTS, to be held at Kansas State Union, Kansas State University, Manhattan, KS. For more information, contact: Dr. Carol Setser or Dr. Karen Penner, Department of Foods and Nutrition, Justin Hall, Kansas State University, Manhattan, KS. 913-532-5508.

September 28-29, SEMINAR ON "TEMPORARY QUALITY ASSURANCE", jointly sponsored by the International Dairy Federation and USNAC. To be held in McCormick Place, Chicago, IL. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

September 30-October 2, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING, to be held at the Holidome in Lawrence, Kansas. For more information, contact: John M. Davis. 316-268-8351.

October 5-9, 13TH INTERNATIONAL SYMPOSIUM OF THE IUMS-ICFMH & FECS-WPFC, "Toxins in Foodborne Disease" and "Microbiology of Drinking Water," to be held in Halkidiki, Greece. For more information, contact: Prof. J. A. Papadakis, Omirou 24, 10672 Athens, Greece.

October 18-21, CORNELL SYMPOSIUM ON CHEESE BIOTECHNOLOGY AND INTERNATIONAL FOOD DEVELOPMENT, to be held at Cornell University, Ithaca, NY. For more information, contact: Richard A. Ledford, Chairman, Department of Food Science, Cornell University, Ithaca, NY 14853-7201. 607-255-7616.

October 19-21, DESCRIPTIVE ANALYSIS, to be held in Palo Alto, California. Pre-registration required. For more information,

contact: Herbert Stone, President, Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833 or Telex WUI 6502215776 (access MCT).

November, CANADA'S AMFES ANNUAL MEETING, to be held in Edmonton, Alberta. For more information, contact: Jim Eisen. 451-0817.

November 8-11, DAIRY INSTITUTE OF CALIFORNIA ANNUAL FALL MEETING, to be held at The Lodge, Pebble Beach, CA. For more information, contact: Robert D. Boynton, Suite 718, 1127 - 11th Street, Sacramento, CA 95814.

November 10-12, BASIC PASTEURIZATION COURSE, to be held in Texarkana, Texas. Location to be announced. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363. 512-458-7281.

November 15-18, SOUTHERN ASSOCIATION OF DAIRY FOOD MFRS., INC. 73RD ANNUAL CONVENTION, to be held at Colonial Williamsburg Foundation, Williamsburg, VA. For more information, contact: John E. Johnson, P.O. Box 10506, Raleigh, NC 27605

November 30-December 3, NATIONAL MILK PRODUCERS FEDERATION ANNUAL MEETING, to be held at the Hyatt Regency, New Orleans, LA. For more information, contact: James C. Barr, 1840 Wilson Blvd., Arlington, VA 22201.

November 30-December 4, THE FIRST LATIN AMERICAN CONGRESS ON FOOD MICROBIOLOGY AND THE I ARGENTINE SYMPOSIUM ON PRESERVATION OF FOODS, to be held in Buenos Aires, Argentina. For more information, contact: Dr. Ricardo Sobol, Secretary General, Bulnes 44 P.B. "B", 1176 Buenos Aires, Argentina. Additional information: Dr. Fernando Quevedo, 525 Twenty Third St., N.W., Washington, D.C. 20037.

December 8-11, WORKSHOP IN INSTRUMENT SERVICE AND REPAIR, to be held at the Anderson training facility and dairy processing plant in Fultonville, NY. For more information, contact: Michael D. Cunningham, Anderson Instrument Company, Inc., R.D. 1, Fultonville, NY 12072. Telephone: 518-922-5315.

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January 20-23, FOURTH INDUSTRY-WIDE U.S. DAIRY FORUM, sponsored by the Milk Industry Foundation and International Ice Cream Association. To be held at the Innisbrook in Tarpon Springs, FL. For more information, contact: Joe Dugan, 888 Sixteenth Street, N.W., Washington, DC 20006. 202-296-4250; TELEX 150185.

July 31-August 4, IAMFES 75th ANNUAL MEETING, to be held at the Hyatt Regency Westshore, Tampa, FL. For more information contact Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 800-525-5223, in Iowa 515-232-6699.



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