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Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL ... APRIL 1996

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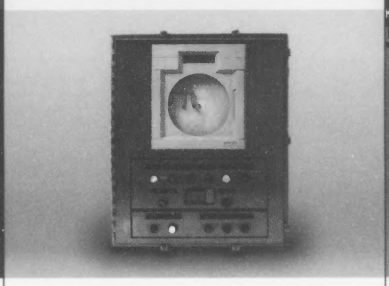

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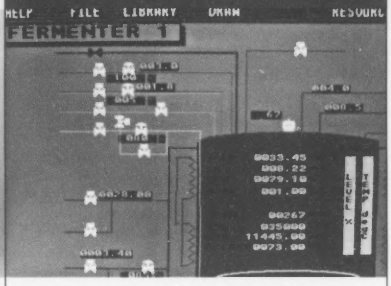

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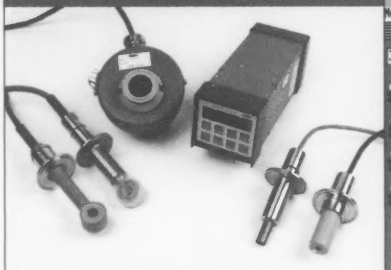

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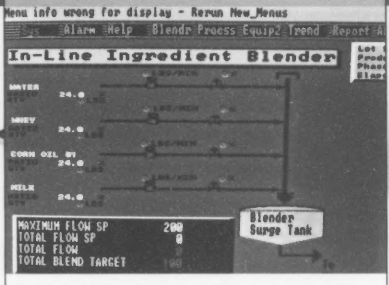

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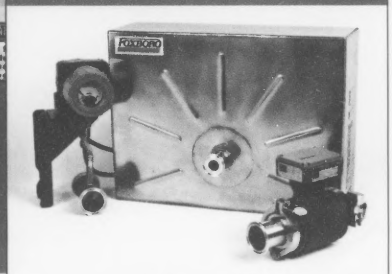

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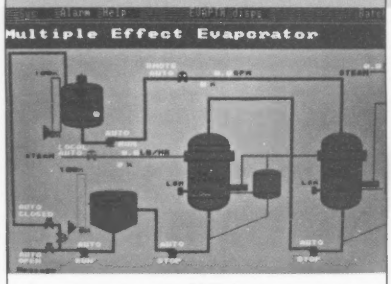

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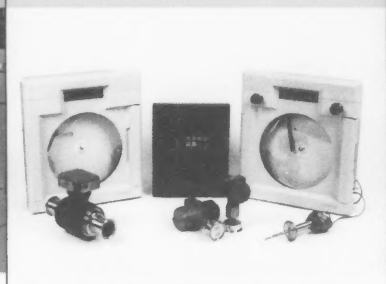

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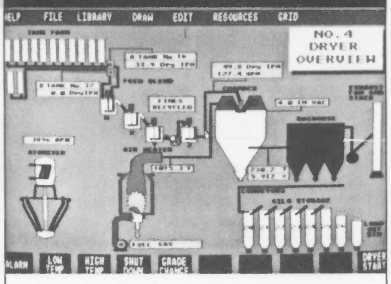

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DAIRY, FOOD AND ENVIRONMENTAL
Sanitation
A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

ARTICLES

Editor's Note:

The January issue of *Dairy, Food and Environmental Sanitation* ran an article on Dr. Thayer being named the 1995 Outstanding Research Scientist by the Agricultural Research Service on page 42. The location of The Eastern Regional Center was listed as being in Greenbelt, MD. The correct location is Philadelphia, PA.

In the March issue of *Dairy, Food and Environmental Sanitation* **Gist-brocades Dairy Ingredients Group** was left off our Sustaining Members list.

Our apologies to The Eastern Regional Center and Gist-brocades Dairy Ingredients Group.

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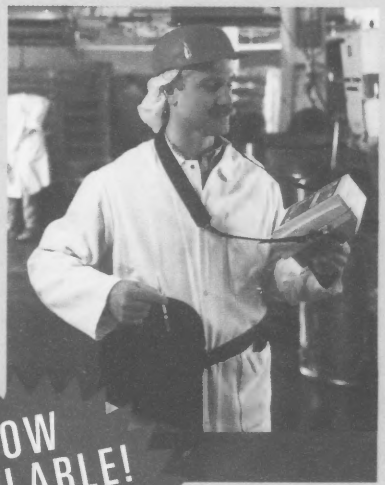

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THOUGHTS

FROM THE PRESIDENT

By F. ANN DRAUGHON,
IAMFES President

"A different mirror"

Associations, like people, are creatures of habit. We look in the mirror and see what we expect to see. For organizations, the habits are existing norms, systems, policies, procedures, written and unwritten rules–the way we do things around here. Habits serve some very useful purposes. They help us get up in the morning, help us get to work, help us exercise regularly, and help keep our association running. However, there is an insidious side of habits which we have all struggled. To paraphrase Mark Twain: "Habits can't be flung out the window; they have to be coaxed downstairs, one step at a time. Habits acquire a life of their own. They stick to us worse than flypaper." One of the greatest challenges that I have faced while on the Board of IAMFES is knowing when to make the effort to change and when to leave well enough alone. Of course we are always afraid of looking foolish when we make "the intelligent-but-with-some-chance-of-looking-like-an-idiot" decision. If we strip away the habits of the association, will it lose its identity? Habits can make it difficult for us to view our reality and that of the association in an unbiased way. We need a different mirror to meet the needs of a changing world.

My grandfather taught me that we have to look at the world as it is and not as we wish it were. I remember asking him "how do I know what is real?" His answer was simple. He said "You must listen." As your president, I have tried to be open, curious, and sometimes inquisitive. I have had quite a bit of communication, with the membership and others outside of IAMFES. Not surprisingly, some of the feedback has been positive and some has been negative. I have found both the positive and negative comments extremely useful. Although I enjoy the positive comments, I have to admit that the negative ones are often more useful in pointing toward a need to change. Without the information that you give me, there is little chance of renewal. Without renewal, there is little chance of excellence in our association. I am asking you to be a vocal member–to ask, "what if?" "how can we do this better?" "why don't we?" and communicate your answer to us.

I would like to leave you with a thought paraphrased from Robert Waterman, Jr.'s book *The Renewal Factor*–"Our thinking about growth and decay is dominated by the image of a single life-span, animal or vegetable. Seedling, full flower and death...But for an ever-renewing association or society, the appropriate image is a total garden, a balanced aquarium or other ecological system. Some things are being born, other things are flourishing, still other things are dying and making room for new growth–but the system thrives and lives on."

We don't care *how* you get it here...

but we do care *if* we get it!

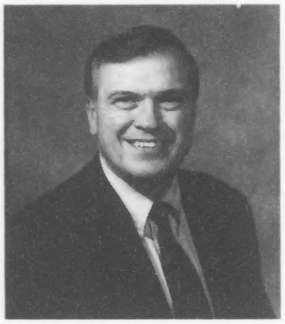
Affiliates are an important part of IAMFES, and that's why we need you, our Affiliate Associations and Affiliate Members, to let us know what is going on in your organizations. Keep us abreast of meetings, activities, seminars and other events by sending us minutes, announcements or just a quick update. In return, we'll publish it in our next issue of *Dairy, Food and Environmental Sanitation*. All we ask is that you please send information regarding upcoming events at least two months in advance.

Please address to: Managing Editor, *Dairy, Food and Environmental Sanitation*, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2863, Telephone (515) 276-3344 or Fax: (515) 276-8655.

Our Affiliates Count!

PERSPECTIVES...

From the Executive Director



By DAVID M. MERRIFIELD,
IAMFES Executive Director

"Those who aim at nothing are hitting it with amazing accuracy"

In his book, *Alice in Wonderland*, Lewis Carroll describes Alice coming to a fork in the road where she encounters the Cheshire Cat. She asks the cat which way she should go. The cat asks her where she's going and she replies that she doesn't really know. The cat responds that it really doesn't matter then which way she does go.

I wonder if IAMFES has come to that fork in the road where we must know where we want to go. If we don't know, then like Alice, it doesn't matter which way we go. I think we know which way to go; at least we did in late 1993.

Of all the documents I've read and reviewed since joining IAMFES, the most significant (and the one that tells us which way to go), is the IAMFES Strategic Plan. Armed with extensive research conducted by Lawrence-Leiter and Company Management Consultants, an action planning session produced the October 1993 plan. It received Executive Board approval and, in his December 1993 DFES column, then IAMFES President, Harold Bengsch, provided an excellent overview of the plan. I wonder how many of you who received that issue remember Harold's column. If you don't, I recommend you pull it out and review it.

The plan has four major objectives, each having substrategies and assigned projects to accomplish the tasks. The first objective is designed as a major effort to expand membership. Its three strategies are to expand the focus beyond the current affiliate organizations in order to identify other potential member pools; shift responsibility for developing the membership program from the membership committee to staff; and develop an effective membership database. This objective clearly recognizes that IAMFES is not only international, but interdisciplinary as well.

The second objective, a major education program development effort, has four strategies: develop a speaker's bureau/panel of experts which can deliver education through the affiliate organizations; utilize the Professional Development Groups (PDGs) as developers of new programs; develop a process to create white papers on issues of significance in food safety and sanitation each year; and develop a system in the office to track all requests for information, program assistance, white papers, and other requests. This objective is absolutely necessary in order to accomplish the IAMFES mission of providing food safety professionals with a forum to exchange information on protecting the food supply.

The plan's third objective involves a major review of current IAMFES product and service offerings leading to a product enhancement program. The strategies include writing a journal editorial policy; basing future education program development on formal research to define program content (this ties closely into the second objective); and developing marketing plans for major projects and service areas. The short version? Produce better products with better marketing.

The final objective is to develop a formal and more sophisticated financial plan for the association. The strategies here are to develop an investment policy, review the dues policy, identify a reserve target, and write a policy regarding all revenue and expense streams to the association. This objective is inextricably tied to the first three. A healthy association is a financially sound association.

Harold finished his column with, "Well, there you have it. Ambitious? Yes! Impossible? No!" I would add, "Are we there yet? I don't think so!" But we have come a long way. What we need now is to do an update scrub (its been over two years since inception and parts of it have either been accomplished or need changing), and forge ahead with implementation. Of course, no plan is static. It will require continuous revision over the years as the association changes.

A final note to ponder: those who aim at nothing are hitting it with amazing accuracy! At least we have something to aim at.

Dairy, Food and Environmental Sanitation, Vol. 16, No. 4, Pages 214-221

The RF Linear Accelerator in In-Line E-Beam Processing of Beef and Poultry

Stephen P. Renwick* and Harold J. Hansen
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SUMMARY

Food irradiation, the processing of food products with gamma rays, X rays, or high-energy electrons, has been scientifically demonstrated to be an effective means of removing pests and pathogens from foods. It has as yet seen little use, partially due to political concerns with public acceptance and partially due to logistical and cost problems with radioactive isotopes. Electron-beam (e-beam) accelerators offer the opportunity for a unique form of food irradiation, specifically, treatment of thin products (beef patties, chicken cutlets) in the processing plant. The accelerators are divided into three types: direct-current (DC) machines, linear induction accelerators (LIA), and radio-frequency linear accelerators (RF linacs). This paper discusses the throughput and dose requirements for treatment of beef and poultry, describes in detail the specification of an accelerator once throughput and dose are known, and estimates costs per pound for e-beam processing. We find that the RF linac occupies an important niche in the spectrum of treatment instruments and can be a useful tool for the industrial meat processor.

OVERVIEW

Food irradiation is not new. It's a process that has been a subject of active research for over 40 years. It involves the treatment of raw food products – beef, poultry, seafood, and vegetables – with energetic ionizing radiation. Radiation has been demonstrated to kill many types of harmful bacteria, including *Escherichia coli*, salmonellae, and *Campylobacter* spp. *(15)*, without causing harmful effects, significantly reducing nutrient value *(17)*, or reducing the food's sensory appeal *(16)*. While it cannot replace proper food handling and cooking, it can be of great use as an additional safeguard when applied to processed meats and other foods sold to the public. For example, recent outbreaks of deadly illness in the western United States caused by *E. coli* O157:H7 in infected beef sold in fast-food restaurants *(8)* could have been prevented by the use of irradiated beef by eliminating pathogens introduced in the processing plant.

An overview of irradiation by M. Lagunas-Solar has recently been published *(11)* and other reviews are available *(18)*. This article reviews many of the technical and political aspects of the irradiation process, so we will only give a brief summary here, after which we will concentrate on electron-beam processing of beef and poultry.

Radiation type and source

The kinds of radiation considered here are all called ionizing radiation, meaning that they carry enough energy into a product to ionize – strip electrons from – atoms and molecules in the product. This is how ionizing radiation destroys bacteria – by altering the chemical structure in crucial parts of the bacterial cell. While there are several types of ionizing radiation, the three used in food processing are gamma rays, X rays, and electrons. Each has its unique characteristics, not the least important of which is the means of production. Broadly speaking, selection of radiation type will be determined mostly by the density and thickness of the product. Selection of the radiation source will be determined

by economic, logistical, and political considerations.

Gamma rays are a penetrating form of electromagnetic radiation, and are emitted as a result of the decay of radioactive elements, referred to as isotopes. The isotope most commonly used in food processing is cobalt 60 (^{60}Co), which is produced in nuclear reactors. Gamma rays from ^{60}Co are emitted with beam energies of 1.17 MeV and 1.33 MeV (1 MeV is 1 million electron volts, a common unit of energy in this field). Another isotope is cesium 137 (^{137}Cs), which emits gamma rays at 0.66 MeV and is a radioactive element produced by the U.S. government as a by-product of weapons production. Because of this link with weapons production, and because it is felt to be dangerous due to its solubility in water, ^{137}Cs has effectively been eliminated from consideration for food irradiation *(11)*.

The key characteristic of gamma rays is their long penetration range into product. With energies around 1 MeV, they can penetrate several centimeters of metal and 20 to 30 cm into most food products *(7)*. This penetration is a double-edged sword; it means that gamma rays are appropriate for treating bulky objects like crates of fruit, but also that they will pass right through thin objects like meat patties, leaving them untreated. Product must be stacked thickly enough to match radiation penetration. Most foods can be treated in crates, but not on a production line or conveyor.

X rays are a form of electromagnetic radiation emitted by electron-beam (e-beam) accelerators, and are actually exactly the same kind of radiation as gamma rays – the different names indicate the different means of production. All X-ray machines internally generate an electron beam and then make X rays by striking a thick metal target with the beam; the X-ray production process is known by the German word *bremsstrahlung*. One characteristic of the *bremsstrahlung* process is that it is highly inefficient; only 5 to 10% of the power in the electron beam is available in the form of X rays. Another is that unlike isotopes, which emit gamma rays at discrete energies, an X-ray machine emits rays in a broad band of energies *(9)*. For that reason, a 4-MeV X-ray machine is roughly equivalent to a ^{60}Co source in terms of penetrating power. Unlike the "natural" radiation emitted by radioactive isotopes, X rays can be produced in energies from a few thousand electron volts (keV) to several million electron volts (MeV), although not all by the same type of machine.

Obviously, electron beams (e-beams) are also emitted by accelerators. An e-beam machine simply has no X-ray target. The e-beam instead leaves the accelerator through a thin metal window. One advantage of using the e-beam directly is that the full power of the accelerator is available. E-beams are far less penetrating than X rays or gamma rays of the same energy; 10 MeV electrons will penetrate only about 1.5 in. (ca. 3.8 cm) into most food products.

Table 1. Energy limits set by governmental regulations

Radiation type	Maximum energy
Gamma rays	0.66, 1.17, or 1.33 MeV (limited by isotope)
X-rays	5 MeV
E-beams	10 MeV

Table 2. Processing applications and dose levels. Doses are set by FDA and are given in kGy

Application	Approved dose
Deinfestation of fruits	<1 kGy
Reducing pork trichinae	0.3 to 1.0 kGy
Reducing microbes in poultry	<3 kGy
Sterilization of spices	<30 kGy

Energy and dose levels: regulated items

The energy of gamma rays is fixed by nature. The energy of X rays and e-beams is varied by choice of machine type, but is regulated by the Food and Drug Administration (FDA). FDA regulations limit X-ray and e-beam energies in order to prevent the process from making the food products radioactive *(14)*. These limits are shown in Table 1.

After the radiation type and source have been selected, the food processor must select the dose level. Dose is a measure of the energy per unit mass imparted via radiation to the product during treatment. Higher doses kill more pathogens – high enough doses will sterilize the product – but dose levels are also regulated by the FDA. Dose is usually measured in grays (Gy), or kilograys (kGy), or sometimes in rads:

$$1\ \text{Gy} = 1\ \text{joule/kg} = 100\ \text{rad}. \quad (1)$$

Allowed dose levels *(14)* for some sample applications are given in Table 2. We note that typical dose levels are generally less than the maximum allowed.

All other things being equal, the radiation type matters neither to the bacteria nor to the government *(11)*. All three types of treatment are equally effective when used in equal amounts, and the FDA has recognized this by treating them equally from a legal standpoint.

Comparison of ^{60}Co and accelerator-based treatment

Commercial application of food irradiation in the United States so far is limited to gamma irradiation facilities using ^{60}Co. Treatment with accelerators is now receiving increased attention due to regulatory and political problems with the use of radioactive isotopes. This is because it is recognized that accelerators pose less *environmental* hazard than do ^{60}Co facilities, since accelerators require neither transport nor disposal of radioactive materials. Indeed, planned Department of Energy (DOE) facilities in Florida and Iowa were changed to accelerator facilities for just that reason *(13)*.

It is tempting to think of accelerator treatment simply as a replacement for ^{60}Co treatment, but this is really not the case. Rather, each treatment type has characteristics uniquely suiting it to different situations.

Gamma irradiation is frequently described as a bulk process. Since gamma rays from cobalt penetrate so deeply, the product under treatment is transported in crates or on pallets into the irradiator, filling as much of the available space as possible. Treatment times are of the order of 5 to 20 min, depending on the size of the cobalt source, so transport of the product through the irradiator is slow. To obtain high throughput, the irradiator must treat large amounts of product for a long time. Thus, gamma treatment lends itself to packaged product treated at a contract irradiation facility. An example is irradiation of strawberries or spices.

It is possible, of course, that X-ray treatment could be used as a direct replacement for ^{60}Co gamma treatment, since the output of a 4-MeV accelerator is so similar to the gamma-ray output of ^{60}Co, but we have chosen not to discuss that here. Much of the data regarding e-beam treatment could also be applied to X-ray treatment if the reader bears in mind that using an accelerator in X-ray mode involves about a 93% loss in conversion of e-beam energy to X-ray energy.

Electron-beam processing is a different item altogether. Clearly it will only work for thin objects, since the e-beam is so much less penetrating than ^{60}Co gamma rays. Thus it cannot replace gamma treatment, and we do not wish to suggest that it would. Its other characteristic, though, is that with available technology it can apply a treatment dose to a small amount of product in a matter of seconds. The treatment scheme is exactly the converse of the ^{60}Co irradiator method; an accelerator treats a small amount of product in a short time. To obtain high throughput, product is *continuously* fed past the accelerator, making it suitable for in-line rather than bulk treatment. This means that it can be used in situations where gamma treatment is inapplicable or uneconomical. An excellent example is treatment of hamburger patties on a production line.

APPLICATION AND CHARACTERISTICS OF AN E-BEAM PROCESSOR

Selection and specification of an e-beam processor depend on three key technical parameters:

- E-beam *penetration*, determined by product thickness;
- E-beam *dose*, determined mainly by desired pathogen eradication level;
- Product *throughput*, determined by size of processing plant and other economic factors.

These three characteristics are used to determine the two important technical specifications of an e-beam accelerator: beam *energy* and beam *power*.

- Beam energy, in MeV, is set by the desired penetration depth into the product.
- Beam power, in kilowatts (kW), is set by the desired dose and throughput together.

We will outline here the characteristics of an e-beam accelerator used for in-line processing.

Penetration range: beam energy

A beam of high-energy electrons incident on a material will penetrate a certain range into that material. This doesn't mean that all the electrons travel the same distance in the material – instead, as the material gets thicker, the number of electrons transmitted through it gradually dwindles to zero. The range is defined as the material thickness that would just result in zero electrons passing through. It depends on the material density and the beam energy and is well known for a variety of different materials. As one might expect, penetration range goes up with electron energy and goes down with increasing material density. Data and equations describing penetration range are available in the scientific literature *(19)*.

Knowledge of e-beam penetration range is obviously important for e-beam food irradiation, because the range determines the thickness of product that can be treated with a given beam energy. It's not enough simply to know the penetration range, though; one must also be concerned with the dose delivered by the electrons as they pass through the product. Suppose the product thickness was exactly equal to the electron range. Since there are very few electrons left at the very limit of the range, at the back side of the product, the back side would therefore receive very little dose. We need to correct the penetration range information to arrive at a working treatment thickness.

We will set working thickness at less than the electron range in

Figure 1.

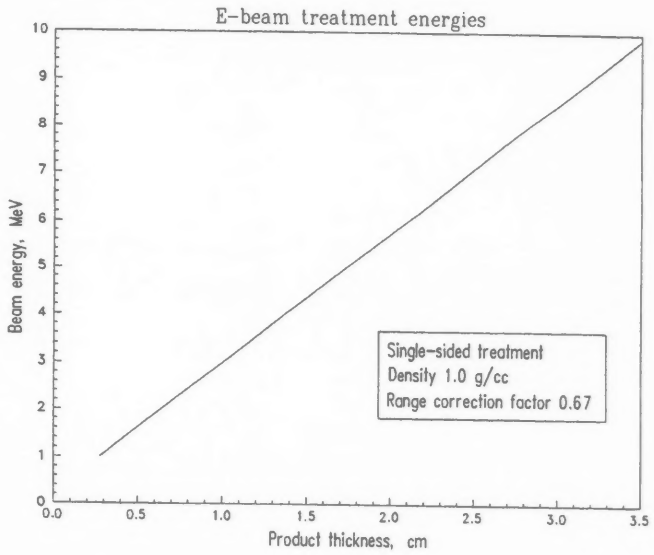
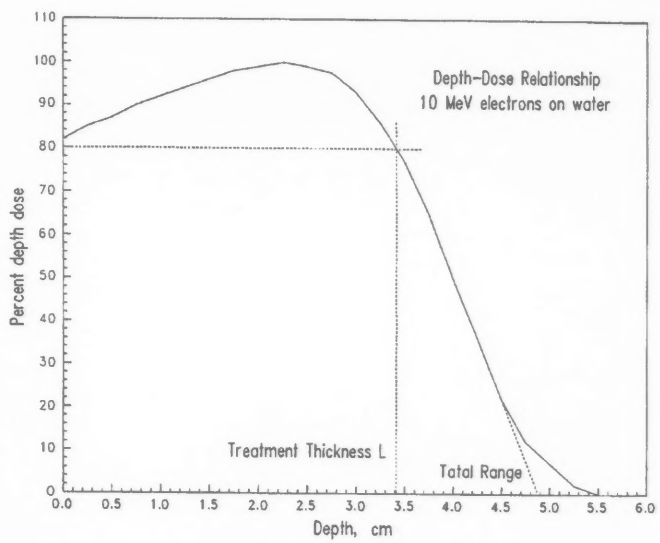


Figure 2.



order to assure a reasonable dose throughout the product. With a correction factor included, then, a simplified equation *(12)* relating beam energy and product treatment thickness is (numerically) given by

$$L = C\left(\frac{0.54E - 0.13}{\rho}\right), \qquad (2)$$

where E is the beam energy in MeV, L is the product thickness in centimeters, ρ is the product density in grams per cubic centimeter, and C is the range correction factor.

We can then use this equation to calculate appropriate food-processing beam energies. First, as explained below, we suggest a range correction factor of $C = 0.67$. Second, we know that beef and chicken are mostly water, so we set density $\rho = 1.0$ g/cm^3. Rearranging equation *(1)* then yields

$$E = 2.8L + 0.25, \qquad (3)$$

which is shown as a graph in Figure 1.

We calculated the correction factor in the following manner. The relationship between penetration depth and applied dose is given by a depth-dose curve, an example of which (for 10 MeV electrons on water) is shown in Figure 2. The dose begins at a high level at the surface, as one might expect. It then actually *rises* somewhat farther into the material. Following that, the dose declines rapidly with increasing thickness.

In order to make sure that pathogens are wiped out throughout the product, the dose must be as uniform as possible throughout the product thickness. Note that dose at the front surface is about 80% of the dose at the peak. We then pick the working treatment range L as the distance where the dose again falls to 80% of the peak value. By doing this, the dose is the same at the front and the back of the product, and the variation from the average dose level throughout the product is only ±11%. This does mean that some electrons will fly out the back side of the product, and that some power will be wasted, but the majority of the available beam power is applied to the product. After comparing depth-dose data from several medical accelerator manufacturers, we find that $L = 0.67$R (R being the whole range) approximately, and thus set $C = 0.67$.

The thicknesses shown in the figures aren't great. We should point out, though, that this is for *single-sided* treatment only. It is possible to treat both sides of the product either by using two accelerators or by flipping the product over and passing it through twice. This roughly doubles the working range and results in a more uniform dose.

We see that the e-beam is complementary to the gamma ray

or X ray. It would be ineffective for bulky materials, but would be extremely useful for treating single layers of product like hamburger patties or chicken cutlets.

Processing dose level and throughput: beam power

Dose levels necessary to eradicate pathogens to a specified level are found in the scientific literature, which is vast; a recent review article by Radomyski and coworkers *(15)* includes data from 87 different research articles concerning inactivation of bacteria in poultry, beef, eggs, cheese, and other foods. Dose levels in the literature are usually specified in terms of the "D_{10} value," a dose which reduces a bacterial population by a factor of 10.

We are primarily interested in the use of an e-beam accelerator for treating thin objects such as hamburger patties. D_{10} values for ground beef under gamma irradiation were recently measured by Clavero and coworkers *(2)* and are given in Table 3. References cited by Radomyski *(15)* give similar values for salmonellae in chicken meat.

We are interested in eradicating more than 90% of the bacteria present, though; we would like to estimate a dose appropriate to real-world processing. If the D_{10} value is constant over a range of doses and bacterial populations (frequently but not always the case), bacterial population B killed by a dose D is given by:

$$\log_{10}B = \frac{D}{D_{10}} \qquad (4)$$

where B is measured in CFU/g. On the basis of this relationship, Clavero calculated the projected bacterial population killed at various higher doses; these numbers are shown in Table 4.

We see, for example, that a dose of 1.5 kGy would kill $10^{4.89}$, or almost 100,000 CFU/g of *E. coli* O157:H7. The authors state that such a population is considerably greater than that found in ground beef. Thus we may assume that a dose of about 1.5 to 2 kGy is sufficient to eliminate the pathogen in ground beef. Moreover, studies have been performed *([5]*, quoted in *[15])*, concerning e-beam irradiation of chicken meat at 3 MeV. Samples irradiated at levels between 1 and 3 kGy all tested presumptive negative for salmonellae.

We thus conclude that a dose of 1.5 to 2.0 kGy, within regulatory limits for chicken, would be appropriate for eradication of pathogens in ground beef, chicken parts, and probably other types of processed meats. This dose will be used as an example.

We know how to select the beam energy of an e-beam accelerator, and we know the dose that we want to apply. Next we need to specify the accelerator power, measured in kilowatts. It is worth pointing out that, once an accelerator type is selected, the power is the single most important factor in determining accelerator price.

Since dose levels in Gy are a measure of applied energy in joules/kg, and since one watt is one joule/s, it is easy to relate the two. The power rating of an accelerator describes the average power available in the beam. If we assume that 100% of the power in the electron beam is delivered to the product, we find that 1 kW = 3,600 kGy·kg/h, or 7,920 kGy·lb/h.

It is unlikely, though, that application efficiency will be 100%; the e-beam will miss some product. After all, we already know that the e-beam needs to penetrate right through the product, with some beam exiting the other side. Moreover, although the beam will be swept back and forth to cover the product, some of it will pass between items or overshoot the sides. We need to assign a dose efficiency ε to the process. With that in mind, desired beam power P is given by the equation

$$P = 7{,}920\ \frac{TD}{\varepsilon} \qquad (5)$$

where T is throughput of product in lb/h, D is the desired dose, and ε is the dose efficiency. A conservative estimate is to assume that one-third of the e-beam is absorbed by product, or ε = 0.33. Using that efficiency, a 1-kW accelerator, for example, could treat 2,640 lb/h of chicken to a dose of 1 kGy, or 1,320 lb/h to a dose of 2 kGy. Throughput could be increased by using a larger accelerator. A 1-kW accelerator is a small machine; RF

Table 3. Sample D_{10} values for ground beef

Bacteria type	D_{10} level (kGy)
E. coli O157:H7	0.31 ± 0.02
Salmonellae	0.80 ± 0.05
Campylobacter jejuni	0.24 + 0.02

Table 4. Projected pathogen population ($\log_{10}$ CFU/g) killed in ground beef at higher doses

Bacteria	1.0 kGy	1.5 kGy	2.0 kGy
E. coli O157:H7	3.3	4.9	6.5
Salmonellae	1.3	1.9	2.5
Campylobacter jejuni	4.3	6.4	8.5

linear accelerators are readily available in beam powers up to 20 kW.

Selection of accelerator

We can now set up an example in order to select an accelerator. We assume the following parameters:

- Application: Eradication of *E. coli*, *Salmonella* spp., etc. in raw meat product
- Product Thickness: About 1 1/4 inch (3.2 cm) maximum (e.g., hamburger patties or chicken cutlets)
- Processing Dose: 2.0 kGy
- Amount Processed: 10,000 lb/h

Referring to Figure 1, we see that a working range L of 3.2 cm implies a beam energy of 10 MeV. Throughput is obtained by multiplying the process amount by the dose to get 20,000 kGy·lbs/h; equation (5) yields a power rating of 7.6 kW. Rounding these numbers off yields:

- Desired e-beam accelerator: 10 MeV, 8 kW.

ACCELERATOR TYPES

So far, we have discussed the kinds of radiation available – gamma rays, X rays, and e-beams and the product thickness, dose, and throughput for one example, the e-beam. With the desired beam energy and beam power in mind, we can look at the three different types of e-beam accelerators appropriate to this situation: direct-current (DC) machines, linear induction accelerators (LIA), and radio-frequency linear accelerators (RF linacs). Like gamma rays and X rays, these three types of accelerators should not be considered competitors. Instead, each instrument's characteristics will suit it to the solution of particular types of problems. We find here that the RF linac is the appropriate machine for treating raw meat products to the dose and in the amount specified in this section.

DC machines

The basic design for the first DC accelerator, the Cockcroft-Walton multiplier circuit, was invented in 1932 *(3)*. Since then, manufacturers have, of course, elaborated on the basic design and developed new designs. DC accelerators are currently available in the United States with beam energies of up to 5 MeV and power ratings of up to 200 kW, and have been built with energies as high as 5 MeV and power levels of 750 kW *(6)*. They are employed in applications such as radiation cross-linking of polymers. A key characteristic of a DC machine is high electrical efficiency; typically this can be 60 to 70%.

Any DC machine, though, has to constantly maintain the accelerating electrodes at a very high voltage equivalent to the beam energy; a 1-MeV instrument produces one megavolt, and so on. As MeV potentials are reached, severe constraints are placed on the designer due to the huge amounts of electrical insulation involved. For this reason, we believe that a10-MeV DC accelerator would be impractical.

DC machines also tend to be very powerful, with typical power ratings of 100 to 200 kW, and thus rather costly, with price tags of $3 million and up for 5-MeV instruments. Thus they tend to have too much beam current for this application, while the low-beam energy affords insufficient penetration. We thus believe that DC accelerators are not applicable to e-beam food processing.

Linear induction accelerators

The linear induction accelerator, hitherto limited to use in high-energy ion and electron-beam physics experiments, has been suggested *(10)* as a viable candidate for industrial irradiation treatment. The hallmark of the LIA is that it provides enormous amounts of beam power; 1.5-MeV, 200-kW machines have recently become commercially available, and 5-MeV, 500-kW machines are feasible. Beam energies higher than this, though, are probably impractical on a commercial scale. Moreover, the LIA is uneconomical to produce in sizes as small as our example. Two hundred-kilowatt machines start at around $2 million. The LIA suffers, then, from the same disadvantages as the DC accelerator, only more so.

We point out, too, that the LIA currently is used only in research and academic applications, unlike the RF linac, which has developed an industrial base due to its extensive medical use. For these reasons, we believe that the LIA will not be a practical e-beam food processor.

The RF linac

An RF linac, unlike a DC accelerator, does not generate a single high voltage and use that to accelerate the electron beam. Instead, it uses the electric fields from internally generated microwaves to accelerate the beam, timing electron pulses such that they extract their energy from the microwaves.

The RF linac has enjoyed extensive industrial development in the medical field as an oncology treatment tool. It is also widely employed as an industrial X-ray source for nondestructive testing (NDT), notably in a low-power transportable form *(4)*. Design and construction of RF linacs is therefore a mature, established technology with several manufacturers and an infrastructure of parts suppliers and technical expertise. Industrial X-ray use especially has spurred lowering of costs.

Typical medical and industrial X-ray linac energies range from 2 to 20 MeV, with beam powers usually around 1 kW. Although this technology is applicable to e-beam processing linacs, which operate at much higher power, it is important to realize that an e-beam processing linac is not just a scaled-up medical linac. Internal parts must be optimized for long-duration high-power use. Larger e-beam machines have recently come into use in the sterilization of medical products

and now have about 10% of the market for this process *(1, 20)*. Users of e-beam sterilization, requiring constant 8- to 16-h/day operation, need greater reliability than a typical medical linac, but they do not need the expensive positioning and dose-monitoring equipment associated with oncology treatment. Manufacturers of these high-powered (10- to 20- kW) machines have therefore learned how to make them to a simpler design at reasonable cost. These will be readily applicable to e-beam food-processing use.

COST ESTIMATES FOR THE RF LINAC

None of this means anything without cost figures. An RF linac is clearly a high-initial-cost item. Once it is installed and running, though, its ability to continuously treat product on a production line will, we believe, reduce per-pound costs to a manageable level. This is demonstrated in the following analysis, using these assumptions:

- Accelerator type: 10-MeV, 8-kW e-beam unit
- Throughput: 10,000 lb/h for 80 h/week, or 40 million lb/year; capitalization period of facility and equipment is 5 years
- System will be installed in an existing production facility

The accelerator does not require a team of specialists to operate it. The industrial user of an e-beam accelerator will require the following:

- The accelerator itself
- A radiation-shielded treatment cabinet (X rays are produced as an inevitable by-product of e-beam treatment)
- Process-monitoring equipment to ensure proper dose
- A conveyor to pass product past the accelerator
- Some training of plant personnel in operation
- Training of a management person in radiation safety
- Regular factory service

We can estimate costs for each of these items.

Initial facility and equipment costs

The cost of the facility includes the accelerator itself, radiation shielding, and the material-handling and process-control systems. We assume that the accelerator will be added to the production line, and that it will not require additional building space. The accelerator electronics requires about 100 ft^2 (ca. 9.29 m^2). Treatment would take place inside a thick lead-walled cabinet, probably about 100 ft^2. The estimated initial cost of $1.2 million is itemized in Table 5. We will include this in annual costs by amortizing the investment over a 5-year period.

For a similar accelerator, an initial cost of $2.7 million has been estimated *(13)*. We believe that this is due to overestimates of accelerator and shielding costs.

Utility costs

Electricity is the main utility cost. Other utility services, such as water, are not significant; all cooling is self contained and included in the cost of the equipment. RF linacs are roughly 20 to 25% efficient in terms of electricity in versus beam power out. An 8-kW beam accelerator will thus require 40 kW of input utility power. At $0.08/kW·h, electricity costs are $12,800/year.

Table 5. Estimated initial e-beam processor costs

Accelerator	$ 700,000
Radiation shielding	200,000
Material handling	100,000
Process monitoring	100,000
Operating capital	100,000
Total initial cost	$1,200,000

Labor costs

Labor costs refer to in-plant operators and supervisors and they are difficult to estimate. Treatment facilities for medical-product sterilization have found it useful to employ a technician with basic electronic and electrical skills, although the technician is not fully engaged in operating or watching the machine. It is possible that existing plant personnel could be trained in these skills. We assign a cost of two technical service persons at $120,000/year, including overhead. In addition, training will be required not only for operators but also for plant managers in areas such as radiation safety; we have estimated this cost at $10,000/year. We assume that the plant will not require additional material handlers for the production line. This yields a total cost of $130,000/year. A cost of $522,000/year has been calculated *(13)* for a freestanding irradiation plant, which requires inclusion of a number of material handlers, plant supervisors, and clerical personnel.

Spare parts and maintenance

Certain costly parts of the linac's internal microwave-generating system wear out, with predictable service lifetimes. We have estimated the yearly spare parts cost at $70,000/year for an 8-kW machine, which includes not only predicted wear items but also an allowance for unforeseen breakdowns. Some savings can be realized here by reconditioning of used components. Typical service contract prices for this type of machine are $40,000 per year, for a total cost of $110,000/year.

Cost summary

Annual costs are summarized in Table 6. Various methods exist of amortizing the initial cost over a 5-year period, depending on

Table 6. Annual cost of e-beam processing, first 5 years

Facilities and equipment	$240,000/yr
Electricity	12,800/yr
Labor	130,000/yr
Maintenance	110,000/yr
Total annual cost	$492,800/yr

interest charges, opportunity cost for borrowing the money, etc. For the purposes of this introductory article, we have chosen simply to divide the initial cost by 5. The informed reader may wish to apply his own calculation.

Total cost for the first 5 years is $492,800/year. At a throughput of 40 million lb/year, this yields:

- Processing Cost:
  1.2 cents/lb, first 5 years.
  0.6 cents/lb thereafter.

This is a very rough estimate. Cost savings could be realized with greater throughput simply by running the accelerator for longer times. Moreover, the cost per kilowatt of beam power goes down as system power goes up, so economies of scale will come into play if larger machines are used. For instance, we have estimated the cost of processing 2 million pounds of hamburger per week, using a 17-kW machine running for 120 h/week, at 0.44 cents/lb.

REVIEW

Food irradiation has repeatedly been demonstrated to be a technically and biologically feasible process; the problems with it now are economic and political. We have demonstrated here that e-beam treatment with an RF linac is a unique form of food irradiation. Biological data show it to be an effective means of removing bacteria from processed meats. E-beam treatment could be used immediately to solve the *Salmonella* and *Campylobacter* problems in poultry, and could be used for the *E. coli* problem in ground beef once treatment is approved. The penetrating range of e-beams from commercially available accelerators demonstrates that the process is ideally suited to these relatively thin meat products, while the processing power available in the beam shows that the accelerators can be used for processing of product in the plant itself. Costs of the RF linac show it to be a viable tool for these applications, with what we believe to be reasonable treatment costs per pound of product. This paper has presented data to support these conclusions with enough information for the reader to perform his own estimates and calculations for his own treatment scenario.

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Chemical Residues in U.S. Meat and Poultry: Suggestions for Improvement in the USDA/FSIS Population–Sampling Programs

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SUMMARY

In response to concern over chemical residues exceeding established tolerance levels, the United States Department of Agriculture (USDA)/Food Safety Inspection Service (FSIS) has developed three population-sampling programs for meat and poultry (Monitoring, Exploratory, and Enforcement programs) to detect and minimize chemical residue violations. Due to a lack of formal risk assessment, doubts were raised in 1985 as to the programs' ability to evaluate efforts to minimize or prevent residues. In spite of ongoing efforts by the USDA/FSIS to improve the programs, subsequent reports and articles have implied continued deficiencies. The goals of this study were (a) to identify areas of needed improvement in the USDA/FSIS population-sampling programs and (b) to provide suggestions for their improvement. Data were obtained from the Residue Violation Information System and included all 1993 violations attributed to the six slaughter classes of adult cattle *(cows, beef cows, dairy cows, bulls/stags, steers, and heifers)* in Texas. The distribution of violative residues in Texas cattle was used as a case example for evaluations and suggestions concerning the enhancement of the present population-sampling programs. To accomplish its goal of preventing chemical residues in foods of animal origin, the population-sampling program will need to implement changes in its recording of nonviolative samples, collection of risk-factor information, classification within factors, and sampling for the monitoring program. With improvement in these areas, this information can be used for risk assessment, management, and communication strategies. Details of the rationale and justification of the proposed suggestions are provided.

INTRODUCTION

National surveys have indicated that consumers perceive the hazard associated with chemical residues in food to be more serious than that of most other food-related issues, including microbiologic hazards *(13)*. In response to concern over chemical residues exceeding established tolerance levels, the United States Department of Agriculture (USDA)/ Food Safety Inspection Service (FSIS) has developed three population-sampling programs for meat and poultry: (a) the monitoring program, designed to provide annual information on violative tissue residue occurrences in specified animal populations and to detect a national problem that affects a minimum of 1% of an animal population of interest, (b) the Exploratory program, designed to study the occurrence of residues for which residue limits have not been established, and (c) the Enforcement program designed to test animals when a problem (elevated prevalence) is suspected based on clinical signs or herd history. These programs are used to detect and minimize chemical resi-

due violations. Testing for and detection of a variety of chemicals have taken place since 1967. Due to a lack of formal risk assessment, doubts were raised in 1985 as to the programs' ability to evaluate efforts to minimize or prevent residues *(11)*.

The National Research Council (NRC) was commissioned in 1983 to evaluate the scientific basis for the current meat and poultry inspection program at that time. The 1985 report identifies 10 optimal characteristics that the chemical residue program should exhibit (see Table 1). The NRC recommended improvement in specific aspects of each of the 10 characteristics, while noting the serious deficiency of (a) a sampling program adequate for prevention, (b) formal risk assessment, and (c) priorities set through an open process. During the last decade, the FSIS has made progress toward implementing some of the recommendations.

One of the improvements made by the FSIS was the creation of the Residue Violation Information System (RVIS) in 1988 *(3)*. The RVIS is a database that facilitates the collection, analysis, and dissemination of information about chemical residue violations in domestic meat and poultry. Specifically, the RVIS is designed as a management tool for the history tracking of residue sources and contains general information regarding the species, responsible source, violative chemical type(s), and sample date for each animal with a violation detected. Cooperatively, the Food and Drug Administration (FDA) has access to the information, which they use when deciding which violations require additional traceback and investigation. Ideally, the RVIS should contain data that can (a) provide a clear picture of the chemical residue situation in the U.S., (b) illustrate trends as a basis for judgment of changes in residue patterns, and (c) indicate and predict the occurrence of a problem. If areas of enhancement were identified and implemented, the RVIS could more effectively and efficiently acquire, transfer, and analyze data to be used for risk assessment, management, and communication strategies.

Table 1. Optimal Characteristics of a program to assess and manage chemical residues in tissues, as recommended by the National Research Council in 1985 *(11)*

	Optimal characteristics
1.	Public protection as the major objective
2.	Focus on prevention
3.	Clear tolerance levels available on all important substances
4.	A sampling scheme adequate for prevention
5.	Formal risk assessment
6.	Adequate analytical tools and testing capacity
7.	A trained inspection service
8.	Close links to regulatory enforcement
9.	Useful information system
10.	Priorities set through an open process

In spite of ongoing efforts by the USDA/FSIS to improve the programs, subsequent reports and articles have implied continued deficiencies *(6, 7, 8, 12, 14)*. It is frequently noted that the surveillance data are products of biased sampling and that the monitoring data are not intended to measure the magnitude of a problem that may be detected *(4, 5, 9, 11)*. With such apparent restrictions to analyses and inferences, it has become essential to evaluate the current population-sampling programs' data and make recommendations for improvement. Following the NRC findings reported in 1985, there have been no additional published studies that have specifically addressed these potential limitations. Therefore, the goals of this study were (a) to identify areas of needed improvement in the USDA/FSIS population sampling programs and (b) to provide suggestions for their improvement.

MATERIALS AND METHODS

Data for this study were obtained from the RVIS. All violative samples from cattle originating in Texas during 1993 were included. The specific data collected were state of animal origin, date collected, project that sample was collected under, regional and sample identification numbers, source type, residue name, and slaughter class. On-line access to the National Computer Center and the RVIS facilitated the retrieval of individual animal records. Data were then compiled on a microcomputer. The distribution of violative residues in Texas cattle during 1993 will be used as a case example for the subsequent evaluations and suggestions.

RESULTS

The data acquired from the RVIS are found in Table 1. The table includes all 1993 violations attributed to the six slaughter classes of adult cattle *(cows, beef cows, dairy cows, bulls/stags, steers and heifers)* in Texas. These data indicate that (a) cows had the most detected violative chemical residues, (b) cull animals (all cows and bulls/stags) had more detected residues than did market beef (steers and heifers), (c) penicillin was the most frequently identified chemical in all the classes except steers, where oxytetracycline was the primary chemical identified and (d) multiple residues in individual ani-

Table 2. Distribution of violative residues in Texas cattle during 1993 by identified chemical

	Cattle slaughter class					
	Cows	*Beef Caws*	*Dairy Caws*	*Bulls/Stags*	*Steers*	*Heifers*
	No. of animals with violative residues					
	111	1	38	6	10	7
Identified chemical[a]	No. of violative residues[b]					
Chlortetracycline	3	0	0	0	0	0
Erythramycin	2	0	0	1	2	0
Gentamicin	1	0	0	0	2	0
Neomycin	2	0	1	0	2	1
Oxytetracycline	33	0	8	1	5	1
Penicillin	51	0	19	3	3	5
Streptamycin	35	1	8	1	0	2
Sulfadimethaxine	4	0	1	0	1	0
Sulfamethazine	5	0	0	0	2	0
Tetracycline	2	0	7	1	1	0
Tatal	138	1	44	7	18	9

[a]Identified chemical: a compound name which may include the parent campound, its metabolites, and/or another substance farmed in ar an faad because of the campaund's use ar inadvertent intraductian.

[b]Vialative residue: the presence af a chemical in edible tissues of the tested animal at levels abave the established tolerance ar actian level. An animal may have had multiple violations (>1 identified chemical).

mals were found in all slaughter classes except *beef cows*.

These findings can shed valuable light on the residue situation in Texas. Similar evaluations can be done for other states or regions, but this information is not sufficient as a basis for risk assessment or generating prevention programs. However, with improvement in specific areas, this information can be used for risk assessment, management, and communication.

DISCUSSION

The largest obstacle to conducting a comprehensive and meaningful analysis on the RVIS data was the lack of available denominators used in incidence- and prevalence-rates equations. The denominator comprises the population at risk for a given time frame. As in the case example, only the total numbers of animals with violations could be calculated, restricting the results to a descriptive analysis of proportional distributions among chemical residue violations. Without a readily available record of all animals (nonviolators as well as violators) tested for residues and which specific chemicals were evaluated, a reference population or a population at risk cannot be ascertained and violation rates cannot be calculated. Risk assessment and management are dependent upon knowing the population at risk or the reference population.

Another major contributor required for risk assessment is adequate sampling. The present population-sampling program includes Monitoring, Enforcement and Exploratory sampling. The Enforcement testing program is designed to be biased toward sampling suspect or unhealthy-appearing animals. To study the occurrence of chemicals that have no established residue limits, the Exploratory program is accomplished by sampling from a designated population. Of the three sampling programs, it is the Monitoring program, with its inclusion of carcasses passing FSIS inspection, whose present sampling is intended to provide baseline information about residue problems in an animal slaughter class. It is not, however, designed to determine the magnitude of a problem *(4, 5, 8, 11)*. In addition to the relatively minute number sampled in some slaughter classes, the reference population bias created by randomly sampling only

healthy-appearing animals prohibits the conduct of risk assessment and management using data from the present Monitoring program.

Another challenge is in the differentiation of animal slaughter classes and source types. The three slaughter classes for cull cows (Table 2), *cows, dairy cows, and beef cows,* are not mutually exclusive. The *cows* class was used exclusively until 1991 when a study to evaluate possible differences between residue occurrences in dairy and beef cows commenced *(7, 9)*. As is evident by the continued use of the *cows* class, the classification of dairy and beef cows within their respective classes has not been uniformly adopted. Though not evident in the case example, a similar overlap of classification is also exhibited by the source types, *producer/independent grower* and *dairy farm*. *Dairy farm* is actually a subset of the *producer/independent grower* source type and dairy cows have been recorded as originating from either source. The inconsistent use of the slaughter classes and source types warrants correction to improve efficiency and/or specificity of data collection.

The present population-sampling data contained within the RVIS serve an important role in meeting FSIS and FDA regulatory and enforcement objectives. While acknowledging personnel and budgetary constraints, it is important to indicate that the ideal database would contain not only the outcome of interest (residue or not), but also the factors that may cause or may be associated with residue occurrences. The data within the RVIS lack the additional information needed for the identification and evaluation of potential risk factors for the occurrence of violative chemical residues, such as a source's management practices or an animal's health record.

Suggestions for Improvements

To facilitate the calculation and extrapolation of results for either a general or a specific population, a reference population and/or population at risk must be defined. Basic information such as species, slaughter class, state of origin, and residue tests performed, recorded for all carcasses sampled within the population-sampling programs, would provide a functional denominator. With such a denominator, Table 2 would contain a picture of how the cattle with violations compare to the broad cattle population sampled. The annual population of sampled animals could serve as a cross-sectional study of violative residues with the prevalence of a violative chemical residue as an outcome of interest. By implementing follow-ups on selected violators and nonviolators, there would also be the possibility of conducting nested case-control studies to elucidate risk factors associated with the occurrence of violative chemical residues.

Collection and recording of adequate data are vital, but inadequate sampling design can undermine the analysis of the most comprehensive data. To reduce the monitoring program sampling bias and its effect on interpretation, sampling should include random selection from an entire slaughter class population, irrespective of the disposition of the carcasses. In addition, sufficiently increasing the annual sample size would potentiate the determination of an identified problem's magnitude. Implementation of these two recommendations is essential to the pursuit of a statistically based sample that could be utilized in the assessment and management of chemical residue risks.

Efficiency and accuracy of data entry are often the result of functional definitions and classifications that employ specificity and mutual exclusiveness. The continued use of the less specific *cows* class renders the data collected under the specific *dairy* and *beef cows* classes as less useful subclassifications in analyses. The criteria for classification of animals into slaughter classes and source types need to be concise and adhered to closely. If more specific classification of information is available and desired, the use of the more general classes should be kept to a minimum, if not eliminated.

Coupled with adequate sampling, additional information, such as the demographics and management practices of the establishments of origin for both violative and nonviolative animals, would allow for epidemiological analysis of risk factors that may be preventable or alterable. The FDA maintains its own Tissue Residue Information Management System (TRIMS) that contains data, including risk factor information, related to selected residue violations. Interpretation and extrapolation of TRIMS data analyses are limited by the selection bias and lack of controls imposed by time and budgetary constraints put on FDA field investigations *(2, 10)*. The expansion, including sampling, and combination of TRIMS and RVIS data could facilitate risk analysis and prevention programs development *(1)*.

In conclusion, the need for continued improvement in the population-sampling programs is evident by their data and sampling deficiencies. The ultimate goal of the programs is to garner information that can be used to prevent chemical residues in foods of animal origin. To accomplish its goal, the population-sampling program will need to implement changes in its recording of nonviolative samples, collection of risk factor information, classification within factors, and sampling for the monitoring program. Once risk assessment and management can be employed and appropriately communicated, consumer decision making regarding risk of chemical residue exposure will be influenced more by fact than perception.

Acknowledgments

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Regulatory Reform Recommendations

FSIS and FDA are proposing a number of reforms that will reinvent how the two agencies regulate. The reforms described in this report will result in more productive use of FSIS' and FDA's resources, reduce unnecessary burdens on industry, expand consumer choice in the marketplace, and, most importantly, improve food safety.

Food Safety: HACCP and Performance Standards

Many authorities, including the National Academy of Sciences (NAS), the National Advisory Committee on Microbiological Criteria for Foods (NACMCF), the Codex Alimentarius Commission, and the Vice President's National Performance Review have recommended fundamental changes in the existing food safety system. Those recommendations urge adoption of a preventative system of quality control known as HACCP (Hazard Analysis and Critical Control Points).

HACCP consists of several internationally recognized principles, including the identification of safety hazards, the establishment of controls that focus on preventing those hazards at critical control points, and the monitoring of controls during operations, to provide immediate information to processors as to whether their operation is under control. Under a mandatory system, the results of the monitoring are documented in records to which government inspectors or investigators have access. In this way, the burden of operating a HACCP system is related to the nature of the hazards presented by a food. The burden on the processor of a low risk food may be as simple as monitoring and controlling the temperature or pH levels of the product and recording the results. If there is a deviation that poses a safety risk, the data collected would enable the processor to identify corrective action more easily. The end result is continual self-monitoring of the food's safety that will prevent problems and facilitate necessary government oversight.

1. Implementation of HACCP-Based Systems to Ensure Food Safety

Background: The Federal government is charged by law with protecting consumers from unsafe, unwholesome and mislabeled foods. The United States Department of Agriculture's Food Safety and Inspection Service (FSIS) implements the Federal Meat Inspection Act, the Poultry Products Inspection Act, and the Egg Products Inspection Act. Under those laws, FSIS regulates meat, poultry, and processed egg products. The Department of Health and Human Service's Food and Drug Administration (FDA) regulates all other food products primarily under the Federal Food, Drug, and Cosmetic Act.

Although the two agencies' laws are similar in many respects, each has its own kind of "inspection." FSIS inspects daily all meat, poultry, and processed egg products, and the establishments producing those products, to ensure the products comply with the law before they are sold in commerce. FDA, on the other hand, inspects processing establishments less frequently, generally targeting specific establishments. The relatively small number of FDA inspectors must give priority to products and establishments known to pose a risk of being in violation of the law. FDA's food program, faced with an increasing workload, is conducting fewer inspections of food establishments each year.

To carry out its statutory mandate to ensure a safe food supply, FDA operates a comprehensive regulatory program for the foods it regulates. This program includes: (1) mandatory, unannounced inspections of the domestic industry; (2) examinations of imports into the U.S.; (3) sample analysis; (4) administration of Federal-State cooperative programs for molluscan shellfish, milk, and retail food; (5) training and technical assistance to states to help them operate their own programs; (6) consumer education; and (7) research.

Although the nation's food supply overall is safe, outbreaks of foodborne illnesses (from sources such as *E. coli*, *Listeria monocytogenes* and *Salmonella*) do occur. FDA tries to "catch" potential microbiological hazards and other food safety problems during its infrequent inspections. This system is neither as effective or efficient as

it could be. FDA must have a better means to ensure that food processors are taking appropriate steps to protect consumers.

FSIS has authorities and programs for meat and poultry products under its jurisdiction similar to FDA's. However, FSIS historically has devoted most of its resources to in-plant inspection activities. Consequently, the present meat and poultry inspection program is based on intensive command-and-control oversight of plant operations and heavy reliance on detecting and correcting problems with plants and products after they occur, instead of preventing them in the first place. The current system does not effectively target control and reduction of the harmful bacteria on raw products that pose the most important food safety hazards for meat and poultry. The result is a resource-intensive system that provides inadequate incentives and flexibility for meat and poultry plants to address the most significant food safety hazards in innovative ways.

Proposals and Justification: FDA and FSIS intend to implement HACCP-type performance standards and flexible science-based systems of preventative controls for, at a minimum, the meat, poultry, and seafood industries. In addition, FSIS will eliminate obsolete or counterproductive command and control measures.

Seafood: Although NAS concluded that commercial seafood is generally safe, FDA is implementing HACCP in this industry first because of the wide array of hazards that can adversely affect seafood safety. Because seafood consists of hundreds of species from every part of the globe, is predominantly wild-caught, is the most perishable of all flesh foods, and is consumed raw more than other flesh foods, the regulation of seafood will always present special challenges. Thus, FDA's seafood program must remain flexible and dynamic and seek ways to maximize efficiencies and effectiveness. HACCP is the best way to achieve these goals.

Because over half of seafood consumed in the U.S. is imported, FDA's regulation requires that all seafood, both domestic and that which is imported into the U.S., be processed under HACCP controls. In this regard, the U.S. is conforming to a growing trend among our trading partners in requiring HACCP control of seafood.

At the same time, the Department of Commerce will privatize its voluntary fee-for-service seafood inspection program presently operated by the National Oceanic and Atmospheric Administration (NOAA). The voluntary program promotes domestic and foreign commerce in American seafood by inspecting for the safety, wholesomeness, and acceptability of products through contracts with processors that purchase their service.

Meat and Poultry: On February 3, 1995, FSIS announced sweeping new food safety proposals in the Federal Register that would "reinvent" federal meat and poultry inspection. These regulations represent a fundamental shift in the FSIS regulatory approach from heavy reliance on prescriptive command and control regulations and requirements to greater reliance on food safety performance standards that plants must meet to improve food safety. The proposed new system would focus on preventing problems before they occur, and provide greater flexibility than the current regulatory scheme, thereby making food inspection more effective and efficient.

Other Foods: For the rest of the food industry, which is under FDA's jurisdiction, the FDA has (1) issued an advanced notice of proposed rulemaking (ANPR) to gather input from interested parties on the expansion of the HACCP concept to "land food" and (2) has begun a voluntary pilot program to assess the feasibility of HACCP for products other than seafood.

Impact: The HACCP rulemaking would improve food safety by:

- Building the principle of prevention into food production operations, and into the USDA and FDA regulatory programs;
- Stimulating improvement in food safety practices by setting reasonable performance standards that all plants must meet; and
- Fostering scientific and technological innovation within the meat and poultry industry by removing unnecessary regulatory obstacles to innovation.

Although there will be some initial costs to establishing and implementing a HACCP system, the benefits to public health and industry are many, including a reduction in foodborne illnesses and increased public confidence in the food supply. Additionally, the American food industry should benefit from harmonization with foreign countries' requirements for a HACCP-type system and from overall improvement in the safety of food. There also should be greater efficiencies in the conduct of Federal regulatory oversight, permitting more assurance of food safety despite shrinking Federal resources.

Implementation and Timeline: FDA published its final seafood HACCP regulations on December 18, 1995 (NOAA published a notice regarding the restructuring of its fee-for-service seafood inspection on September 22, 1995). FSIS is preparing the final HACCP regulations for meat and poultry. FSIS reopened the comment period for its proposal on August, 1995, to permit additional comments and dialogue with interested parties on issues raised during the initial comment period. The comment period remained open through November 13,1995. FSIS is working to review all comments and complete the rule as quickly as possible. Timing and structure of a proposed HACCP rule applicable to other segments of the food industry depends on analysis of the comments received in response to FDA's ANPR and on the results from the on-going pilot program.

Call for Symposia

1997 IAMFES Annual Meeting
July 6 – July 9, 1997
Orlando, FL

The Program Advisory Committee invites IAMFES members to submit symposia proposals for presentation during the 1997 IAMFES Annual Meeting. Proposals may be submitted by mail to IAMFES headquarters (for receipt prior to June 15, 1996) or by presenting the proposal to the Program Advisory Committee at its meeting on Sunday, June 30, 1996 in Seattle, WA. Proposals may be prepared by individuals or by committees.

Generally, each symposium will be a half-day session (8:30 to Noon or 1:30 to 5:00) with a scheduled break. Symposia emphasize a central theme and usually consist of six 30-minute presentations by each speaker. Proposals will be evaluated by the Program Advisory Committee for relevance to current science and to IAMFES members.

Guidelines for submitting symposia proposals: Use the printed Symposium Proposal form that appears on the following page or reasonable facsimile. The following information must be included: (1) Title of Symposium, (2) Names, telephone numbers, fax numbers, and complete mailing addresses of the person(s) organizing the symposium and conveners of the session, (3) Topics for presentations, suggested speakers, affiliations, complete addresses, (4) Description of audience to which this topic would be of greatest interest, and (5) Signature of submitter.

Organizers for accepted proposals will be contacted after the 1996 Annual Meeting to secure speaker commitment.

Questions? Contact the Program Advisory Committee Chairperson for the 1997 IAMFES Annual Meeting:

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James A. Sharp has been promoted to vice president of Carl Zeiss with worldwide responsibility for the Microscope Division, headquartered in Jena, Germany. Mr. Sharp assumed his position in Jena as of January 1, 1996. Formerly he was president and general manager of the Microscope Division of Carl Zeiss, Inc., Thornwood, NY, responsible for microscopy sales, marketing and service in North America.

The new general manager of the Microscope Division at Carl Zeiss, Inc., Thornwood, NY, is Edward T. Mancini. Mr. Mancini was formerly group product manager for clinical microscopy and histology, plus OEM sales at Carl Zeiss, Inc. His background includes the marketing of a broad range of laboratory and industrial instrumentation.

University of Minnesota's Food Science and Nutrition Honored for Academic Excellence

To recognize and celebrate the excellence in scholarship of the University of Minnesota's Department of Food Science and Nutrition, President Nils Hasselmo honored faculty and spouses of the Department at a dinner on January 9. President Hasselmo presented a plaque to the Department, citing it "as a model of scholarly leadership and academic excellence."

This is the second year of these award dinners, which were established to recognize highly-ranked graduate programs within the University. Only three departments on the St. Paul campus have been so honored.

Also paying tributes were the Dean of the College of Human Ecology and the Associate Dean for Extension of the College of Agricultural, Food, and Environmental Sciences, who addressed the contributions of the Department to the University and academia; and Frank Busta, Professor and Head of the Department, who recognized the accomplishments of the Department and its faculty members.

Dairy Management Inc. Names Two Key Communications Executives

Dairy Management, Inc. (DMI), named Linda Eatherton and Michael Braden to two newly created communications posts.

Linda Eatherton joins DMI as vice president, public and industry relations to lead the development and implementation of integrated external communications for dairy products and industry-related issues. Most recently Eatherton was corporate director, communications for Hyatt Hotels Corporation where she led the company's communications department with responsibility for external media relations, brand marketing communications and crisis communications. Prior to Hyatt, she held corporate communications posts for Kraft Foods in Northfield and Glenview, IL with similar responsibilities for the company's retail cheese, dairy foods and frozen foods business.

In addition, Michael Braden has joined DMI to become director, communications services. Braden will lead the organization's internal communications efforts with chief responsibility for all DMI member board and producer communications. Prior to DMI, Braden was a vice president with Ketchum Public Relations/Chicago, where he was responsible for corporate, product and issues management for clients that included Kraft Foods, Georgia Pacific, and IBM.

Quality Chekd Dairy Products Association Names New Officers

Quality Chekd Dairy Products Association announces a new slate of officers and directors for its upcoming fiscal year. The representatives will lead the association of independent dairy processing companies toward its goals for the year, which include continued excellence in achieving higher-than-industry standards, a continued strong marketing program, and expanded training and professional education.

The association has re-elected Steve Turner, of Turner Dairies, Memphis, TN, as its president. The lineup also includes Steve Schmid, association vice president, of Smith Dairy, Orrville, OH; Paul Arbuthnot, treasurer, of Sunshine Dairy, Portland, OR; and Wayne Newson, secretary, of Beatrice Foods Dairy Division, Toronto, Ontario.

Dennis Winter, of Super Store Industries, Stockton, CA, was newly elected to the board of directors. Re-elected to the board were Jim Miklinski, Wendt's Dairy, Niagara Falls, NY, and Paul Arbuthnot.

California Milk Advisory Board Names Dairy Herd Health and Food Safety Research Committee

Eight California dairy producers have been appointed for a one-year term to the California Milk Advisory Board's (CMAB) Dairy Herd Health and Food Safety Research Committee, which serves as the CMAB's liaison to the California Dairy Research Foundation in Davis. They are: Richard Lutz of Oakdale; Ray Wilson of Gerber; Petey McCune of Corona; Randy Mouw of Chino; Gregory Dias, Jr. of Visalia; Dale Matney of Ceres and Tony Souza, Jr. of Tulare. The appointments were made by CMAB Chairman Jeffery Poston of Tulare.

The committee's role is to evaluate dairy health issues and proposed academic and non-academic research proposals dealing with these issues. These proposals are evaluated in terms of meeting producer needs for maintaining herd health and high quality production.

Established in 1969, the California Milk Advisory Board is headquartered in Modesto, California and is the largest marketing board in the Western United States, serving more than 2,300 dairy families.

Hall, Walgrove Elected to ADPI Board of Directors

John E. Hall, vice president of sales & marketing, The Milnot Company, St. Louis, MO, and George R. Walgrove, Jr., general manager & treasurer of the Maryland & Virginia Milk Producers Cooperative Association, Inc., Reston, VA have been elected to the Board of Directors of the American Dairy Products Institute, the national trade association of the processed dairy products industry.

Hall, who has been with The Milnot Company for 4 years, also serves as Chairman of the Institute's Evaporated Milk Committee. His Board term will expire in 1998. Walgrove has 38 years experience in the dairy industry, including 12 years with the MD & VA Milk Producers Cooperative Association, Inc. He is completing the unexpired term of ADPI past-president Robert E. Vaughn.

The American Dairy Products Institute was founded in 1986 by a merger of the American Dry Milk Institute and the Whey Products Institute. As the national trade association of the processed dairy products industry, ADPI represents firms associated with processed dairy products in all matters affecting the industry including government liaison, market development and promotion product standards, and consumer relations. The American Dairy Products Institute is headquartered in Chicago.

'Mad Cow Disease' Not a Threat in U.S., Says Penn State Scientist

Speculation in the British tabloid press over "mad cow disease," a degenerative brain disorder that causes cattle to exhibit oddly belligerent behaviors, has triggered questions about whether humans can contract the disease by consuming beef products. A veterinary virologist at Penn State's Animal Diagnostic laboratory says there is no evidence to suggest that the disease can make the jump across species to infect humans.

"There is no epidemiological evidence to suggest this disease in animals is tied to similar diseases in humans," says Anthony Castro, director of the laboratory.

Mad cow disease, clinically known as bovine spongiform encephalopathy (BSE), produces the same type of lesion in the brain as three very rare human ailments: Creutzfeldt-Jakob syndrome, kuru, and Gerstmann-Straussler syndrome. Castro emphasizes that there have been no cases of BSE in the United States since the ailment was first identified in 1986.

"The disease is not genetically inherited, and it is not transmitted horizontally. That means cows can't get it from standing next to another cow," says Castro, who together with Bill Stoffregen, a senior majoring in veterinary science, have just completed an extensive review of BSE. Signs of the disease in cattle include unsteady gaits, excessive salivation, head-butting, belligerence and paralysis.

BSE originated in Great Britain. Scientists theorize the disease came from feeding dairy cattle meat and bone meal derived from the carcasses of sheep infected with scrapie, a University spongiform encephalopathy which occurs in certain breeds of sheep. "In the United States, cattle are currently not fed diets derived from sheep carcasses," Castro explains. "In fact, rendering plants in the U.S. will not take sheep carcasses to manufacture by-products."

In addition, slides of brain tissue of any cattle that have died exhibiting neurological signs are sent for BSE testing to the National Veterinary Services Laboratory in Ames, Iowa. The U.S. Department of Agriculture also bans the import of cattle and other products derived from cattle from countries where BSE has been diagnosed.

Castro says both scrapie and BSE are found only in the brain and spinal tissue of affected animals. The infectious agent is believed to be an abnormal protein called a prion. The protein is extremely resistant to heat and irradiation and no vaccines exist to prevent the disease.

"BSE doesn't pose a threat in the U.S. but as a precaution, people should not eat cattle or sheep brains, which are products that used to be commonly stocked in some stores," Castro warns. "There is no danger from beef and sheep muscle meats like steak, lamb and mutton."

Although scientists are unsure how the prion protein causes BSE and the rarer human spongiform encephalopathies, Castro says research into these diseases may hold clues as to what causes other neurological diseases such as multiple sclerosis and Parkinson's Disease.

"The evidence is still not all in, but BSE is unique to the bovine species and there is no evidence it can be passed to humans," Castro says.

New Edition of *Food Irradiation*

Morton Satin, Director and OIC of the Agricultural Services Division of Food and Agricultural Organization in Rome, a subdivision of the UN, has completely revised his guide book to food irradiation.

Addressing the vocal opposition to the process of food irradiation, Satin, in **Food Irradiation: A Guidebook**, takes the reader through an updated, detailed, readable survey of the past, present and future of food irradiation. Comparing the opposition to food irradiation to the opposition an earlier generation had towards pasteurization of milk, Satin draws attention to the safety and practicality of food irradiation as a tool to prevent foodborne diseases, to improve food safety and to increase product shelf life.

Satin also thoroughly explains the process of irradiation, demystifying what food irradiation entails and how it works to prevent contamination in clear, plain-language text. Anecdotal material and recent examples of preventable foodborne illnesses receiving national attention focus the reader's attention on how important food irradiation is to consumer safety.

While Satin clearly supports the safety and effectiveness of food irradiation, he has chosen a logical and noncontroversial path for advocacy: He suggests that, since the process has been found safe and effective by acceptable scientific standards and has obtained government approval, the next step is to offer consumers a free and

open choice–products in the marketplace made safer by the process, rather than allowing unscientifically based arguments to withhold products treated by the process from the open market.

This new book is now available from Technomic Publishing Company, Inc., 851 New Holland Ave., Box 3535, Lancaster, PA 17604, U.S.A. Phone: 717-291-5609 (Toll-Free in the U.S./Territories and Canada: 800-233-9963), Fax: 717-295-4538, E-Mail: marketing@techpub.com.,WWW Site: http://www.techpub.com.

FDA Acts on AFFI's "Healthy" Petition Frozen Products would have Parity with Raw

In response to a petition filed by the American Frozen Food Institute (AFFI), the Food and Drug Administration (FDA) is proposing to revise its food labeling regulations by amending the definition of the term "healthy" to permit frozen fruits and vegetables to bear this term on food labels. FDA published its proposal on February 12, 1996 in response to a petition AFFI filed with the agency in 1994.

FDA said in the proposal, "AFFI... stated that the nutrient profile information for frozen products submitted in its database proposal shows that the nutrient profile information on frozen vegetables does not differ significantly from the nutrient profile information for fresh products, and that in some cases the nutrient levels in frozen products exceed the nutrient levels in fresh products."

"FDA reviewed the data presented in AFFI's supplemental comments comparing nutrient profiles of selected raw fruits and vegetables and frozen, single ingredient versions of the same fruits and vegetables. While only preliminary, the data does support AFFI's argument that blanching and freezing do not significantly change the nutrient profile of fruits and vegetables," FDA said.

"The higher nutrient levels found in the frozen version of the food are likely attributable to the fact that unprocessed fruits and vegetables may lose some of their nutrients over time or under certain storage conditions," FDA asserted.

"Further, based on these data, the agency tentatively concludes that in cases where the nutrient profile of a single ingredient, frozen fruit or vegetable product is comparable to the nutrient profile or the raw version of the same fruit or vegetable, the single ingredient, frozen fruit or vegetable product would likely have the same effects, and could be used interchangeably in the diet to achieve dietary goals, as the raw version of the fruit or vegetable. Precluding such foods from being termed 'healthy' could undermine an important element of current dietary guidance," FDA said.

FDA went on to say that the agency" does not have information comparable to that submitted by AFFI to support extending this exemption to all single ingredient processed fruit and vegetable products."

FDA tentatively concluded in the proposal that frozen fruits and vegetables should not be barred from bearing the term "healthy," "...especially when the foods are comparable to, and are just as useful as raw fruits and vegetables in assisting consumers in structuring diets that achieve dietary goals. Furthermore, consumers should be informed that these foods serve as appropriate and useful alternatives to raw fruits and vegetables in constructing diets consistent with current dietary recommendations."

Showcase Takes Healthy Eating — U.S. Style — to Asia

Tofu, fresh fish, rice... Asia has in the minds of many long been synonymous with healthy eating. Until recently, however, foods labeled as "low fat," "reduced calorie" or "organic" were hard to find in Asian stores or markets. Like the rest of the world, Asian consumers are now clamoring for these foods. The Traveling Healthy Showcase is prepared to help U.S. companies take advantage of this demand.

Scheduled for May 29 - June 12, 1996, the showcase will take U.S. products to Hong Kong; Manila, Philippines; and Jakarta, Indonesia. There, the products will be displayed before pre-qualified importers and distributors, who will evaluate each of the products for their taste, packaging and overall competitiveness.

Companies participating in the showcase are encouraged but not required to attend. Those attending will have the opportunity to meet one-on-one with interested importers and distributors; those not present will receive their product evaluations at the end of the showcase. Companies may sign up for one, two or all three of the showcase locations. The fee to participate is $300 per country or $750 for all three, plus freight and travel costs.

For more information, please call David Manson at MIATCO at (312) 944-7777 ext. 215.

Focus, Inc. Introduces Investigational Site Newsletter; Free Premier Issue is Offered

Focus, Inc., a company committed to provide cutting-edge investigational site training, is pleased to announce the publication of their new bi-monthly newsletter, *The Clinical Trial Advantage*. The newsletter is designed to give investigational site professionals strategic information to help them better conduct clinical trials. A free issue of the Clinical Trial Advantage can be obtained by contacting Focus, Inc. at (913) 341-0882.

The newsletter covers such topics as: business builders for the investigational site, high-impact patient recruitment strategies, techniques to control costs at the investigational site, tips to improve quality, and productivity sponsor and CRO profiles, site selection trends, and how to identify Phase I-IV study opportunities.

Focus, Inc. provides training and educational services to investigational sites throughout the United States. Focus trains sites to reach their maximum clinical trial potential by teaching practical tools for marketing and networking, strategic planning, budgeting, quality assurance, patient recruitment and productivity. To subscribe or to request a free copy of the premier issue, please contact a Focus representative at (913) 341-0882, or fax (913) 341-3025. The address is 10308 Metcalf, Suite 236, Overland Park, KS 66212.

USA Today Reporter Discusses Food Safety Issues and the National Media

Communicators who work with scientists in speaking with the media must spend more time developing messages that inform and engage readers, according to Anita Manning, health reporter for USA Today. Too much detailed science, she says, can be intimidating and does not always best serve the issues or the reader.

"When putting together stories involving food safety and health issues, I spend too much time sifting through medical jargon," Manning said. "The scientists that I'm dealing with believe they are being specific and clarifying issues. But a scientific statement that clarifies information familiar only [to scientists] confuses my readers," said Manning at the January 23 meeting of the AHI Food Safety Network.

The most effective way that communicators involved with food safety can address their issues is by presenting reporters with clear, concise messages that are backed by scientists with excellent credentials, according to Manning.

Because sound science is vital to food safety and health reporting, she said that it is essential that groups support their messages with scientific spokespeople who are recognized and have sound credentials. She noted, however, that "even with well-qualified scientists speaking about a particular position, I almost always run into the problem of dueling scientists. When this happens – and it seems to happen a lot with stories on a tight deadline – I make sure to address each side's position even-handedly in the story. Other than that, there is little else I can do."

The issue of scientists opposing each other in the media is an interesting one, Manning said, and is a reflection of how political reporting about food and health has become.

"I can tell you that dueling scientists frustrate readers," Manning said. "But it's a difficult problem for a reporter. It seems that everyone has their own agenda."

Reporters try to present the facts objectively, she said, by checking with several sources about a group's motivation or special interest. While this doesn't preclude the problem of dueling scientists, Manning says it does help put certain remarks in context.

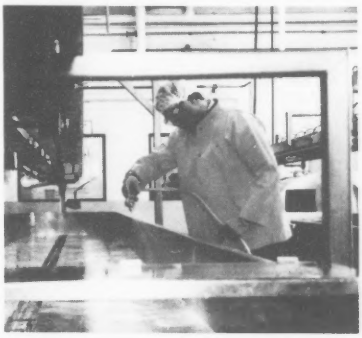
At the end of the day, Manning said, the public still wants to know what the scientific community has to say – whether dueling or not. "People are frustrated by too much conflicting information, but they still believe scientists who say they have reviewed this, studied this and believe this."

Manning also said that she believes the trend toward sensationalizing the news "has peaked." The public, she says, sees this type of reporting as alarmist and rather manipulative and want objective news sources.

Manning also provided meeting attendees with topics she thinks may attract media attention in 1996: Antibiotic resistance; "Techno-food," or genetic engineering and the creation of synthetic food products; Irradiated foods; Labelling issues; Efforts to regulate the development of Hazard Analysis or Critical Control Points – called HACCP – along the food chain, especially in light of budget cuts; Children's health issues regarding water and food safety; and Organics, pesticides and chemical residues in food, water and soil.

Manning also suggested that stories about the global community are hot this year, and foresees coverage of food issues and technologies that "help feed hungry people in foreign countries."

Industry**Products**



Ecolab

Thin Film Cleaning Improves Labor Productivity by 20%

Thin Film Cleaning, or TFC, a unique triple solvent-based cleaning system combined with superior surfactant technology employs a "thin film" application that surpasses traditional foam cleaners for environmental sanitation in several ways. Unlike standard foam, TFC is sprayed evenly through a FlatJet® nozzle. That means faster passes and wider coverage to save time and labor.

TFC coats evenly with a thin film as opposed to a foam application. Less product is used to cover a given area. For example, 1.1 gallons of TFC will cover the same area as 2.3 gallons of standard foam product. This helps sanitation crews get the maximum effect from a minimum amount of product and application time. It reduces overall cost because you use less product per application and total cleaning time is greatly reduced.

Thin Film Cleaning can boost labor productivity by 20%, a significant factor in the overall management of sanitation costs.

New chemistry in TFC allows the film to remain wet and active on the surface being cleaned for up to 30 minutes, compared to 3-5 minutes for traditional foam. This longer contact time makes TFC effective with just a single application. And unlike standard foam, TFC rinses easily without clogging drains.

FlatJet® is a registered trademark of Spraying Systems Co.®

Ecolab, St. Paul, MN

Reader Service No. 301

New Signature Care™ Pest Service Program Developed Specifically for the Food Processing Industry

Food processing companies can now get unmatched protection from food related pests thanks to the new Signature Care™ IPM Partnership Program from Copesan Services, a nationwide leader in pest management services.

"Superior pest management requires a working partnership between the food processing company and their pest management firm," says Ted Bruesch, Director of Technical Support for Copesan. "Our new Signature Care Program establishes a working partnership and combines it with state-of-the-art pest management techniques, including advanced Integrated Pest Management (IPM) practices. The result is a pest management service fully backed with written performance standards and guarantee. Signature Care™ protects the environments and products of food processing plants, and the firm's reputation."

The success of Signature Care™ is based on four program principles: Consistency, Accountability, Responsiveness and Effectiveness, Bruesch adds. Every Signature Care™ Program is custom designed for each specific client and their facilities.

IPM Specialists providing Signature Care™ service must first complete Copesan's required training and certification exam covering food plant pests, IPM, AIB/ASI standards and Food and Drug Administration GMPs. Completion of the Purdue University Food Plant Pest Management training program is accepted for part of this certification requirement. Rigorous and ongoing training assures that all Signature Care™ IPM Specialists are skilled in performing inspections, providing service and meeting regulatory requirements and contract inspection service standards. Signature Care IPM Specialists must also undergo continual training annually.

A nationwide network of more than 100 degreed Copesan technical experts in entomology, biology and other pest-related sciences provide superior technical support for Signature Care™.

Copesan Services, Brookfield, WI

Reader Service No. 302

Handwashing is Helped by Glowing "Germs"

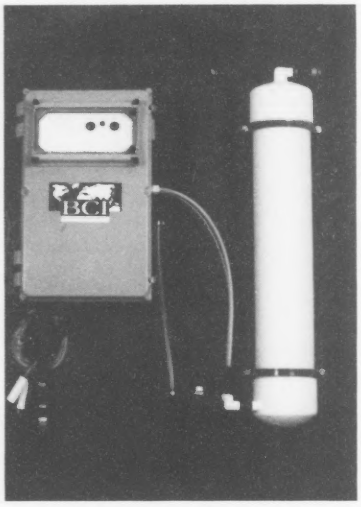
Cross contamination has got to be seen to be believed. That's why a hallowed training device has been used to show food workers how colonies of bacteria grow in a petri dish they have touched with their bare hands. The trouble with this demonstration is you have to wait 48 hours to get the results from the lab.

But now you can simulate cross contamination instantly with a product called "Glo-Germ." Glo-Germ is an oil that holds in suspension thousands of tiny plastic fluorescent "germs." A few drops to the oil on the hands causes the ersatz germs to glow under an ultra violet lamp. Even after repeated handwashings the germs are visible under the black light in the lines of

the skin and under the fingernails. That's what makes Glo-Germ an ideal gimmick for demonstrating to "show-me" foodhandlers how thoroughly hands must be washed to rid them of bacteria.

Glo-Germ Company, Moab, UT

Reader Service No. 303



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Bio-Cide International has announced its newest innovation-**AAMIS II™** (Automated Activation Metered Injection System). BCI manufactures EPA approved, proprietary forms of aqueous chlorine dioxide-based sanitizers, **Oxine®** and **Purogene®**, and the related equipment for the safe activation and delivery for your specific needs. These activated solutions display an exceedingly profound biocidal ability against a wide range of microorganisms in astonishingly short contact time. **AAMIS II™** is designed for **Oxine®** and **Purogene®** customers that have repetitive and/or large volume requirements for activated product. One of **AAMIS II™**'s biggest advantages is its high capacity. **AAMIS II™** is capable of producing up to 7.5 gallons per minute of 25-600 PPM active product per day. **AAMIS II™** also utilizes a state of the art, dual head water driven Crown® pump, ensuring accurate chemical delivery.

Bio-Cide International, Inc., Norman, OK

Reader Service No. 304

In-House Inspection Programs Now Available

ESS Laboratories is pleased to offer HACCP-based internal inspection programs to the Food and Dairy Industry. The programs are designed to routinely monitor plant sanitation and GMP's. The inspections will comply with current HACCP programs, and also increase confidence for upcoming regulator inspections. To receive more information on our maintenance programs, or any of the following: Microbiological Testing, Pathogen Testing, Chemical Testing, Environmental Swab Testing, HACCP Programs, Toxic Monitoring Programs, Hazardous Waste Analysis, Water and Wastewater Analysis, circle no. 305 on the reader service card.

ESS Laboratories, Culpepper, VA

Reader Service No. 305

BESTech's Second-Generation Grease-Eating Bacteria System

A new second-generation system for dispensing grease-eating bacteria into drain lines that can save restaurant operators up to 60 percent in bioremediation costs has been introduced by BESTech, Inc.

Because the system requires fewer service calls, the cost of keeping kitchen drains and traps free of grease is substantially reduced, according to the company.

BESTech will provide the dispenser to restaurants free of charge. Keeping one dispenser supplied with pellets will cost the restaurant about $39 a month compared to a cost that is often twice that amount for conventional bacterial services, the company noted.

Using the new BESTech system, a three-month supply of pelletized bacteria is loaded into the wall-mounted unit. A pea-sized pellet is periodically dispensed into a growth chamber containing water, where the bacteria regenerates to full strength.

"This charged load of bacteria is then flushed into the drain lines and on into the grease trap where the bacteria convert grease into harmless by-products of water and carbon dioxide," Williams said. The freeze-dried bacteria pellets are free from chemicals, surfactants or solvents.

Called BESTech BioFeed PDS, the new pelletized dispensing system from BESTech will be shipped from Sarasota to restaurant chains, private labelers, value added providers and self-service restaurants.

BESTech BioFeed is a registered trademark of BESTech.

BESTech, Inc., Sarasota, FL

Reader Service No. 306

Kness

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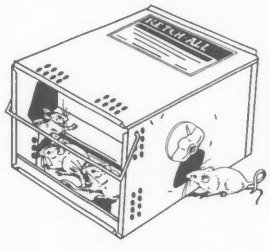

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KNESS Mfg. Co., Albia, IA

Reader Service No. 307

New Brush Cleans Filling Machine Vent Tubes

Nelson-Jameson, Inc. announces a new two-stage brush, designed specifically for hard-to-clean vent tubes on popular filling machines. The special design features two different diameters of nylon bristle and a long, plastic-covered handle to eliminate scratching.

The new #105 Vent Tube Filler Brush effectively cleans the vent tubes found on Federal and Fogg filling machines. Regular, manual cleaning with a brush is found to reduce the threat of product contamination.

Nelson-Jameson Inc., Marshfield, WI

Reader Service No. 308

The Luminator™, HACCP Testing Tool in Lightweight Shoulder Bag

The **Luminator™** is a HACCP testing tool that offers multiple applications on a single, lightweight shoulder bag unit. The Luminator is battery powered, simple to operate, and has complete data storage for later download to computer or printer.

Real time tests for the dairy industry include:

A 45 second pre-op ATP sanitation test in a self contained, single service **PocketSwab™** – swab, twist, and read in seconds. No glass. No tools. No guesswork with the PocketSwab.

Verify pasteurization effectiveness with the 4 minute *PMO approved* **Alkaline Phosphatase** test.

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Other tests in the Charm Lite Series are available for other industries and applications.

Charm Sciences, Inc., Malden, MA

Reader Service No. 309

Ultra-Kleen-A Universal Specialty-Cleaning and Decontaminating Agent

The Sterilex Corporation has recently introduced Ultra-Kleen, a unique and patented specialty decontamination product. Based upon Sterilex' patented technology, Ultra-Kleen penetrates and removes biofilms, biofouling, proteins, fats, oil deposits and related contamination. Ultra-Kleen is both water and lipid-soluble, enabling it to penetrate biofilms and biofouling.

Ultra-Kleen is safe for personnel and equipment, compatible with all materials, non-toxic, non-corrosive, environmentally safe and contains no solvents. Ultra-Kleen may be used wherever biofilms are a threat; food service and food processing, industrial processing, water cooling towers, health care applications, marine applications, and pesticide decontamination.

The Sterilex Corporation, Owings Mills, MD

Reader Service No. 310

Clarke/Delco

Delco's Equalizer Hot Pressure Washers Handle the Toughest Cleaning Jobs

Delco's EQUALIZER Series is a complete line of hot water pressure washers designed to handle the really tough cleaning jobs. Delco EQUALIZERS maximize cleaning power making them ideal for truck/car fleets, automotive shops, oil fields, construction sites, and an endless variety of applications.

As standard equipment, all of Delco's EQUALIZERS are equipped with ceramic plunger pumps producing from 2.0 gpm at 1,000 psi up to 4 gpm at 2,000 psi. Adding to the performance and long life of Delco's EQUALIZERS are stainless steel fuel and float tanks which eliminate carbon steel deterioration causing contamination of fuel tanks and water reservoirs found on competitive units. Also standard on select models are stainless steel coil wraps.

Operator safety is insured with the EQUALIZER'S Ground Fault Circuit Interrupter (G.F.C.I.)... unexpected power surges create no dangers for the operator. Delco EQUALIZERS are equipped with an automatic, electronic, high-temperature shut-off switch which maintains machine temperature parameters, as well as insuring operator safety.

Clarke/Delco, Springdale, AK

Reader Service No. 311

BusinessExchange

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Reader Service No. 129

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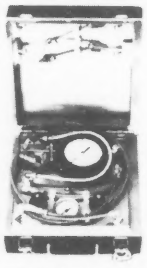

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Reader Service No. 124

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Reader Service No. 111

BusinessExchange

Employment Opportunities

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Agriculture & Agri-Food Canada

A position is available immediately for a recent graduate from a recognized university with a Ph.D. in food microbiology or microbiology with supporting courses in meat/food science. Preference will be given to applicants with knowledge and experience in meat microbiology. The successful candidate will be expected to develop an independent research program within a multidisciplinary team of scientists with a common mandate to evaluate and improve the quality of red meats. The research program should focus on the control of meatborne spoilage bacteria and pathogens with a goal to improve the safety and extend the storage life of raw products. The successful applicant must also develop and maintain a good working relationship with red meat industry and cooperate in the development of commercializable technologies in the areas of meat hygiene and preservation.

Preference will be given to Canadian citizens. The salary range is $37,036 to $48,727 per annum (RES-01).

Applications will be received until April 30, 1996. A detailed Statement of Duties and Qualifications can be obtained upon request. Please forward curriculum vitae and 3 letters of reference to:

Human Resources
Research Centre
6000 C & E Trail
Lacombe, Alberta T4L 1W1

• PHONE: (403) 782-8112 • FAX: (403) 782-6120

PLEASE QUOTE COMPETITION NUMBER:
96-AGR-OC-IV-A-385-0011C

DEPARTMENT OF FOOD SCIENCE

The Department of Food Science, University of Guelph, invites applications for a tenure-track position in the food microbiology area at the assistant or associate professor level. Candidates should have a Ph.D. in food science or microbiology, a strong interest in research substantiated by recognized accomplishments, and will be expected to develop a vigorous research program. Teaching responsibilities will include food microbiology at the undergraduate and graduate levels, as well as general food science. The successful applicant will have the opportunity to work in a multidisciplinary environment and should be prepared to work closely with other academic and industrial scientists. Salary is commensurate with qualifications.

The University of Guelph is committed to an employment equity program that includes special measures to achieve diversity among its faculty and staff. We therefore particularly encourage applications from qualified aboriginal Canadians, persons with disabilities, members of visible minorities and women.

In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents of Canada. Position subject to final budgetary approval and commences **July 1, 1996.** Deadline for applications is **May 15, 1996.**

Send full curriculum vitae, selected reprints, and the names of three references to:

Chair,
Department of Food Science
University of Guelph
Guelph, Ontario
Canada N1G 2W1

UNIVERSITY of GUELPH

ANNOUNCING!

In-Line Business Exchange Advertisements are now available in the Business Exchange Section of *Dairy, Food and Environmental Sanitation.*

85¢ per word

Bold and capitalized words are charged as two words. Area code and phone number count as one word. All in-line business exchange ads must be paid in advance. $20.00 per ad minimum charge.

For more information on how your organization may utilize these ads, call Rick McAtee, IAMFES Advertising/Exhibits Manager at (800) 369-6337 or (515) 276-3344.

IAMFES Constitution and Bylaws

International Association of Milk, Food and Environmental Sanitarians, Inc.

(As Amended November 15, 1995)

CONSTITUTION

ARTICLE I.

ASSOCIATION

There is hereby created the International Association of Milk, Food and Environmental Sanitarians, Inc., not for pecuniary purposes, which shall hereinafter be referred to as IAMFES.

ARTICLE II.

OBJECTIVES

1. Provide a forum for professionals in the areas of milk, food, and environmental safety and quality.
2. Improve the professional status of the members.
3. Assist members in their technical work and professional development.
4. Disseminate information regarding the protection of milk, food and the environment.
5. Develop, improve and promote sanitary methods and procedures for the development, production, processing, distribution, preparation and serving of milk and food.
6. Develop, improve and promote methods and procedures for supervision and inspection of the production, processing, distribution, preparation and serving of milk and food.
7. Develop and promote improved methods for the examination of milk, food and environmental samples.
8. Promote the development and adoption of uniform equipment and quality standards to improve the sanitary handling of milk and food.
9. Develop, improve and promote methods and procedures for protecting and improving the environment.
10. Cooperate with other professional groups in the improvement and promotion of milk, food and environmental sanitation.

ARTICLE III.

MEMBERSHIP

Section 1. The classes of membership in IAMFES shall be Regular, Student, Retired, Sustaining and Honorary Life Members.

Section 2. The qualifications of the several classes of members, the dues of each, the manner of their election to membership, and their respective rights and privileges shall be prescribed in the Bylaws, except as otherwise provided in this Constitution.

ARTICLE IV.

OFFICERS, EXECUTIVE BOARD, AND AFFILIATE COUNCIL

Section 1. The officers of IAMFES shall be President, President-Elect, Vice President and Secretary, who shall hold these offices for one year or until their successors are elected or appointed, as provided in the Bylaws.

A. At the termination of each Annual Meeting, the President-Elect, Vice President, and Secretary shall automatically succeed to the offices of President, President-Elect and Vice President, respectively.

B. The Secretary will be nominated, on a rotating basis, from educational, government and industry members.

1. The Secretary shall be elected by majority ballot of votes cast.

Section 2. The Executive Board shall consist of the Officers of IAMFES, the Immediate Past President and the Chairperson of the Affiliate Council.

Section 3. The Executive Board must include, at all times, members officially connected with education, government, and industry. There must be at least one representative from each of the three categories at all times.

A. If the status of any member of the Executive Board changes after election, or during the term of that office, or after protem appointment as provided in the Bylaws, so that the composition of members officially connected, as stated herein, is not maintained in the Executive Board, then such member shall be deemed ineligible without prejudice and such office shall be declared vacant.

B. The elective officer(s) will continue in their respective office(s) until their successor(s) are duly elected.

Section 4. An Affiliate Council shall be created, which shall consist of a duly authorized representative for each Affiliate Association, and the Immediate Past President of IAMFES.

A. Each Affiliate Association shall have one vote.

B. The Affiliate Council parliamentary procedure shall be governed by Operational Guidelines, adopted by majority vote of Affiliate Representatives representing all of the member affiliates and approved by the IAMFES Executive Board. A copy of the current Affiliate Council Operational Guidelines shall be filed with the IAMFES Executive Director.

C. The Affiliate Council shall, elect its Chairperson and other officer(s) as set forth in the Affiliate Council Operational Guidelines, shall keep a record of its proceedings and authorized representatives, and shall submit its recommendations to the Executive Board.

D. The Chairperson of the Affiliate Council shall represent the Affiliate Associations as a voting member of the IAMFES Executive Board.

E. It shall be the function of the Affiliate Council:

1. To be an advisory body to the Executive Board;
2. To represent the interests of the Affiliate Associations to the Executive Board and IAMFES members; and
3. To serve as the means for the interchange of ideas and recommendations on programs, activities, awards and procedures among and between the Affiliate Associations and the Executive Board.

ARTICLE V.

AFFILIATE ASSOCIATIONS

Section 1. IAMFES members residing in the same geographical area, and, also, functioning organizations of milk, food and/or environmental sanitarians or closely related groups whose objectives are consistent with those of IAMFES, may apply for a Charter as an Affiliate Association, under conditions stipulated in the Bylaws.

Section 2. Each Affiliate Association shall have one representative on the Affiliate Council. The representative shall be a member of IAMFES.

ARTICLE VI.

MEETINGS

Section 1. Each year, IAMFES shall hold an Annual Business Meeting.

A. A quorum, for any meeting to conduct business, shall consist of at least 50 voting members.

Section 2. Other meetings of IAMFES may be called by the Executive Board by duly announcing any called meeting in the official publication of IAMFES at least 60 days prior to the date of the meeting.

Section 3. In case there is no quorum present to transact necessary business, the Executive Board is authorized to act for the best interests of IAMFES.

Section 4. The Executive Board shall meet at each IAMFES Annual Business Meeting and at such other times as the President shall deem necessary.

A. A quorum for Executive Board meetings shall consist of at least four members and decisions shall be by a majority vote of those present.

B. In the event of a tie vote, the presiding officer will be permitted to vote.

ARTICLE VII.

AMENDMENTS

Section 1. Any member may propose amendments to the Constitution by submitting them in writing to the Executive Director, at least 60 days before the date of the next announced Annual Meeting.

A. The Executive Director shall notify all members, at least 30 days before the Annual Meeting that the proposed amendments will be open for discussion at that meeting.

B. Such proposed amendments, upon a majority affirmative vote of the members present shall, within 60 days, be submitted to the entire membership of IAMFES by the Executive Director.

C. All members voting on such amendments shall, within 45 days after issuance of such notification, register their vote in writing with the Executive Director, on ballots furnished by IAMFES.

D. These ballots shall be opened, recorded and filed, and the results shall be reported by the Executive Board to the IAMFES membership.

E. If the proposed amendments are passed by a two-thirds vote of those members who register their votes with the Executive Director, they shall become a part of the Constitution from the date of such report and notice by the Executive Board.

ARTICLE VIII.

BYLAWS

Section 1. The IAMFES parliamentary procedure shall be governed by Bylaws, adopted by majority vote of voting members in attendance at a duly called meeting.

BYLAWS

ARTICLE I.

MEMBERSHIP AND DUES

Section 1. Regular Members

A. Regular members of IAMFES shall be those persons who are engaged in milk, food or environmental inspection, or the laboratory control of, or the administration of such function, or engaged in research or education work relating to any aforesaid function or otherwise interested in the objectives of IAMFES.

B. Regular members may attend meetings of IAMFES and shall be entitled to vote and hold office.

Section 2. Student Members

A. Students pursuing undergraduate or graduate degrees in colleges or universities are entitled to membership in IAMFES at one-half (1/2) the dues of regular members.

B. Student members may attend meetings of IAMFES, be accorded privilege of the floor, but shall not be entitled to vote.

C. Student members may not hold office in IAMFES, but may serve on committees, as Affiliate representatives and as appointed representatives of IAMFES.

Section 3. Retired Members

A. Retired members who are no longer receiving compensation for work relating to the objectives of IAMFES and who have been regular members for at least ten (10) years are entitled to membership at one-half (1/2) the dues of regular members.

B. Retired members may attend meetings of IAMFES and shall be entitled to vote and hold office.

Section 4. Sustaining Members

A. Sustaining members shall be organizations or persons who are interested in the objectives of IAMFES.

B. Sustaining members are entitled to special services as determined by the Executive Board of IAMFES.

C. Sustaining members shall be entitled to one (1) Regular membership in IAMFES for their representative at no additional cost.

1. The name of the representative must be submitted to the Executive Director of IAMFES at the time of membership.
2. Other persons associated with the Sustaining Member's organization are not members of IAMFES unless they have individual memberships.

Section 5. Honorary Life Members

A. The Honorary life membership shall be composed of persons who, on account of their substantial contributions to the objectives of IAMFES, have been nominated by a member(s) and confirmed by the Executive Board.

B. Honorary life members shall not be required to pay dues.

C. Honorary life members may not hold office in IAMFES, but may serve on committees, as Affiliate representatives and as appointed representatives of IAMFES.

D. Honorary life members may attend meetings of IAMFES, be accorded privilege of the floor, and shall be entitled to vote.

Section 6. Composition of Executive Board and Committees

A. Any person serving as an officer of IAMFES must be a regular or retired member of IAMFES.

B. Any person serving on IAMFES committees, as an Affiliate representative, or as an appointed representative of IAMFES, shall be a current regular, student, retired or honorary life member of IAMFES.

Section 7. Any person desiring membership in IAMFES shall submit an application to the Executive Director. It is the responsibility of the Executive Board to insure that applicants meet the eligibility requirements for membership.

Section 8. The Executive Board is authorized to set dues as may be necessary to achieve the objectives of IAMFES and shall notify the members of amount of dues.

Section 9. Any person, having once become a member, may continue membership in IAMFES so long as the annual membership dues are paid, except as provided in Article II, Section 5, Subsection F of these Bylaws.

A. Any member who shall fail to pay annual dues by due date shall be placed in the inactive list.

1. Members on the inactive list shall not receive publications of IAMFES.

B. Such member(s) may be reinstated within 90 days thereafter, upon payment of dues.

C. Any member who is delinquent in dues after 90 days will be dropped from the inactive list.

1. Membership may be renewed by filing an application and payment of annual dues.

Section 10. Each paid-up member of IAMFES, in good standing, shall receive, at no extra cost, the regular issues of the Official Publication and such other publications as the Executive Board may direct, for the period in which the dues are paid.

Section 11. Collection of Dues:

A. The Executive Director shall collect annual membership dues for each member paying directly to IAMFES.

B. Affiliate Associations may authorize the Executive Director to bill their members for both Affiliate and IAMFES dues. In such case, the Executive Director will forward to the Affiliate, within 30 days of collection, the dues paid for Affiliate membership.

C. Affiliate Associations may collect both the Affiliate and IAMFES dues. In such case, the Treasurer of the Affiliate will forward to IAMFES, within 30 days after collection, the dues paid for IAMFES membership.

D. Members of IAMFES who pay local dues to more than one Affiliate Association will pay annual membership dues only once to IAMFES and shall receive only one annual subscription to the official publication of IAMFES.

ARTICLE II.

DUTIES OF OFFICERS AND THE EXECUTIVE BOARD

Section 1. The President shall preside at all meetings of IAMFES and the Executive Board.

A. The President shall appoint all Committees, unless otherwise directed by the Constitution and Bylaws.

B. The President shall perform such other duties as the usually devolve upon the presiding officer or are required of this officer by the Constitution and Bylaws.

Section 2. The President-Elect shall perform the duties of the President, in the latter's absence, and shall succeed the President when the latter's term expires.

A. The President-Elect shall be Chairperson of the Program Committee which will be responsible for planning the program for the Annual Meeting.

B. The President-Elect will also appoint the Teller's Committee and the Nominating Committee.

Section 3. The Vice President shall perform the duties of the President and President-Elect in their respective absences.

A. The Vice President shall serve on the Program Committee.

B. The Vice President shall study the organization and operation of the committees of IAMFES and make recommendations to the Executive Board regarding said committees.

Section 4. The Secretary shall perform the duties of the President, President-Elect and the Vice President, in their respective absences.

A. The Secretary shall be responsible for maintaining correspondence and minutes of IAMFES proceedings.

B. The Secretary, with the assistance of the Executive Director and Staff, shall record and report all minutes of meetings of the Executive Board, including the Business Meeting at the Annual Meeting.

Section 5. The full management of the affairs of IAMFES shall be in the hands of the Executive Board as provided in the Constitution. The duties of the Executive Board shall be:

A. To direct the administrative work of IAMFES, including all matters connected with its collaboration with other groups, institutions and its professional development;

B. To act as trustee of IAMFES property;

C. To fix the time and place for the Annual Meeting;

D. To act for and in behalf of IAMFES in any administrative, financial, legislative, educational, or other capacity as IAMFES may direct, or to act on its own initiative between meetings and report such action at the next Annual Meeting;

E. To make protem appointments to fill any vacancy or vacancies that may occur among the officer(s) between IAMFES meetings, and to recommend the replacement of an officer at the Annual Meeting, because of inability or inactivity or for other causes which may be in the best interest of IAMFES;

F. To recommend expulsion from membership for cause by two-thirds of all votes cast, but in no case to recommend revocation without giving the member written notice of reasons for the contemplated action at least one month before action is taken and an opportunity for a hearing in person and/or a rebuttal in writing;

G. To employ personnel, as the situation demands, and fix their compensation and duties;

H. To execute the policies of IAMFES and report to the members at the business meeting at the Annual IAMFES Meeting, any action taken that was not specifically authorized;

I. To set the amount of the Registration Fee for the Annual Meeting;

To authorize the issuance or revocation of a Charter to an Affiliate Association.

K. In the absence of an Executive Director, due to illness, death, resignation, or prolonged absence, the Executive Board will be responsible for all duties shown in Article III for these Bylaws.

ARTICLE III.

EXECUTIVE DIRECTOR

Section 1. The Executive Board shall hire an Executive Director to perform the following duties:

A. Keep a list of members and their addresses.

B. Assemble and transmit to the Editors of the publications of IAMFES, all papers, addresses, and other matter worthy of publication as soon as possible after the Annual Meeting.

C. Keep a current list of names and addresses of IAMFES members entitled to receive the publications.

D. Issue notices of all meetings, conduct correspondence pertaining to the affairs of IAMFES and perform other duties incident to the office as the Executive Board may authorize.

E. Receive all monies due IAMFES, giving receipt therefore, and keeping account thereof.

F. Faithfully care for all monies received, paying out expenses as authorized by the Executive Board and keeping account thereof.

G. File a surety bond with the President of IAMFES in an amount as directed by the Executive Board.

H. Provide a detailed statement of the financial condition of IAMFES at the Business Meeting of the Annual Meeting.

I. Provide other services as directed by the Executive Board.

ARTICLE IV.

AFFILIATE ASSOCIATIONS

Section 1. The conditions for authorizing the issuance of a Charter to an Affiliate Association are as follows:

A. When a regional group of members of IAMFES want to form an Affiliate Association, a group of at least ten members of IAMFES will sign the application and forward it to the Executive Director of IAMFES with the following information:

1. A list of the names, addresses and phone numbers of the IAMFES members forming the proposed Affiliate Association;
2. A list of names, addresses and phone numbers of the temporary officers of the proposed Affiliate Association, at least one of which shall be a member of IAMFES;
3. The name of the proposed Affiliate Association, and
4. A definition of the geographical area desired to be covered.
5. A copy of the proposed Affiliate Constitution and Bylaws.

B. When an already-existing organization with at least ten (10) members of IAMFES wants to become an Affiliate Association, the secretary or other duly authorized officer of the applicant organization will make written request for affiliation status and provide the following information:

1. A list of the names, addresses and phone numbers of the IAMFES members forming the proposed Affiliate Association;
2. A list of names, addresses and phone numbers of its officers, at least one of which shall be a member of IAMFES;
3. The name of the organization;
4. A definition of the geographical area desired to be covered;
5. A copy of the Affiliate Constitution and Bylaws, and
6. An attested copy of the minutes authorizing said application.

Section 2. Upon majority vote of the Executive Board, the Executive Director, or, in the absence thereof, the Secretary of IAMFES will notify the responsible officer of the applicant organization concerning the action taken.

A. Upon receipt of any further information requested by the Executive Board, a Charter will be executed to an Affiliate Association in form and substance as approved by the Executive Board.

1. The Charter will be presented to the duly authorized Affiliate representative member at the IAMFES Annual Meeting or at the Annual Meeting of the Affiliate.

B. After the granting of the Charter by IAMFES, and yearly thereafter, the Secretary of the Affiliate Association or other duly authorized officer shall submit the names, addresses and phone numbers of each IAMFES member and Affiliate member, and other official business to the Executive Director of IAMFES.

Section 3. Any Affiliate Association may use the expression "Affiliated with the INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.," or an equivalent legend that is approved by the IAMFES Executive Board

Section 4. An Affiliate Association Charter may be revoked by the IAMFES Executive Board:

A. Upon recommendation by the Affiliate Council, on two-thirds (2/3rds) vote of the total number of votes cast by that Council after due and reasonable notice has been given in writing at least three months before such a vote is to be taken and a reasonable opportunity is given for a hearing.

B. A Charter may be revoked for the following causes:

1. When the affairs of the Affiliate Association are not conducted consistent with the Constitution and Bylaws of IAMFES.
2. When the Affiliate Association has ceased to function for two years, or
3. When the Affiliate Association fails to maintain at least ten (10) members in IAMFES for two (2) consecutive years.

ARTICLE V.

COMMITTEES

Section 1. Standing committees of IAMFES shall consist of the following: Program Committee, Journal of Food Protection Management Committee, Journal of Dairy, Food and Environmental Sanitation Management Committee and Past Presidents' Advisory Committee.

A. The Program Committee shall include the officers of IAMFES, Chairperson of the Program Advisory Committee, the Executive Director and the Chairperson of the Local Arrangements Committee. The President-Elect shall chair the Committee.

B. The Journal management committees shall consist of Chairpersons, appointed by the President, the Editors of the IAMFES publications, three members appointed for 3-year terms and the Executive Director, who shall serve as the Managing Editor of the publications, unless otherwise designated by the Executive Board.

1. The Committees shall handle all editorial matters concerning publications of the Journal(s) and other publications of IAMFES, with the approval of the Executive Board.

C. The Past Presidents' Advisory Committee shall be composed of Past Presidents of IAMFES.

1. The Immediate Past President will act as liaison between this committee and the Executive Board.
2. This committee will meet at each Annual Meeting.
3. In the absence of all Executive Board members, this committee would select interim officers until new officers could be elected.
4. Advise Executive Board on any IAMFES matters as deemed advisable.

Section 2. Each year, prior to the Annual Meeting, the President-Elect shall appoint a seven member Nominating Committee.

A. At least one member shall have served on the Nominating Committee the previous year, and the members should be representative of geographical and membership groups.

B. The Chairperson of the committee shall be announced at the Annual Meeting, and published in the official publication of IAMFES the month following the Annual Meeting, together with the date by which candidates for nomination(s) for office(s) shall be submitted.

C. The Nominating Committee shall submit the names of at least two nominees for the office of Secretary to the Executive Director as directed by the President-Elect. The names, with pictures and biographical sketches, shall be published in the official publication of IAMFES not later than April 1 of the year in which the election is to be held.

D. Ballots shall be distributed by the Executive Director as directed by the Executive Board and must be returned to the Executive Director by June 1, for checking against the IAMFES eligible voter list and then forwarded to the Teller's Committee for counting.

E. The person receiving the greatest number of votes shall be certified to the President at least one month in advance of the Annual Meeting.

Section 3. The President-Elect shall appoint a Teller's Committee composed of three persons for the purpose of certifying the results of each election of Officers.

Section 4. Other special committees and regular continuing committees may be authorized by the Executive Board or by the President for special work or assignment.

A. The need for continuation of such committees shall be subject to annual review of the Executive Board.

B. All appointments of Chairpersons to Continuing committees shall be made by the President-Elect prior to the Annual Meeting and shall be subject to annual review of the Executive Board. Proposed members of committees will be designated by the Committee Chairperson and presented to the Executive Board for approval.

Section 5. The terms of office of all committee Chairpersons shall expire at the end of the Annual Meeting next following their appointment, except as provided in the Bylaws.

ARTICLE VI.

MEETINGS

Section 1. Each year, IAMFES shall hold an Annual Business Meeting.

A. A quorum for any meeting to conduct business shall consist of at least 50 voting members.

Section 2. Other meetings of IAMFES may be called by the Executive Board, by duly announcing any called meeting at least 60 days prior to the date of the meeting.

Section 3. The Executive Board and the Affiliate Council shall meet at the Annual Meeting.

Section 4. When, in the discretion of the Executive Board, it is considered advisable to conduct a vote on a question by mail ballot, a majority of the votes cast will be necessary to carry the proposition.

Section 5. Robert's Rules of Order shall govern the procedures at all meetings. Voting by proxy shall not be permitted.

ARTICLE VII.

PUBLICATIONS

Section 1. All publications of IAMFES will be issued under the authority of the Executive Board.

A. Any Affiliate Association may publish its own material but must assume full responsibility therefore, and obligate IAMFES in no way.

Section 2. Dairy, Food and Environmental Sanitation shall be the official publication of IAMFES and the Journal of Food Protection will be the scientific publication.

A. These Journals will be the property of IAMFES, which will own the copyrights and all the articles published therein.

B. The Editors will serve at the pleasure of the Executive Board.

Section 3. The Executive Board will authorize and direct other publications of IAMFES.

ARTICLE VIII.

AMENDMENTS

Section 1. Any member may propose amendments to these Bylaws by submitting them in writing to the Executive Director at least 60 days before the date of the next announced meeting.

A. The Executive Director shall notify all members, at least 30 days before the next announced meeting, that the proposed amendment(s) will be open for discussion and voting at the next meeting.

B. These Bylaws may be amended by majority affirmative vote of the voting members present.

ComingEvents

MAY

·1-3, IFT, FDA, AIB Cooperate on Basic Food Labeling Seminar, in Rosemont, IL, near Chicago. The seminar will include the basics of labeling as well as new requirements resulting from the Nutrition Labeling and Education Act. For additional information or to enroll, contact: AIB, 1213 Bakers Way, Manhattan, KS 66502; or call (913) 537-4750; fax (913) 537-1493.

·2-4, Symposium on Dairy Microorganisms as Probiotics and Nutrition Week, Potsdam, Germany. For further information, contact Prof. Dr. Chr Barth, Director, DIFE, Arthur-Scheunert-Allee 114-116, D-1505 Bergholz-Rehbrücke (Germany); telephone +49 33 20088216; fax +49 33 200 85250.

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

·6-8, Introduction to Food Chemistry, Chicago, IL sponsored by the American Association of Cereal Chemists. For more information, contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097, USA; phone (612) 454-7250; fax (612) 454-0766; E-mail aacc@ scisoc. org.

·6-9, 1996 Southwest Regional Milk Seminar, hosted by the Milk and Dairy Products Division of the Texas Dept. of Health, in conjunction with the U.S. Public Health Service. The seminar will be held in San Antonio, TX at the Holiday Inn, Downtown/Market Square. For additional information, contact Texas Dept. of Health, Milk and Dairy Products Division, Attn: Daniel McCreary, 1100 W. 49th St., Austin, TX 78756.

·7-9, Food Regulations and Their Impact on Additives and Ingredients Seminar, Radisson Hotel, Newark, NJ. This new seminar presents the impact of regulations in the EC, U.S.A., and some Latin American countries on the usage of food additives and ingredients. For detailed seminar agendas and registration please call (717) 291-5609; fax (717) 295-4538.

·9-15, Interpack 96, in Dusseldorf, Germany. Three conference programs, an international symposium and a forum will be held in conjunction with Interpack 96. For further information contact, Dusseldorf Trade Shows, Inc., 150 Michigan Ave., Suite 2920, Chicago, IL 60601; or phone (312) 781-5180; fax (312) 781-5188.

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

·13, Introduction to Backflow Prevention, in Gainesville, FL. The course is offered by The University of Florida's Center for Training, Research and Education for Environmental Occupations. Topics include basic backflow prevention terminology, hydraulic conditions that cause backflow, state and federal backflow prevention regulations, and additional responsibilities and liabilities. For further information, contact TREEO, 3900 SW 63rd Boulevard, Gainesville, FL 32608-3848 or phone (904) 392-9570; fax (904) 392-6910.

·13-14, PAMFES Annual Meeting and Conference, at Nittany Lion Inn, State College, PA. For further information or details, contact Gene Frey at (717) 397-0719.

·18-22, National Restaurant Association Restaurant, Hotel-Motel Show, in Chicago, IL. Educational sessions; 1700+ vendors with the latest in foodservice technology. Contact the Associations's convention office at (312) 853-2525 for further information; e-mail: BITSITE@CAPCON. NET; WEB: HHP://WWW.Restaurant. org

·20, Hazardous Waste Regulations for Generators, in Orlando, FL. This course teaches participants about the latest requirements and the proper procedure for accumulation, storage, transportation, and disposal of hazardous waste. For further information, contact The University of Florida's Center for Training, Research and Education for Environmental Occupations (UF/TREEO), 3900 SW 63rd Blvd., Gainesville, FL 32608-3848; phone (904) 392-9570; fax (904)392-6910.

·20-24, International Training Course in Food Microbiology and Safety, River Falls, WI. The course will emphasize systems and methods for the microbiological safety and quality assurance of foods. For further information contact, Dr. Purnendu C. Vasavada, Dept. of Animal and Food Science, Univ. of Wisconsin–River Falls, River Falls, WI 54022 or phone (715) 425-3150; fax (715) 425-3372; Internet: purnendu. c.vasavada@uwrf. edu.

·20-25, Annual Meeting of the 3-A Sanitary Standards Committees, Milwaukee, WI. The attendees will review 30 tentative 3-A documents and consider three rescinding motions. Representatives of numerous 3-A Equipment Task Committees will present tentative documents to the members of the Sanitary Standards Subcommittee of the Dairy Industry Committee (the "User Group" representing processors). Registra-

tion is required and pre-registration to DFISA office by May 3, 1996 is preferred. For more information, contact Tom Gilmore or Kirk Snyder at (703) 761-2600.

·**21-24, Wet Milling,** Champaign, IL sponsored by The American Association of Cereal Chemists. For more information, contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097, USA; phone (612) 454-7250; fax (612) 454-0766; E-mail aacc@ scisoc. org.

·**27-29, Principles of Cereal Science and Technology,** Chicago, IL sponsored by The American Association of Cereal Chemists. For more information, contact the AACC Short Course Dept., 3340 Pilot Knob Rd., St. Paul, MN 55121-2097, USA; phone (612) 454-7250; fax (612) 454-0766; E-mail aacc@ scisoc. org.

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

JUNE

·**1-12, U.S.–Ukrainian Food Industry Trade & Investment Mission to Ukraine,** Kiev, Lviv, Odessa, Dnipropetrovsk, and Cherkasy. The mission will be of interest to companies involved in the food processing and packaging sector, food distribution agricultural machinery and equipment, and agricultural chemicals. If interested, please contact Mr. Eugene Shaw at (202) 482-3494; fax (202) 482-0304 or Mr. Damon C. Greer at (202) 482-5023; fax (202) 482-5666.

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

·**3-4, Food Irradiation Symposium,** at the Doubletree Hotel in Austin, TX. The two-day symposium will focus on: The dynamics of foodborne illness, obstacles to food irradiation, the background of food irradiation, and consumer and industry acceptance of food irradiation. For further information, contact Dr. Kerri Harris, Institute of Food Science, Texas A & M–College Station, TX or call (409) 862-2036.

·**3-14, Ninth Summer Institute in Environmental Health Sciences**, in Baltimore, MD. The Summer Institute is sponsored by The Dept. of Environmental Health Sciences and the Johns Hopkins University/NIOSH Education Resource Center in Occupational Safety and Health. For additional information, contact Denise Barton at (410) 955-3537; Kay Castleberry at (410) 955-2212; Diane Zerbe at (410) 955-0423 or fax (410) 955-0617.

·**4-5, TAMFES Annual Meeting,** at the Wyndham Hotel in Austin, TX. For further information, contact Kent Roach at 1-800-825-5550.

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

·**9-11, AFFI's 13th Annual Distribution and Logistics Conference,** in Chicago, IL. The conference will host leading experts in distribution and logistics, give facility tours and provide an opportunity for an industry exchange of ideas on transportation issues. For more information, contact AFFI at (703) 821-0770.

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

·**11-12, Cross–Connection Control: Survey & Inspection Course,** offered by The University of Florida's Center for Training, Research & Education for Environmental Occupations (UF/TREEO). Participants learn to identify appropriate methods to prevent backflows for isolation and containment. For further information, contact TREEO, 3900 SW 63rd Blvd., Gainesville, FL 32608-3848; phone (904) 392-9570, ext. 112; fax (904) 392-6910.

·**22-26, Institute of Food Technologists 1996 Annual Meeting & FOOD EXPO,** in New Orleans. For further information, contact Leigh Ann Disser, Institute of Food Technologists, 221 N. LaSalle St., Suite 300, Chicago, IL 60601-1291; phone (312) 782-8424; fax (312) 782-8348; e-mail: ladisser@ift.org.

·**25-26, International Symposium on Industrial Applications of Bioluminescence in Microbiology,** at the Beaumont Conference Center. The symposium will feature experts on the application of ATP bioluminescence technology from a range of industrial sectors. These include brewing, chemicals, dairy, food, meat, personal care products, petroleum, pharmaceuticals, soft drinks and water. For further information, contact Dr. Bill Simpson, Cara Technology Limited at int+44(0)1342 836061; or fax +44(0) 1342 836 0161.

·**30-July 3, International Association of Milk, Food and Environmental Sanitarians, Inc. 83rd Annual Meeting,** in Seattle, WA. For additional information, contact Julie Cattanach at (800) 369-6337; fax (515) 276-8655.

JULY

·**9-19, World's Largest International Culinary Event Scheduled to Take Place in the United States.** World Association of Cooks Societies (WACS) has scheduled the World Cooks Tour for Hunger and Culinary Arts Festival. The event will begin at Walt Disney World Resort with a five–day international culinary competition, dubbed the World Culi-

nary Arts Festival. For further information, contact Davin Light, Marketing A La Carte at (407) 539-1459 or Keith Keogh, World President, World Assn. of Cooks Societies at (407) 560-2054.

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

·**22-26, Backflow Prevention Technician Training & Certification**, in Gainesville, FL. Offered by The University of Florida's Center for Training, Research and Education for Environmental Occupations. This course provides guidelines for acceptable practices for annual testing of backflow prevention assemblies used in cross-connection control programs. Individuals wishing to register should call (352) 392-9570, ext. 112.

SEPTEMBER

·**2-3, Symposium on Years in the Dairy Industry,** Copenhagen, Denmark. The main objective of this Symposium is to provide a comprehensive view of the role of yeasts, both positive and negative aspects, in the dairy industry. For registration information, contact Prof. M. Jakobsen, The Royal Veterinary and Agricultural University, Dept. of Dairy and Food Science, Rolighedsvei 30, DK-1958 Frederiksberg C Denmark; telephone +45 35 28 32 15; fax +45 35 28 32 14.

·**10-12, Producing Safe Dairy Products Workshop,** hosted by The Wisconsin Center for Dairy Research in Madison, WI. Two days will be devoted to discussing the microbiology and control of dairy pathogens; one day will be dedicated to HACCP and other sanitation methods used in dairy plants and food processing systems. For more information, contact Sara Quinones at (608) 262-2217; fax (608) 262-1578; e-mail: quinones@ahabs.wisc.edu, 1605 Linden Dr., Madison, WI 53706.

·**10-14, The 11th International Packaging & Food Processing Machinery and Materials Exhibition,** Jakarta, Indonesia. For further information, telephone +44 (0)171 486 1951; fax +44 (0)171 486 8773 or +44 (0)171 413 8222.

·**11-12, 75th Anniversary of the Vermont Dairy Industry Association,** held at the Ramada Inn, S. Burlington, VT. For further information, contact Mr. Byron Moyer at 116 State St., Drawer 20, Montpelier, VT 05620-2901 or phone (802) 828-2433; fax (802) 828-2361.

·**15-19, American Association of Cereal Chemists to Hold 81st Annual Meeting,** in Baltimore, MD at the Baltimore Convention Center. The annual meeting includes a technical program, technical and poster sessions, table-top exhibits, new products/services sessions, educational short courses and social events. Annual Meeting registration materials are available after May 1, 1996, from AACC headquarters, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

OCTOBER

·**2-4, International Conference on New Developments in Refrigeration for Food Safety and Quality Call for Papers, Co-sponsored by IAMFES**. Lexington, KY. Conference papers are sought from all areas of food refrigeration. The purpose of this conference is to provide an opportunity for food technologists, food processors, and refrigeration engineers from around the world to exchange current information on the role of refrigeration in the food chain. For further information, contact Food Refrigeration Conference, Univ. of Kentucky, 128 Agriculture Engineering Bldg., Lexington, KY 40546-0276; phone (606) 257-3000 ext. 111; fax (606) 257-5671; e-mail wmurphy@bae.uky.edu.

·**16-18, 16th–Food Microbiology Symposium and Workshop,** Univ. of Wisconsin, River Falls, WI. The workshop is designed to provide practical demonstrations and discussion of various tests and instruments available for rapid detection, isolation and characterization of foodborne pathogens and toxins as well as prediction of shelf-life and checking hygiene and sanitation in food processing facilities. For further information, contact Dr. Purnendu C. Vasavada, Dept. of Animal and Food Science, Univ. of Wisconsin–River Falls, River Falls, WI 54022 or phone (715) 425-3150; fax (715) 425-3785; internet: purnendu.c.vasavada@uwrf.edu.

·**20-23, The 1996 International Exposition for Food Processors® (IEFP) will host "El Congreso de las Americas,"** at San Francisco's Moscone Center. IEFP attracts visitors from around the world in every segment of the processing industry, including canning and freezing, dairy, beverages, meat, pharmaceuticals and other industry segments. For more information, contact Janet Palmisano, Communications Coordinator at (703) 684-1080.

·**31-Nov. 2, NAMA National Convention and Exhibition,** Cervantes Convention Center, St. Louis, MO. Exhibitors of vending machines, food products and services related to the industry. For additional information, contact Larry Eils at (312) 346-0370.

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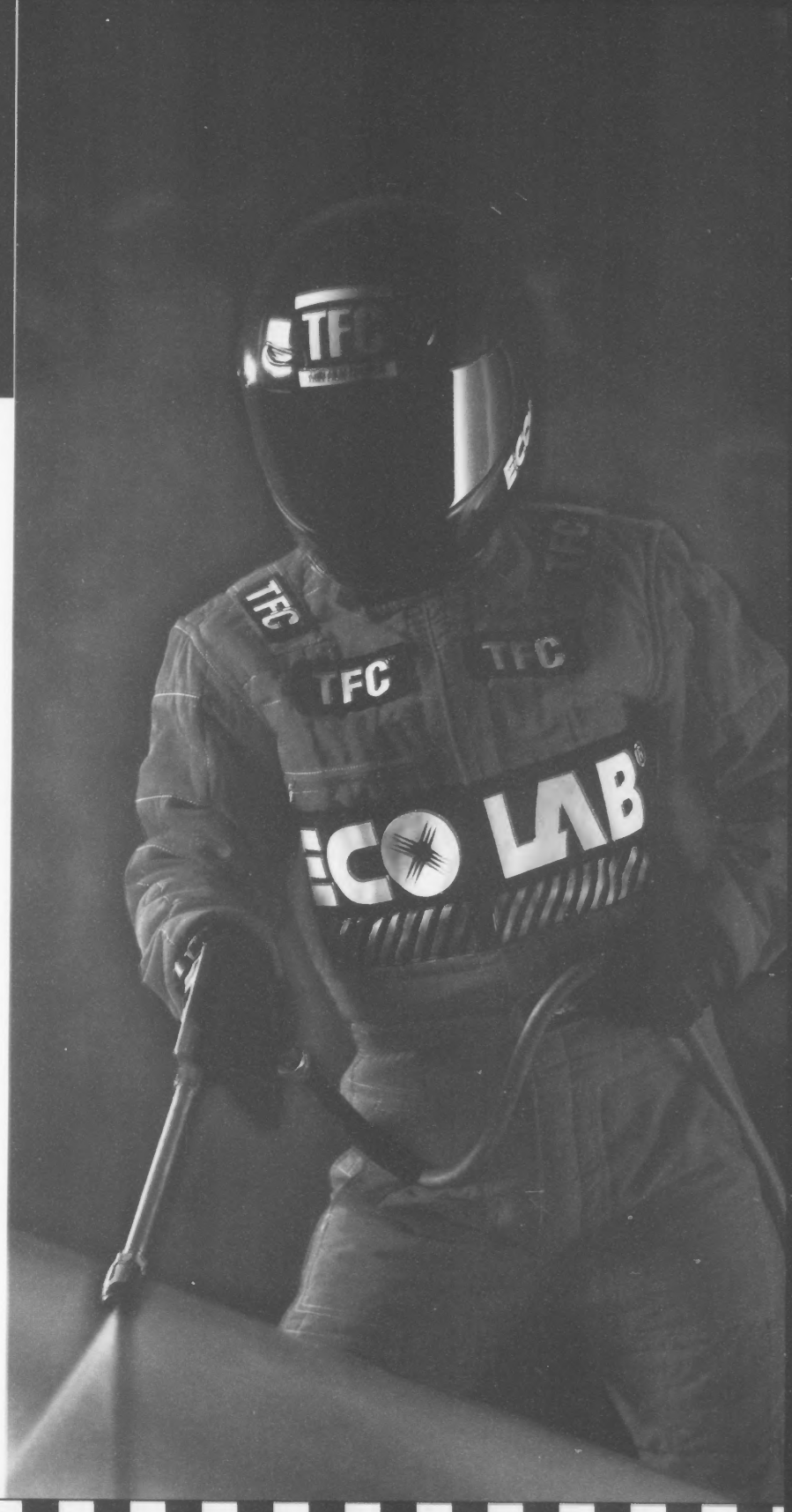

Preliminary Program

of the 83rd IAMFES Annual Meeting

Monday Morning—July 1, 1996

Travellers Advisory—Don't Leave Home Without It!

8:30 Medical Advice and General Food Safety Information for Travellers—**P. SNYDER**, Hospitality Institute of Technology & Management, St. Paul, MN

9:00 Food Safety for Cruises—**D. TURNER**, CDC, Miami, FL

9:30 New Findings in Washroom Microbiology—**C. GERBA**, University of Arizona, Tucson, AZ

10:00 Break

10:20 How Safe is Airline Food—**J. SIMPSON**, Germantown, TN

10:50 Ethnic Food Safety—**G. SWICK**, Marion County General Health District, Marion, OH

11:20 The Safety of Mysterious Ethnic Foods—**J. GANS**, Santa Clara Department of Environmental Health, San Jose, CA

Technical Session—Meat & Poultry Safety

8:30 Ecology of *Salmonella*, *Campylobacter* and *Listeria* in Chicken Production—**S. BAILEY**, N. Stern, and N. Cox, USDA-ARS-RRC-PMSRU, Athens, GA

8:45 Evaluation of a Steam Pasteurization Process in a Commercial Beef Processing Facility—**A. NUTSCH**, R. Phebus, D. Schafer, M. Riemann, R. Wilson, and J. Leising, Kansas State University, Manhattan, KS

9:00 Characterization of *Lactococcus* spp. Isolated from Cooked Modified Atmosphere Packaged Poultry Meat—**R. BARAKAT** and L. Harris, University of Guelph, Guelph, Ontario, Canada

9:15 The Optimization of a Lactic Acid Treatment for the Improvement of the Microbiological Quality and Safety of Poultry Carcasses—**D. BAUTISTA**, N. Sylvester, S. Barbut, and M. Griffiths, University of Guelph, Guelph, Ontario, Canada

9:30 Level of *Campylobacter* on the Farm Associated with Levels on Processed Carcassess—**N. STERN**, USDA-ARS-RRC-PMSRU, Athens, GA

9:45 An Effective Procedure for the Detection of *Campylobacter* spp. on Broiler Carcasses by Rinsing Directly with Enrichment Broth—**M. MUSGROVE**, N. Stern, and R. Johnson, USDA-ARS-RRC-PMSRU, Athens, GA

10:00 Break

10:20 Comparison of *In Ovo* Treatments for Reduction of *Salmonella* Colonization in Broiler Chickens—**J. LINE**, N. Stern, S. Bailey, and N. Cox, USDA-ARS-RRC-PMSRU, Athens, GA

10:35 Immobilization of Nisin in an Edible Gel for Reducing Bacteria on the Surface of Beef and in Ground Beef—**C. NETTLES-CUTTER** and G. Siragusa, USDA-ARS, Clay Center, NE

10:50 Statistical Evaluation of a Poultry Process for the Determination of Overall Quality Using Conventional Microbiology and ATP Bioluminescence—**D. BAUTISTA**, S. Barbut, J. Vaillancourt, L. Harris, and M. Griffiths, University of Guelph, Guelph, Ontario, Canada

11:05 Environmental Analysis Methods Utilized to Determine the Contamination Source in a Sausage Processing Plant—**S. SHUMAKER** and J. Feirtag, University of Minnesota, St. Paul, MN

11:20 Comparison of F+RNA Coliphage and Coliform Levels as Fecal Contamination Indicators in a Pork Slaughterhouse Environment—**A. MILLER** and B. Eblen, USDA, ARS, ERRC, Philadelphia, PA

11:35 Quantity and Distribution of Airborne Microorganisms in Poultry Processing Environments—**R. LINTON**, K. Lutgring, M. Peugh, A. Heber, and N. Zimmerman, Purdue University, West Lafayette, IN

Planning for the 21st Century on the Dairy Farm

8:30 Large Farm Design from the Owner/Operator Perspective—**D. BANSEN**, Dairy Gold Cooperative, Portland, OR

8:55 Large Herd Health Management—**T. FURMAN**, Dairy Services of Arizona, Tempe, AZ

9:20 On Farm Concentration of Milk—**J. OGDEN**, New Mexico Department of Agriculture, Albuquerque, NM

9:45 Proper Design of Milking Equipment—**C. SLOANE**, Germania Equipment, Centralia, WA

10:10 Break

10:30 Western Milk Hauling Concepts—**A. SAYLOR**, Food and Drug Administration, Washington, D.C.

10:55 ECO-Agriculture–Sustaining the Dairy Cow–**J. LOHMAN**, Blue Diamond Corporation

11:20 Electronic Communication on the Dairy Farm–**R. CADY**, Washington State University, Puyallup, WA

11:45 Farm Uses of Computer Technology–**C. JAMIESON**, Valley Agriculture Software, Tulare, CA

Global Perspectives on *E. coli* O157:H7 and Other Serotypes (Sponsored by ILSI)

8:30 VTEC Overview–**M. NEILL**, Brown University and Memorial Hospital of Rhode Island, Pawtucket, RI

8:40 Australian Views–**P. DESMARCHELIER**, CSIRO, Australia

9:10 Canadian Views–**J. WILSON**, Health Canada and University of Guelph, Guelph, Ontario, Canada

9:35 European Views–**H. KARCH**, University of Wurzburg, Wurzburg, Germany

10:05 Break

10:25 Perspectives on Shiga-like Toxin (SLT) Infections in Argentina–**E. LOPEZ**, Hospital de Ninos, Buenos Aires, Argentina

10:55 The Investigations and Control of VTEC in the UK: An Overview–**N. SIMMONS**, Guy's and St. Thomas' Hospital Trust, London, United Kingdom

11:25 Overview of VTEC in the USA–**P. TARR**, Children's Hospital and Medical Center, Seattle, WA

11:55 Round Table

Posters–General Microbiology Pathogens

- Numerical Methods to Determine Suitability of *Listeria monocytogenes* Ribotype Patterns for Normalization and Matching–**B. TENGE**, K. Jinneman, N. Dang, F. Fry, W. Hill, and M. Wekell, U.S. Food and Drug Administration, Bothell, WA
- Differences in ELISA Reactions of Monoclonal Antibodies EM-6E11 (Genus-Specific) and EM-7G1 (Species-Specific) Against Live and Heat Killed Cells of *Listeria* and *Listeria monocytogenes*–**R. NANNAPANENI**, R. Story, A. Bhunia, and M. Johnson, University of Arkansas, Fayetteville, AR
- Evaluation of Five Methods for Detection of *Listeria* Species in Market Mussel–**D. JEONG**, C. Chung, D. Gu, and E. Nam, Kosin University, Pusan, Korea
- Antimicrobial Agents Incorporated in Edible Films to Control Microbial Growth–**J. GRABER**, M. Schnepf, S. Sumner, S. Cuppett, and C. Weller, University of Nebraska, Lincoln, NE
- Influence of Temperature and Preincubation Temperature on Survival of *Listeria monocytogenes* at pH 4.8–**M. GAY**, K. Davey, and O. Cerf, ASEPT, France
- Significance of Preincubation Temperature and Inoculum Size on Growth of *Listeria monocytogenes*–**M. GAY**, K. Davey, and O. Cerf, ASEPT, France
- Thermal Destruction of *Listeria innocua* in Solid Muscle Beef or Chicken–**J. GOFF**, M. Christie, R. Story, and M. Johnson, University of Arkansas, Fayetteville, AR
- Effect of Some Additives Used in Meat Products on Behavior of *Listeria monocytogenes*–**R. RAYBAUDI** and A. Martinez, Universidad Central de Venezuela, Caracas, Venezuela
- Evaluation of Rapid DNA Extraction Methods for Detection of *Listeria monocytogenes* in Dairy Products Using the TaqMan™ Sequence Detection System–**T. COX**, R. Behari, S. Flood, C. Yamashiro, C. Paszko-Kolva, and R. Cano, California Polytechnic State University, San Luis Obispo, CA
- Survey on *Listeria* spp. Contamination of Korean Market Pork–**C. CHUNG**, D. Gu, and D. Jeong, Kon-Kuk University, Seoul, Korea
- Predictive Modeling of *Listeria* spp. Inactivation in Whole Bovine Milk in a High-Temperature, Short-Time Pasteurizer–**R. MCKELLAR**, P. Punidadas, and S. Liou, Centre for Food and Animal Research, Ottawa, Ontario, Canada
- Survival and Growth of *Listeria monocytogenes* Scott A in Beef and Pork Stored at Different Temperatures–**A. CASTILLO**, N. Martinez-Gonzales, and M. Rodriguez-Garcia, Texas A & M University, College Station, TX
- Disinfection Efficacy Against Pure-Culture and Mixed-Population Biofilms of *Listeria innocua* and *Pseudomonas aeruginosa* on Stainless Steel, Teflon® and Rubber–**F. BOURION**, and O. Cerf, ASEPT, France
- Effect of Temperature and pH on the Growth of *Listeria monocytogenes* on Pork Packaged in CO_2–**P. BODNARUK** and B. Shay, University of Tennessee, Knoxville, TN
- Microbial Competition: Suppression of *Listeria monocytogenes* Growth by *Pseudomonas fluorescens*–**L. BAGI** and R. Buchanan, USDA, ARS, Philadelphia, PA
- Evaluation of a New Rapid Screening Test for *Listeria*–**J. GEBLER**, Murray Goulburn Co-Operative Company, Limited, Victoria, Australia
- Evaluation and Application of *Listeria monocytogenes* Specific Antibodies–**P. SCHUBERT**, K. Kramer, and A. Bubert, MERCK KGaA, Darmstadt, Germany
- Petrifilm™ *Listeria* Count Plate: A Highly Selective Method for the Quantitative Recovery of *Listeria* from Environmental Samples–**G. SANDBERG**, M. Tochacek, and R. Young, 3M Company, St. Paul, MN

- Time to Toxin Production by Nonproteolytic *Clostridium botulinum* as Affected by Environmental Factors–**P. ELLIOTT** and D. Schaffner, Campbell Soup Company, Camden, NJ
- Development of a Twenty-Four Hour Method for the Detection of *Bacillus cereus* Spores in Raw Milk–**J. QUINLAN** and P. Foegeding, North Carolina State University, Raleigh, NC
- Development of a PCR Assay for the Detection of *Bacillus cereus*–**J. CZAJKA** and C. Batt, Cornell University, Ithaca, NY
- Effect of Modified Atmosphere and NaCl Treatment on the Growth of *Yersinia enterocolitica* on Minimally Processed Broccoli Stored at 4°C–**P. BODNARUK** and A. Draughon, University of Tennessee, Knoxville, TN
- Use of a Single Procedure for Selective Enrichment Isolation and Identification of Plasmid-Bearing Virulent Serotypes of *Yersinia enterocolitica* from Ground Pork–**S. BHADURI** and A. Pickard, USDA, ARS, ERRC, Philadelphia, PA
- Enhancement of Recovery by Removal of Blood from Standard *Campylobacter* Culture Protocol–**D. BARK**, C. Abeyta, and B. Jay, U.S. Food and Drug Administration, Bothell, WA
- Multiplex PCR for the Identification and Differentiation of *Campylobacter coli* and *C. jejuni*–**K. HARMON**, Iowa State University, Ames, IA
- Comparison of Selective Media for Primary Isolation of *Campylobacter*s Using Numerical and Graphical Tools to Indicate Optimal Media–**B. TENGE**, C. Abeyta, Jr., J. Hunt, P. Trost, D. Bark, C. Kaysner, and M. Wekell, U.S. Food and Drug Administration, Bothell, WA
- Rapid Detection of *Campylobacter jejuni* in Chicken Products by a Nested PCR–**D. WINTERS**, A. O'Leary, and M. Slavik, University of Arkansas, Fayetteville, AR
- The Measured Heat-Resistance of Non-Proteolytic *Clostridium botulinum* Spores is Increased by Endogenous Lysozyme Activity of Vegetable Extracts–**S. STRINGER** and M. Peck, Institute of Food Research, Norwich, United Kingdom
- Microbiological Quality of Cream-Fillings from Doughnuts Sold at Bulawayo, a Zimbabwean City–**R. OKAGBUE,** Applied Biology and Biochemistry, Byo, Zimbabwe
- Cross Protection by Heat and Cold Shock to Lethal Temperatures in *Clostridium perfringens*–**J. LIMÓN**, N. Heredia, and J. Garcia-Alvarado, UANL, Mexico
- Effect of Heat Shock on Sporulation, Protein Synthesis and Enterotoxin Production of *Clostridium perfringens*–**N. HEREDIA**, J. Garcia-Alvarado, and R. Labbe, UANL, Mexico

Monday Afternoon–July 1, 1996

Food Safety Education

1:30 Using a Computer-Based CD-ROM Tutorial to Strengthen Understanding of Good Sanitary Practices in Retail Food Stores–**R. GRAVANI**, K. Williams, D. Berry, S. Kern, and J. Tauer, Cornell University, Ithaca, NY

1:45 Different Ways to Get Food Safety Information to Clientele Groups–**S. BARNARD**, S. Knabel, and T. Dimick, The Pennsylvania State University, University Park, PA

2:00 Codex Alimentarius: Its Expanded Importance in Food Safety and International Trade–**H. WEHR**, TAS, Inc., Washington, D.C.

2:15 The Management and Technology of Retail Food System Food Safety–**O. SNYDER, JR.**, Hospitality Institute of Technology and Management, St. Paul, MN

2:30 ISO 9000/HACCP/Food Hygiene Practices: Food Safety and Quality for the Food and Beverage Industry–**R. DOUGHERTY**, NSF International, Ann Arbor, MI

2:45 Food Safety Education for Teens–**M. LEE** and B. Lacroix, Ryerson Polytechnic University, Toronto, Ontario, Canada

Technical Session–Sanitation

1:30 A Novel Enzyme-Linked Antibiotic Assay for Rapid Detection of Gram-Negative Bacteria–**V. LEWANDOWSKI**, T. Bridgeman, E. Zottola, and A. Olstein, University of Minnesota, St. Paul, MN

1:45 Quenching and Enhancement Effect on the ATP Bioluminescence Signal Using Different ATP Extractans and Sanitizers–**M. VELAZQUEZ**, H. Chan, A. Kirumira, and J. Feirtag, University of Minnesota, St. Paul, MN

2:00 Characterization of *Alicyclobacillus* Species Isolated from Fruit Juices and Canned Tomatoes–**I. WALLS**, V. Scott, and J. Webster, National Food Processors Association, Washington, D.C.

2:15 Chemical, Microbiological, and Physical Quality of Packaged Ice in Florida–**R. SCHMIDT** and G. Rodrick, University of Florida, Gainesville, FL

2:30 Assessment of the Microbiological Quality of Ready-to-Use Vegetables for Healthcare Food Service in Ontario, Canada–**J. ODUMERU**, S. Mitchell, D. Alves, J. Lynch, A. Yee, S. Wang, S. Styliadis, and J. Farber, Ontario Ministry of Agriculture, Guelph, Ontario, Canada

2:45 The Effect of Lactic Acid Sanitizer Treatment on *Listeria monocytogenes* L-Forms Biofilms on Food and Clinical Contact Surfaces–**S. JASSIM**, A. Hibma, and M. Griffiths, University of Guelph, Guelph, Ontario, Canada

Technical Session—General Food Microbiology

1:30 Survival of *Yersinia enterocolitica* during Fermentation and Storage of Yogurt—**R. WILLIAMS**, P. Bodnaruk, and D. Golden, University of Tennessee, Knoxville, TN

1:45 Efficacy of Chlorine and Heat Treatment in Killing *Salmonella stanley* on Alfalfa Seeds, and Growth of the Pathogen during Sprouting and Storage—**C. JAQUETTE**, L. Beuchat, and B. Mahon, University of Georgia, Griffin, GA

2:00 Inhibition of *Listeria monocytogenes*, *Staphylococcus aureus*, and *Bacillus cereus* by the Hop ß Acid Colupulone and Its Derivative, Hexahydrocolupulone—**J. MEYER**, N. Faith, J. Schoeni, J. Luchansky, A. Wong, J. Cerveny, and M. Barney, Oscar Mayer Foods Corporation, Milwaukee, WI

2:15 A Rapid Dot-Blot Immunoassay for the Detection of *Salmonella enteritidis* in Eggs, Poultry and Other Foods—**M. YOSHIMASU** and J. Zawistowski, University of Manitoba, Winnipeg, Manitoba, Canada

2:30 Antimicrobial Properties of Linear Furanocoumarins—**J. ULATE-RODRIGUEZ**, H. Schafer, E. Zottola, and P. Davidson, University of Minnesota, St. Paul, MN

2:45 The Influence of Divalent Cations and Chelators on Aflatoxin B_1 Degradation by *Flavobacterium aurantiacum* —**D. D'SOUZA** and R. Brackett, University of Georgia, Griffin, GA

3:00 Break

3:20 Determination of Nisin Activity Using an HPLC Method—**A. LARSSON** and E. Zottola, University of Minnesota, St. Paul, MN

3:35 Comparison of Methods for Coliform and *Enterobacteriaceae* Counts Among Naturally Contaminated Food and Environmental Samples—**P. MACH** and K. Lindberg, 3M Company, St. Paul, MN

3:50 Evidence for the Occurrence of Plant Specific *Bacillus cereus* in the Dairy Industry—**H. SCHRAFT**, M. Steele, J. Odumeru, W. McNab, and M. Griffiths, University of Guelph, Guelph, Ontario, Canada

4:05 Application of Generalized Evaluation Procedure for Comparing Isolation Methodologies for Foodborne *Listeria monocytogenes*—**T. HITCHINS**, Food and Drug Administration, Washington, D.C.

4:20 The Antibacterial Effect of Tea and Tea Concentrates on *Clostridium botulinum*—**P. MCCLURE** and M. Cirigliano, Unilever Research, Sharnbrook, England

Sensory Attributes of Dairy Foods

1:30 Introduction to Sensory Principles—**J. BRUHN**, University of California-Davis, Davis, CA

1:50 Milk Sensory Attributes—**S. BARNARD**, Penn State University, University Park, PA; **E. SPEAR**, Dairy & Food Industry Consultant, Corpus Christie, TX; **M. SMUKOWSKI**, University of Wisconsin, Madison, WI

2:05 Cheddar Cheese Sensory Attributes—**M. BATES**, Washington State University, Pullman, WA; **T. LENSMIRE**, LOL, Lake to Lake, Denmark, WI; **T. DULMAGE**, University of Wisconsin, Madison, WI

2:20 Yogurt Sensory Attributes—**P. JELEN**, University of Alberta, Edmonton, Alberta, Canada

2:35 Ice Cream Sensory Attributes—**R. MARSHALL**, University of Missouri, Columbia, MO; **T. GOTTEMOLLER**, Archer Daniel Midland, Decatur, IL

2:50 Cottage Cheese Sensory Attributes—**R. BRADLEY**, University of Wisconsin, Madison, WI; **T. GRUETZMACHER**, Dean Foods Co., Rockford, IL

3:05 Break

3:25 Sensory Evaluation of the Products

4:50 Open Discussion

Controlling *Escherichia coli* O157:H7and Friends in Meat

1:30 Industrial Perspective—**J. WILLIAMS**, American Meat Institute, Arlington, VA

2:00 Farm Prevalence of EHEC and Production Intervention Strategies—**R. JOHNSON**, Agriculture Canada

2:30 Effect of Carcass Decontamination Procedures on Microflora—**W. DORSA**, USDA, ARS, Clay Center, NE

3:00 Break

3:20 Intervention Strategies in Primary Processing—New Zealand Experience—**P. DESMARCHELIER**, CRISO, Tingalpa, Australia

3:50 Physiological Control of EHEC—**T. ROSS**, University of Tasmania, Australia

4:20 Control of *Escherichia coli* O157:H7 in Dry, Fermented Sausage—**J. LUCHANSKY**, Food Research Laboratory, Madison, WI

Posters—Methods/Sanitation

- Assessing Microbial Hazards from Chilled/Frozen Foods Exposed to Refrigeration Failure—**R. LACHICA** and R. Worfel, U.S. Army, Natick, MA

- Microbial Quality of Vacuum Packaged Cook/Chill Foods Prepared in a Hospital–**B. LANGLOIS**, K. Akers, S. Bastin, and J. O'Leary, University of Kentucky, Lexington, KY
- Automated Ribotyping-Based Assessment of Diversity in Bovine Mastitis-Causing Microorganisms–**J. BRUCE**, A. Rivas, C. Batt, M. Wiedmann, C. McDowell, R. Gonzalez, and E. Cole, DuPont Experimental Station, Wilmington, DE
- A Comparison of Various Phenotypic and Genotypic Methods for Typing *Enterobacter sakazakii*–**M. NAZAROWEC-WHITE** and J. Farber, Health Canada, Ottawa, Ontario, Canada
- Comparative Recovery of Coliforms from Meat and Milk Using m-ColiBlue24 and Direct Plating–**J. DICKSON**, J. Erdmann, and M. Grant, Iowa State University, Ames, IA
- Rapid Coliform Counts of Raw Milk–**P. TUITEMWONG** and K. Tuitemwong, KMIT Thonburi, Thailand
- Microbiological and Sensory Quality of Milk–**C. HACKNEY**, S. Duncan, H. Williams, and W. Hartman, Virginia Polytechnic Institute and State University, Blacksburg, VA
- Fermented Milk Containing *Bifidobacterium longum* Potentiates Immune Response of the Host–**C. FERREIRA**, M. Moulin, and J. Mezencio, Universidade Federal de Vicosa, Vicosa, Brazil
- Survival and Growth of *Aeromonas hydrophila* and *Listeria monocytogenes* on Raw Cabbage and Celery–**R. DIAZ**, R. Raybaudi, and A. Martinez, Universidad Central de Venezuela, Caracas, Venezuela
- Isolation and Characterization of Lactic Acid Bacteria from Bean Sprouts which Inhibit *Listeria monocytogenes*–**J. FARBER**, Y. Cai, and L. Ng, Health Canada, Ottawa, Ontario Canada
- Occurrence of *Listeria monocytogenes*, *Salmonella* spp., *Escherichia coli* and *Escherichia coli* O157:H7 in Vegetable Salads–**C. LIN**, S. Fernando, T. Huang, and C. Wei, University of Florida, Gainesville, FL
- Growth of *Listeria monocytogenes* on Minimally Processed Broccoli with Antimicrobial Treatment–**R. SMILEY**, D. Grindstead, J. Mount and A. Draughon, University of Tennessee, Knoxville, TN
- Application of ATP-Bioluminescence for Cleaning Validation of Food Processing Equipment–**E. EHRENFELD**, J. Scheld, S. Miller, and C. Carpenter, IDEXX Laboratories, Westbrook, ME
- Application of a Rapid ATP-Bioluminescence Method for Assessing Cleanliness of Milking Equipment–**K. STRUTZ**, C. Fong, and P. Vasavada, University of Wisconsin-River Falls, River Falls, WI
- Monitoring Cleanliness of Food Contact Surfaces Using Rapid ATP-Bioluminescence Method–**C. FOONG** and P. Vasavada, University of Wisconsin-River Falls, River Falls, WI
- A New Medium for the Quantification of Bacteria in Food After 24 Hours–**D. TOWNSEND**, A. Croteau, and A. Naqui, IDEXX Laboratories, Westbrook, ME
- Real Time Monitoring of Lactic Fermentations Using Impedance Microbiology–**J. COOMBS**, A. Marshall, A. Pridmore, and P. Silley, Bioscience International Inc., Rockville, MD
- The Efficacy of Washing and Sanitizing Animal Hauling Trucks–**K. RAJKOWSKI**, USDA, ARS, ERRC, Philadelphia, PA
- Enhanced Detection of Pathogens in Meat Products Using Automated Malthus Conductance Assays–**D. GIBSON**, BIODON, Aberdeen, United Kingdom
- Genetic Characterization and Identification of Lactic Acid Bacteria Important to the Food Industry Using Automated Ribotyping–**A. MCCARDELL**, J. Bruce, E. Cole, and M. Corby, DuPont Experimental Station, Wilmington, DE
- Biopreservation of Vacuum Packaged Coarse Ground Beef by *Leuconostoc gelidum* UAL 187–**R. WOROBO**, G. Greer, M. Stiles, and L. McMullen, University of Alberta, Edmonton, Alberta, Canada
- Oregon Consumers' Use of U.S.D.A. Safe Handling Instructions Label on Meats and Poultry and Their Knowledge of Foodborne Illness Risks–**M. WOODBURN** and C. Raab, Oregon State University, Corvallis, OR
- An Evaluation of the Efficacy of Two Beef Carcass Decontamination Methods–**S. KOCHEVAR**, J. Sofos, and G. Smith, Colorado State University, Fort Collins, CO
- Isolation of *Hafnia alvei* from Commercially-Prepared, Chub-Packed Ground Beef, and Its Importance in Meat Spoilage–**S. GAMAGE**, S. Ingham, and J. Luchansky, Food Research Institute, Madison, WI
- Microbiology of Aquacultured Striped Bass Grown in Earthen Ponds, Flow-Through Tanks, and Recirculating Tanks–**P. NEDOLUHA** and D. Westhoff, University of Maryland, College Park, MD
- Growth of Psychrotrophic Pathogens on Refrigerated Aquacultured Rainbow Trout and Channel Catfish Filets–**C. FERNANDES**, T. Thomas, and G. Flick, Virginia Polytechnic Institute and State University, Blacksburg, VA
- Effect of Organic Acids on the Microflora of Channel Catfish (*Ictalurus punctatus*)–**C. FERNANDES**, J. Cohen, T. Thomas, and G. Flick, Virginia Polytechnic Institute and State University, Blacksburg, VA
- Comparison of Quality in Aquacultured Fresh Catfish Filets II: Pathogens *Escherichia coli* O157:H7, *Campylobacter*, *Vibrio, Plesiomonas* and *Klebsiella*–**C. FERNANDES**, G. Flick, J. Silva, and T. McCaskey, Virginia Polytechnic Institute and State University, Blacksburg, VA
- Microbial Evaluation of Salmon Roe Processed in Alaska–**B. HIMELBLOOM** and C. Crapo, University of Alaska, Kodiak, AK

- Biogenic Amines in Fish Sauces–**Y. HUANG**, M. Zheng, H. Amos, K. Gates, and M. Froetschel, University of Georgia, Athens, GA
- Quality of Surimi Made from Tilapia and Carp–**Y. HUANG**, H. Abdel-Aal, and A. Awad, University of Georgia, Athens, GA

Tuesday Morning–July 2, 1996

Use of Indicator Microorganisms in Food Safety

8:30 Microbial Indicators: Purposes and Uses –**L. JAYKUS**, North Carolina State University, Raleigh, NC

8:55 Use of Microbial Indicators–Regulatory Perspective–**A. McNAMARA**, USDA, FSIS, Washington, DC

9:20 Use of Microbial Indicators–Industry Perspective–**D. ZINK**, Nestle USA, Inc., Glendale, CA

9:45 Value of Microbial Indicators in Environmental Monitoring–**J. FRANK**, University of Georgia, Athens, GA

10:10 Break

10:30 Microbial Indicators and Foodborne Pathogens–*Salmonella*–**S. BAILEY**, USDA-ARS-RRC, Athens, GA

10:55 Microbial Indicators and Foodborne Pathogens–*Escherichia coli* O157:H7 –**R. NICKELSON**, National Cattleman's Beef Association, Chicago, IL

11:20 Bacteriophage Indicators of Enteric Pathogens in Food–**M. SOBSEY**, University of North Carolina at Chapel Hill, Chapel Hill, NC

Technical Session–*Escherichia coli/Listeria*

8:30 Acid and Heat Tolerance of Acid Habituated *Escherichia coli* O157:H7–**H. THIPPAREDDI**, D. Retzlaff, R. Phebus, and D. Fung, Kansas State University, Manhattan, KS

8:45 Changes in Heat-Resistance of *Escherichia coli* O157:H7 Following Heat Shock and Acid-Shock–**N. WILLIAMS** and S. Ingham, University of Wisconsin-Madison, Madison, WI

9:00 Influence of a_w and Temperature on Viability of Unheated and Heat-Stressed *Escherichia coli* O157:H7 in Salami–**R. CLAVERO** and L. Beuchat, University of Georgia, Griffin, GA

9:15 Isolation and Characterization of Substances Inhibitory to *Escherichia coli* O157:H7 and *Listeria monocytogenes*–**T. BRIDGEMAN** and E. Zottola, University of Minnesota, St. Paul, MN

9:30 Outer Membrane Proteins and Adherence of Iron-Stressed Enterohemorrhagic *Escherichia coli* to HEp-2 Cells–**T. SCHWACH** and E. Zottola, University of Minnesota, St. Paul, MN

9:45 Survival of *Escherichia coli* O157:H7 during Fermentation of Apple Cider–**J. SEMANCHEK** and D. Golden, University of Tennessee, Knoxville, TN

10:00 Break

10:20 Application of a Fluorogenic 5' Nuclease PCR Assay for Detection of *Listeria monocytogenes* in Raw Milk–**C. BATT**, D. Norton, B. Miller, R. Behari, S. Flood, V. Lunge, and P. Witham, Cornell University, Ithaca, NY

10:35 Development of a Bacteriophage–Mediated ATP Bioluminescent Detection System for *Listeria monocytogenes*–**L. MCINTYRE**, S. Jassim, and M. Griffiths, University of Guelph, Guelph, Ontario, Canada

10:50 Use of Nisin to Control *Listeria monocytogenes* in Queso Fresco Cheese–**A. DEGNAN**, N. Farkye, M. Johnson, and J. Luchansky, Food Research Institute, Madison, WI

11:05 Response of *Escherichia coli* O157:H7 in the Presence of Sodium Lactate during Refrigerated Storage with and without Temperature Abuse–**D. CONNER** and O. Oyarzabal, Auburn University, Auburn, AL

Increasing Dairy Product Shelf Life

8:30 Computerization in Pastuerization Controls–**R. COFFMAN**, Masterleo and Associates, Worthington, OH

9:00 Round Table Discussion on Increasing Shelf-Life from 16 to 21 Days–**J. DELANEY**, Prairie Farms Dairy Inc., Carlinville, IL; **R. FUQUA**, Quality Chekd Dairy Products Association, Naperville, IL; **T. BOUFFORD**, Ecolab Research Center, St. Paul, MN; **V. MILLS**, Evergreen Packaging, Cedar Rapids, IA

9:55 Break

10:15 Plant Design and Equipment for Aseptic and Near Aseptic Processing of Milk–**D. HENYON**, Elopak Inc., New Hudson, MI; **C. REINHART**, Waukesha Cherry Burrell, Louisville, KY; **R. SIMPSON**, APV Crepaco, Rosemont, IL

11:15 Regulatory Concerns of Aseptic Processing–**S. SIMS**, Food and Drug Administration, Washington, D.C.

11:45 Prevalence of *Listeria monocytogenes* in Dairy Products, **R. BYRNE,** International Dairy Foods Association, Washington, D.C.

Tempest in a Teapot

Speakers and Topics to be announced

Emerging Issues in Communicating Food Safety Risks

8:30 Consumer Perceptions of Food Safety Issues: What do We Know and How are We Using That Information in Developing Risk Communication Strategies?–**R. GRAVANI**, Cornell University, Ithaca, NY

9:00 Changing Newspaper Coverage of Microbial Food Safety Risks in North America and Implications for Risk Communication–**D. POWELL**, University of Guelph, Guelph, Ontario, Canada

9:30 Effect of Professional and Media Warnings about the Hazards of *Escherichia coli* O157:H7 Prior to and After the 1993 Jack-in-the-Box Outbreak–**L. HARRIS**, University of California-Davis, Davis, CA

10:00 Break

10:20 Communicating to the Public About New Technologies–**C. BRUHN**, University of California-Davis, Davis, CA

10:50 Overview of Existing Food Safety Communication and Education Programs–**C. ROBERTS**, U.S. Department of Agriculture/Food & Drug Administration, Beltsville, MD

11:20 Designing Food Safety and Nutrition Information, Educational Materials and Campaigns: A Comparative Review of Four Campaigns–**C. SCHIFFMAN**, Food and Drug Administration, Washington, D.C.

Posters–General Microbiology

- A Definitive and Rapid Method for Identifying Atypical *Salmonella* from Selective Agar Plate–**E. COLE**, S. Tseng, M. Barbour, D. Macool, L. Ecret, C. McDowell, H. White, and B. Kriegar, DuPont Experimental Station, Wilmington, DE
- Control of Enteric Pathogenic Bacteria on Fresh Produce–**D. PETERS**, S. Sumner, J. Albrecht, and L. Bullerman, University of Nebraska, Lincoln, NE
- Evaluation of the Salmonella BAX™ System. A Rapid PCR Based Method for the Analysis of Foods for Foodborne *Salmonella*–**C. SOBITIES**, A. Bennett, D. Greenwood, R. Betts, and J. Banks, DuPont Experimental Station, Wilmington, DE
- Establishing Baseline Risk for *Salmonella enteritidis* in Shell Eggs–**R. MORALES**, L. Jaykus, and P. Cowen, North Carolina State University, Raleigh, NC
- Elimination of *Salmonella* and *Staphylococcus aureus* from Bison, Ostrich, Alligator, and Caiman Meat by Gamma Irradiation–**D. THAYER** and G. Boyd, USDA, ARS, ERRC, Philadelphia, PA
- Detection of *Salmonella* in Food Using a Novel PCR-Based Fluorogenic 5' Nuclease Assay–**C. YAMASHIRO**, R. Behari, S. Flood, C. Thio, P. Witham, D. Norton, S. Kawasaki, B. Kimura, T. Fujii, and C. Paszko-Kolva, Perkin-Elmer, Foster City, CA
- Rapid Molecular Method for the Detection of Human Enteric Viruses in Clams–**A. DIX** and L. Jaykus, North Carolina State University, Raleigh, NC
- The Effects of Some Extrusion and Canning Processes on Deoxynivalenol–**C. WOLF-HALL**, L. Bullerman, and M. Hanna, University of Nebraska, Lincoln, NE
- Electron Microscopy of Fungal Spores Produced under Reduced Water Activity–**M. BLASZYK** and G. Blank, University of Manitoba, Winnipeg, Manitoba, Canada
- Stability of Fumonisin B_1 (FB_1) during Extrusion Cooking–**S. KATTA**, M. Castelo, S. Sumner, M. Hanna, and L. Bullerman, University of Nebraska, Lincoln, NE
- Inhibition of Growth and Mycotoxin Production of Penicillium by Lactobacillus Species–**H. GOURAMA**, Penn State, Reading, PA
- An Easy Screening Test for Detecting Yeast Contamination in Rinse Water Samples–**C. CHEN**, K. Doherty, and A. Naqui, IDEXX Laboratories, Inc., Westbrook, ME
- Fumonisin Concentrations in Commercial Corn-Based Food Products–**M. CASTELO**, S. Sumner, and L. Bullerman, University of Nebraska, Lincoln, NE
- Retention of Acid Tolerance and Acid Shock Responses in *Escherichia coli* O157:H7–**D. GARREN**, M. Harrison, and S. Russell, University of Georgia, Athens, GA
- A Model for the Interactions of Temperature pH, Lactate, Salt and Nitrite on the Survival of *Escherichia coli* O157:H7–**R. WHITING** and M. Golden, USDA, ARS, ERRC, Philadelphia, PA
- Effectiveness of Sanitizers vs. *Escherichia coli* O157:H7–**Z. WANG** and M. Banner, Diversey Corporation, Plymouth, MI
- Heat Shock Response Protects *Escherichia coli* O157:H7 Against Lethal Acidity–**G. WANG** and M. Doyle, University of Georgia, Griffin, GA
- Survival of *Escherichia coli* O157:H7 in Drinking and Recreational Water–**G. WANG** and M. Doyle, University of Georgia, Griffin, GA
- Heat Inactivation and Injury of *Escherichia coli* O157:H7 Cultured at 10 and 37°C–**J. SEMANCHEK** and D. Golden, University of Tennessee, Knoxville, TN
- Studies on the Survival of *Escherichia coli* O157:H7 in Fermented Meat Products–**D. RIORDAN**, G. Duffy, J. Sheridan, R. Whiting, B. Eblen, D. McDowell, and I. Blair, The National Food Centre Dunsinea, Castleknock, Ireland
- Evaluation of an ELISA System for Detecting Verotoxin Produced by Enterohemorrhagic *Escherichia coli* (EHEC)–**W. TSAI**, C. Miller, and E. Richter, Silliker Laboratories of Ohio, Inc., Columbus, OH
- A Multiplex PCR Assay for Detecting Verotoxin-Producing *Escherichia coli* O157:H7–**J. MENG**, S. Zhao, and M. Doyle, University of Georgia, Griffin, GA
- The Behavior of *Escherichia coli* O157:H7 in Fermentation Systems with Thermophilic and Mesophilic Dairy Starter Cultures–**J. SOUDAH**, and K. Boor, Cornell University, Ithaca, NY
- Thermal Inactivation of *Escherichia coli* O157:H7 in Meat–**O. SNYDER, JR.**, V. Juneja, and B. Marmer, Hospitality Institute of Technology & Management, St. Paul, MN

- Validation of Pepperoni Processes for Control of *Escherichia coli* O157:H7–**N. FAITH**, J. Hinkens, T. Lorang, P. Bailey, D. Buege, J. Luchansky, and C. Kaspar, University of Wisconsin, Madison, WI
- Survival of *Escherichia coli* O157:H7, *Listeria monocytogenes*, and *Salmonella typhimurium* in Ground Beef Jerky–**J. HARRISON** and M. Harrison, University of Georgia, Athens, GA
- Acid Stress and Death in Pathogenic *Escherichia coli*–**A. CASTILLO**, E. Cabrera-Diaz, and M. Rodriguez-Garcia, Texas A & M University, College Station, TX
- Effect of *Escherichia coli* O157:H7 Growth in the Presence or Absence of Glucose on Its Acid Tolerance–**R. BUCHANAN** and S. Edelson, USDA, ARS, ERRC, Philadelphia, PA
- Prevalence of *Escherichia coli* O157:H7 in Lebanon–**W. BIRBARI**, M. Jurdi, G. Araj, and M. Mikati, American University of Beirut, Beirut, Lebanon
- A PCR-Based Method for the Detection of *Escherichia coli* O157:H7 from Ground Beef–**W. BARBOUR**, L. Ecret, C. Sobities, S. Fritschel, DuPont Experimental Station, Wilmington, DE

Tuesday Afternoon–July 2, 1996

General Session–Ensuring a Safe Global Food Supply (Sponsored by ILSI)

1:30 A Global Perspective of Foodborne Disease–**S. NOTERMANS**, National Institute of Public Health and Environmental Protection, Bilthoven, The Netherlands

2:00 Microbial Food Safety Issues and Concerns in International Trade: Harmonization and Standards–**M. VAN SCHOTHORST**, NESTEC Ltd., Vevey, Switzerland

2:30 Microbial Hazards and Emerging Issues Associated with Produce–**K. WACHSMUTH**, U.S. Food and Drug Administration, Washington, D.C.

3:00 Microbial Hazards and Emerging Issues Associated with Seafood–**E. GARRETT**, National Marine Fishery Service, Pascagoula, MS

3:30 Break

3:50 IAMFES Annual Business Meeting

Wednesday Morning–July 3, 1996

Microbiological Issues in Seafood

8:30 Parasites in Seafoods–**A. ADAMS**, U.S. Food and Drug Administration, Bothell, WA

9:00 Marine Toxins–**R. MANGER**, U.S. Food and Drug Administration, Bothell, WA

9:30 Control of Bacterial Pathogens in Seafood –**M. EKLUND**, NMFS, Seattle, WA

10:00 Break

10:20 Risk Assessment of Seafood in Canada–Initial Stages–**E. TODD**, Health Canada, Ottawa, Ontario, Canada

10:50 Epidemiology and Detection of Human Enteric Viruses in Seafood–**L. JAYKUS**, North Carolina State University, Raleigh, NC

11:20 Aquaculture–**M. WEKELL**, U.S. Food and Drug Administration, Bothell, WA

Microbiology of Wine

8:30 Quality Control Aspects in Winemaking–**A. KARUMANCHIRI**, Liquor Control Board of Ontario, Toronto, Ontario, Canada

9:00 Influence of Yeast Strains on Wine Quality–**G. CONE**, American Yeast Co., Union City, CA

9:30 Yeast Enumeration and Identification–**L. BEUCHAT**, University of Georgia, Griffin, GA

10:00 Break

10:20 Interaction Between Yeasts and Malo-lactic Bacteria–**C. EDWARDS**, Washington State University, Pullman, WA

10:50 Physiology of the Malo-lactic Bacteria–**E. OLSEN**, Chateau Ste Michelle, Woodinville, WA

11:20 Wine Spoilage Microorganisms and Their Control–**D. SPLITTSTOESSER**, Cornell University, Geneva, NY

Dairy Foods Safety and Quality–Dairy Foods Research Centers

8:30 The Development and Use of Bacteriocin-Containing Dairy Ingredients to Control Unwanted Microorganisms in Formulated Foods–**E. ZOTTOLA**, University of Minnesota, St. Paul, MN

9:00 Survival of *Escherichia coli* O157:H7 in Fermented Dairy Foods–**K. BOOR**, Cornell University, Ithaca, NY

9:30 Mastitis Pathogens of Public Health Concerns–**J. CULLOR**, University of California-Davis, Davis, CA

10:00 Break

10:20 Microbiological Safety and Quality of Reduced-Fat Cheddar Cheese–**E. JOHNSON**, University of Wisconsin, Madison, WI

10:50 HACCP Model Programs for the Dairy Industry–**R. BISHOP**, University of Wisconsin, Madison, WI

Framework for Accessing the Risk of Microbial Contamination (Sponsored by ILSI)

8:30 The Role of Risk Assessment in Microbial Food/Water Safety Regulatory Issues–**D. VOSE**, DVRAS, Wincanton, United Kingdom

9:00 Risk Assessment Principles Document of the U.S. National Advisory Committee on Microbial Criteria for Foods–**R. BUCHANAN**, U.S. Department of Agriculture, Philadelphia, PA

9:30 Overview of Microbial Risk Assessment in the Agri-Food Industry: Approaches to Identifying Intervention Strategies for Risk Reduction–**A. LAMMERDING**, Agriculture and Agri-Food Canada, Guelph, Ontario, Canada

10:00 Break

10:20 Conceptual Framework for Microbial Water Safety Risk Assessment: Report of the ILSI Risk Science Institute Working Group on Microbial Risk Assessment–**J. SEED**, ILSI Risk Science Institute, Washington, D.C.

10:50 Development of Risk Assessment Guidelines for Foods of Animal Origin in International Trade–**S. HATHAWAY**, Ministry of Agriculture and Fisheries Regulatory Authority, Gisborne, New Zealand

11:20 Practical Approaches to Risk Assessment–**M. VAN SCHOTHORST**, NESTEC, Ltd., Vevey, Switzerland

Wednesday Afternoon–July 3, 1996

Surveillance of Foodborne and Waterborne Disease

1:30 *Salmonella enteritidis* Surveillance in New York State–**J. GUZEWICH**, New York Department of Health, Albany, NY

2:00 *Escherichia coli* O157:H7 Outbreaks in the Northeast United States–**B. BARTLESON**, Washington State Department of Health, Olympia, WA

2:30 Foodborne Disease Surveillance–A National Perspective–**E. TODD**, Health Canada, Ottawa, Ontario, Canada

3:00 Break

3:20 Foodborne Disease Surveillance in Latin America and the Caribbean–An International Perspective–**P. ARAMBULO**, Pan American Health Organization, Washington, D.C.

3:50 On Sites Investigation of Waterborne Disease–**K. FOX**, Environmental Protection Agency, Cincinnati, OH

4:20 Procedures to Investigate Waterborne Illness–**F. BRYAN**, Food Safety Consultant, Lithonia, GA

Current Methods and Future Prospects for the Control of Foodborne Pathogen Colonization in the Gastrointestinal Tract

1:30 Historical, Current, and Future Prospects for Probiotic Research–International Perspectives–**S. STAVRIC**, Bureau of Microbial Hazards, Ottawa, Ontario, Canada

1:50 Strategies for Controlling *Salmonella enteritidis* in Egg-Laying Chickens–**R. GAST**, USDA-ARS, Athens, GA

2:10 Ecological Concepts for Developing Continuous-Flow Competitive Exclusion Cultures for Food Animals–**D. NISBET**, USDA-ARS, College Station, TX

2:30 Virulence Mechanisms of Bacterial Pathogens and the Effect of Human Biota Interactions in the Gut–**K. WILSON**, Duke University Medical Center, Durham, NC

2:50 Break

3:10 Research Strategies for Understanding Foodborne Pathogen Competiveness under Strict Anaerobic and Gastrointestinal Conditions–**S. RICKE**, Texas A & M University, College Station, TX

3:30 Immuno-Based Methodology for Detection of Competitive Exclusion Cultures–**L. STANKER**, USDA-ARS, College Station, TX

3:50 The Utility of Molecular Assays for Understanding Microbial Gene Expression in Gastrointestinal Tracts–**S. PILLAI**, Texas A & M University, El Paso, TX

Emerging Issues in Food Mycology

1:30 Detection, Control and Toxicity of Fumonisns and Other Fusarium Toxins–**L. BULLERMAN**, University of Nebraska, Lincoln, NE

2:00 Alternative Methods for Isolation, Culture and Identification of Fungi in Foods–**L. BEUCHAT**, University of Georgia, Griffin, GA

2:30 Immunological and Genetic Methods to Rapidly Detect Fungi in Foods–**M. COUSIN**, Purdue University, West Lafayette, IN

3:00 Break

3:20 Biocontrol of Mold Growth and Mycotoxin Production–**H. GOURAMA**, Penn State University, Reading, PA

3:50 Heat Resistant Molds and Preservative Resistant Yeasts–**A. KING**, USDA, Alban, CA

Intervention Strategies for Safe Meats: Production to Consumers

1:30 Probiotics–**N. COX**, USDA, ARS, Athens, GA

1:55 Slaughter–**J. REIMANN**, Excel Corporation, Wichita, KS

2:20 Chemical Treatments/Bacteriocins–**B. SHELTON**, North Carolina State University, Raleigh, NC

2:45 Irradiation–**J. DICKSON**, Iowa State University, Ames, IA

3:10 Break

3:30 Restaurants–**D. THENO**, Foodmaker Inc., San Diego, CA

3:55 Retail–**G. PRINCE**, The Kroger Company, Cincinnati, OH

Guest Room Commitment
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IAMFES

83rd Annual Meeting
June 30 – July 3, 1996
Sheraton Seattle Hotel & Towers
Seattle, WA

Please check accommodation requested:
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❑ Double (2 persons)

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❑ King Bed
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SPECIAL REQUESTS _____

After May 29, 1996 reservations will be accepted on a space and rate available basis. Reservations will be held until 6:00 p.m. on the date of arrival, unless guaranteed by a one night advance deposit, payable by certified check or a major credit card.

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83rd

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83rd IAMFES Annual Meeting

Special Events

Opening Session

Ivan Parkin Lectureship
Sunday, June 30, 1996 — 7:00 p.m.

Lecture: Sense, Nonsense, and Science presented by: Joseph A. Schwarcz, Ph.D., Professor of Chemistry, Vanier College; Senior Adjunct Professor of McGill University; Science Editor of CJAD Radio; TV Columnist on The Discovery Channel.

Cheese and Wine Reception Held in the Exhibit Hall

Sunday, June 30, 1996 — 8:00 p.m. — 10:00 p.m.

The traditional opening of the Educational Exhibits and an opportunity to learn about the latest industry advancements as well as greet old friends and make new friends.

Monday Night Gala
Evening at the Museum of Flight

Monday, July 1, 1996 — 6:00 p.m. — 9:00 p.m.
Registration: $45 (Late $50)

Enjoy dinner at Seattle's most spectacular attraction: Boeing Museum of Flight. In the steel and glass Great Gallery, the history of aviation soars past, with more than 20 full-sized aircraft flying in formation six stories above. Dinner will be in the Museum's Side Gallery overlooking the colorful displays.

After dinner feel free to tour the facility. Visit the "Red Barn", the birthplace of Boeing. See the world's only remaining M/D-21 Blackbird, a rare World War II FG-1D Corsair fighter, the sole remaining 1929 Boeing 80A Trimotor, and dozens of other vintage aircraft and spacecrafts.

Exhibit Schedule

Monday, July 1, 1996

9:30 a.m. - 4:00 p.m. Exhibits Open
Complimentary Coffee and Donuts in Exhibit Hall
(9:30 a.m. – 11:00 a.m.)

Tuesday, July 2, 1996

9:30 a.m. - 4:00 p.m. Exhibits Open
Complimentary Lunch in Exhibit Hall
(12:00 p.m. – 1:30 p.m.)

IAMFES Annual Awards Banquet and Reception

Wednesday, July 3, 1996
Reception: 6:00 p.m. — Banquet: 7:00 p.m.
Registration: $35 ($40 Late)

Included in Full Registration

IAMFES Kids' Pizza Banquet

Wednesday, July 3, 1996 — 6:30 p.m. — 9:30 p.m.
Registration: $15 ($20 Late)

Adult supervised for children ages 4 and up. Pizza, pop and activities provided.

IAMFES Kids' Room

Monday — Wednesday, July 1, 1996 — July 3, 1996
9 a.m. — 12 noon and 1:30 p.m. — 4:30 p.m.
No registration required, please check in.

Adult supervised child care for children ages 4 and up.

A New Event–Seattle Mariners vs. Oakland Athletics Baseball Game

Tuesday, July 2, 1996–6:00 p.m.–10:00 p.m.
Registration: $17 (must pre-register)

Plan to attend an evening at the Seattle Kingdome with family and friends while watching the 1995 American League West Champion Seattle Mariners play the Oakland Athletics in a game of baseball. Ticket price includes round trip transportation to the Kingdome and one admission to the game.

Spouse/Companion Tours

Sample Seattle — A Deluxe City Tour

Sunday, June 30, 1996 — 10:00 a.m. — 3:00 p.m.
Registration: $30 (Late $35) Lunch on your own

Come sample Seattle – This tour provides an overview of the many attractions Seattle offers its visitors. You'll enjoy a drive along the waterfront with its import shops and fresh seafood restaurants. Then you'll drive into Pioneer Square, the city's oldest area rich with early 1900's architecture, much of which has been renovated into art galleries and specialty shops. Next is the International District in which evidence of the Pacific Rim cultural influences abound. The tour continues along Lake Washington into the Arboretum and on to the University of Washington campus. The Hiram Chittenden Locks and salmon ladders will be the first stop. The locks connect the Puget Sound with freshwater Lake Union and the salmon ladders feature seasonal migration of salmon returning to parent streams to spawn. Next you will travel to Magnolia Bluff for a breathtaking view of the Sound. Then back to the city and the world famous Pike Place Market for shopping. The day will be capped off with a visit to the Space Needle observation deck.

The Museum of Doll Art, Bellevue Art Museum and Shopping at Bellevue Square

Monday, July 1, 1996 — 9:00 a.m. — 3:00 p.m.
Registration: $30 (Late $35), Lunch on your own

You will visit an extraordinary museum dedicated to the preservation and exhibition of dolls as an art form. The nostalgia of Rosalie Whyel's Museum of Doll Art will fill you with memories of days gone by. Here you will witness one of the world's fine collections of dolls, teddy bears, toys and miniatures. Over 700 dolls ranging from rare porcelain pieces from the 18th century to Barbie and GI Joe are on display. After you experience the charm of the museum and its eloquent Victorian Gardens you will depart for Bellevue Square with over 200 shops and restaurants. Time will be provided for shopping. If shopping is not your forte, visit the Bellevue Art Museum on the third floor where contemporary Northwest art is on display. Then relax while sipping a cappuccino at Seattle's Best Coffee, or savor a warm cinnamon roll at Cinnabon.

Country Sampler

Tuesday, July 2, 1996 — 9:00 a.m. — 3:30 p.m.
Registration: $30 (Late $35), Lunch on your own

This favorite outing begins with a scenic ride through the foothills of the Cascade Mountains to breathtaking Snoqualmie Falls. Once worshipped by Native American Indians as a place for the gods, these falls are actually 97 feet higher than Niagara! Next you're off to Gilman Village in Issaquah. The homes are historic and provide a unique setting for shops which include hand-crafted jewelry, clothing, home accessories and freshly baked goods. You will have time to explore. The last stop will be Chateau Ste. Michelle, Washington's premier winery. Nestled on 87 acres of rolling grounds, the original manor house was built in 1912 and is surrounded by formal gardens, a trout pond, and hundreds of lush shrubs and flowers. During your private guided tour, you will witness the marvel of wine-making and learn the "sniff, swirl, and slurp" method of wine tasting as you sample world famous wines.

Historic Seattle

Wednesday, July 3, 1996 — 9:00 a.m. — 3:30 p.m.
Registration: $30 (Late $35), Lunch on your own

Discover the intrigue of Seattle's history and its fascinating architecture on this informative tour. You will break into smaller groups and begin your tour with a short walk to the Fifth Avenue Theater, a national historical landmark, where you will hear about the theater's latest production and enjoy the dramatic interior. Next is a short walk to Seattle's most recent architectural feat, the Underground Metro Bus Tunnel. You'll experience an incredibly clean, beautiful marbled tunnel on your trip down to Pioneer Square. The history of Seattle will unfold before you and come to life as you are guided through the streets on a walking tour of the district. During your tour you will visit the Klondike Museum and Seattle's Underground where you will see "old Seattle." During the afternoon you will have time to enjoy the area. The tour ends with a bus trip back to your hotel.

83rd IAMFES Annual Meeting Registration Form

Sheraton Seattle Hotel & Towers — Seattle, WA — June 30 - July 3, 1996
(Use photocopies for extra registrations)

FOR OFFICE USE
Registration # _____ Date Rec'd. _____ First initial _____ Last name _____

First Name (will appear on badge) (please print) Last Name

Title Employer

Mailing Address (Please specify: Home or Work)

City State/Province Country Postal/Zip Code

Telephone # Fax #

Please check where applicable:

- ___ IAMFES Member
- ___ Non-Member
- ___ Local Arrangements
- ___ 30 Yr. Member
- ___ 50 Yr. Member
- ___ Past President
- ___ Executive Board
- ___ Speaker
- ___ Honorary Life Member
- ___ Exhibitor
- ___ IAMFES Sustaining Member
- ___ IAMFES Program Advisory Committee

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515-276-8655

Sign up to become a NEW member
and take advantage of the member discount.

***REGISTER BY MAY 31, 1996 TO AVOID LATE REGISTRATION FEES**

REGISTRATION:	MEMBERS	NON-MEMBERS	AMOUNT
Registration (Banquet included)	$195 ($240 late)*	$275 ($320 late)*	_____
Student Member	$ 25 ($ 35 late)*	Not Available	_____
One Day Registration (Circle: Mon/Tues/Wed)	$100 ($120 late)*	$130 ($150 late)*	_____
Spouse/Companion (Name): _____	$ 25 ($ 25 late)*	$ 25 ($ 25 late)*	_____
Children (14 & Under), Names: _____	FREE	FREE	_____

NEW MEMBERSHIP FEES:		
Membership with *Dairy, Food & Environmental Sanitation*	$ 70	_____
Membership with *Dairy, Food & Env. Sanitation & Journal of Food Protection*	$110	_____
Student Membership ❒ *Dairy, Food & Env. San.* **or ❒ *Journal of Food Protection*	$ 35	_____
**Student Membership with *Dairy, Food & Env. San. & Journal of Food Protection*	$ 55	_____
***Full-time student verification required.*		
SHIPPING CHARGES: OUTSIDE THE U.S. – SURFACE RATE	$ 22.50 per journal	_____
AIRMAIL	$ 95.00 per journal	_____

OTHER FEES:	PER PERSON	# OF TICKETS	
Cheese and Wine Reception (Sun., 6/30)	FREE	_____	_____
An Evening at the Museum of Flight (Mon., 7/1)	$ 45 ($ 50 late)*	_____	_____
Seattle Mariners vs. Oakland Athletics Baseball Game (Tues., 7/2)	$ 17 (N/A late)*	_____	_____
IAMFES Awards Banquet (Wed., 7/3)	$ 35 ($ 40 late)*	_____	_____
Kids' Banquet (Wed., 7/3)	$ 15 ($ 20 late)*	_____	_____

SPOUSE/COMPANION EVENTS:	PER PERSON		
Sample Seattle – A Deluxe City Tour (Sun., 6/30)	$ 30 ($ 35 late)*	_____	_____
The Museum of Doll Art, Bellevue Art Museum and Bellevue Square (Mon., 7/1)	$ 30 ($ 35 late)*	_____	_____
Country Sampler (Tues., 7/2)	$ 30 ($ 35 late)*	_____	_____
Historic Seattle (Wed., 7/3)	$ 30 ($ 35 late)*	_____	_____

❒ Please indicate here if you have a disability requiring special accommodations.

Credit Card Payments: Please Circle: VISA/MASTERCARD/AMERICAN EXPRESS

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Name on Card _____ Signature _____

Total Amount Enclosed $_____
U.S. FUNDS DRAWN ON U.S. BANK

Registration Information

Send payment with registration to IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322–2863. Make checks payable to IAMFES. Registration must be post-marked by May 31, 1996. Registration post-marked after May 31, 1996 will be charged the late registration fee. For additional information contact Julie Cattanach at 1-800-369-6337.

Refund/Cancellation Policy

The IAMFES policy on refunds and/or cancellations is as follows: Registration fees, minus a $50 processing fee, will be refunded for written cancellations post-marked by June 14, 1996. No refunds will be made for cancellations post-marked after June 14, 1996, however, the registration may be transferred to a colleague with written notification to IAMFES.

Budget Rental Car Information

For information on special rental car rates from Budget call 1-800-866-6137. Please mention Rate Code: V9Y and BCD #: U009666.

The Workshops

Workshop 1—New Methods to Study Old and New Pathogens

Workshop Agenda

Saturday, June 29, 1996
8:00 a.m. - 5:00 p.m.

Fees:
Member: $220; After May 31, 1996: $270
Non-Member: $295; After May 31, 1996: $345

Workshop Instructor:
Charles Kasper

The detection and typing of foodborne pathogens is a continually evolving aspect of food safety and an area where training must be constantly updated. This workshop is designed to fill this training need.

Participants will receive the latest information on the characteristics, ecology, and epidemiology of familiar foodborne pathogens. Another area to be presented will involve video demonstrations and literature on commercially available detection/typing systems including immunological and nucleic acid detection. Workshop facilitators are experts in each of these areas.

About the Instructors:

Clostridium botulinum
Dr. Eric Johnson
Associate Professor
Food Research Institute
University of Wisconsin
Madison, WI

Seafood safety-vibrios and toxins
Dr. Mark Tamplin
Associate Professor
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, FL

Molecular subtyping and tracking
Dr. Charles Kasper
Assistant Professor
Food Research Institute
University of Wisconsin
Madison, WI

Immunological detection methods
Dr. Tim Frier
Senior Scientist, Microbiology
Cargill Analytical Services
Cedar Rapids, IA

The use of gene probes and PCR for the detection of foodborne pathogens
Dr. Walter Hill
Research Geneticist
Food and Drug Administration
Bothell, WA

Workshop 2—Eat, Drink, and be Wary: Risk Communication

Workshop Agenda

Saturday, June 29, 1996
8:00 a.m. - 5:00 p.m.

Fees:
Member: $225; After May 31, 1996: $275
Non-Member: $300; After May 31, 1996: $350

Workshop Instructor:
Douglas Powell

While there has been strong focus on risk assessment, little attention has been paid to risk communication and microbial food safety. Yet food scientists and managers are increasingly called upon by clients, regulators, and the public to enter into value-laden conflicts involving technological risk, such as lethal bacteria in ground meat. But the mysterious language of probabilities and technology proficiency lends itself poorly to the general public; facts alone are never enough. Established risk communication theory offers a framework to study the most effective way for food professionals to communicate about specific risk.

This workshop will introduce the basic concepts of risk communication and use applied research, case studies, and role playing to substantiate the crucial role of risk communication as a bridge between food science and the consuming public. The following topics will be covered in this day-long workshop:

- Communication basics
- Public perceptions of microbial food safety
- Outrage factor
- Media coverage and consumer effect
- Techniques for gathering information
- Using electronic information to support risk communication activities
- Preparing for interviews/public meetings/consultations
- How to answer tough questions
- Good and bad examples of risk communication
- Communicating with different audiences
- Building trust and alliances
- Is it possible to separate risk assessment from risk management and communication?
- Integrating public and scientific judgements to manage food-related risks

About the Instructor:

Douglas Powell at the University of Guelph, Department of Food Science applies risk communication theory to issues of food safety and food biotechnology. Specifically, working with studying public perceptions of agricultural biotechnology and microbial aspects of food safety in North America; and the broader public discussions involving technology and society, which shape public attitudes and policy decisions. He completed a BS (honors) in molecular biology and genetics at the University of Guelph in 1985. After two years of work he entered journalism through the student press. He has been the editor of several community newspapers, has written for a diverse range of magazines, and managed communications at a university-based computer research center. He also is a freelance journalist, reporting on Canadian news for the Washington based journal, *Science*, and contributes regularly to the *Toronto Globe and Mail*.

1996 IAMFES Workshops
• Registration Form •

First Name (will appear on badge) PLEASE PRINT Last Name

Title Employer

City State/Province ZIP/Postal Code

Area Code & Telephone # FAX #

Charge Card Payments: VISA • MASTERCARD • AMERICAN EXPRESS

Account #: _____

Name on Card: _____

Expiration Date: _____

Signature: _____

For further information, please contact IAMFES at (800) 369-6337 (U.S. and Canada), (515) 276-3344, FAX (515) 276-8655.

• WORKSHOPS •

❑ **WORKSHOP 1: New Methods to Study Old and New Pathogens**
Sheraton Seattle Hotel & Towers, Seattle, WA — Saturday, June 29, 1996

	Before 5/31/96	After 5/31/96
IAMFES Member	**$220**	**$270**
Non-Member	**$295**	**$345**

❑ **WORKSHOP 2: Eat, Drink, and be Wary: Risk Communication**
Sheraton Seattle Hotel & Towers, Seattle, WA — Saturday, June 29, 1996

	Before 5/31/96	After 5/31/96
IAMFES Member	**$225**	**$275**
Non-Member	**$300**	**$350**

TOTAL AMOUNT ENCLOSED: $ _____
(U.S. Funds on U.S. Bank)

Refund/Cancellation Policy
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NOTE: IAMFES reserves the right to cancel workshops if minimum enrollment is not met by **May 31, 1996.**

Advertising Index

Let your voice be heard!

Do you have an opinion regarding the new format and design of *Dairy, Food and Environmental Sanitation*? Why not let us know?

Submit comments to: Managing Editor, *Dairy, Food and Environmental Sanitation*, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa, 50322-2863; telephone (515) 276-3344 or (800) 369-6337; fax (515) 276-8655.

Please Don't Stop

We've had such a **great response** to our request for cover photos, we are already interested in photos for our 1997 issues.

So **please**, don't stop submitting your industry related 4-color photos!

As always, send to: Publication Specialist, *Dairy, Food and Environmental Sanitation*, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa, 50322-2863. **THANKS!**

IAMFES Offers the Dairy Practices Council
"Guidelines for the Dairy Industry"

IAMFES has agreed with the Dairy Practice Council to distribute their *"Guidelines for the Dairy Industry."* DPC is a non-profit organization of education, industry and regulatory personnel concerned with milk quality and sanitation throughout 19 northeastern/mid-Atlantic Midwestern states. However, its membership and subscriber rosters list individuals and organizations throughout the United States, Canada and other parts of the world.

For the past 6 years, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality fluid milk and manufactured dairy products.

The DPC Guidelines are written by professionals who comprise five permanent Task Forces. Prior to distribution, every Guideline is submitted for approval to the key milk control sanitarian in each of the 19 states which are now active participants in the DPC process. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

The Guidelines are renown for their common sense and useful approach to proper and improved sanitation practices. We think that they will be a valuable addition to your professional reading library.

The entire set consists of 48 guidelines including:

1 Planning Dairy Freestall Barns
2 Effective Installation, Cleaning and Sanitizing of Milking Systems
3 Selected Personnel in Milk Sanitation
4 Installation, Clenaing, & Sanitizing of Large Parlor Milking Systems
5 Directory of Dairy Farm Building & Milking System Resource People
7 Sampling Fluid Milk
8 Good Manufacturing Practices for Dairy Processing Plants
9 Fundamentals of Cleaning and Sanitizing Farm Milk Handling Equipment
10 Fluid Milk Shelf-Life
11 Sediment Testing and Producing Clean Milk
13 Environmental Air Control & Quality for Dairy Food Plants
14 Clean Room Technology
16 Handling Dairy Products From Processing to Consumption
17 Causes of Added Water in Milk
18 Abnormal Milk--Fieldman's Approach
21 Raw Milk Quality Tests
22 Control of Antibacterial Drugs and Growth Inhibitors in Milk and Milk Products
23 Preventing Rancid Flavors in Milk
24 Troubleshooting High Bacteria Counts of Raw Milk
25 Cleaning and Sanitizing Bulk Pickup and Transport Tankers
28 Troubleshooting Residual Films on Dairy Farm Milk Handling Equipment
29 Cleaning and Sanitizing in Fluid Milk Processing Plants
30 Potable Water on Dairy Farms
31 Composition and Nutritive Value of Dairy Products
32 Fat Test Variations in Raw Milk
33 Brucellosis and Some Other Milkborne Diseases
34 Butterfat Determinations of Various Dairy Products
35 Dairy Plant Waste Management
36 Dairy Farm Inspection
37 Planning Dairy Stall Barns
38 Preventing Off-flavors in Milk
39 Grade A Fluid Milk Plant Inspection
40 Controlling Fluid Milk Volume and Fat Losses
41 Milkrooms and Bulk Tank Installation
42 Stray Voltage on Dairy Farms
43 Farm Tank Calibrating and Checking
44 Troubleshooting Dairy Barn Ventilation Systems
45 Gravity Flow Gutters for Manure Removal in Milking Barns
46 Dairy Odor Control
47 Naturally Ventilated Dairy Cattle Housing
48 Cooling Milk on the Farm
49 Postmilking Teat Dips
50 Farm Bulk Milk Collection Procedures
51 Controlling the Accuracy of Electronic Testing Instruments for Milk Components
52 Emergency Action Plan for Outbreak of Milkborne Illness in the Northeast
53 Vitamin Fortification of Fluid Milk Products
54 Selection and Construction of Herringbone Milking Parlors
56 Dairy Product Safety (Relating to Pathogenic Bacteria)
57 Dairy Plant Sanitation
58 Sizing Dairy Farm Water Heater Systems
59 Production and Regulation of Quality Dairy Goat Milk

If purchased individually, the entire set would cost $194. We are offering the set, packaged in three loose leaf binders for $125 plus $9 shipping and handling (outside the U.S., $21 for shipping and handling).
Information on how to receive new and updated Guidelines will be included with your order.
To purchase this important source of information, complete the order form below and mail or FAX (515-276-8655) to IAMFES.

Please enclose $125 plus $9 shipping and handling for each set of Guidelines. Shipments outside the U.S. are $125 plus $21 shipping and handling.

Payment in U.S. $ drawn on a U.S. Bank or by credit card.

Name: _____ Phone No. _____
Company: _____
Street Address: _____
City, State/Province, Code: _____
VISA/MC/AE No.: _____ Exp. Date: _____

The International Association of Milk, Food and Environmental Sanitarians, Inc.

6200 Aurora Avenue, Suite 200W • Des Moines, Iowa 50322-2863 • (515) 276-3344 or (800) 369-6337

SHIP TO: (Please print or type. All areas must be completed in order to process.)

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Country _____ Zip/Postal Code _____

Office Telephone # _____ FAX # _____

IAMFES Booklets

Quontity	Description	Member or Gov't. Price	Non-Member Price	Totol
	Procedures to Investigate Waterborne Illness–2nd Edition	$8.00	$12.00	
	Procedures to Investigate Foodborne Illness–4th Edition	6.00	9.00	
	Procedures to Investigate Arthropod-borne and Rodent-borne Illness	6.00	9.00	
	Procedures to Implement the Hazard Analysis Critical Control Point System	6.00	9.00	
	Pocket Guide to Dairy Sanitation (minimum order of 10)	.50	.75	
	Multiple copies available at reduced prices. Phone our order desk for pricing information on quantities of 25 or more.		Shipping/Handling (See Below)	
			Booklet Total	

3-A Sanitary Standards

Quontity	Description	Member or Gov't. Price	Non-Member Price	Totol
	Complete Set 3-A Dairy Standards	$48.00	$72.00	
	Complete Set 3-A Dairy & Egg Standards	70.00	105.00	
	3-A Egg Standards	40.00	60.00	
	Five-year Update Service on 3-A Sanitary Standards, 3-A Dairy & Egg Standards	62.00	93.00	
			Shipping/Handling (See Below)	
			3-A Sanitary Standards Total	
			Total Order Amount	

Mail order to the IAMFES address listed above, or
call (515) 276-3344, (800) 369-6337 (U.S. and Canada);
or **fax** your order to (515) 276-8655.

Method of Payment

❑ CHECK OR MONEY ORDER ENCLOSED

❑ MASTERCARD ❑ VISA ❑ AMERICAN EXPRESS

Exp. Date _____

SIGNATURE _____

PAYMENT MUST BE ENCLOSED FOR ORDER TO BE PROCESSED

★ U.S. FUNDS ON U.S. BANK ★

Shipping and Handling

IAMFES booklets

Within U.S.
First booklet $2.00
Each additional booklet $1.00
Pocket Guide to Dairy Sanitation–per 10 ... $2.50

Outside U.S.
First booklet $4.00
Each additional booklet $1.00
Pocket Guide to Dairy Sanitation–per 10 ... $3.50

3-A Sanitary Standards
Within U.S. (each item) $6.25
Outside U.S. (each item) $10.25

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- **Gamma irradiation is the safe choice for processed foods and ingredients.**
  It is a proven, reliable method used to make food safer to eat. It eliminates pathogens, yeasts and molds while leaving no chemical residues. According to Dr. James Steele, former assistant U.S. Surgeon General "Irradiation . . .will move the nation and the world one step closer to UN/WHO goals of health for all."

- **Gamma irradiation is the smart choice for food processors.**
  It is a thorough process. Gamma energy penetrates completely, guaranteeing 100% of the product has been properly treated to meet your criteria. You can specify counts of <10 for pathogens, yeasts and molds. You can require total plate counts of <1000 with the assurance that your product's shelf life and quality will be increased.

For more information on SteriGenics and how gamma irradiation can benefit your business, call 800-777-9012. You'll receive free copies of "A Working Guide to Food Irradiation" and "Development of Hazard Analysis Critical Control Points (HACCP) for the Food Industry."

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Guess which rapid antibiotic test...

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- ✓ is recognized worldwide for reliability
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* Selectivity is the number of positives reported when testing 60 blind replicates of antibiotic-free (negative) milk, and is required data on every set of instructions supplied by test kit manufacturers.
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