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FOOD PROTECTION TRENDS

SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

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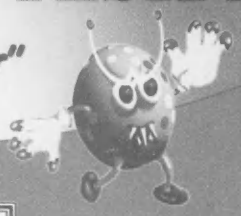

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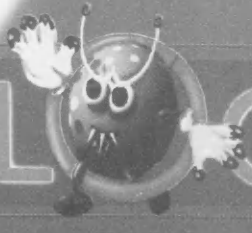

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FOOD PROTECTION TRENDS
SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

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New Orleans, Louisiana

AUGUST 8-11

JW Marriott Desert Ridge Resort
Phoenix, Arizona

AUGUST 14-17

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"THOUGHTS" FROM THE PRESIDENT

By ANNA M. LAMMERDING
PRESIDENT

"As we progress towards dealing with food safety issues on a global basis, it makes sense to provide opportunities for food safety professionals to meet, discuss and learn, and not just in North America"

Our Program Committee met in January of this year, faced with a formidable task. A record number of abstracts were submitted for the IAFP 2003 Annual Meeting, plus almost all symposia ideas, proposed by individuals and PDGs during IAFP 2002, were sent in complete with tentative speakers and topics. The daunting challenge was how to fit everything into the already full schedule? As we see every year, more than enough good "stuff" is going on all at once, at our conferences!

The review process for all abstracts is thorough; each is carefully considered by members of the Committee before being accepted for the Annual Meeting program. A key feature of the Program Committee is that it comprises equal representation from industry, academia and government, and includes international members. This make-up brings different expertises to the table when evaluating and planning the slate of sessions. Finally, the hard decisions were made under the guidance of Chairperson Lynn McMullen and Vice Chairperson Gary Acuff, and an exciting program will be awaiting you in New Orleans (other than the non-scientific "program" on Bourbon Street!).

Discussions are also underway to organize, independently or together with a partner, an IAFP forum in Europe. IAFP has many members outside of North America, and many who may find it easier to manage conference attendance on an alternate continent! We are asking our international members for input and support for this undertaking, as we explore options, venues, and topics to feature in the program. I invite all members to contact either myself (anna_lammerding@hc-sc.gc.ca) or David Tharp at the IAFP office, and share with us any thoughts or suggestions you might have about this proposal.

Following on the international perspective, the Codex Committee on Food Hygiene (CCFH) also met in January 2003. I am a relative newcomer to the workings of the CCFH, as a member of the Canadian delegation. Nevertheless, I have seen a shift in the work of the Committee, whose charge is to draft basic provisions on food hygiene for all foods. The term "hygiene" also includes, where applicable, microbiological specifications for food and associated methodology. New Chairperson, Dr. Karen Hulebak, Deputy Administrator, Office of Public Health and Science, USDA-FSIS, has clearly focused on incorporating "risk-based thinking" into the drafting of codes of practice and other guidance documents.

Created in 1963 and for many years declared one of the world's "best-kept secrets," the Codex Alimentarius Commission is now the designated standards-setting body for foods in international trade, under the provisions of world trade agreements, and hence the work of the various Codex committees is becoming increasingly important to food industries, regulators and consumers in all countries. Useful information can be found at http://www.codexalimentarius.net, or http://www.fsis.usda.gov/OA/codex/fh.htm, as well as from Codex offices in member countries. Other types of guidance documents for risk assessment and risk management in the international arena (but valuable also for national programs and education) can also be found at the Web sites for the food safety offices of the Food and Agricultures Organization (www.fao.org/es/esn) and the World Health Organization (www.who.int.fsf).

As we progress towards dealing with food safety issues on a global basis, it makes sense to provide opportunities for food safety professionals to meet, discuss and learn, and not just in North America.

Besides, springtime in Paris would be nice...!

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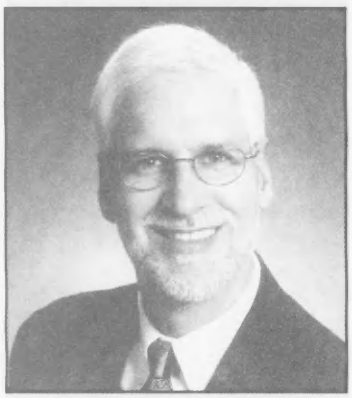
"COMMENTARY"
FROM THE EXECUTIVE DIRECTOR

As I sit down to write this month's column, we just endured the Shuttle Columbia tragedy here in the USA as the world kept a watchful eye. It sometimes takes a catastrophe of this magnitude to force us to realize how fragile our lives are. Seven lives were taken during the shuttle's reentry to earth's atmosphere as each of the astronauts reached the prime of their careers. Such a sad event when you think about it.

They were taken from their families without notice. They were taken from the world of science without forewarning. Some of the best minds in aeronautic and space exploration along with their family ties are severed from the world, as we know it. What does this have to do with the International Association for Food Protection or IAFP Members you may ask? A lot, I think!

We cannot plan for these life-changing events in our personal lives, but we can live life to the fullest while we have the opportunity! Think about your own personal life or the lives of others close to you. Think of friends, colleagues, business associates, your children, your parents and grandparents, and aunts or uncles. Almost everyone has experienced the death of a loved one or a close friend. Yes, it can be sad for those of us left on earth to live on after such an event. But it can also be an impetus to force change in our lives. Good change.

These types of tragedies cause us to take a look at ourselves and give us reason to pause and reflect on our own lives. What are we doing well and what should we be doing to improve our lives and our relationships with others? Do we have a balance between family time and work time?



By DAVID W. THARP, CAE
EXECUTIVE DIRECTOR

"We cannot plan for these life-changing events in our personal lives, but we can live life to the fullest while we have the opportunity."

How does our life affect others?

We probably ponder these questions frequently, but even more often when lives are known to be so fragile and it seems that it takes a tragedy to make us more aware of these issues. On the Saturday of the Columbia tragedy, I was just concluding a weeklong skiing vacation with my wife Connie. We were packing for our return to Des Moines the morning that the news came on the television stating that NASA had lost communication with the Shuttle. As more information became available, it was evident that the Columbia crew was lost.

I bring this up because the week I had with Connie in Utah was the first time in a long, long time that I had traveled with her and left my computer at the office! She was so pleased by this action it was amazing. She was overjoyed to have my undivided attention. These little actions can make a big difference in the way that our loved ones perceive us. It is important to give our full attention to family members when spending time together. In our busy world, this becomes more difficult daily as additional means of communication are developed. Sometimes though, it is good to get away from it all!

Another part of the interaction between family, friends, colleagues, etc. is your health. You must maintain your good health in order to continue your life — it is that simple. Without good health, you will not have the opportunity to develop relationships with family, friends, colleagues and business associates. You will not be able to spend quality time with your family and eventually, you will not be here to share in their accomplishments. Take good care of your health and live long!

This brings me back to the crew of the Shuttle Columbia. Each time the Shuttle goes to orbit the earth, there are literally hundreds of experiments conducted during its flight. Many of these experiments are carried out in an effort to find cures for diseases that are intended to extend our lives. While the astronauts knew fully the risk they faced by traveling to outer space, they assumed this risk to make our lives better and more fully livable. We should all pause for a moment to thank them for the sacrifice they made for the good of mankind.

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ARTICLES

Food Protection Trends, Vol. 23, No. 3, Pages 234-242

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International Association for Food Protection

Providing an Adequate Supply of Microbiologically Safe and Palatable Food and Drinking Water: Contribution of a European Vertically Integrated Approach to Educating Professionals and Consumers — Part 3

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[d]University of Hertfordshire, Faculty of Natural Sciences, Hatfield, Herts., UK

UNEQUIVOCAL ALLOCATION OF COMMITMENTS

Attempts to achieve food safety have a strong societal element. It is now generally accepted that, largely for practical reasons, the prime responsibility rests with the food manufacturing and catering industries. This is most explicitly stated in EU Directive 93/43 *(23)*. The responsibility of governments is to supervise the performance of all businesses. Specifically this can be achieved by auditing the adoption and implementation of Regulatory, or Codex, Codes of GMDPs, in conformity with the principles laid down in Table 1. Where required, legal enforcement should logically follow.

The role of the public in this respect has been much debated. Unquestionably, the consumer should meticulously follow instructions and advice printed on food packages. Temperature abuse of colonization-prone products is particularly compromising to safety and quality and must be avoided at all costs. Governments should consequently be vigilant about adequate labeling, and make available to the public general supporting information, especially that relating to microbiological safety.

It is, however, inappropriate to blame the public too much for the

A peer-reviewed article

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TABLE 1. Academic model, that could serve in regulatory enforcement of the responsibility of EU-governments for the microbiological safety of foods and catered meals

Phase 1. Audit of the premises and practices

Conduct a visual and instrumental audit, supported by microbiological spot-tests with the brief to assess whether applied GMDP procedures can ensure a safe product, when it is handled and ingested in accordance with instructions on the label.

- If the audit substantiates *compliance*: give the green light with the proviso of Phase 3.
- In case of *minor* deficiencies, recommend adequate remedial changes, validate their application and verify their impact.
- Upon ascertaining *substantial* failures: suggest radical improvements to avoid legal action.

Phase 2. Survey on the microbiological condition of the commodities as marketed

Examine a representative number of samples, with a minimum of 25, drawn at random from a production of about 1000 units, manufactured, stored and distributed in accordance with e.g. Codex Alimentarius Codes of Good Manufacturing and Distribution Practices (GMDPs), or procedures agreed on by consensus as appropriate, or processsing technologies designed specifically for a particular situation or commodity.

- If all samples pass a refereed examination procedure, proceed to Phase 3.
- If one or more samples fail to pass, inform the management of the Company that the survey will be repeated as soon as a second audit, as in Phase 1, has demonstrated that substantial improvements have been introduced successfully.

Phase 3. Sentinel activity

- Periodically verify that the Practices applied in Phase 1 have indeed been meticulously adopted and, as is apparent from the mandatory records, are consistently complied with.
- When auditing indicates a need for more searching monitoring, examine some ten samples, drawn at random from each production lot, by the procedure referred to under Phase 2 and, depending on the results, revert to one of the previous Phases if required.

high incidence of foodborne infections *(19, 29)*. A consumer's practice cannot be held responsible for foodborne infection if enteric pathogens are continually introduced into her/his kitchen as a result of the dangerous contamination of many raw foods *(21)*. Rather, all such foods should be decontaminated and aseptically packaged, so as to comply meticulously with approved codes of practice (ACoPs) before reaching the consumer, as is the case with liquid milk, ice cream and egg products in many countries *(6, 17, 31, 38)*. When foods processed-for-safety have been nonetheless found to be associated with occasional outbreaks, it has invariably been demonstrated that correct processing, in accordance with ACoPs and in the sense employed by Wilson, has not been achieved.

HUMAN RESOURCES FOR ENDEAVORING SUBSTANTIALLY IMPROVED PROTECTION OF THE PUBLIC THROUGH STRUCTURED EDUCATION

Dominant limiting factors in assurance of microbial food integrity

As expounded before, it is in fact most surprising that, whereas ample published knowledge and experience are readily available in textbooks, this body of knowledge seems to be virtually unexploited in strategies adopted in practice to reduce the incidence of foodborne disease and of spoilage. A WHO- team *(25)* has designated this unacceptable situation the microbiological food safety paradox.

A British expert, having analyzed the situation (Table 2), reached the conclusion that the hundreds of symposia, conferences, seminars, workshops, etc., devoted to the management of loss of food integrity during recent decades have, unfortunately, resulted in astonishingly little progress in daily practice. The authors *(24)* consider these discrepancies to be due to the lack of formal, structured education in this area, because all 'infotainment' activities referred to by Gilbert were non-committal. At best, a certificate of attendance was issued. A valid verification to assess whether the information had been assimilated and digested by a *viva voce* examination, or at least some sort of as-

TABLE 2. Reasons for the failure to contain food-transmitted diseases of microbial etiology, in spite of immense progress made in the privileged areas of the world, in the control of infectious diseases per se

Main reasons for the default

- *Denial* of the severity of the situation by many *actors*
- Failure to comply, through due diligence and responsible care, with available Codes of Preventive Practices, generally adopted by *industry* but frequently not embraced by the smallest, small and even medium size *enterprises*
- Failure by *Government Agencies* to elaborate or enforce Regulations
- Reluctance of the *public* to accept safer products obtained by the application of innovating technology, e.g. transradiation

Epicrisis

It is disappointing and mortifying that — as at that time emphasized by Professor Dr. R. J. Gilbert, Central Public Health Laboratory London, in a BBC television program addressing the aetiology of foodborne diseases — hundreds of international and national congresses, recommendations by expert panels and scientific dissertations advocating improved consumer protection have failed to rectify this situation.

sessment, failed to occur. Rarely were any practicals included to ensure unbiased validation of presented Good Practices.

A further contributing factor to the food safety paradox may be that Food Microbiology as an academic discipline has occupied a Cinderella position in too many instances. It has roots in Food Science, Biology, Human and Veterinary Medicine, Pharmacy and Sanitary Engineering, none of which has a strong affinity to food integrity. Any improvement of consumer protection might not be expected until the isolation of Food Microbiology within the educational ambience is rectified.

An interdisciplinary approach

The prime commitment in the area of food safety assurance unquestionably rests with the public health profession, with emphasis on both human medicine and — considering the preponderance of zoonoses among foodborne illnesses — veterinary medicine *(24)*. This does not mean that adjacent disciplines do not play an essential role. As previously noted, the cooperation between experts in processing food for safety, preservation of staples and manufactured foods, risk analysis and management, mathematics and behavioral science is indispensable. Advanced education in Public Health Science of Food should not fail to take this into consideration.

The Eijkman Foundation at Utrecht University has designed, in consultation with four sister universities, a 'common stem' curriculum to accommodate these requirements. Between 1988 and 1999 a postgraduate curriculum was submitted for review to an international panel of about 30 senior professors of Food Microbiology *(26, 33)*. A condensed version of the curriculum and a few practical details about its teaching are presented in Table 3, which emphasizes that up-to-date practical experience in this branch of science is indispensable.

A quite innovative major constituent of the curriculum is the emphasis on behavioral sciences. As already stated, unless staff can be persuaded to comply meticulously with ACoPs, and unless the public can be reassured that the food supply is safe or will be safe in the very near future, research and development efforts will lose much of their impact. Many health professionals and most technologists lack sufficient up-to-date psychosocial skills to deal adequately with such cardinal elements of effective consumer protection.

In-service training and motivation of professional and technical staff in food hygiene (Fig. 1) must, therefore henceforth be entrusted to food safety graduates conversant with the main determinants of human learning and behavior *(8, 10, 24)*. This will allow trainees, for instance, to appreciate that a 100 percent successful persuasion of target groups to embrace preset systems of compliance is illusory. Psychographic studies have demonstrated that this impossibility originates from three innate human attitudes. The first is the desire to feel that one has the option to exercise free choice ("empowerment"). This inclination is reinforced by dichotomism: the tendency to categorize situations as either good or bad, rather than quantify their degree of hazard. Finally, individuals may be confused rather than helped by information originating from third parties if this information is not rooted in science.

Implementation

Where postgraduate education in food microbiology has been provided it has, most unfortunately, not always kept up with the substantial progress made in the discipline. This applies particularly to the practical-*intervention*-constituent of curricula. Chairs once occupied by full-time experienced food microbiologists in the United States as well as continental Europe and the United Kingdom have gradually been converted into pro-

TABLE 3. M.Sc in public health science of food and drinking water, University of Hertfordshire, UK

Contribution of the Eijkman Foundation: Public Health microbiology of foods and drinking water

Aims

To introduce students to the essential learning components contributing to the manufacture, distribution and delivery of (i) food products with unimpaired integrity, *i.e.* safe and of good nutritional and sensory quality; and (ii) drinking water supplies to be used in the food and catering industries.

Objectives

To gain an understanding of advanced:

- Microbial Taxonomy
- Microbial Ecology
- Microbial Pathogenesis
- Essentials of Microbiological Safety Assurance including monitoring for compliance with Approved Codes of Practice (ACoPs)
- Psycho-social Fundamentals of Communicating Food Integrity Issues

Practicals

In residence:

- Familiarization with Good and Safe Food Microbiological Laboratory Practices
- Obtaining experience with the enumeration and tentative typification of major food-associated microorganisms, including *Clostridium* spp.
- The standard Public Health package and a few additional specific criteria for colonization-prone foods, both recently manufactured and temperature abused specimens
- Routine monitoring of supplies of drinking water

At place of work, if appropriate and certified (optional):

- Conducting an investigation, selected from a collection of current problems in Public Health microbiology of foods, catered meals and piped or bottled drinking water

fessorates of more general nature, including microbial genomics and biotechnology. This further undermining of the position of the poor cousin in the academic family has not exactly worked out to the benefit of education in Public Health Microbiology of Foods. A novel, concerted academic effort, along the strategic lines summarised in the previous section, is therefore called for.

An initiative has been taken by the Universities of Hertfordshire, and Lingköping, the Eijkman Foundation at Utrecht University and the Scottish Centre for Infection and Environmental Health to design and provide, by the Academic Year 2003/2004, an indispensable education of the structure introduced in the previous section. Its teaching goals are to provide the skills necessary to ensure food integrity, to graduates as well as to those already employed by food and catering industries or government agencies enforcing food legislation, who require or desire re-accreditation. Emphasis will be placed on two essentials: (i) theory and practicals are interventon-oriented and include validation and verification; and (ii) food and meals have to be safe for all consumer segments, i.e., from dignitaries dining in Michelin star restaurants, to patrons of fast-food eateries — not forgetting persons with debilitated immuno-defense, under medical care, or those just enjoying domestic cooking. The educational track is designated as *Public Health Science, Food and Drinking Water*, demonstrating that, in addition to the main menu of public health microbiology of foods, other components of bromatology will also be covered.

The emphasis is on Web-based distance learning, because expecting a rapid change in the structure of academic education in Food Microbiology within traditional in-residence education would be unrealistic. All tracks include the option of some 60% of practicals, and two periods of up to two weeks in residence at the university. The remaining part is devoted to carrying out a project at the place of work, if this site is qualified and certified for that purpose. Presentation of a dissertation at the end of the training period will conclude the educational program; cf. Box 1. It is the intention of the organizing institutions that this masters-level course will soon include universities outside the UK, Sweden, and The Netherlands. Some have already opened negotiations that may lead to an association with the founding universities.

Once such scientific understanding has been added to the food microbiologists' armament, it will be possible to make headway in influencing less formally educated staff, resulting in amended behavior and improved food safety. One would anticipate a

BOX 1.
Public Health Science of Food and Drinking Water

EIJKMAN FOUNDATION

UH SCIEH NHS SCOTLAND

Public Health Science of Food and Drinking Water
Introducing a new web-based distance learning MSc/Postgraduate Diploma

Presented by the University of Hertfordshire in partnership with:
The Eijkman Foundation for Medical microbiological Education and Research, Utrecht University, and the Scottish Centre for Infection and Environmental Health

Commencing: September 2003

The course is part-time only and is designed primarily for environmental health officers, food safety officers, public health medical practitioners, and microbiologists. However it will be of use to anyone who has an interest in the public health aspects of food and water safety.

Food and drinking water safety has never had a higher profile worldwide. Food safety relies on the expertise of many different professional groups and is best maintained through continuing professional development at postgraduate level. The objective of this part-time course is to produce a new generation of multi-skilled food safety professionals by engendering a holistic and pan-European approach to food safety. The course will include residential and distance-learning components designed to generate postgraduates with an increased ability to deal with food safety matters in their professional practice and the ability to work more effectively with other professionals in a European context. The final degree award is an MSc which requires the completion of eight taught modules and a four-module research project. Interim awards of a Postgraduate Certificate (four taught modules) and a Postgraduate Diploma (eight taught modules) are also available.

Course content

The taught modules will include epidemiology; principles of public health; public health microbiology of food and drinking water; risk analysis; microbiological aspects of processing food for safety; environmental health and consumer protection; veterinary aspects of food safety; and national and European perspectives on food administration and policy.

Course delivery

Students will require the facility to study at home and/or their place of work. A computer and internet access are essential. Delivery of material will involve the University of Hertfordshire's web-based managed learning environment "Studynet"; which provides a full discussion forum for students and staff and a portal into all course materials, electronic journals, assessment regulations and general information. Students will be required to attend at least two short residential courses. Assessment will involve a range of web-based assessment, written assignments and unseen examinations.

Cost

The average cost of each module will be approximately £600

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BOX 2.

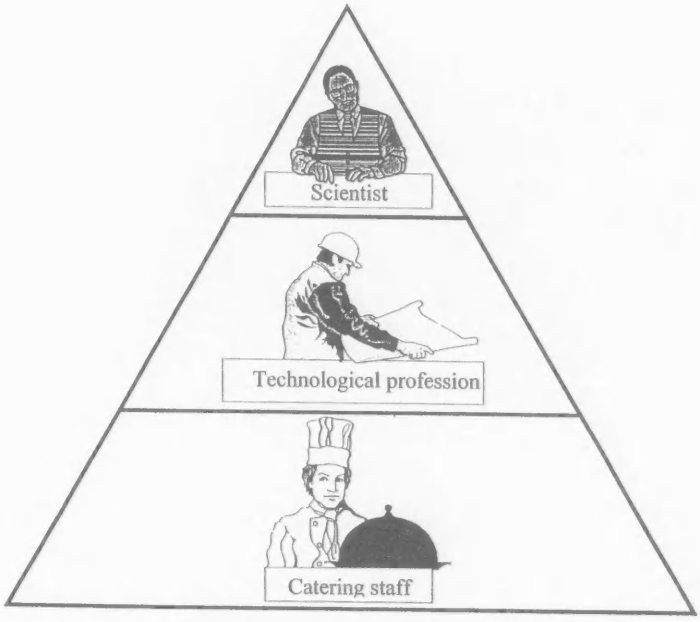
Definition of an approved code of practice (ACoP)

Example: a Codex Alimentarius 'Hygiene Code'

A document that

- provides sector (branch) guidance to assure that the food prepared and/or distributed in that sector is microbiologically safe for consumption;
- encompasses basic (prerequisite) hygiene advice as well as protocols for adherence to the seven principles of HACCP, specifically elaborated and validated for the process applied in the sector;
- takes into account the level of education and cultural background of the operators and staff to whom the code is directed.

FIGURE 1. The educational 'pyramid' – the pressing need for motivating all staff



Interaction, up– and downwards, between the disciplines is crucial to foster integration and collaboration

discernable improvement in performance and self-confidence, but the process will inevitably be slow, because, meanwhile, staff will often also be exposed to inaccurate and sometimes even misleading messages.

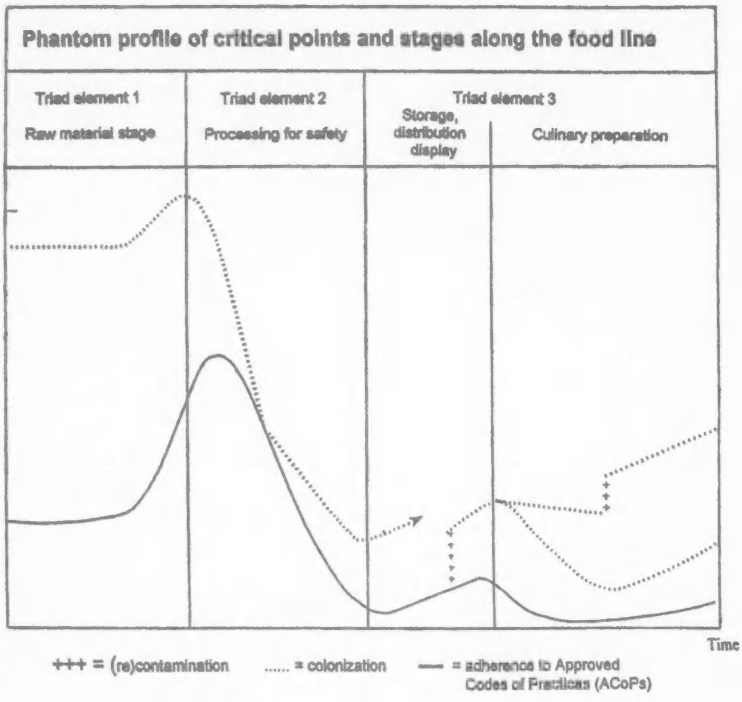
RETROSPECT AND CONCLUSIONS

Virtually all food incidents of chemical nature are, or will soon be brought, under control. On the other hand, it is unfortunately true that the incidence of food-transmitted diseases with a microbial etiology is not decreasing *(4, 5, 18, 27, 37)*. Likewise, the enormous amount of food that is spoiled before it reaches the consumer is not diminishing. This situation persists despite the availability of a considerable body of knowledge and excellent practical guidance, including that contained in Codex Alimentarius 'Hygiene Codes'; cf Box 2 *(7, 11, 12, 13, 14, 20, 22)*.

One of the most crucial but at the same time most exacting elements of an endeavor to markedly improve consumer protection in the food area will be the encouraging of all supervisory and line staff (Fig. 1) to commit to meticulous application of ACoPs, as outlined in Fig. 2. Every employee, irrespective of her or his function, and independently of the size of the enterprise, should be made aware of being engaged in a social process. Moreover, the Executive should make it conspicuously clear that it considers food safety to be an issue as important as sales and profit. The public perceives that it has a right to expect the food and catering industries to exercise responsible care over the preparation and handling of any food or meal purchased. Such good stewardship — whether practiced by food production line staff member, cook, retail store employee or food service personnel — should be overt, thus restoring consumer confidence, which is now eroded by an unending stream of media reports on foodborne incidents. Food safety experts should start by listening attentively to concerns voiced by the public. Subsequently, the most streneous efforts should be made to regain credibility as communicators. Such attempts are marred by the asymmetric character of credibility: it is difficult to build, but easily lost.

Redoubled efforts to secure safe food are obviously mandatory for such ethical reasons. Potentially severe and even lethal sequelae of food-transmitted infections and intoxinations, such as botulism, Guillain-

FIGURE 2. The Wilson triad to assure microbiological food integrity, i.e., safety and nutritional and organoleptical quality



Barré polyneuropathy, *E. coli*-induced hemolytic-uremic syndrome, *Listeria* encephalitis, the transmissible spongiform encephalopathies *(22)* and possibly also hepatitis A-virus-induced forms of atherosclerosis *(30, 39)*, demand a focused and energetic strategy. Effort is no less vital, too, for the milder foodborne diseases, which constitute a massive drain on the ever-increasing health care budget. In addition, such episodes have the potential to markedly impair workers' productivity *(9)*, and in extreme cases can devastate businesses. Moreover, food-transmitted episodes may deter the development of flourishing tourist industries. These are often endangered by repeatedly occurring outbreaks of more or less severe 'travelers' diarrhea *(1, 2, 3, 16, 28, 32, 34, 35, 36)*, which invariably result from multiple, often elementary, breaches in microbiological safety assurance strategies. Consequently, appropriation of resources to structured education concluded by an examination, to the profession, and to campaigns that inform consumers constitutes a most well-considered investment of public as well as private funds.

Another moral obligation of the profession is to ensure teaching and implementation of food preservation technologies. If adequately absorbed by students, this may tip the balance between starvation and well-being in many underprivileged regions of the world.

Striving for the return of full-time, well-supported university chairs in intervention-oriented food microbiology, modeled after the ten nestors of this discipline, including Tanner, O.B. Williams, Fellers, Frazier, Sarles, Ingram, J.G. Murray, Lerche, Hess and Buttiaux, constitutes the obvious first step in the long overdue direction of responsible care for the integrity of the food supply *(33)*. Network construction, initially within Europe and later possibly wider, could follow. We will then have within our reach one ultimate goal, that plentiful food of good quality will become available, food that is safe to eat *as sold* and that remains so, provided storage and handling instructions on the package are meticulously embraced. Moreover, *eating out* in places that are certified to comply with ACoPs will then henceforth be devoid of adverse aftermaths.

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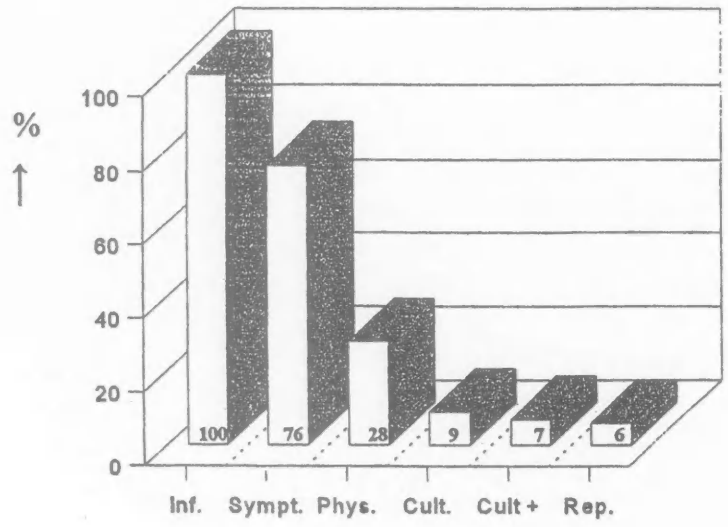
Part I of this series appeared in the January issue of *FPT*. On page 18, Figure 1 ran with the incorrect legend information. This is a corrected copy of Figure 1. We apologize for any inconvenience this has caused.



Inf = Persons infected
Sympt = Symptomatic patients
Phys = Physician consulted
Cult = Fecal sample examined
Cult+ = Pathogen identified
Rep = Reported to Health Authority

Food Protection Trends, Vol. 23, No. 3, Pages 243-251

Media Coverage of Food Irradiation

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ABSTRACT

Mass media are the conduit through which potential consumers are most likely to hear about food irradiation. Furthermore, news media influence opinion by identifying issues of prominence and otherwise framing debate on topics of public importance. This study summarizes the content of mainstream newspaper, television, and radio stories that addressed food irradiation from January 1991 to June 2001. Results suggest that in aggregate, coverage has been balanced, if not positive, towards the technology. That irradiation is a means of controlling harmful microorganisms in foods was the most frequent idea that came across in news stories. This finding is likely due in part to coverage of the regulatory approval process for use of irradiation to control pathogens in poultry and meats and in part to coverage of high profile outbreaks and recalls involving microbiological contaminants. Concerns about irradiation, while varied, reinforced the idea that the technology is controversial. Statements in the media that directly questioned the safety of irradiation or its effects on foods were less common and were frequently found in conjunction with counter statements. News coverage of irradiation focused more on the benefits and concerns of the technology than on the technical aspects of food irradiation and its uses.

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INTRODUCTION

Enabling regulations allow the use of irradiation on a wide variety of foods, and the technology holds promise as a safe and effective method of controlling microbiological contamination. Irradiated ground beef which first arrived at supermarkets in Minneapolis and St. Paul in early 2000 is now available in many markets nationwide *(12)*. At this time, one remaining factor that will determine the ultimate role of irradiation in protecting the nation's food supply is broad enough consumer acceptance to justify the costs of investing in irradiation facilities and integrating irradiation technology into food processing establishments.

That consumer acceptance is central to the potential for irradiation as a food safety tool has not gone unnoticed and is the subject of many earlier studies. In a survey of the Centers for Disease Control and Prevention FoodNet sites, it was found that half of all consumers were willing to purchase irradiated products and 23 percent were willing to pay a premium for irradiated products *(9)*. Other research about consumer knowledge of and opinions about food irradiation has demonstrated increasing awareness, lack of knowl-

edge about its attributes, and the possibility for change with education *(2, 4, 6)*. This change can produce more consumer acceptance *(5, 6, 10, 15)*. In market simulation experiments, for example, willingness to buy increased with information about food irradiation *(1, 15)*.

Education is important, but greater espoused willingness to purchase irradiated foods has also been associated with whether consumers had previously heard of food irradiation *(8)*. Simple awareness influenced willingness to purchase irradiated foods even when controlling for education, income, gender, and a variety of measures of risks of contracting foodborne illness *(8)*. Misra, Fletcher, and Huang found that while consumers place a high degree of confidence in scientific findings generated by universities and independent laboratories, most information consumers receive about the benefits and risks of irradiation is obtained through media sources *(13)*. In this survey, 64 percent of respondents cited radio and television coverage as the main source of information and 54 percent identified newspapers as a major source.

Characterizing the content of media stories can provide insight into the mindsets of potential consumers of irradiated foods. The studies suggest that simply hearing about irradiation in the news may affect the demand for irradiated foods. Furthermore, a large body of research suggests that mass media influence public opinion by influencing the salience of topics and framing the way the public thinks about these topics *(11)*. In an earlier study, Sullivan specifically examined media coverage of food irradiation *(17)*; the study addressed the detail of newspaper coverage during a three-day period following the 1984 FDA proposed rule to allow irradiation to be used on fruits and vegetables. Sullivan concluded that coverage inadequately informed the public about the scientific issues surrounding the proposed rule and the procedural aspects of the rulemaking process.

In this paper, we summarize the content of irradiation stories from 5 national newspapers, 4 regional newspapers, and 6 television or radio news organizations between January 1991 and June 2001. This period provides a good opportunity to examine media coverage of irradiation in conjunction with several high profile outbreaks of foodborne illness and the regulatory approval process for irradiated poultry and meats. Unlike the Sullivan *(17)* study, our focus is on broad ideas or statements about irradiation that were communicated to potential consumers through the media. We do not attempt to critically evaluate the scientific merits of these statements or to reach conclusions about the accuracy of media coverage. Rather, we hope to illuminate the main issues of the irradiation debate as it reaches consumers through the filter of the news media.

MATERIALS AND METHODS

Development of coding sheets and coder training occurred between March and June 2001. A collection of recent newspaper clippings was used as source material in developing the coding sheets and for coder training activities. During the training activities, basic instructions for analyzing media articles were provided, after which each coder independently analyzed the same set of media stories. In a follow-up session, inter-coder reliability (the extent to which individuals code the same piece of information in the same manner), was assessed, and the coders and investigators discussed various interpretations of the article content and coding sheet. After the session, coding sheets were revised to eliminate confusing wording and to enhance inter-coder reliability.

The training activities described and subsequent revisions to the coding sheet occurred several times before arriving at the final coding sheet. In broad terms, the coding sheet addressed the type, motivation, and main subject of the story, along with a list of common positive and negative thematic statements related to the use, benefits, and risks of food irradiation. In cases in which a thematic statement appeared in a story, coders were instructed to record the statement's presence and note whether a counter-argument was provided. For example, the statement "irradiation has an adverse effect on nutritional content" could be marked both as having been raised in the story and as having been countered. Coders were also asked to assess the overall tone of the story, the degree to which the story provided a positive or negative impression of irradiation technology, along a 7-point scale. A copy of the final coding sheet is available from the authors upon request.

Coding of media articles began in June 2001 and was completed in November 2001. Media stories reported over the period of January 1991 to June 2001 were obtained from nine national and regional newspapers and from major national television and radio news transcripts. With the exception of stories reported in *The Wall Street Journal*, the full text of media stories was obtained from the Lexis-Nexis database using the search term "irradiation." The full text for stories in *The Wall Street Journal* was obtained from the ProQuest database, using the same keyword search term. The search provided 892 media stories.

The stories were assigned to four coder samples, with each having an equal probability, 0.25, of being assigned to a given coder. To assess inter-coder reliability, 84 of the 892 articles (roughly 9 percent) were randomly assigned to more than one coder for reliability checks. Each of

TABLE 1. Media sources and frequency of coded irradiation stories

	News Stories	Other Stories*	Total
National Newspapers			
New York Times	60	27	87
Washington Post	45	18	63
USA Today	46	4	50
Wall Street Journal	13	4	17
Christian Science Monitor	9	4	13
Regional Newspapers			
St. Petersburg Times	60	30	90
Los Angeles Times	42	12	54
St. Louis Post-Dispatch	30	3	33
San Francisco Chronicle	11	11	22
Television and Radio News			
CNN Transcripts	35	2	37
CBS News Transcripts	35	-	35
National Public Radio Transcripts	14	5	19
ABC News Transcripts	18	-	18
NBC News Transcripts	8	-	8
News Hour Transcripts	4	-	4
Total	**430**	**120**	**550**

*Other stories include items such as editorials and letters to the editor

the samples was then organized in a random order, and coders were required to analyze the stories in the order presented. The random ordering prevents subtle changes in coder behavior over time from systematically affecting the characterization of articles from a particular source or time period. From their respective lists of articles, coders were unable to distinguish articles that were to be used in reliability checks from those for which they were sole coders.

Coders were instructed not to analyze an article if the content did not pertain to food irradiation, for example, if a story contained the word "irradiation" but in the context of cancer treatments or some other non-food application. Coders were also instructed to disregard a story if only an abstract, rather than full text, was available. Of the 892 stories identified through the database searches, 550 met the criteria established for a "food irradiation" story and were coded. Forty-three of these stories were analyzed by two coders. Table 1 presents the number of stories in the coded sample by source and by type of story. Of the 550 stories, the coders classified 430 as news stories and the remaining 120 as editorials, letters to the editor, or some other story type. The 430 news stories serve as the basis for results presented in the next section.

Inter-coder reliability was assessed in two ways. The first was through percent agreement measures computed from the 43 stories analyzed by two coders. The second involved the use of logistic regression models to determine whether there were significant coder effects influencing the probability that a given content item was identified as present in a media story. Given the random assignment of stories to each coder sample, the extent to which these models show significant differences provides an additional indicator of reliability. The logistic regression model approach has an advantage in that it uses the information contained in the entire sample of coded articles. These models were estimated with the SAS v. 8.2 GENMOD procedure.

RESULTS

Table 2 provides general background on the characteristics of news stories mentioning food irradiation over the study period. In half of these stories, coders identified the primary motivation for the story as either regulatory approval, outbreaks of foodborne illness, food recalls, or market introduction of irradiated products. In over 60 percent of news stories, the main subject was identified as either irradiation or food safety. For a large number of stories, coders identified story motivation and/or main subject as "other." In these cases, the subject or motivation is varied, but many of these "other stories" relate to coverage of the USDA rule-making process for organic standards, business-related coverage of companies involved in irradiation or other food safety related technology, and food labeling.

Table 2 provides some indication of the prominence of news stories

TABLE 2. Characteristics of news stories*

	Number of Stories	Percent of Stories
Motivation for the Story (N = 430)		
Regulatory Approval	121	28.1
Outbreak/Recall	58	13.5
Market Introduction	36	8.4
Other	215	50.0
Main Subject of the Story (N = 430)		
Irradiation	185	43.0
Food Safety	84	19.5
Other	161	37.4
Location of Newspaper Stories (N = 316)		
Front Page, Front Section	24	7.6
Front Page, Internal Section	50	15.8
Internal Page, Front Section	101	32.0
Internal Page, Internal Section	141	44.6

* Excludes letters to the editor and editorials.

about food irradiation. Of the stories appearing in newspapers, only 24 were on the front page, while 50 appeared on the front page of an internal section. Roughly 75 percent of newspaper stories appeared on the internal pages of newspaper sections. From the source documents, it was not possible to consistently identify positions for stories within television and radio programs.

Figure 1 presents the number of irradiation stories over time by primary motivation. The most intense coverage corresponds to FDA approval of irradiation for red meats in late 1997. Figure 1 shows another peak in the number of stories during 1991 and 1992. However, aside from coverage of USDA approval for poultry, many of these stories represent coverage from the *St. Petersburg Times* (Florida) related to a local irradiation facility. National coverage of irradiation increased during the latter part of the sample period (1997 – 2001). Also evident from the figure is that irradiation did receive additional coverage in the wake of outbreaks of foodborne illness or high profile product recalls. Such coverage is observed after an outbreak related to *E. coli* O157:H7 in early 1993 and its aftermath, a large ground beef recall during the summer of 1997, and two large recalls related to *Listeria monocytogenes* in late 1998 and early 1999.

Intercoder reliability

Tables 3 and 4 provide a summary of the content of irradiation news stories along with measures of inter-coder reliability for each content item or statement. Table 3 presents the total occurrences of statements or ideas along with the occurrences, in parentheses, of the statement without the presence of arguments counter or contradictory to the statement as framed in the table.

Turning first to inter-coder reliability, the tables show that in percentage terms, there is quite strong agreement among coders, higher than 80 to 90 percent for most items. Two noteworthy exceptions are with respect to the statements "Irradiation helps to control pathogens" and "Irradiation is safe for use on approved foods." In these cases, agreement among coders was 70 and 74 percent, respectively. These two ideas are often communicated implicitly in news stories about irradiation even if there is not specific wording that summarizes the main idea of the statement. The lower agreement among coders on these topics is likely a reflection of differing personal thresholds for what does or does not constitute the presence or absence of these statements.

Table 3 suggests that different coders may have been more alert to different subsets of the statements or content items and/or may have used different thresholds for determining the presence or absence of a given idea. For example, coder 2 appears to have been more conservative in making a determination about the presence of most statements. Coder 3 appears to have been less attentive to statements about adverse effects on taste or quality and Coder 4 less attentive to statements about adverse effects on nutritional content.

The logistic regression models indicate that there was lower agreement when coders identified the total occurrences of the statements without regard to the presence of counter statements; half of the statements showed significant differences among coders. Despite this, a cursory examination of frequencies with which coders identify ideas suggests a high

TABLE 3. Occurrences and inter-coder reliability for statements about irradiation found in news stories*

	Occurrence of Statement (Uncountered Statement), Percent of Stories										% Agreement	
	Coder 1 N = 120		Coder 2 N = 101		Coder 3 N = 116		Coder 4 N = 93		Total N = 430		(N = 43)	
Positive Statements about Irradiation												
Helps to control pathogens	60[a]	(57)[1]	50[a,c]	(50)[1]	72[b]	(72)[2]	48[c]	(48)[1]	59	(57)	69.8	(72.1)
Is safe for use on approved foods	43[a]	(41)[1]	52[a]	(49)[1]	49[a]	(49)[1]	27[b]	(27)[2]	43	(42)	74.4	(74.4)
Improves shelf life and freshness	20	(18)	16	(15)	18	(18)	17	(17)	18	(17)	88.4	(88.4)
Benefits at-risk populations	6	(5)	2	(2)	9	(9)	4	(3)	5	(5)	97.7	(97.7)
Negative Statements about Irradiation												
Concerns consumer advocacy groups	26[a]	(24)[1]	12[b]	(11)[2]	23[a]	(22)[1]	28[a]	(27)[1]	22	(21)	81.4	(81.4)
Leaves harmful residuals in foods	28[a]	(8)	13[b]	(11)	22[a]	(11)	9[b]	(5)	19	(9)	83.7	(76.7)
Lack of consumer acceptance is a major barrier	17	(15)	10	(9)	16	(14)	13	(12)	14	(13)	76.7	(76.7)
Adversely affects nutritional content	19[a]	(5)	11[b,c]	(6)	16[a,c]	(8)	6[b]	(2)	13	(5)	97.7	(97.7)
Adversely affects taste or quality	13[a]	(3)	9[a,b]	(4)	3[b]	(1)	8[a,b]	(3)	8	(3)	95.3	(95.3)
Inadequate knowledge of long term risks	12[a]	(4)	3[b]	(3)	4[b]	(3)	8[a,b]	(8)	7	(4)	90.7	(93.0)
Generates waste or can harm the environment	8	(7)	4	(4)	9	(7)	3	(2)	6	(5)	93.0	(93.0)
Poses risks to food industry workers	6	(5)	3	(3)	5	(3)	3	(3)	4	(4)	97.7	(97.7)
If available then govt./industry will be less diligent in enforcement/compliance	6	(5)	2	(2)	5	(3)	4	(4)	4	(4)	93.0	(95.3)
Primarily benefits food companies	2	(2)	2	(2)	1	(1)	3	(3)	2	(2)	93.0	(95.3)
Statement Summary												
Contains one or more positive statements	68[a]	(63)[1]	63[a]	(61)[1]	78[b]	(78)[2]	61[a]	(61)[1]	68	(67)	76.7	(76.7)
Contains one or more negative statements	52[a]	(43)[1]	37[b]	(30)[2]	52[a]	(46)[1]	40[b]	(40)[1,2]	46	(40)	86.0	(90.7)

*Different superscript letters or numbers by statement indicate significant differences among coders at the $P = 0.10$ level. Letters correspond to logistic regression models for occurrence of the statement and superscript numbers correspond to logistic regression models for occurrence of the uncountered statement. Occurrences of uncountered statements are in parentheses.

TABLE 4. Occurrences and inter-coder reliability for other basic content items found in news stories

Content Item	Occurrences of Content Item, Percent of Stories					% Agreement
	Coder 1 N = 120	Coder 2 N = 101	Coder 3 N = 116	Coder 4 N = 93	Total N = 430	(N = 43)
Availability of Irradiated Products	32	31	23	38	30	74.4
Labeling or the Radura	18	16	21	15	17	97.7
Other Uses of Irradiation Technology	23[a]	11[b]	11[b]	15[b]	15	90.7
Other Emotional Food Topics	20[a]	10[b]	16[a,b]	10[b]	14	86.0
Other Food Safety Advances	18[a]	6[b]	10[a,b]	6[b]	10	86.0
Cost Difference of Irradiated Foods	7	9	9	6	8	90.7
An Explanation of Irradiation Technology	6	8	9	8	7	81.4

*Different superscript letters by content item indicate significant differences among coders at the $P = 0.10$ level.

degree of correlation among the four coders. This was particularly true for the occurrence of the uncountered statements, where only 3 of the 14 statements show significant differences among two or more coders.

Statements about irradiation

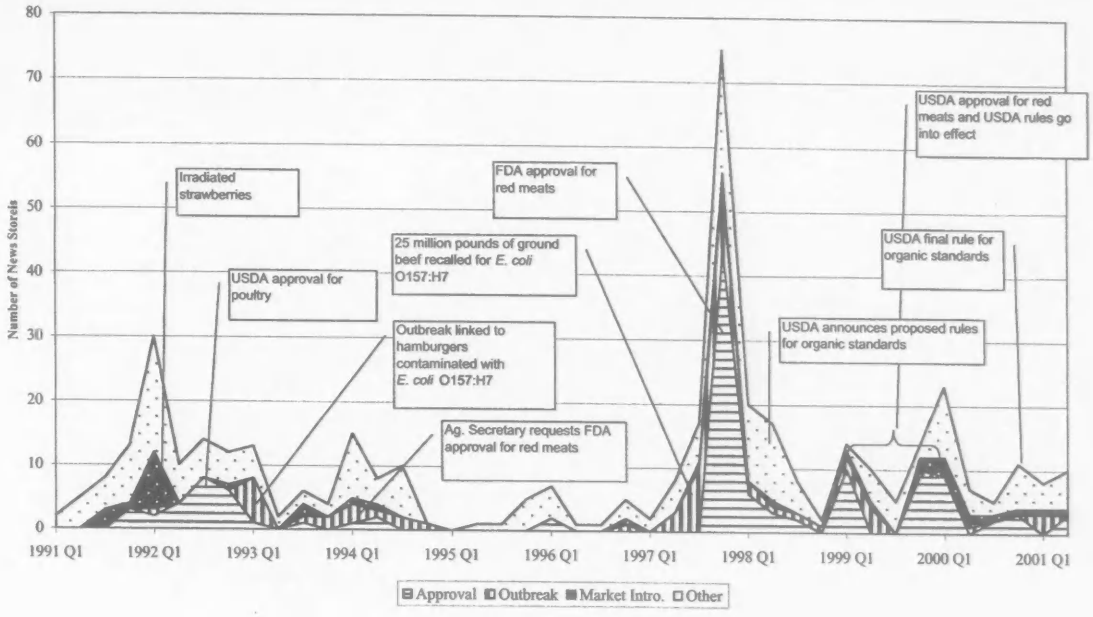
An important finding that is apparent from Table 3 is that positive statements were identified more commonly than were negative statements. Consider the first two statements, "Irradiation helps to control pathogens" and "Irradiation is safe for use on approved foods." These statements were identified as being present and as being uncountered in 57 and 42 percent of the news stories, respectively. As noted earlier, there is some lack of agreement between coders on a story-by-story basis for these statements. However, with the exception of Coder 4, both of these statements were identified more frequently than any other statement or content item. Other positive statements were "Irradiation improves shelf-life and freshness" and "Irradiation benefits at-risk populations." These were found in 18 and 5 percent of the news stories, respectively.

Media coverage of food irradiation has been addressing the benefits of the technology or at least has been addressing the benefits along with the concerns. The statement summary presented in Table 3 suggests that in total, positive messages about irradiation appear to have come across more frequently than negative messages. In 67 percent of the news stories, coders found one or more uncountered positive statements. They found one or more uncountered negative statements in 40 percent of the stories. Although not evident from Table 3, stories that contained only uncountered negative statements accounted for a mere 18 of the 430 news stories coded.

Although media coverage of irradiation has been balanced or generally favorable in aggregate toward the technology, statements with negative connotations were communicated in the news stories. As seen by referring back to table 3, the most common negative statement is that "irradiation concerns consumer advocacy groups." This statement was identified in just over 20 percent of the stories. Another common negative statement is that "a major barrier to adoption of irradiation is lack of consumer acceptance." This occurred in 13 percent of news stories.

Negative statements related directly to the safety of irradiation and its effects on food, although raised in news stories, were countered frequently. Two statements questioning the safety of the technology are: "irradiation leaves harmful residuals in foods" and "there is inadequate knowledge of long term health risks associated with irradiation." The former statement was raised 19 percent of the time; however, it appeared only in 9 percent of news stories as an uncountered statement. The latter statement appeared in 7 percent of the stories but was an uncountered statement in only 4 percent. Counter statements were found to accompany more than half of the appearances of statements that reflect concerns with altered taste, quality, or nutritional content as the result of irradiation.

FIGURE 1. Events motivating irradiation news stories over time



Negative statements that were seldom countered pertain to risks faced by food industry workers; concerns about waste or the environment; and concerns that if irradiation is allowed, less emphasis will be placed on compliance with sanitary and food safety standards. In total, these statements occurred with low frequency (4 to 6 percent of news stories).

Other content of news stories

Of the basic content items reported in Table 4, the most common was whether irradiated products are available to consumers, that is, whether consumers can currently purchase these foods or whether consumers may be encountering irradiated foods in daily life. However, the news stories mentioned the radura or labeling only about 17 percent of the time. This number may be lower than it should be due to the fact that coders had access to only the text of a story and not to associated graphics or video that might have featured the radura. Food irradiation was discussed within the context of other emotional food topics such as biotechnology, pesticides, and growth hormones in about 14 percent of the stories. One reason for this finding is media coverage of USDA's release of organic rules during the study period. Many of these stories gave short mention to food irradiation and whether irradiated foods would qualify as organic under the rules.

Several of the content items addressed the extent to which news stories were providing contextual information about irradiation, its uses, and its role in food safety. Applications of the technology to items such as medical devices, certain consumer products, and spices were mentioned in 15 percent of the stories. Ten percent of stories mentioned other safety advances such as pasteurization and chlorination of water. However, in only 7 percent of the stories was there an attempt to explain irradiation technology or otherwise clarify what the process entails.

The overall tone of irradiation stories

Table 5 provides a general summary of the frequency of positive or negative messages broken down by regional and national newspapers, and by newspapers and television/radio transcripts. Television and radio stories were more likely to present positive messages about irradiation. Seventy-nine percent of the television and radio stories contained uncountered positive statements and 40 percent contained uncountered positive statements without the presence of uncountered negative statements. Otherwise, there were few differences on the tone of stories between newspapers and television/radio. What is most striking from Table 5 is that across all types of media only 4 to 5 percent of news stories can be classified as predominantly negative.

The main conclusion that irradiation coverage was balanced if not positive over the sampled period is reinforced by coders' assessments of

TABLE 5. Comparison of statements by type of media (percent of stories)

	Regional Papers (N=143)	National Papers (N=173)	Total Papers (N=316)	Television & Radio (N=114)	All News Stories (N=430)
Statement Summary					
Contains one or more uncountered positive statements	65	60	62	79	67
Contains one or more uncountered negative statements	41	38	39	42	40
Story Tone					
Positive: Contains uncountered positive statements but no uncountered negative statements	29	26	27	40	31
Balanced: Contains both uncountered positive and uncountered negative statements	36	34	35	39	36
Negative: Contains uncountered negative statements but no uncountered positive statements	5	4	4	4	4
Indeterminate: Contains neither uncountered positive nor uncountered negative statements	30	36	34	18	29

story tone along a 7 point scale, with a value of 1 being the most negative and a value of 7 being the most positive. The average of this rating scale across all coders was 4.49. A breakdown of coders' ratings is as follows: Ten percent of the stories were deemed by the coders to provide a negative impression (values of 1 or 2 on the scale); 58 percent provided a slightly negative, neutral, or slightly positive impression (values of 3, 4, or 5 on the scale); and 32 percent provided a positive impression (values of 6 or 7 on the scale).

DISCUSSION

If, as previous studies suggest, mass media are influential in framing the way the public thinks about topics, the findings presented above can shed light on the potential acceptance of irradiated foods. Of particular importance are perceptions of advantages and disadvantages of irradiation. Such perceptions have been shown to be important determinants of the rate of diffusion of new innovations *(16)*.

Perceptions of the advantages of irradiation depend on consumers' awareness of the existence of the problem it precludes, namely the possible illnesses resulting from foodborne pathogens. High profile outbreaks and food recalls that occurred during the study period raised awareness of foodborne pathogens and are likely one factor that caused journalists to place emphasis on the pathogen reduction angle in irradiation stories. Also important was the reasoning behind regulatory approvals for meat and poultry. It is noteworthy that the purpose of these approvals was for control of pathogens rather than for control of insects and prolonged shelf life, as had been the case in some of the earlier approvals for use of irradiation.

For a new technology, however, perceived disadvantages can play a larger role than perceived advantages in determining the rate of diffusion *(16)*. Along with explanations of the benefits of irradiation, news stories also raised a myriad of concerns. However, no single concern or group of concerns dominated the coverage. If anything, the most frequent concerns simply reinforced the idea that irradiation is a controversial issue. Among the ways the news media influence public opinion is that people learn from the information presented *(3, 7, 18)*. Protess et al. state that

issues presented with "dramatic, convincing, and clear evidence" tend to change public opinion *(14, 19)*. Concerns that related directly to the safety of the technology or adverse effects on food were most ambiguous and journalists were most likely to report varying viewpoints on these issues. What appears to be clearest in the aggregate is that despite numerous concerns, highly credible sources conclude that the technology is safe.

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International Association for Food Protection

Occurrence *of Campylobacter* and *Salmonella* in Broiler Chickens Raised in Different Production Systems and Fed Organic and Traditional Feed

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SUMMARY

The purpose of this study was to determine whether using different production systems and types of feed had an effect on the occurrence of the bacterial pathogens, *Salmonella* and *Campylobacter* in broiler chickens.

In each of four small farm operations, 300 chickens were randomly assigned to one of four treatment groups (75 in each): (1) free-range, organic feed (2) free-range, traditional feed (3) pastured pen, organic feed, and (4) pastured pen, traditional feed. A fifth farm had 50 chickens in each of the four treatment groups. After eight weeks, random samples of the viscera from each treatment group were collected, for a total of 456 samples.

One-way ANOVA ($P < 0.05$) was used to determine if there was a significant effect of farm environment, production method, and type of feed used on the presence of *Salmonella* and *Campylobacter*.

There were no instances of *Campylobacter* contamination in any of the 456 samples. There was no significant effect of feed type on the occurrence of *Salmonella* when the organic and traditional feeds were compared. There was, however, a significant farm effect; all nine of the samples in which *Salmonella* were detected were from two of the nine farms.

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INTRODUCTION

An estimated 10 million consumers bought $8 billion worth of organic food during the year 2000 alone *(8)*. More and more, consumers are turning to organic foods in the belief that these foods are more healthful and safer because no chemicals or antibiotics are used to produce them. Antibiotic resistance in animals and humans is a growing concern for consumers, and antibiotic-free products are a selling point for organic farmers. However, microbiological safety is the key concept in today's food market, particularly concerning meat and poultry products.

According to the Centers for Disease Control (CDC) *(2, 5)*, foodborne infections are estimated to cause 76 million illnesses, 325,000 hospitalizations, and 5,200 deaths in the United States each year. Of the 76 million cases of illness, the bacterial pathogens *Campylobacter* and *Salmonella* caused 2.4 million, and 1.4 million cases, respectively *(2, 5)*. As these pathogens are normally associated with poultry products, it is no surprise that consumers, researchers, farmers, and processors are highly concerned about food safety in regard to poultry production. Chickens are often vectors for these pathogens, harboring the bacteria but showing no signs of illness. *Campylobacter* and *Salmonella* can be spread from bird to bird via a common water source or contact with infected feces. Furthermore, during slaughter, bacteria can be transmitted from the intestines to the meat, which is then sent out for consumption. It is estimated that over half of the raw chicken in the US market is contaminated with *Campylobacter (3)*. Foods, such as poultry that are contaminated with these pathogens will look and smell normal, so, in essence, these pathogens are undetectable to the average consumer.

Because contamination may occur through the water supply and particularly through contact with feces, different chicken production methods need to be examined to determine whether or not there is a difference in bacteria levels depending on the method used. The different production methods, including free-range skid, pastured pen and commercial rearing, allow for different levels of pathogen exposure. Prophylactic use of antibiotics in these production systems has led to increased antibiotic resistance among *Campylobactor* and *Salmonella (6)*.

By implementing different production methods and testing for pathogen contamination within each group, one can begin to determine the best management practices (BMPs) that provide consumers with "safe" poultry products. As the market for organic food increases and interest in the use of antibiotics in traditional animal feed rises, the safety of organic versus traditional chicken feed also needs to be studied. Therefore, the purpose of this study was to determine the occurence of *Campylobacter* and *Salmonella* bacteria in pastured, free-range, and commercially raised chickens fed organic or traditional feed.

MATERIALS & METHODS

Rearing site selection

A notice was mailed to small poultry operations from a list provided by the USDA County Executive Director of a Farm Service Agency (Bourbonnais, IL). The farmers were given the protocol of the study and were asked to respond if they were interested in participating. Respondents were contacted by phone to determine if they had land for rearing free-range, and pastured pen chickens. Individuals who met the criteria were asked to attend an informational meeting to discuss the project and to provide input. After the meeting, five operators within Illinois were chosen to participate in the study (Forest City, Jacksonville, Edinbury, Raymond and Waterman). Participants were instructed in the study protocol, which included using two different production methods, free-range and pastured pen, and two types of feed, organic (without medication) and traditional (with medication).

Farms 1 through 4 were provided with 300 chickens each. Farm 5, because of its smaller size, was provided with 200 chickens. Delivery of the chickens to each farm was staggered, with one week in between each farm and the next, because of the variety of locations of the farms and to allow for space between slaughter dates. Chickens were provided as Cornish Cross Cockerel chicks (Sunnyside Inc., Beaver Dam, WI) and were inoculated with Mareks vaccine prior to shipment to the farms. Samples were pulled for analysis for *Salmonella* and *Campylobacter* prior to shipment to the farms to determine whether the chicks were initially pathogen-free. Chicks on each farm were randomly assigned to one of four treatments (n=75 for farms 1–4, n=50 for farm 5). The treatments were: (1) organic feed, pastured pen, (2) commercial feed, pastured pen, (3) organic feed, free-range and (4) commercial feed, free-range.

Each farm had two different brooder compartments, one for organically fed and one for commercially fed chicks. All heat and lighting systems were the same for both brooder compartments. Brooder pen size varied, because each farm used previously built pens and the brooders were individual to each farm. All baby chicks were housed in brooders for three weeks after delivery.

Following the brooder period, chickens were raised by either the free-range or the pastured pen method for five weeks. All chickens were offered feed and water ad libitum. Free-range chickens were kept

TABLE 1. Chicken containment sizes

Farm	Free-range size	Pastured pen
1	8' × 12'	8 × 12'
2	8' × 16'	10 × 12'
3	75' × 75'	8 × 16'
4	8' × 10'	8 × 10'
5	75' × 75'	10 × 12'

in a grass area surrounded by mesh fencing. The fencing and the chickens were moved after 2 1/2 weeks of the five-week outside period. Free-range chickens were outside during the day and in their respective pens at night. The free-range organic and commercially fed chickens were kept separate by electrical mesh fencing. Pastured pen chickens were housed in large pens placed in grass fields to provide the chickens with vegetation. Pens were moved daily, and chickens were provided with water and feed within the pen.

Per farmer request, all chicken feed was made from non-genetically modified organism (GMO) corn and soybeans. Two feed mixtures, organic without medications (Carlock, IL) and traditional (Arthur, IL) with medications (Amprolium and Ethopabate to prevent coccidiosis), were obtained from commercial vendors using previously standardized formulas. The feed allotment was 12 lbs. per chicken for the entire raising period.

Although a specific production protocol was followed for the pastured pen and free-range chickens, there were some variations in the dimensions of the free-range areas, pen sizes, and brooder heating and lighting systems among farms (Table 1). To compare pathogen levels of chickens "raised" on experimental protocols with those of chickens raised by standard industry protocols, viscera samples from 30 chickens were obtained from a commercial facility.

Sampling and analyses

After eight weeks, a random sample of 30 chickens from each of the four treatments and 30 from a commercial farm was delivered live to a USDA-inspected poultry processing plant (Arthur, IL). Any bird that developed leg rotations was not a part of the end sample. Using the USDA FSIS method, the viscera were extracted, bagged and iced for transport to the Centralia Animal Disease Laboratory (Centralia, IL) for analysis to detect the presence of genus *Salmonella* and genus *Campylobacter* bacteria. All bags were pre-marked using the three following designations: an uppercase letter specifying farm (A-E), followed by a number one or two specifying organic (1) or traditional (2) feed, followed by a lowercase letter designating either pastured pen (a) or free-range (b) production method. A VIDAS assay was conducted to test for the presence of *Salmonella*. The *Campylobacter* results were determined by use of a spread plate method and reported as present or absent.

The Centralia Animal Disease Laboratory followed standard procedures for its analyses, which were based on the Bacterial Analytical Manual of the Food and Drug Administration. It is also certified by the Food Safety and Inspection Service (FSIS), National Veterinary Services Laboratories (NVSL) and American Association of Veterinary Laboratory Diagnosticians (AAVLD).

Statistical analysis

A Univariate Analysis of Variance using SPSS for Windows was applied to determine the significance of the data on presence or absence of *Campylobacter* and *Salmonella* (dependant variable) with the use of different farm, feed and production methods (independent variables). The significance level was set at $P < 0.05$.

RESULTS

Testing for the presence of a pathogen in the viscera of chickens provides better information as to whether the chicken was infected at the farm or during the "growing-out" phase. If pathogens are detected on the feathers and skin, it is hard to determine whether the contamination came from the farm, during transport, or from cross-contamination at the processing facility. Because *Salmonella* and *Campylobacter* are most prevalent in the viscera of chickens, it is necessary to use the viscera as the primary testing point to provide accurate results.

Presence of *Campylobacter* and *Salmonella*

During the study, micronutrient imbalances and weather conditions reduced the number of chickens available for sampling. Some farms lost entire treatment groups. Out of the 456 samples, there were no cases of *Campylobacter* contamination across all production systems and types of feed. The commercially raised chickens were excluded from the statistical analyses because no cases of either *Campylobacter* or *Salmonella* were found in viscera samples.

As shown in Table 2, *Salmonella* was detected in a total of nine (1.9%) of 456 samples. Within the organically fed chickens (n=176), three cases of *Salmonella* were found (1.7%). Of those three cases, one occurred among pastured pen chickens (33%) and two among free-range chickens

TABLE 2. Cases of *Salmonella* per production system and type of feed

Farm	Organic Feed/ Pastured	Traditional Feed/ Pastured	Organic Feed/ Free-Range	Traditional Feed/ Free-Range	Traditional Feed/ Commercial
A	cases (0)	cases (0)	—	—	—
B	—	cases (0)	—	cases (0)	—
C	cases (1)	cases (1)	cases (1)	cases (2)	—
D	—	—	cases (1)	cases (3)	—
E	cases (0)	cases (0)	cases (0)	cases (0)	—
Commercial	—	—	—	—	cases (0)
Totals	n = 86 cases (1)	n = 125 cases (1)	n = 90 cases (2)	n = 125 cases (2)	n = 30 cases (0)

n = 30 unless otherwise noted

— denotes no sample available

TABLE 3. Effect of farm on *Salmonella* cases in broiler chickens

Farm	Number of cases of *Salmonella*
A	n = 56, cases (0)
B	n = 70, cases (0)
C	n = 120, cases(5) (56% of total cases)
D	n = 60, cases (4) (44% of total cases)
E	n = 120, cases (0)
	$P = .013$

(66%). Within the traditionally fed chickens (n=250), there were six cases of *Salmonella* (2.4%), five of which (83%) were found in free-range chickens. All nine cases of *Salmonella* were found within two of the five farms, demonstrating a significant farm effect (Table 3).

There was no significant effect of feed type on occurrence of *Salmonella* when the organic and traditional feeds were compared (organic n=176, traditional n=250, $P=.221$).

Within the 211 samples from the pastured pen method, two cases of *Salmonella* were found (< 1%). Among the 215 samples of the free-range birds, seven cases of *Salmonella* were found (3.25%). Although more cases of *Salmonella* were found among the free-range chickens, the differences between production methods were not significant ($P=.774$).

DISCUSSION

The lack of positive *Campylobacter* samples in this study may have been due to the fact that, unlike most studies, which are conducted in the marketplace using chicken that has been exposed to many elements after it is processed, this study included only viscera that were immediately isolated in the processing plant. In addition, the samples in this study were generally from pastured and free-range raised chickens rather than from commercial sources. The commercial sample of 30 was from one farm, so the outcome may have been different if more farms or a larger sample had been used.

The loss of chickens within different treatments of this study was due to several factors, including flash flooding, extreme heat and supplier error. This study involved actual farm environments rather than an experimental laboratory, and was therefore subject to the same difficulties that farmers have. Rain and heat are problems that pasture and free-range poultry operations face each day, in contrast to their commercial counterparts, with their climate controlled facilities. The one organic feed delivery that did not meet the project nutrient specifications was unusual and reinforces the importance of checkpoints in all phases of a production system.

Despite the loss of chickens during the study, commercial, free-range, and pastured pen systems appeared equal in their ability to limit *Campylobacter* and *Salmonella* contamination of chickens. The farm itself may be a more important factor in determining pathogen contamination than the production system used on the farm. Kotula and Pandya (7) indicated a lower incidence of contamination in free-range chickens, in contrast to the report of one author (4), who reported that free-range

chickens had greater *Salmonella* contamination than traditionally raised chickens. The results of this study indicated that the time and amount of exposure of a chicken to its feces (free-range method versus pastured pen method) is not necessarily a factor in *Campylobacter* and *Salmonella* contamination when growing out pathogen-free day old chicks.

Starting in 1995, the USDA allowed the use of a specific class of antibiotics, called fluoroquinolones, in poultry flocks *(1)*. Over time, resistance of *Campylobacter* and *Salmonella* to these antibiotics has increased. Gouws and Brozel *(6)* reported a 98 to 100% resistance level of *Salmonella* to tetracycline and streptomycin. The question that arises is not so much the consumption of antibiotics through eating food products "raised" on antibiotics but rather the inability of physicians to treat bacterial infections with the usual antibiotics *(1)*. This study did not show a significant effect of feed on the occurrence of *Campylobacter* and *Salmonella* in broilers. In addition, none of the birds fed organic feed (without medication) developed coccidiosis. These results suggest that its use of medication in chicken feed is not necessary to produce a safer poultry product. In the long term, decreasing prophylactic antibiotic and medication use in poultry or livestock production may help reduce the emergence of antibiotic resistant bacteria.

Using on-farm production methods, as was done in this study, allows for a realistic yet experimental environment. Because this study found a significant farm effect, it is important that future studies use this realistic protocol to determine the impact of sanitation at the grow-out facility on pathogen levels in the production of chickens. Kotula and Pandya *(7)* found that the majority of the chickens were contaminated with either *Salmonella* or *Campylobacter* prior to processing. Stern et al. *(9)* revealed that *Campylobacter* contaminated chickens may have been the result of the farm procedures. The sanitation level at farm grow-out facilities should be determined before beginning the poultry raising process.

With the increase in consumer awareness concerning food safety, it is evident that more research is needed in specific areas including farm sanitation, production methods, and types of feed which are related to the safety of our poultry. Determining where contamination occurs is the first step. Developing methods to prevent or reduce this contamination is a critical second step in reducing the incidence of foodborne illness in our country.

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Highlights of the Executive Board Meeting
January 19-20, 2003

Following is an unofficial summary of actions from the Executive Board Meeting held at the Hilton New Orleans Riverside, January 19-20, 2003:

Approved the following:

- Minutes of September 23, 2002 Executive Board Meeting
- Minutes of September 23, 2002 Executive Board Executive Session
- Online manuscript submission for *Journal of Food Protection*
- Supporting FSnet through a small contribution

Discussed the following:

- *FPT* & *JFP* update — both increased manuscript submissions for the year, *FPT* name change completed, *JFP* online manuscript submission processing, *JFP* Online reviewed, *JFP* assignment of copyright
- Web site e-commerce report
- Membership dues structure
- Add "full-time" requirement to student membership
- Advertising sales close to budget projections
- November financial statements reviewed and compared to budget
- Fiscal year end August 31, 2002 audit report
- Winter Affiliate Newsletter
- IAFP Officers made presentations at seven Affiliate meetings this fall. Three are scheduled for spring meetings
- Non-compliant Affiliates — revoke charters for three Affiliates if not in compliance by April 10
- Affiliate Membership Achievement Award restructuring
- Potential new Affiliate organizations — United Kingdom and Vermont
- International Food Safety Icons — business plan
- 3-A Committee on Sanitary Procedures — new Chairperson
- Revision of Fellows Award judging criteria
- Revision of Black Pearl Award judging criteria
- Foundation Fund — regular Sunday meeting, new members, terms and rotation issues
- *FPT* strategic plan
- Awards nomination deadline — March 17, 2003
- Committee on Communicable Diseases Affecting Man — mid-year working meeting
- IAFP 2003 — LAC issues
- IAFP 2003 — exhibitor sign up and sponsorship continues strong
- IAFP 2003 — 31% increase in technical paper submissions to 420
- IAFP 2003 — Ivan Parkin Lecturer selection
- IAFP 2003 — tours and events
- IAFP 2003 — toured hotel meeting space
- IAFP 2006 — contract negotiations progressing
- Future Annual Meeting site selection
- IAFP 2003 — 2 workshops to be held
- IAFP on the Road — Food Safety Summit, March 18-20, 2003
- European Association Service — research further
- 3-A Sanitary Standards, Inc. — Executive Director hired January 2003
- Corporate Challenge update
- Sponsorship of session for Food Safety Summit
- IAFP and World Health Organization Non-Governmental Organization status

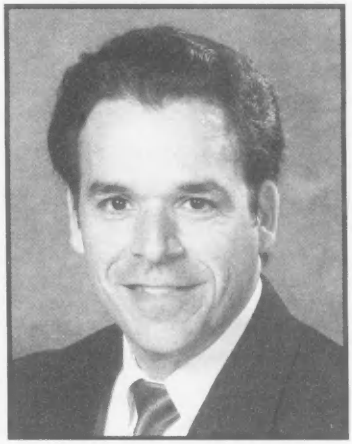
Next Executive Board meeting: April 27-28, 2003

2003–2004 *Secretary Election*

The following page contains biographical information for the 2003-2004 Secretary candidates. Review the information carefully as you make your voting decision. Ballots were mailed to all International Association for Food Protection Members during the first week of February. Completed ballots are due back to the Association office by March 21, 2003. Sealed ballot envelopes are forwarded to the Tellers Committee for opening and counting. Watch for the election results in the May issue of *Food Protection Trends.*

If you have questions about the election process, contact David W. Tharp, CAE, Executive Director at 800.369.6337, or 515.276.3344, or E-mail dtharp@foodprotection.org.

DONNA M. GARREN



FRANK YIANNAS

The Candidates

Biographical Information

Donna M. Garren

Dr. Donna Garren is currently Vice President, Scientific and Technical Affairs for United Fresh Fruit & Vegetable Association headquartered in Alexandria, VA. Founded in 1904, United is the produce industry's oldest national trade association that promotes the growth and success of produce companies and their partners and represents the interests of growers, shippers, processors, brokers, wholesalers and distributors of produce, working together with their customers at retail and foodservice, suppliers at every step in the distribution chain, and international partners. United provides a fair and balanced forum to promote business solutions, help build strong partnerships among all segments of the industry and promote increased produce consumption.

In this position, Dr. Garren is responsible for all produce food safety and food quality related issues and activities, science-based regulatory and legislative activities, and technical consultation to United's membership to help them compete effectively in today's marketplace. Before assuming the vice president's position, Dr. Garren was director, scientific and regulatory affairs.

Before joining United in 1999, Dr. Garren worked for Boskovich Farms, Inc. in Oxnard, CA as director, research & development and product safety. While at Boskovich Farms, her duties included the development, implementation, and management of all produce food safety programs and the management of new product research and development projects.

During her tenure at United Fresh Fruit and Vegetable Association, Dr. Garren has provided technical advice and support to both state and federal regulatory agencies and testified before Congressional and regulatory leaders concerning fruit and vegetable food safety and quality issues. Dr. Garren has been an invited speaker at numerous national and international meetings providing educational updates on topics including produce good agricultural practices, current microbiological produce issues, general food safety and sanitation training, and consumer trends in international produce markets. Dr. Garren has also developed and managed many successful national food safety and regulatory workshops for the produce industry. In addition, she has been a member of the United States Delegation to the International Codex Committee on Food Hygiene.

Since joining the International Association for Food Protection (IAFP), Dr. Garren has served on the Program Committee and has been a member and Chairperson of the Developing Scientist Award Committee and the very successful Fruit and Vegetable Safety and Quality Professional Development Group (PDG). Dr. Garren has also given many invited talks, as well as organized numerous symposia at the IAFP Annual Meetings, including the very first international IAFP workshop on produce food safety in Guadalajara, Mexico.

Dr. Garren also serves on the Institute of Food Technologists' Fruit and Vegetable Division Executive Committee and Food Law Executive Committee.

Dr. Garren graduated from Clemson University with a Bachelor of Science degree in Food Science and Nutrition and a Minor in Microbiology and earned her Ph.D. from the University of Georgia in Food Science and Technology.

Frank Yiannas

As Manager of Walt Disney World's Food Safety & Health Department, Frank Yiannas oversees all food safety programs, as well as other public health functions, for one of the world's strongest and well-recognized global brands. His scope of responsibilities includes: food safety oversight of major theme parks and resorts, two cruise ships, two water parks, and hundreds of the world's busiest food locations. More than 15,000 food and beverage employees, hundreds of food suppliers, and a number of critical regulatory compliance issues also come under his purview.

Since joining Disney in 1989, Mr. Yiannas has expanded Disney's program beyond testing and inspections by creating leading-edge risk management strategies. Under his tenure, Disney has been recognized as a pioneer in food safety training, implementing HACCP at the food service level, developing hand-held computer technology to conduct food safety audits, and utilizing progressive microbial testing approaches. In 2001, Walt Disney World received the prestigious Black Pearl Award for corporate excellence in food safety by the International Association for Food Protection (IAFP).

As a frequent speaker at national and international conferences, Mr. Yiannas is known for his ability to build partnerships and for his innovative approaches to food safety. He has given many invited presentations to professionals in the United States and abroad and is frequently cited in industry publications.

Mr. Yiannas' commitment and involvement with IAFP includes numerous positions within the association such as: Immediate Past Chairperson of the Annual Meeting Program Committee, Past Chairperson of the Food Sanitation PDG, and Past Black Pearl Award Jury Committee Member. He has organized numerous symposia and workshops for annual meetings and lectured on relevant food safety topics as well as currently serving as the Chairperson of the Retail Food Safety & Quality PDG. Mr. Yiannas led a groundbreaking initiative on behalf of this PDG and IAFP, leading a task force to develop International Food Safety Icons, pictorial representations of important food safety concepts that can be recognized regardless of a person's native language.

At the affiliate level, Mr. Yiannas supports IAFP through his involvement with the Florida Association of Food Protection (FAFP) as their Immediate Past President. During his tenure as President in 2000 and 2001, FAFP received the Shogren Award for two consecutive years. The Shogren Award is given annually by IAFP to the best overall affiliate.

At the national level, Mr. Yiannas is Vice Chair of Council I, Laws and Regulations, of the Conference for Food Protection (CFP). This council reviews proposed changes to the Food and Drug Administration (FDA) Model Food Code. In addition, he participates in numerous professional committees involved with issues of national importance, including co-chairing a committee for the CFP to develop standards for permanent, outdoor cooking sites. Mr. Yiannas also participated on the FDA-sponsored, 10-member panel organized through the Institute of Food Technologists to review the current definition of potentially hazardous food.

Mr. Yiannas is a registered microbiologist with the American Academy of Microbiology. He holds memberships with several professional associations, including the National Environmental Health Association, the American Society of Microbiology, and the Institute of Food Technologists. He received his BS in Microbiology from the University of Central Florida and is completing a Master of Public Health (MPH) from the University of South Florida.

NEW MEMBERS

CANADA

Linda Dun
Thrifty Foods
Saanichton, British Columbia

John P. Halleran
Maple Leaf Pork
Brampton, Ontario

Ron W. Judge
Maple Leaf Consumer Foods
Burlington, Ontario

Riz A. Khimji
Maple Leaf Consumer Foods
Burlington, Ontario

George M. Znoj
Saputo Inc.
St. Leonard, Quebec

ISRAEL

Sima Yaron
Technion IIT
Technion, Haifa

JORDAN

Suleiman J. Abu Tayeh
Jordan Flight Catering Co., Ltd.
Amman

MEXICO

Fausto Tejeda-Trujillo
B.U.A.P.
Puebla, Puebla

NORWAY

Jens Kolstad
Elopak Corporate Offices
Spikkestad

PORTUGAL

Maria Joao Sousa
Universidade Do Minho
Braga

SOUTH KOREA

Jeong-Weon Kim
Korea Health Industry Development Institute, Gungo, Kyunggi-do

Hye-Kyung Moon
Changwon National University
Changwon, KyungSangNam-Do

Ki-Hwan Park
Chung-Ang University
Anseong, Kyeonggi

SWITZERLAND

Isabelle Sauli
Swiss Federal Veterinary Office
Schwarzenburgstrasse, Bern

UNITED KINGDOM

Rob Davies
Veterinary Laboratories Agency
Addlestone, Surrey

UNITED STATES

ALABAMA

Mark A. Scott
State of Alabama, Dept. of Ag and Industries, Millbrook

ARKANSAS

John A. Marcy
University of Arkansas
Fayetteville

CALIFORNIA

Diana A. Chen
Palo Alto

Walter W. Ritt
Blommer Chocolate Co.
Union City

Frank Wang
Lee Kum Kee Foods Inc.
City of Industry

George K. York
University of California-Davis
Davis

CONNECTICUT

Cheng-An Hwang
Nestle Product Technology Center
New Milford

Bonnie B. Sandel
Milford

FLORIDA

Renee M. Goodrich
University of Florida
Lake Alfred

Lourdes R. Tamborello
Pasco Beverages
Seffner

GEORGIA

Megan M. Lang
University of Georgia
Griffin

Michael T. Musgrove
USDA-ARS
Athens

ILLINOIS

Mark A. Kloster
Oberweis Dairy
North Aurora

Sireesha Tipparaju
Illinois Institute of Technology
Elk Grove Village

MICHIGAN

Louise D. Huebschman
Kellogg Company
Battle Creek

Teresa M. Large
Michigan State University
East Lansing

NEW MEMBERS

MINNESOTA

Jane K. Johnson
Gold'n Plump Poultry
St. Cloud

Chuck Leonard
DCI Inc.
St. Cloud

NEW YORK

Rick Fahle
Fairbank Farms
Ashville

Robert E. Marquis
University of Rochester
Rochester

Gary F. Senyk
Perry's Ice Cream Co.
Akron

NORTH CAROLINA

Shilpa A. Joshi
North Carolina State University
Durham

John D. Walsh
Organon Teknika Corp.
Durham

PENNSYLVANIA

Naveen Chikthimmah
Pennsylvania State University
University Park

TEXAS

Romeo J.P. Leu
Windsor Frozen Foods
Houston

UTAH

Pat E. Williams
Idaho Technology
Salt Lake City

VIRGINIA

Brenda H. Halbrook
USDA, Food & Nutrition Service
Fairfax

WISCONSIN

Arthur Bartsch
The Swiss Colony
Monroe

Kimberly S. Sanderson
Nu-Pak Inc
Boscobel

Richard P. Vitlip
Chr. Hansen, Inc.
New Berlin

YUGOSLAVIA

Vera R. Katic
University of Belgrade
Belgrade

UPDATES

Harold Wainess & Associates Appoint New President and Staff

Harold Wainess & Associates of Northfield, IL has announced the appointment of Ken Anderson as president of the company. He replaces Harold Wainess who will be available for special assignments when needed.

Harold Wainess & Associates has also added Dan Erickson to its staff. For the past 18 years, Dan worked with the Department of Agriculture as an FDA certified rating officer for the IMS dairy program. Other duties included training and assistance to Minnesota's dairy industry in the area of milk hauling and sampling, dairy farm inspection and milk pasteurization and processing. Dan has served as chairperson of the 3-A Committee on Sanitary Procedures and has been active on numerous committees of the NCIMS. Dan was presented with the Sanitarian Award at the IAFP 2002 Annual Meeting.

Silliker Names Laboratory Director

Dena Light was named laboratory director of Silliker, Inc.'s Stone Mountain, GA, testing facility. Prior to her appointment, she served as a technical sales manager for the Homewood, IL-based organization. A graduate of Georgia State University with a master's in microbiology, Ms. Light was a member of the Stone Mountain microbiology staff from 1994 to 2000.

Park Joins FDA/CFSAN/OFP

J. Douglas Park, epidemiology and food safety specialist, has joined the FDA/CFSAN/OFP emergency coordination and response staff in College Park, MD.

Mr. Park recently retired from the Michigan Department of Agriculture (MDA). He had previously worked for the MDA and the Michigan Deptartment of Public Health. He currently serves on the eLEXNET Steering Committee and currently chairs the AFDO Education and Training Committee.

Chr. Hansen Appoints New Dairy Account Manager in California

Reggie Jones joins Chr. Hansen, Inc., as account manager for the company's dairy customers in California. Mr. Jones has over twelve years of experience within the dairy industry. His experience includes process development, quality assurance, quality control, and plant management of a major cheese production facility. Most recently, Mr. Jones was with Evolutionary Ingredient Group, where he was responsible for directing all operations of the company's whey refineries. He is a graduate of California State University, Fresno, with a BS in biological science.

Travis Chambers Joins Bell Laboratories, Inc. as North Central Technical Sales Representative

Travis Chambers recently joined the sales staff of Bell Laboratories. As the technical sales representative for the north-central US, he advises distributors and pest management professionals through individual consultations and trade shows.

Chambers earned a BA in business management from Webster University in St. Louis, MO. He previously worked as a regional sales manager for Farmland Foods in Kansas City, MO, and as an account manager/food broker for Scherzer and Associates in Shawnee Mission, KS.

International Association for Food Protection NEWS

3-A Taking Applications for New Conformance Inspectors

Applications are now available from 3-A Sanitary Standards Inc. (3-A SSI) for candidates interested in obtaining certification as a 3-A Certified Conformance Evaluator (CCE). A CCE designation will be necessary to conduct third-party equipment inspections of dairy equipment covered by 3-A Standards. This inspection will be required for equipment manufacturers or used equipment resellers to obtain or renew a 3-A Symbol. In December, 3-A SSI announced the new third party verification requirement to monitor conformance with 3-A Standards for sanitary equipment design, fabrication and construction materials.

The basic qualification criteria for an individual to become a CCE includes:

- Bachelor of Science degree in science or engineering plus three (3) years experience in relevant food or pharmaceutical processing. One (1) year of the three (3) years of general experience must be directly related to 3-A covered equipment design or sanitary processes, or
- High School graduation plus five (5) years experience in relevant food or pharmaceutical processing. Three (3) years of the five (5) years of general experience must be directly related to 3-A covered equipment design or sanitary processes.

Beyond the basic education and experience requirements, all CCE candidates must have the ability to review and evaluate complex processes, demonstrate knowledge of the types of processes to which 3-A Standards covered equipment will be applied, and have the ability to interpret engineering drawings pertaining to manufacturing equipment and instrumentation for the food processing industries. CCE candidates must also have knowledge of 3-A Sanitary Standards and must provide references attesting to the candidate's work experience and integrity.

The new CCE application form and complete details on 3-A SSI inspection program requirements can be obtained on the 3-A SSI Web site (www.3-a.org) or from the 3-A SSI office. If you have any questions, contact Tim Rugh, Executive Director at 703.790.0295 or by E-mail at trugh@3-a.org.

Alliance Targets Food Safety Protection

A strategic alliance has been formed between Teagasc and the Food Safety Authority of Ireland (FSAI). The aim is to ensure maximum collaboration between the two bodies in food safety and consumer protection. Under the new agreement, both Teagasc and the Food Safety Authority of Ireland (FSAI) will work hand-in-hand on developing and implementing the highest standards of food safety and hygiene at all stages of the food chain.

It formalizes and enhances the close links which already exist between the two bodies. A central feature of the agreement is the recognition that farmers are just as much in the food business as any other stakeholder. Teagasc, as the body providing research advisory and training services for farmers, is committed to keeping food safety at farm level at the top of its agenda.

The agreement will also see FSAI working with Teagasc in focusing its research on the critical food safety issues. Both organizations will work together in ensuring that the results of this research are communicated to all areas of the food chain. The ultimate aim is to give consumers confidence that the expenditure on food safety in these two state agencies is giving value.

Both organizations are also working together on the development of a nationally accredited food safety training program for large and small food companies with the objective of developing a food safety culture in food processing and marketing. A number of priority joint Teagasc-FSAI initiatives are already well advanced under the new agreement. These include the implementation of blueprints developed by scientists at the Teagasc National Food Centre on the best safety practices in Irish beef abattoirs.

A similar project is underway on the development of best safety practices for the Irish catering sector.

The Teagasc National Food Centre has already completed a comprehensive survey, on behalf of FSAI, on the presence of the lethal pathogen, *E. coli* O157:H7 in minced beef and beef burgers. This found that some 3% of minced beef and burgers contained levels of *E. coli* with a potential to cause serious disease. A number of joint projects are now underway aimed at protecting vulnerable groups of consumers.

Outbreak of Staphylococcal Enterotoxin Food Poisoning

Coagulase positive staphylococci are generally difficult to grow in foodstuffs without substantial temperature abuse and foodborne outbreaks are uncommon. The following incident resulted in the first detection of staphylococcal enterotoxin in food in a Queensland, Australia, outbreak and is the first reported outbreak of staphylococcal foodborne illness in Queensland since 1997 when 42 people in a Bundaberg nursing home became ill and subsequent fecal testing of a complainant isolated staphylococcal enterotoxin.

Eighteen elderly persons (from a party of 200) developed severe vomiting, diarrhea and abdominal pain within 5 hours of consuming a pre-prepared meal of cold meat, salad and dessert at a club on March 23, 2000. Unconfirmed reports indicated that a total of approximately 50 guests (25% attack rate) were affected with many of these cases not being reported because of allegiance to the club. Two elderly females were hospitalized and had moderate and slight levels of coagulase positive staphylococci detected in fecal samples. Staphylococcal enterotoxin was detected in fecal and vomitus samples. An epidemiological and environmental investigation sought details of symptom history and exposure to potential sources of staphylococcal enterotoxin, including foods consumed.

The caterer advised that whole chickens were cooked at 200°C for 50 minutes by a butcher-delicatessen business on the morning of March 22, 2000. One batch of 18 was cooked at 10 a.m. and placed into a hot box (for an estimated 3 hours) and another batch of 30 was cooked at 11:15 a.m. and remained in the closed oven pending collection. A temperature check on the hot box yielded 450°C, a temperature at which bacterial growth will be supported.

The cooked chickens were collected at about 2 p.m. on that day and transported (40-50 minutes) in an iced esky to the luncheon venue. The temperature of the chickens (whether hot or cold) when collected is unclear. They were not transported in an approved refrigerated food vehicle as required by the Food Hygiene Regulations. The temperature within the esky is unknown and no records were kept of temperatures before, after or during transit. Outside temperatures reached approximately 28°C.

There is doubt as to whether the chickens were immediately refrigerated in a small cold room\ (3°C) upon arrival at the venue or placed on a food preparation bench at ambient temperature (approximately 27°C). Later that afternoon the caterer removed the chickens from the cold room and quartered them by hand. A common tea towel was used to dry hands. The chicken was consumed on the following day.

The Food Microbiology Laboratory at Queensland Health Scientific Services tested the food for coagulase positive staphylococci and found diagnostic levels of >2.5 $\times 10^6$ CFU/g in the 5 submitted samples. Using the TECRA Staphylococcal Enterotoxin Visual Immunoassay kit, 2 staphylococcal enterotoxin was detected in four out of five plated meals of chicken, ham, pasta and salad obtained on March 24, 2000. Further enterotoxin testing of individual food items indicated that the chicken was the most likely source of contamination. Pulsed Field Gel Electrophoresis demonstrated genetic relatedness between the food and human isolates.

Environmental investigations concluded that improper storage temperatures post cooking and during transport were unacceptable in that the chicken was stored in the temperature danger zone (between 5°C-60°C) for a prolonged period increasing bacterial growth. Furthermore, the potential for cross-contamination was noted at the manufacturing premises due to food handlers handling both cooked and raw meats.

An Outbreak of Infections with a New *Salmonella* Phage Type Linked to a Symptomatic Food Handler

In December 2001, the South Australian Communicable Disease Control Branch investigated an outbreak of gastrointestinal illness linked to a Korean-style restaurant in metropolitan Adelaide. Twenty-eight people were identified as having experienced gastrointestinal symptoms subsequent to dining at the restaurant between December 9 and 12, 2001. A case-control study implicated mango pudding dessert (OR 16.67 95% CI 2.03-177.04) and plain chicken (OR 10.67 95% CI 1.04-264.32). Nineteen cases and one food handler submitted fecal specimens that grew *Salmonella* Typhimurium 64var.

Two samples of mango pudding and one sample of pickled Chinese cabbage also grew *Salmonella* Typhimurium 64var. The infected food handler reported an onset of illness 2 days before cases first reported eating at the restaurant. The food handler's only role was to prepare the mango pudding

dessert in an area external to the restaurant's kitchen. Illness was strongly associated with consumption of a contaminated mango pudding dessert, with contamination most likely resulting from the symptomatic and culture positive food handler who prepared the dish. This outbreak demonstrates the importance of excluding symptomatic food handlers, and the need for appropriately informing and educating food handlers regarding safe food handling procedures. Restaurants with staff and management from non-English speaking backgrounds should be specifically targeted for education that is both culturally sensitive and language specific.

Foot and Mouth Disease in Livestock and Reduced Cryptosporidiosis in Humans, England and Wales

During the 2001 epidemic of foot and mouth disease (FMD) in livestock in England and Wales, it was discovered a corresponding decrease in laboratory reports of cryptosporidiosis in humans. Using a regression model of laboratory reports of cryptosporidiosis, we found an estimated 35% (95% confidence interval [CI] 20% to 47%) reduction in reports during the weeks spanning the period from the first and last cases of FMD. The largest reduction occurred in northwest England, where the estimated decrease was 63% (95% CI 31% to 80%). Genotyping a subgroup of human isolates suggested that the proportion of *Cryptosporidium* genotype 2 strain (animal and human) was lower during the weeks of the FMD epidemic in 2001 compared with the same weeks in 2000. Our observations are consistent with livestock making a substantial contribution to *Cryptosporidium* infection in humans in England and Wales; our findings have implications for agriculture, visitors to rural areas, water companies, and regulators. Full study available at www.cdc.gov/ncidod/EID/vol9no1/02-0512.htm.

Effect of Common Sanitizers on *Listeria monocytogenes*

The incidents reported reflect the continuing challenge that *Listeria monocytogenes* poses to the food industry and particularly the ready-to-eat sector. The unusual growth and survival properties of the organism and its ability to adhere to food contact surfaces contribute to the complexity of eliminating it from the food processing environment. Microorganisms including *L. monocytogenes* adhered to surfaces are more resistant to disinfectants than those in suspension (*Food Technology* 46:1992 12:84; *Journal of Food Protection* 55: 1992:246).

A recent study conducted at the Campden & Chorleywood Food Research Association in the UK encapsulates some of the barriers that must be overcome by an effective sanitation program in those environments where *L. monocytogenes* is found.

This study (*Journal of Applied Microbiology Symposium Supplement* 92 2002 1115) had a number of aims, one of which was to determine the disinfectant resistance of persistent strains of *L. monocytogenes* and *Escherichia coli* found in the UK food industry. An important finding from the study was that conditions are likely to be present in food factories that may give rise to the development of persistent *L. monocytogenes* (and *E. coli*) strains. The nature of this persistence, however, is not due to disinfectant resistance but may be due to physical adaptation (surface attachment, biofilm formation) to a whole range of environmental conditions. The authors conclude that current cleaning and disinfection programs, correctly applied to equipment and environments that are hygienically designed, effectively control the presence of potential pathogens in food factories.

Further work in this area should be focused on other aspects of persistence adaptation, particularly the removal of adhered strains from surfaces to suspension environments in which they are inherently less disinfectant resistant.

In the study, selected *L. monocytogenes* and *E. coli* strains isolated from five chilled food factories were assessed for any resistance to commercial disinfectants compared with a laboratory *L. monocytogenes* strain. The disinfectants chosen for testing were a commercial quartenary ammonium disinfectant (QAC) and sodium hypochlorite. The QAC was chosen because a detailed survey of the food industry showed that these disinfectants were the most widely used although many factories use more than one product often for different applications. QACs may be used on food processing equipment and surfaces where they are non-corrosive while sodium hypochlorite may be used for floors and drains.

The results obtained suggest that for the *Listeria* strains examined, there was no evidence that the three strains isolated from food factories were any more resistant

to either the QAC or hypochlorite than the laboratory disinfectant test strain. This study consolidates earlier work with special reference to *L. monocytogenes* and the need for a cleaning program to obtain the cells in suspension as far as possible before the selected disinfectant is applied.

Beef Industry Leaders Unveil Actions to Further Reduce *E. coli* O157:H7

Beef industry leaders pledged their support to further reduce *Escherichia coli* O157:H7 (commonly referred to as *E. coli*) in the beef supply and committed to a series of industry-wide actions to move them toward this goal. More than 200 industry leaders, representing each link in the beef production chain, participated in this intensive, checkoff-funded two-day working summit.

"Today, the leaders of our industry have taken unprecedented action to ensure that safe, wholesome US beef becomes even safer," said Terry Stokes, CEO, National Cattlemen's Beef Association, which managed the Summit on behalf of the Cattlemen's Beef Board and America's beef producers. "Safety has always been our top priority and as a result, US beef is one of the safest in the world. But we can do even better. I am confident that the farm-to-table solutions we've identified at this Summit will help us further reduce and eventually eliminate *E. coli* O157:H7 in the beef supply," Stokes said.

The action plan is designed to build on recent successes in combating foodborne pathogens. An April 2002 report from the Centers for Disease Control and Prevention showed an overall 23 percent decline in illness from the top four bacterial pathogens since 1996. Moreover, the report stated that *E. coli* infections alone had dropped 21 percent since 2000.

The Summit focused on identifying good manufacturing practices, interventions and research needs to reduce the incidents of *E. coli*. Action steps were identified for each industry segment: cattle production, fabrication, processing, retail and foodservice. Specific actions recommended include:

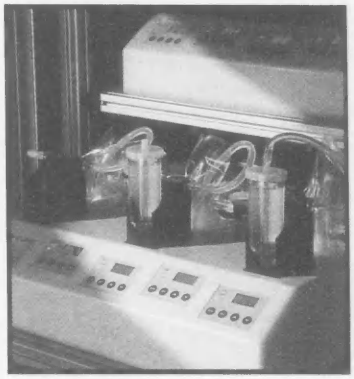
- Expanded research and fast-tracked approval of interventions such as cattle vaccines and feed additives Standardization of safety testing and verification at packing plants;
- Uniform practice of sampling, testing and negative confirmation before meat processing; and
- Consumer information regarding cooking temperatures and thermometer use at point of purchase.

These actions will complement checkoff-supported interventions currently in place including thermal pasteurization and carcass washing systems that eliminate or reduce the presence of pathogens.

"These research breakthroughs coupled with industry-initiated meetings such as this Summit are the kinds of creative solutions that will help us all live up to our commitment to safety," said Dave Theno, Ph.D, chair of the Summit's Foodservice Working Group and senior vice president of quality and logistics for Jack In The Box. "In the past decade, we have made tremendous strides in reducing the incidences of foodborne illness. The solutions we've identified here mean that each link in the beef-safety chain will work together and get even stronger, allowing companies like mine to continue to ensure that the food we serve exceeds our customers' expectations for safety and quality," he said. Industry leaders from each sector will leave the Summit charged with bringing the action plan back to their sectors, seeking approval and implementation.

"The working session and the actions we have identified are great examples of the cooperation and collaboration that always have been characteristic of our industry," Stokes said. "I know that the nation's beef producers feel more confident than ever in the safety of the beef we put on America's tables, including our own."

INDUSTRY PRODUCTS



Matrix MicroScience Limited

Aviagen Chooses Pathatrix System for *Salmonella* Testing

Aviagen, a poultry breeding company is to use Matrix Microscience Ltd.'s Pathatrix system for the routine *Salmonella* testing of visitors and staff to its Scottish, bio-secure farms.

Giving completed test results in just 40 hours, Pathatrix recently received AOAC* R1 Validation for *Salmonella* testing after an extensive evaluation process at Campden & Chorley Food Research Association (CCFRA). Pathatrix has also received AOAC accrediation for its dual (*Listeria*/*Salmonella*), *Listeria* and *E. coli* O157 tests.

The Aviagen Group supplies pedigree day-old chicks for the production of major commercial broilers to over 85 countries worldwide. As part of its commitment to quality and product integrity, Aviagen routinely tests all visitors and staff before they can gain entrance to one of its bio-secure farms.

Previously the Group had used traditional, microbiological testing methods for *Salmonella*, which took between two to four days to complete. Following a 10 month trial of Pathatrix, Aviagen concluded the system was not only quicker than existing methods, but more accurate and sensitive.

The company is now evaluating Pathatrix for a wider range of uses within the Group and is also carrying out trials with Matrix's presence/absence test, COLORTRIX, which will be officially launched in January 2003.

Matrix MicroScience Limited, Cambridgeshire, United Kingdom

READER SERVICE NO. 242

Daimer Industries Introduces Its Heavy-duty, Industrial KleenJet™ Steamer Ultra 800

The KleenJet™ Steamer Ultra 800 is a 100 lb. stainless steel, continuous-fill, mobile vapor system for food safety, sanitation, and pest control. The 120 psi, 330 degree, 220 volt self-contained steamer offers non-stop steaming, cleaning, sanitizing, deodorizing, and degreasing using ordinary tap water.

The Ultra 800, which can be used either in a contact or non-contact manner, targets stainless steel, overhead structures, conveyor belts, pipes, drains, tile, grout, walls, floors, locker rooms, food processing equipment, and more as it helps prevent and eliminate mold, *Listeria, E. coli, Salmonella*, and most other foodborne bacteria, and nuisance insects. The applications are virtually unlimited

Daimer Industries, Inc., Medford, MA

READER SERVICE NO. 243

BD Diagnostic Systems MI Agar — A New Chromogenic/Fluorogenic Medium

BD Diagnostic Systems announces the release of BD MI Agar, a new chromogenic/fluorogenic medium formulated to simultaneously detect total coliforms and *Escherichia coli* in drinking water by membrane filtration. BD MI Agar conforms to the USEPA 1604 approved procedure for monitoring drinking water under the Total Coliform Rule and source water under the Surface Water Treatment Rule. A significant enhancement to the membrane filtration (MF) test method, MI Agar increases the analytical quality, while reducing analysis time when compared to conventional techniques. Final results are available in 24 hours or less. The benefit for testing facilities is a more efficient, cost-effective, sensitive and specific tool for the detection of total coliforms and *E. coli* in drinking water. BD MI Agar offers precise, quantifiable results as compared to the most probable numbers method which provides only a statistical estimate that is more costly and time consuming.

While BD MI Agar is approved for use by certified drinking water laboratories for microbial analysis of potable water, it's also ideal for a wider range of applications. BD MI Agar can be used to test recreational, surface or marine water, bottled water, groundwater, well water, treatment plant effluents, water from drinking water distribution lines, drinking water source water and possibly foods.

MI Agar was developed by the USEPA for testing drinking water as an enhancement to the MF technique. As a single-step MF technique, MI Agar can be used to simultaneously detect and enumerate both total coliforms and *E. coli* in water samples in 24 hours or less on the basis of their specific enzyme activities. MI Agar detects the presence of the bacterial enzymes β-galactosidase and β-glucuronidase produced by total coliforms and *E. coli*, respectively.

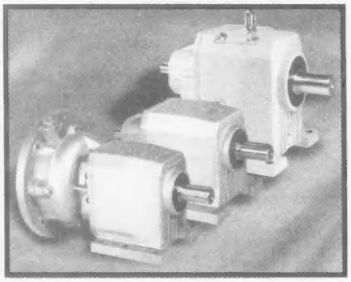
Typically found in fecally polluted water, coliform bacteria are species that inhabit the intestines of warm-blooded animals or occur naturally in soil, vegetation and water. They are often associated with disease outbreaks. Although these bacteria are not usually pathogenic themselves, their presence in drinking water indicates the possible presence of other pathogens. *E. coli* is one species in this group of coliform bacteria. Since it is always found in feces, it is a more direct indicator of fecal contamination and the possible presence of enteric pathogens.

BD Diagnostic Systems, Sparks, MD

READER SERVICE NO. 244

Viking Pump Introduces New Series of In-line Gear Reducers

Viking Pump has expanded its gear reducer product line to include a new series of in-line gear reducers compatible with any positive displacement pump or other equipment needing speed reduction. The new gear reducers have the input and output shaft on the same centerline for easy alignment and maximum space savings.



Viking Pump Inc.

All gear reducers in the new series offer double reduction, high efficiency and low noise levels. The gear reducers are available in ten different sizes, with ratios varying from 2.6:1 to 35.1:1. Available horsepower ranges from 0.5 to 350 hp (0.37 to 261 kW), while output speeds range from 50 to 673 rpm (with 1,750 rpm input).

The gear reducers offer universal mounting with either a solid input shaft, or a hollow input shaft combined with a NEMA C or IEC flange to close-couple to the motor. The direct mounting eliminates alignment problems as well as the need for a coupling set and a coupling guard between the motor and the reducer. Gears are hardened or case-hardened steel, and input/output shafts are high strength steel.

In addition to the new series of in-line gear reducers, Viking has offered parallel shaft single-reduction gear reducers for more than 40 years. These gear reducers feature an adjustable input shaft height to match up to a variety of drives. Viking will continue to offer these gear reducers along with the new in-line models.

Viking Pump Inc., Cedar Falls, IA

READER SERVICE NO. 245

SKF's Low-Cost Micro-Vibe™ Makes Vibration Test and Measurement Accessible to Everyone Who Needs It

The Micro Vibe™, the latest portable vibration test and measurement instrument from SKF Reliability Systems, makes sophisticated analysis of rotating equipment available to virtually any technician in any commercial or industrial setting. Low-cost, compact and lightweight, the Micro Vibe is the first vibration test and measurement instrument made to be used with a PDA. Packed full of advanced features, including user-selectable measurement units (English or metric), the instrument offers Vibration, Time-waveform, and FFT Spectrum Plots. It also provides technicians with judgment criteria based on ISO standards, enabling an immediate assessment of a machine's condition.

Micro Vibe is a card-type vibration meter made to fit the Springboard™ expansion slot of a Handspring™ Visor handheld. Micro Vibe is versatile, accepting a variety of sensors, including accelerometers and electro-dynamic velocity pickups, and thereby allowing the collection of the kind of data required in a specific operation. Also, since the Micro Vibe uses a commercial, off-the-shelf PDA, it represents a significant value to the user in terms of cost when compared to other available systems, and the user has the use of a fully functional PDA for other applications. For example, a user may "hot sync" the Handspring Visor to a desktop computer, then, using available Data Extract Software, save collected vibration data to Microsoft® Excel for documenting and review.

"This product," says Marshall, "makes vibration analysis accessible to technicians who have never used it

before because of high instrument and software costs. People who have traditionally done condition monitoring on rotating machinery — plant and reliability engineers as well as maintenance and operations personnel — will use Micro Vibe. However, its low cost and high functionality also make it a 'must have' for everyone from HV AC technicians to elevator mechanics, from building maintenance engineers to hospital maintenance staffs. The MicroVibe makes condition monitoring and machine reliability practical considerations for medium-size and even small commercial and industrial plants," Marshall concludes.

MicroVibe will be available via the Internet, in general industrial supply catalogs and globally by independent distributors and manufacturers' representatives.

SKF USA Inc., Kulpsville, PA

READER SERVICE NO. 246

DirectSense RH Relative Humidity Meter from Gray Wolf Sensing Solutions

GrayWolf Sensing Solutions of Trumbull, Connecticut and Tuamgraney, Ireland introduces an innovative new %RH meter that utilizes the power of pocket PC computers.

A thin-film capacitive %RH sensor and PT100 temperature sensor are incorporated for fast, accurate measurement. Display %RH and °F/°C, as well as derived moisture readings including dewpoint, wetbulb temperature, specific humidity, absolute humidity and humidity ratio. Optionally add carbon monoxide of carbon dioxide sensors.

GrayWolf's WolfSense™ application software allows for a clear real-time display of up to 7 simultaneous measurements on a mobile computer,

GrayWolf Sensing Solutions

plus instantaneous data-logging and long-term trending. In addition, data file association of text, graphic, audio, photo, CAD/CAM and calibration notes results in efficient and detailed documentation of surveys. Sensor tips are available at the tap of the tactile screen, and industry/application relevant Word and PDF documents are also included.

Additional probes are available for air velocity, toxic gases and indoor air quality parameters.

GrayWolf Sensing Solutions, Trumbull, CT

READER SERVICE NO. 247

New Anderol H-1 Food Grade Steam Peeler Lubricant Increases Productivity and Reduces Maintenance

Food manufacturers performing peeling applications can now achieve higher productivity and less maintenance while meeting HACCP (Hazard Analysis Critical Control Point) requirements, including FDA regulations and NSF International standards with the Anderol PQ® cooker & valve oil. Once in place, processing facilities will realize significant cost savings from less downtime, extended equipment life and improved operational efficiency without disturbing the integrity of food products. This white oil-based lubricant is designed to withstand water washouts and reduce occurrences of scaling or residue on food equipment. Special additives enhance the lubricant's performance under high temperatures and moisture.

"We worked with processors to create a customized, innovative food grade formula that withstands a variety of operational challenges specific to the steamed peeling process, including, moisture, temperature and pressurized washouts," says Garrett M. Grega, global marketing manager at Anderol. "Plant output is no longer threatened, but most importantly, our oil exceeds governmental standards for incidental lubricant contact assuring food quality and safety."

The company has a full line of food grade lubricants to meet multiple requirements and applications in both the food and drug industry.

Anderol, East Hanover, NJ

READER SERVICE NO. 248

Excel Scientific Sealing Films for PCR

Excel Scientific, Inc., the plate-sealing and reagent-handling experts, announce AlumaSeal II, a soft aluminum sealing film designed specifically for PCR plates.

AlumaSeal II incorporates a strong medical-grade adhesive which can withstand thermal cycling and provides a reliable seal from -70 to +110°C. The film prevents evaporation during cycling, yet pierces easily for sample recovery with pipette tips or robotic probes without significant

adhesive gumming. Films are nuclease and nucleic acid free, available presterilized, sized to fit standard multiwell plates, and have two perforated end tabs for easy application and removal. The end tabs can be detached if necessary to prevent interference with automated equipment.

Excel Scientific, Inc., Wrightwood, CA

READER SERVICE NO. 249

The National Food Laboratory Pushing the Safety Limits for Food Manufacturers

For the purposes of public health, corporate liability, and corporate reputation, neglect of food safety is not an option. Companies, in fact, can be held liable even when consumers are primarily at fault. Such was the case a number of years ago when a consumer mistakenly stored clam chowder intended to be refrigerated in the cupboard for months, allowing toxic *Clostridium botulinum* spores to grow. This resulted in the hospitalization of several family members after consumption of the mishandled product. Had the company done a Challenge Study on the clam chowder; however, the manufacturer would have known that *C. botulinum* would have grown under conditions of abuse in the product. The manufacturer then could have formulated or processed the product in a manner that would have minimized or eliminated the risk of an outbreak.

While consumer misuse of food products can compromise safety, consumer demand for fresher, less thermally processed foods results in products potentially hazardous in terms of microbiological safety.

Low acid food products packed in hermetically sealed containers must be processed to a level to destroy *C. botulinum*. Spores of this pathogen are highly resistant to heat and require processing at 250°F for at least five minutes to be destroyed. Thermal processing that high is, however, destructive to the quality of many products and can significantly reduce consumer appeal. The trick is to use the right level of thermal processing along with the right combination of physical properties such as pH, salt (or sugar) content, and preservatives to maximize food safety and consumer appeal. Proper scientific approach and protocols must also be followed, or regulators such as the FDA could potentially halt production or order a product recall months or perhaps years after product launch.

"If a sandwich is tested and found to be negative for *Salmonella* spp., is it reasonable to infer there's no *Salmonella* spp. in any of 10,000 other sandwiches that come off the production line that day?" asks Stillwell. "Without detailed knowledge of the process, there's no confidence that one sandwich testing negative means that the others will. But demonstrate that you've designed your process properly, run it the way you designed it, and now you have confidence the sandwiches would test negative. The assurance is in the process design and monitoring, which results in a better, safer product."

The National Food Laboratory, Torrance, CA

READER SERVICE NO. 250

Ivan Parkin Lecture

presented by

Donald L. Zink, Ph.D.

Lead Scientist, Food Processing
Food and Drug Administration
Center for Food Safety and Applied Nutrition
Office of Plant, Dairy Foods, and Beverages
College Park, Maryland

"On the Trail of Food Safety — From the Early Days to the Future"

Sunday, August 10, 2003
Opening Session — 7:00 p.m.

Preliminary Program

Sunday, August 10, 2003 — 7:00 p.m.

- Opening Session

Monday, August 11, 2003

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Use of Food Safety Objectives and Other Risk-based Approaches to Reduce Foodborne Listeriosis
- Intervention Strategies for Ready-to-Eat Meat Products
- Hazard Identification in the Fresh Produce Industry
- Recipe for Food Safety at Retail

Technical Session

- Microbiological Methods

Poster Session (10:00 a.m. – 1:00 p.m.)

- Pathogens and Their Controls

Afternoon — 1:30 p.m. – 5:00 p.m.

Symposium Topics

- Effective Food Worker Hygiene Interventions: A Risk Assessment Approach
- Cost of Food Safety
- Current Issues in the Microbiological Safety of Dairy Foods – From Farm to Table
- Hot Topics in Seafood Quality and Safety

Technical Session

- Food Safety Management and Communication

Poster Session (3:00 p.m. – 6:00 p.m.)

- Microbiological Methods

Tuesday, August 12, 2003

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Detection Methods for Foodborne Pathogens
- Food Allergens: Past, Present, and Future
- Molecular Investigative Techniques and Their Application to Food Safety
- Spoilage and Pathogenic Fungi and Yeasts

Technical Session

- Produce Microbiology

Poster Session (10:00 a.m. – 1:00 p.m.)

- Foods of Animal Origin

Afternoon — 1:30 p.m. – 3:30 p.m.

Symposium Topics

- Assuring Food Safety and Security
- Applied Microbiological Genomics for Food Safety and Quality
- *Campylobacter*: A Pathogen in Need of Resolution
- Current Issues in Food Toxicology
- Microbial Stress Response to Intervention Technologies

Technical Session

- Food Handling in the Domestic Food Service Environment

Business Meeting — 4:00 p.m. – 5:00 p.m.

Wednesday, August 13, 2003

Morning — 8:30 a.m. – 12:00 p.m.

Symposium Topics

- Science-based Shelf Life Dating of Ready-to-Eat Refrigerated Foods
- All the Latest Jazz — Recent Foodborne Outbreaks
- Food on the Move
- Aquaculture: Safety and Quality Issues

Technical Session

- Foodborne Pathogens

Poster Session (9:00 a.m. – 12:00 p.m.)

- Jambalaya

Afternoon — 1:30 p.m. – 5:00 p.m.

Symposium Topics

- The Evolution of Foodborne Pathogens
- Natural Antimicrobials – Current Trends and Future Perspectives
- Risk Communication – Putting Food Safety in Perspective
- Emerging Issues in Water Quality for the Food Industry

Technical Session

- Risk Modeling

Poster Session (2:00 p.m. – 5:00 p.m.)

- Produce and Seafood Microbiology

Event Information

EVENING TOURS

MONDAY NIGHT SOCIAL AT MARDI GRAS WORLD – *Sponsored by IGEN International, Inc.*

Monday, August 11, 2003 • 6:30 p.m. – 10:00 p.m.

Fred Flinstone awaits. So do Rhett Butler, Wonder Woman, King Kong, Hulk Hogan and Marilyn Monroe. They're standing around a wondrous warehouse filled with Mardi Gras floats, giant disembodied heads and larger-than-life creatures such as Medusa and Poseidon.

Coming upon them at Blaine Kern's Mardi Gras World is like walking into a giant toy box of doll parts. What visitors are actually seeing are bits and pieces of Mardi Gras floats (and some complete ones), movie-set pieces and sculpted characters made for Walt Disney World attractions and other festive occasions.

Blaine Kern, known in New Orleans as "Mr. Mardi Gras," started the company Blaine Kern Artists in 1947 and opened Mardi Gras World to the public in 1984. Now, 150,000 people tour the studio every year.

Even those who never plan to go to the real Mardi Gras would probably like visiting Mardi Gras World. After all, how often do you get to see Spiderman, Marilyn, Scarlett and Rhett all in the same room? The night will be filled with food, entertainment, and fun! This is a Monday Night Social you will not want to miss.

CREOLE QUEEN DINNER & JAZZ CRUISE

Tuesday, August 12, 2003
7:00 p.m. – 8:00 p.m. Boarding
8:00 p.m. – 10:00 p.m. Cruising with Dinner

Constructed at Moss Point, Mississippi, the Paddle-wheeler Creole Queen took her maiden voyage on October 1, 1983. She is an authentic paddle-wheeler powered by a 24-foot diameter paddlewheel. You will experience the finest in Southern hospitality as you board the Creole Queen for a leisurely and fun trip down the Mississippi. The sounds of Dixieland fill the air as you step aboard for an adventure back in time. Relive the era when cotton was king while enjoying a lavish Creole buffet. A cruise on the Mississippi is pure New Orleans and pure pleasure! Your ticket purchase benefits the IAFP Foundation Fund.

IAFP FUNCTIONS

NEW MEMBER RECEPTION

Saturday, August 9, 2003 • 4:30 p.m. – 5:30 p.m.

If you recently joined the Association or if this is your first time attending an IAFP Annual Meeting, welcome! Attend this informal reception to learn how to get the most out of attending the Meeting and meet some of today's leaders.

AFFILIATE RECEPTION

Saturday, August 9, 2003 • 5:30 p.m. – 7:00 p.m.

Affiliate officers and delegates plan to arrive in time to participate in this educational reception. Watch your mail for additional details.

COMMITTEE MEETINGS

Sunday, August 10, 2003 • 7:00 a.m. – 5:00 p.m.

Committees and Professional Development Groups (PDGs) plan, develop and institute many of the Association's projects, including workshops, publications, and educational sessions. Share your expertise by volunteering to serve on any number of committees or PDGs.

STUDENT LUNCHEON

Sunday, August 10, 2003 • 12:00 p.m. – 1:30 p.m.

The mission of the Student PDG is to provide students of food safety with a platform to enrich their experience as Members of IAFP. Sign up for the luncheon to help start building your professional network.

OPENING SESSION

Sunday, August 10, 2003 • 7:00 p.m. – 8:00 p.m.

Join us to kick off IAFP 2003 at the Opening Session. Listen to the prestigous Ivan Parkin Lecture delivered by Donald L. Zink, Ph.D., Lead Scientist, Food Processing, FDA, CFSAN, OPDFB, College Park, Maryland. The presentation will be "On the Trail of Food Safety — From the Early Days to the Future."

CHEESE AND WINE RECEPTION

Sunday, August 10, 2003 • 8:00 p.m. – 10:00 p.m.

An IAFP tradition for attendees and guests. The reception begins immediately following the Ivan Parkin Lecture on Sunday evening in the Exhibit Hall.

IAFP JOB FAIR

Sunday, August 10 through Wednesday August 13, 2003

Employers, take advantage of recruiting the top food scientists in the world! Post your job announcements and interview candidates. Watch for additional information at www.foodprotection.org.

DAYTIME TOURS

NEW ORLEANS SUPER CITY TOUR

Sunday, August 10, 2003 • 9:00 a.m. – 2:00 p.m.

See the landmarks and architecture and listen to the legends and charm that make New Orleans famous! Three hundred years of entertaining history about "America's Most Interesting City" make this tour a visitor's favorite. The tour will begin with Jackson Square, continue along Esplanade Avenue with its splendid architecture, and then on to the "Cities of the Dead" where you'll learn about a most unusual burial system. City Park, Lake Pontchartrain, the New Orleans Yacht Club, the oldest in the US and the Causeway, the longest bridge in the world are next on the agenda. Traveling along the line of the famous St. Charles Avenue Streetcar, the tour will pass Tulane and Loyola Universities and Audubon Park. Better known as "Millionaire's Row", St. Charles Avenue boasts stately mansions and lush tropical gardens. While uptown, enjoy a traditional New Orleans jazz brunch at Dominique's. The tour will brush the edges of the warehouse and business districts enroute back to the Hilton New Orleans Riverside. When this tour draws to an end, guests will have a much deeper understanding of New Orleans and its fascinating history.

SWAMP & BAYOU TOUR

Monday, August 11, 2003 • 9:00 a.m. – 1:00 p.m.

Along with the wondrous alligator, visit a few other Louisiana swamp friends. How about a beautiful ivory white egret (related to the crane) perched on a moss-draped cypress tree searching for an ill-fated catfish? Or a curious raccoon along the bayou's edge gathering his lunch of crawfish while a Louisiana snapping turtle watches him from atop a fallen willow tree? Or a Cajun hunter's cabin with an alligator sunbathing on his weather-beaten wharf? All this and much more will accompany your adventure into the pristine bayous and swamps of Southern Louisiana. Your guide will entertain you with Cajun folklore and Cajun Zydeco music as he skillfully guides your climate-controlled swamp boat beneath the beautiful foliage draped mysteriously across your path. He will bring you into hidden coves which you probably only thought existed on the Discovery Channel. Enjoy lunch in the Gator Den Cafe before leaving Cajun country.

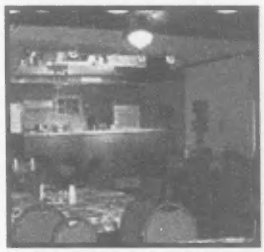
RIVER ROAD PLANTATION TOUR

Tuesday, August 12, 2003 • 9:00 a.m. – 4:00 p.m.

Sit back, relax and enjoy a delightful journey along the River Road, back in time to an era when sugar was king and a massive plantation was a sugar planter's kingdom! A native tour guide will point out sites and tell tales of the bygone antebellum period on the excursion to two magnificent plantations, Oak Alley and San Francisco. Oak Alley is named for the dramatic double row of live oaks interlaced to form a beautiful canopy leading three hundred yards from River Road to the mansion. It is considered to be one of the finest remaining examples of adaptive restoration. Nowhere else in the Mississippi Valley is there such a spectacular setting! Enjoy a luncheon buffet on the grounds before continuing along River Road to bright and colorful San Francisco Plantation. Originally named for its builder, Marmillion, it was renamed as a derivation of the French Slang "sans fruscins" — "without a penny in my pocket," in reference to its high cost to build. Gingerbread galleries and extensive ornamentation mark the exterior while San Francisco's interior is ornate, boasting handcarved woodwork, ceiling paintings, frescos and beveled glass. A tour you will be sure to remember.

NEW ORLEANS SCHOOL OF COOKING

Wednesday, August 13, 2003 • 9:30 a.m. – 1:00 p.m.



Join in the fun in the comfortable atmosphere of a Louisiana homestyle kitchen to learn the secrets of authentic Creole cooking. The City That Care Forgot never forgets about its food, and you will never forget it either. In just three hours, you'll learn to recreate the magic of New Orleans in your own kitchen. Founded in 1980, the cooks at The New Orleans School of Cooking demonstrate basic Creole recipes and share their favorite tips while the rich, spicy aromas float through the air.

HOSPITALITY ROOM

SPOUSE/COMPANION ROOM

Register your spouse/companion and they will have access to the hospitality room where a continental breakfast and afternoon snacks are provided Sunday through Wednesday.

IMPORTANT! Please read this information before completing your registration form.

MEETING INFORMATION

Register to attend the world's leading food safety conference.

Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception
- Program and Abstract Book

4 EASY WAYS TO REGISTER

Complete the Attendee Registration Form and submit it to the International Association for Food Protection by:

Online: www.foodprotection.org

Fax: 515.276.8655

Mail: 6200 Aurora Avenue, Suite 200W,
Des Moines, IA 50322-2864, USA

Phone: 800.369.6337; 515.276.3344

The early registration deadline is July 9, 2003.
After this date, late registration fees are in effect.

International Association for Food Protection®

REFUND/CANCELLATION POLICY

Registration fees, less a $50 administration fee and any applicable bank charges, will be refunded for written cancellations received by July 25, 2003. No refunds will be made after July 25, 2003; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 18, 2003. Event and tour tickets purchased are nonrefundable.

EXHIBIT HOURS

Sunday, August 10, 2003	8:00 p.m. – 10:00 p.m.
Monday, August 11, 2003	9:30 a.m. – 1:30 p.m. 3:00 p.m. – 6:30 p.m.
Tuesday, August 12, 2003	9:30 a.m. – 1:30 p.m.

DAYTIME TOURS

(Lunch included in all daytime tours)

Sunday, August 10, 2003	
New Orleans Super City Tour	9:00 a.m. – 2:00 p.m.
Monday, August 11, 2003	
A Swamp Tour Experience	9:00 a.m. – 1:00 p.m.
Tuesday, August 12, 2003	
River Road Plantation Tour	9:00 a.m. – 4:00 p.m.
Wednesday, August 13, 2003	
New Orleans School of Cooking	9:30 a.m. – 1:00 p.m.

EVENING EVENTS

Sunday, August 10, 2003	
Opening Session	7:00 p.m. – 8:00 p.m.
Cheese and Wine Reception *Sponsored by Kraft Foods North America*	8:00 p.m. – 10:00 p.m.
Monday, August 11, 2003	
Exhibit Hall Reception *Sponsored by Qualicon Inc.*	5:00 p.m. – 6:30 p.m.
Monday Night Social at Mardi Gras World *Sponsored by IGEN International, Inc.*	6:30 p.m. – 10:00 p.m.
Tuesday, August 12, 2003	
Creole Queen Dinner and Jazz Tour Ticket sales will benefit the IAFP Foundation Fund	7:00 p.m. – 10:00 p.m.
Wednesday, August 13, 2003	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an International Association for Food Protection Annual Meeting attendee to receive a special rate of $145/$165 per night, single/double. Make your reservations as soon as possible; this special rate is available only until July 9, 2003.

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Attendee Registration Form

Name (Print or type your name as you wish it to appear on name badge) _____ Member Number: _____

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❒ Regarding the ADA, please attach a brief description of special requirements you may have. Member since: _____

❒ IAFP occasionally provides Attendees' addresses (excluding phone and E-mail) to vendors and exhibitors supplying products and services for the food safety industry. If you prefer NOT to be included in these lists, please check the box.

PAYMENT MUST BE RECEIVED BY JULY 9, 2003 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration (Awards Banquet included)	$ 305 ($355 late)	$ 475 ($525 late)	_____
Association Student Member (Awards Banquet included)	$ 52 ($ 62 late)	Not Available	_____
Retired Association Member (Awards Banquet included)	$ 52 ($ 62 late)	Not Available	_____
One Day Registration:* ❒ Mon. ❒ Tues. ❒ Wed.	$ 170 ($195 late)	$ 235 ($260 late)	_____
Spouse/Companion* (Name): _____	$ 50 ($ 50 late)	$ 50 ($ 50 late)	_____
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EVENTS:		# OF TICKETS	
Student Luncheon (Sunday, 8/10)	$ 5 ($ 10 late)	_____	_____
Monday Night Social at Mardi Gras World (Monday, 8/11)	$ 39 ($ 44 late)	_____	_____
Children 14 and under	$ 34 ($ 39 late)	_____	_____
Creole Queen Dinner and Jazz Tour (Tuesday, 8/12)	$ 70 ($ 75 late)	_____	_____
Awards Banquet (Wednesday, 8/13)	$ 50 ($ 55 late)	_____	_____

DAYTIME TOURS: (Lunch included in all daytime tours)			
New Orleans Super City Tour (Sunday, 8/10)	$ 69 ($ 74 late)	_____	_____
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We invite you to participate as a sponsor for IAFP 2003. Sponsorship participation provides an excellent opportunity to position your company or organization as a supporter of the Association.

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$5,000	Exhibit Hall Pastries and Coffee (Monday Morning)
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Contact David Larson for details.
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3-A® Sanitary Standards for Italian-Type Pasta Filata Style Cheese Cookers, Number 70-01

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Italian-type pasta filata style cheese cooker specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A SCOPE

A1 The equipment covered by these standards may include unitized sections that act as receiving reservoirs, pre-heat or cooking sections (direct or indirect), integral heating media systems, stretcher assembly, discharge reservoir and discharge ports. The cheese equipment shall begin at the point where cheese curd is introduced and shall terminate at the point where cooked and stretched cheese is discharged. With regard to the use of steam, hot water, or other forms of heating media, the equipment shall begin and end at the manufacturer's supplied fittings. (Cheese dicers, mills, cyclones or similar appurtenances attached to the receiving reservoir are not covered by these standards.)

A2 In order to conform to these 3-A Sanitary Standards, Italian-type pasta filata style cheese cookers shall conform to the following design, material, and fabrication criteria.[1]

B DEFINITIONS

B1 *Product:* Shall mean cheese or cheese curd, cheese mat derived from milk and milk products, and also whey/heating media which contacts the cheese, cheese curd, or cheese mat.

B2 *Italian-Type Pasta Filata Style Cheese Cookers (referred to hereafter as a cooker):* Shall mean equipment in which products are elevated in temperature and physically manipulated to impart a stretch characteristic and finished texture common to Italian-type pasta filata style cheeses.

B2.1 This definition shall also cover: Italian-type cheese cooker/mixer; Italian cheese cooker/mixer/stretcher, Italian cheese stretcher/cooker and other common names for similar devices.

B3 *Solutions:* Shall mean water and/or those homogeneous mixtures of cleaning agents and/or sanitizers and water used for flushing, cleaning, rinsing, and sanitizing.

B4 **Surfaces**

B4.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, diffuse or be drawn into the product.

B4.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B4.2.1 *Splash Contact Surfaces:* Shall mean other nonproduct contact surfaces that during normal use are subject to accumulation of soil and which require routine cleaning.

[1] Use current revisions or editions of all referenced documents cited herein.

B5 **Cleaning**

B5.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement, circulation or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B5.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B6 **Surface Modification**[2]

B6.1 *Surface Treatments:* Shall mean a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable, typically less than 1 µm, build-up of new material or removal of existing material.

B6.1.1 Surface treatments include:
1. Mechanical (shot peening[3], polishing)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carburizing, nitriding)
4. Chemical (etching, oxidation)
5. Electropolishing

B6.2 *Coatings:* Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 1 µm, build-up of new material.

B6.2.1 Coating processes include:
1. Chemical (conversion coatings)
2. Spraying (pneumatic, flame, plasma, arc spray)

B7 *Soil:* Shall mean the presence of unwanted organic residue or inorganic matter, with or without microorganisms, including food residue, on or on the equipment.

B8 *Sanitizing or Sanitization:* Shall mean a process applied to a cleaned surface which is capable of reducing the numbers of the most resistant human pathogens by at least 5 log cycles (99.999%) by applying hot water or steam or by applying an EPA registered sanitizer according to label directions. Sanitizing may be effected by mechanical or manual methods.

B9 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B10 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by an employee from the floor, platform, or other permanent work area.

B11 *Inspectable:* Shall mean all product contact surfaces can be made available for close visual observation.

B12 *Simple Hand Tools:* Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench or mallet.

B13 *Nontoxic Materials:* Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug and Cosmetic Act of 1938, as amended.

B14 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use including expected contact with product and cleaning or sanitizing compounds or solutions.

C MATERIALS

C1 Metals

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[4] or corresponding Alloy Cast Institute[5] (ACI) types (See Appendix, Section E.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.1.1 Augers, auger troughs and auger components, hoppers, baffles, bodies and discharge ports made of the materials provided for in C1.1 or other structurally suitable metal(s) may have their product contact surfaces modified by surface treatment or coating(s).

C2 Nonmetals

C2.1 Rubber and rubber-like materials may be used for seals, gaskets, guide rails, discharge ports and parts having the same functional purposes.

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

C2.2 Plastic materials may be used for baffles, bearings, caps, chutes, discharge ports, extrusion ports, gaskets, guide rails, knives, spray devices and spray device components, seals, sight and light openings, direct reading gauge tubes, and parts having the same functional purposes.

C2.2.1 Plastic materials may be used as coatings for hoppers, hopper components, augers and auger troughs, and cut-off devices and parts having the same functional purposes.

C2.2.2 Plastic materials when used for the above-specified application(s) shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

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

C2.4 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic.[6]

C2.5 Where materials having certain inherent functional purposes are required for specific applications, such as shaft seals, carbon, and/or ceramic materials may be used. Carbon and/or ceramic materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C3 Nonproduct Contact Surfaces

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 Surface Texture

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

D1.1.1 Product contact surfaces may be modified to an R_a 125 µin. (3.2 µm) finish through shot peening on augers, auger troughs, auger components, auger supports, discharge ports, hoppers, bodies, baffles, dividers, and frames.

D2 Permanent Joints

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded, except that:

D2.1.1 In such cases where welding is impractical, press-fitting or shrink-fitting may be employed where necessary for essential functional reasons such as bearings. (See Appendix, Section G.)

D2.2 Product contact surfaces joined by welding, press-fitting and shrink-fitting shall have product contact surface texture which is in compliance with D1.1.

[2] Additional information on surface modification is contained in *Advanced Materials and Processes*, Volume 137(1); "Coatings and Coating Fractions" by H. Herman, "Surface Modification" by F. A. Smith. ASM International, Materials Park, OH. 44073. (216) 338-5151.

[3] MIL-S-13165C (1), *Military Specification: Shot Peening of Metal Parts*. Available from Standardization Document Order Desk (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA 19111-5094 (215) 697-2179.

[4] The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-3. Available from the Iron and Steel Society, 186 Thorn Hill Road, PA 15086 (724) 776-1535.

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

[6] Adhesives shall comply with 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 512-1800.

D3 Bonding Materials

D3.1 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D4 Coatings

D4.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, galling, blistering and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

D4.2 Plastic materials, when used as a coating, shall be at least 0.0005 in. (0.0127 mm) thick.

D5 Cleaning and Inspectability

D5.1 Cookers that are to be mechanically cleaned shall be designed so that the product contact surfaces and all nonremoved appurtenances thereto can be mechanically cleaned and are easily accessible and inspectable. Demountable parts shall be readily removable.

D5.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible and inspectable either when in an installed position or when removed. Demountable parts shall be readily removable.

D6 Draining

D6.1 All product contact surfaces shall be self-draining or drainable except for normal clingage.

D7 Sanitary Fittings, Valves, Connections and Tubing

D7.1 All sanitary fittings and connections shall conform to the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D7.2 All sanitary valves shall conform to the 3-A Sanitary Standards for Plug-Type Valves for Milk and Milk Products, Number 51-; 3-A Sanitary Standards for Compression-Type Valves for Milk and Milk Products, Number 53-; 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 55-; and 3-A Sanitary Standards for Vacuum Breakers and Check Valves for Milk and Milk Products, Number 58-.

D7.3 All instrument connections having product contact surfaces shall conform to the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number 74-.

D7.4 All metal tubing shall conform to the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D8 Heating Methods

D8.1 Steam injection heaters, if used, shall conform to the 3-A Sanitary Standards for Steam Injection Heaters for Milk and Milk Products, Number 61-.

D8.2 Equipment for producing culinary steam, if provided, shall conform to the 3-A Sanitary Practices for A Method of Producing Steam of Culinary Quality, Number 609-.

D8.3 Tubular heat exchangers, if provided, shall conform to the 3-A Sanitary Standards for Tubular Heat Exchangers for Milk and Milk Products, Number 12-.

D8.4 Plate heat exchangers, if provided, shall conform to the 3-A Sanitary Standards for Plate-Type Heat Exchangers for Milk and Milk Products, Number 11-.

D9 Pumps

D9.1 Positive rotary or centrifugal pumps, if provided, shall conform to the 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products, Number 02-.

D10 Gaskets

D10.1 Gaskets having a product contact surface shall be removable or bonded.

D10.2 Grooves in gaskets shall be no deeper than their width unless the gasket is readily removable and reversible for cleaning.

D10.3 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in Section D7.

D11 **Radii**

D11.1 All internal angles of less than 135° on product contact surfaces, shall have radii of not less than 1/4 in. (6.35 mm), except that:

D11.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in shaft seals. In no case shall such radii be less than 1/32 in. (0.794 mm).

D11.1.2 The radii in gasket retaining grooves or grooves in gaskets, shall be not less than 1/8 in. (3.18 mm) except for those for standard 1/4 in. (6.35 mm) and smaller O-rings and those provided for in Section D7.

D11.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section J.

D11.1.4 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D12 **Threads**

D12.1 There shall be no threads on product contact surfaces except where necessary for attaching the auger support.

D12.1.1 In such case(s) the threads shall be ACME type as specified in the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63- or the American Standard Stub Acme Thread. These threads shall conform to the drawing, Fig. (1), the American Stub Acme Thread. (See Appendix, Section I.) The thread angle shall be not less than 60° and with not more than 8 threads to the inch (25.4 mm), nor less than 5/8 in. (15.88 mm) major basic diameter. The length of the nut shall not exceed three-quarters of the basic thread diameter. The nut shall be of the open type. Equipment components with exposed threads as described above shall be designed for manual cleaning.

D13 **Shafts and Bearings**

D13.1 Shaft seals, when provided, shall be of a packless type and sanitary in design, and shall be readily accessible and inspectable. Bearings having a product contact surface shall be of a nonlubricated type.

D13.2 Lubricated bearings, including the permanent sealed type, shall be located outside the product contact surface with at least 1 in. (25.4 mm) clearance open for inspection between the bearing and any product contact surface.

D13.3 Where a shaft passes through a product contact surface without a shaft seal, the portion of the opening surrounding the shaft shall be protected to prevent the entrance of contaminants.

D14 **Openings and Covers**

D14.1 Openings through a fixed bridge and cover hinged or removable covers, to which connections are not permanently attached, shall be flanged upward at least 3/8 in. (9.52 mm). All sanitary pipelines and other appurtenances entering through the cover shall be fitted with a sanitary umbrella deflector that overlaps the edges of the opening. Other openings, with the exception of agitator openings, shall have a removable cover which shall be downwardly flanged to make close contact with the upper edges of the upward flanged opening in the covered surface.

D14.2 Covers and bridges shall pitch to an outside edge(s), so that liquid cannot accumulate.

D14.2.1 Permanent covers and bridges shall be integral with or continuously welded to the lining.

D15 **Agitators, Augers, Mixing Arms, or Stretching Devices**

D15.1 If provided, agitator or auger shaft openings through the bridge or top enclosure shall have a minimum diameter of 1 in. (25.4 mm) on cookers which require removal of the agitator shaft for cleaning, or be of a diameter that will provide a 1 in. (25.4 mm) minimum annular cleaning space between the appropriate shaft and the inside surface of the flanged opening on cookers which do not require removal of the agitator or auger for cleaning. Shielding shall be provided which effectively protects against the entrance of dust, oil, insects, and other contaminants into cookers through the annular space around the agitator shaft. Any product contact or splash contact surfaces on the shielding shall be readily accessible for inspection.

D15.2 The agitator, augers, mixing arms, or stretching devices driving mechanism, if provided, shall be securely mounted in a position that will provide a minimum distance of 4 in. (101.6 mm) measured from the driving mechanism housing, excluding bearing bosses and mounting bosses, to the nearest surface of the cooker; and in such a manner that all surfaces of cookers under or adjacent to the driving mechanism shall be readily accessible for cleaning and inspection.

D15.3 The agitating device shall be readily cleanable and shall be one of the following types:

D15.3.1 Top-entering nonremovable type agitators shall be readily accessible and cleanable. There shall be at least a 1/2 in. (12.70 mm) space between the nonremovable agitator and the bottom of the lining, unless the agitator is mounted on a hinged-type cover.

D15.3.2 The top-entering removable or demountable type agitator shall be provided with an easily accessible, readily demountable coupling of either a sanitary type located within the product contact area or a coupling located outside the product contact area provided that it is above the shield used to protect the annular space around the shaft. All product contact surfaces of the agitator shall be visible when the agitator is removed.

D15.3.3 The side or bottom-entering type agitator, augers, mixing arms, stretching devices and their shafts, including the complete seal, shall be demountable with simple hand tools for cleaning or inspection. Nonremovable parts having product surface shall be designed so that the product contact surfaces are readily cleanable from the inside of the Italian cheese cooker. Seals for the agitator, augers, mixing arms, stretching devices and their shafts, shall be of a packless type, sanitary in design, with all parts readily accessible for cleaning.

D15.3.4 Mixing arm(s) shall be sanitary in design and be demountable using simple hand tools. Any bearings or actuators located over exposed product or product contact surfaces shall be provided with adequate sanitary shields and/or deflectors.

D15.4 A bottom support or guide, if used, shall be welded to the lining and shall not interfere with drainage of the cooker and the inside angles shall have a minimum radii of 1/8 in. (3.18 mm). When the agitator shaft has a bearing cavity, the diameter of the cavity shall be greater than the depth. The agitator shall be easily demountable for cleaning of the bearing and any shaft cavity.

D16 **Fines Basket**

D16.1 Where a perforated basket is required for the collection of cheese fines, the basket shall be constructed so that perforations in product contact surfaces shall be readily accessible and inspectable. Perforations shall not be less than 1/32 in. (0.794 mm) in diameter. Slots shall be at least 1/32 in. (0.794 mm) wide. All perforations shall be free of burrs.

D17 **Supports**

D17.1 The means of supporting the cooker shall be one of the following:

D17.1.1 If legs are used they shall be smooth with rounded ends or with a flat, load bearing foot suitable for sealing to the floor, and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall provide a minimum clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm).

D17.1.2 If casters are used they shall be of sufficient size to provide a clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm). Casters, if provided, shall be easily cleanable, durable and of a size that will permit easy movement of the Italian cheese cooker.

D18 **Guards**

D18.1 Guards required by a safety standard that will not permit accessibility for cleaning and inspection shall be designed so that they can be removed with the use of simple hand tools.

D19 **Nonproduct Contact Surfaces**

D19.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, be readily cleanable and those surfaces to be coated shall be effectively prepared for coating.

D20 **Information Plate**

D20.1 Cheese cookers which have temperature limitations for operation or cleaning shall have appropriate cautionary wording on the machine nameplate or on an information plate in juxtaposition to the nameplate. (See Appendix H.)

D20.2 Cheese cookers which have plastic coated product contact surfaces shall display appropriate cautionary wording about cleaning materials or procedures on the machine name plate or on an information plate in juxtaposition to the name plate. (See Appendix H.)

D20.3 All identification or information plates shall be attached to the exterior of the cheese cooker in such a way as to be effectively sealed.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08 %. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM[7] specifications A351/A351M; A743/A743M and A744/A744M.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 um), when measured according to the recommendations in American National Standards Institute (ANSI) / American Society of Mechanical Engineers (ASME)[8] B46.1 - *Surface Texture*, is considered to be equivalent to a No. 4 finish.

G **PRESS-FITS AND SHRINK-FITS**

Press-fits or shrink-fits may be used to produce useful free permanent joints in metallic product contact surfaces when welding is not practical. Joints of this type may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example: they may be used to assemble round pins or round bushings into round holes. In both types of fits, the outside diameter of the part being inserted is greater than the inside diameter of the hole. In the case of the press-fit the parts are forced together by applying pressure. The pressure required is primarily dependent upon the diameter of the parts, the amount of interference and the distance the inner member is forced into the outer member.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is *Machinery's Handbook* published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

H **INFORMATION PLATE(S)**

Manufacturers should provide an information plate in juxtaposition to the nameplate giving the following information or cautionary statement which may be required on some Italian cheese cookers as outlined in Section D20. The specific information displayed on the information plate will vary among manufacturers. The following example is for illustration purposes only and is not intended to specify precise wording of the statements:

H1 **CAUTION**

Do not operate or clean this machine at temperatures above (__°F (__°C); Exceeding this temperature may cause serious damage.

H2 **CAUTION**

During handling or cleaning of this machine, avoid abrasion or rubbing of the plastic coated surfaces. Do not use metal scrapers, brushes, or any abrasive scouring pads. Follow recommended cleaning instructions in your operator's manual.

I **THREADS**

I1 Figure 1 - American Standard Stub Acme Thread Specifications

P = PITCH	P = 1/T.P.I.
SD = SINGLE DEPTH	SD = 0.433 * P
TF = TOP FLAT	TF = 0.259 * P
BF = BOTTOM FLAT	BF = 0.227 * P
T.P.I. = THREADS PER INCH	

J **O-RING GROOVE RADII**

TABLE 1 - Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568[9])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[10])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

These standards are effective November 24, 2002.

[7] Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

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

[9] The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15096 (412) 776-4970.

[10] The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO): 1 Rue de Varembe, Case Postale 56, CH-1211, Geneva, Switzerland (41-22-734-1240).

3-A® Sanitary Standards for Italian-Type Pasta Filata Style Cheese Moulders, Number 71-01

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Italian-type pasta filata style cheese moulder specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A **SCOPE**

A1 These standards cover the sanitary aspects of Italian-type pasta filata style cheese moulders, including but not limited to mozzarella, string and provolone cheeses. The equipment shall begin at the point where the cooked and stretched cheese is introduced and shall terminate at the point where the cheese is discharged into transfer moulds, discharged from integral moulds, or discharged through an extruder. The equipment may include individual or combined equipment sections that act as receiving-transition units, salt application devices, receiving conveyors, integral moulds or extruder pieces. These standards also cover Italian cheese moulders which cool moulded cheese by indirect methods.

A2 In order to conform to these 3-A Sanitary Standards, Italian-type pasta filata style cheese moulders shall conform to the following design, material, and fabrication criteria.[1]

B **DEFINITIONS**

B1 *Product*: Shall mean cheese derived from milk and milk products.

B2 *Italian Type Pasta Filata Style Cheese Moulders (referred to hereafter as a cheese moulder)*: Shall mean a process unit or vessel in which heated Italian cheese is manipulated to impart dimensional characteristics to the product.

B3 *Solutions*: Shall mean water and/or those homogeneous mixtures of cleaning agents and/or sanitizers and water used for flushing, cleaning, rinsing, and sanitizing.

B4 **Surfaces**

B4.1 *Product Contact Surfaces*: Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, diffuse or be drawn into the product.

B4.2 *Nonproduct Contact Surfaces*: Shall mean all other exposed surfaces.

B5 **Cleaning**

B5.1 *Mechanical Cleaning or Mechanically Cleaned*: Shall mean soil removal by impingement, circulation or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B5.2 *Manual (COP) Cleaning*: Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B6 **Surface Modification**[2]

B6.1 *Surface Treatments*: Shall mean a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable, typically less than 1 µm, build-up of new material or removal of existing material.

B6.1.1 Surface treatments include:
1. Mechanical (shot peening[3], polishing)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carburizing, nitriding)
4. Chemical (etching, oxidation)
5. Electropolishing

B6.2 *Coatings*: Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 1 µm, build-up of new material.

B6.2.1 Coating processes include:
1. Chemical (conversion coatings)
2. Electrodeposition[4]
3. Spraying (pneumatic, flame, plasma, arc spray)

B7 *Soil*: Shall mean the presence of unwanted organic residue or inorganic matter, with or without microorganisms, including food residue, in or on the equipment.

B8 *Sanitizing or Sanitization*: Shall mean a process applied to a cleaned surface which is capable of reducing the numbers of the most resistant human pathogens by at least 5 log cycles (99.999%) by applying hot water or steam or by applying an EPA registered sanitizer according to label directions. Sanitizing may be effected by mechanical or manual methods.

B9 *Easily or Readily Removable*: Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B10 *Easily or Readily Accessible*: Shall mean a location which can be safely reached by an employee from the floor, platform, or other permanent work area.

B11 *Inspectable*: Shall mean all product contact surfaces can be made available for close visual observation.

B12 *Simple Hand Tools*: Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench or hammer.

B13 *Nontoxic Materials*: Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug and Cosmetic Act of 1938, as amended.

B14 *Corrosion Resistant*: Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use including expected contact with product and cleaning or sanitizing compounds or solutions.

C **MATERIALS**

C1 **Metals**

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[5] or corresponding Alloy Cast Institute[6] (ACI) types (See Appendix, Section E.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.1.1 Auger components, baffles, chutes, discharge ports, hoppers, integral mould components, knives, moulder bodies and shuttle plates made of the materials provided for in C1.1 may have their product contact surfaces modified by surface treatment or coating(s).

C1.1.2 Auger drive shafts and knives may also be made of stainless steel of the AISI 400 Series that is made as corrosion resistant as AISI 300 Series by surface treatment or coating(s) or made of nontoxic, nonabsorbent metal that is as corrosion resistant, under the conditions of intended use, as stainless steel of the AISI 300 Series.

C2 **Nonmetals**

C2.1 Rubber and rubber-like materials may be used for seals, gaskets, guide rails, extruder or discharge ports, curtains, plungers, plunger coatings, hoses, pneumatic discharge components, and parts having the same functional purposes.

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

C2.2 Plastic materials may be used for baffles, caps, chutes, discharge ports, extruder ports, gaskets, guide rails, integral mould components, knives, spray devices and spray device components, seals, curtains, bearings, bushings, conveyors, sprockets, plungers, hoses, pneumatic discharge components, slip sheets, and parts having the same functional purposes.

C2.2.1 Plastic materials also may be used as coatings for hoppers, hopper components, augers, auger troughs, moulds, mould components and cut-off devices and parts having the same functional purposes.

C2.2.2 Plastic materials when used for the above-specified application(s) shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

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

C2.4 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic.[7]

C3 **Nonproduct Contact Surfaces**

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D **FABRICATION**

D1 **Surface Texture**

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

D1.1.1 Product contact and nonproduct contact surfaces may be modified to an R_a 125 um. (3.2 um) finish through shot peening on augers, auger troughs, auger components, auger supports, fill necks, discharge ports, hoppers, bodies, baffles, dividers, frames, moulds and mould components, knives, chutes, and eject plungers.

D2 **Permanent Joints**

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded, except that:

D2.1.1 In such cases where welding is impractical, press-fitting or shrink-fitting may be employed where necessary for essential functional reasons such as bearings. (See Appendix, Section G.)

D2.2 Product contact surfaces joined by welding, press-fitting and shrink-fitting shall have product contact surface texture which is in compliance with D1.1.

D3 **Coatings**

D3.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, spalling, blistering and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

D3.2 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces when used on stainless steel. When these surfaces are other than stainless steel, the minimum thickness of electrodeposited coatings shall not be less than 0.002 in. (0.05 mm).

D3.3 Plastic materials, when used as a coating, shall be at least 0.0005 in. (0.0127 mm) thick.

D4 **Cleaning and Inspectability**

D4.1 Cheese moulders that are to be mechanically cleaned shall be designed so that the product contact surfaces of the cheese moulder's integral mould components and augers, if provided, and all nonmoved appurtenances thereto can be mechanically cleaned and are readily accessible and inspectable. Demountable parts shall be readily removable.

D4.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible and inspectable either when in an installed position or when removed. Demountable parts shall be readily removable. When parts having product contact surfaces are too large or heavy for manual handling, appropriate mechanical means for handling shall be provided.

D5 **Draining**

D5.1 All product contact surfaces shall be self-draining or drainable except for normal adherence.

D6 **Sanitary Fittings, Valves, Connections and Tubing**

D6.1 All sanitary fittings and connections shall conform to the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D6.2 All sanitary valves shall conform to the 3-A Sanitary Standards for Plug-Type Valves for Milk and Milk Products, Number 51-; 3-A Sanitary Standards for Compression-Type Valves for Milk and Milk Products, Number 53-; 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 55-; and 3-A Sanitary Standards for Vacuum Breakers and Check Valves for Milk and Milk Products, Number 58-.

D6.3 All instrument connections having product contact surfaces shall conform to the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number 74-.

D6.4 All metal tubing shall conform to the applicable provisions of the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D6.5 Product inlet and outlet connections shall be provided with welded stub ends, or bolted or clamp-type flanges. The face of a bolted or clamp-type flange shall be as close as practical to the outer shell of the moulder body.

D7 **Moulder Body**

D7.1 The distance between the nearest point on the outer shell of the moulder body to the face of a bolted or clamp-type flange on an inlet or outlet valve connection shall not exceed the smaller of (a) twice the nominal diameter of the connection or (b) 5 in. (127 mm).

D8 **Gaskets**

D8.1 Gaskets having a product contact surface shall be removable or bonded.

D8.2 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D8.3 Grooves in gaskets shall be no deeper than their width unless the gasket is readily removable and reversible for cleaning.

D8.4 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in Section D6.1.

[1] Use current versions or editions of all referenced documents cited herein.

[2] Additional information on surface modification is contained in *Advanced Materials and Processes*, Volume 137(1), *Coatings and Coating Practices* by H. Herman, *Surface Modification* by F. A. Smith. ASM International, Materials Park, OH 44073 (216) 338-5151.

[3] MIL-S-13165C-7, Military Specification: *Shot Peening of Metal Parts*. Available from Standardization, Document Order Desk (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA 19111-5094 (215) 697-2667.

[4] Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), with Amendment 4. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited). Available from the General Services Administration, Federal Supply Service Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, DC 20407 (202) 755-0325.

[5] The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the Iron and Steel Society, 186 Thorn Hill Road, PA (5086 (724) 776-1535.

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

[7] 21 CFR 175- Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 512-1800.

D9 **Radii**

D9.1 All internal angles of less than 135° on product contact surfaces, shall have radii of not less than 1/4 in. (6.35 mm), except that:

D9.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in shaft seals. In no case shall such radii be less than 1/32 in. (0.794 mm).

D9.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm) except for those for standard, 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D6.

D9.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section I.

D9.1.4 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D10 **Threads**

D10.1 There shall be no threads on product contact surfaces, except where necessary for attaching mould spindle mounting shafts, shuttle base mounting, and for weight, fill, or chute adjusting.

D10.1.1 In such case(s) the threads shall be ACME type as specified in the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63- or the American Standard Stub Acme Thread. (See Appendix, Section I.) These threads shall conform to the drawing, Fig. (1), the American Stub Acme Thread. (See Appendix, Section I.) The threaded angles shall be not less than 60° and with not more than 8 threads to the inch (25.4 mm), nor less than 5/8 in. (15.88 mm) major basic diameter. The length of the nut shall not exceed three-quarters of the basic thread diameter. The nut shall be of the open type. Equipment components with exposed threads as described above shall be designed for manual cleaning.

D11 **Perforated Product Contact Surfaces**

D11.1 Perforations in product contact surfaces may be round, square, or rectangular. If round, the holes shall be a minimum of 1/32 in. (0.794 mm) in diameter. If square or rectangular, the least dimension shall be no less than 0.020 in. (0.51 mm) with corner radii of no less than 0.0050 in. (0.13 mm). All perforations shall be free of burrs.

D12 **Springs**

D12.1 Any coil spring having product contact surfaces shall have at least 3/32 in. (2.38 mm) openings between coils, including the ends, when the spring is in the free position.

D13 **Shafts and Bearings**

D13.1 Shafts seals, when provided, shall be of a packless type and sanitary in design, and shall be readily accessible for cleaning and inspection. Bearings having a product contact surface shall be of a nonlubricated type.

D13.2 Lubricated bearings, including the permanent sealed type, shall be located outside the product contact surface with at least 1 in. (25.4 mm) clearance open for inspection between the bearing and any product contact surface.

D13.3 Where a shaft passes through a product contact surface without a shaft seal, the portion of the opening surrounding the shaft shall be protected to prevent the entrance of contaminants.

D14 **Openings and Covers**

D14.1 Openings through a fixed bridge and either hinged or removable covers, to which connections are not permanently attached, shall be flanged upward at least 3/8 in. (9.52 mm). All sanitary pipelines and other appurtenances coming through the cover shall be fitted with a sanitary umbrella deflector that overlaps the edges of the opening. Other openings, with the exception of agitator openings, shall have a removable cover, which shall be downwardly flanged to make close contact with the upper edges of the upwardly flanged opening in the cover surface.

D14.2 Covers and bridges shall slope to an outside edge(s), so that liquid cannot accumulate.

D14.2.1 Permanent covers and bridges shall be integral with or continuously welded to the liner.

D15 **Supports**

D15.1 The means of supporting a cheese moulder shall be one of the following:

D15.1.1 If legs are used, they shall be smooth with rounded ends or with flat, load bearing feet suitable for sealing to the floor, and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall provide a minimum clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm).

D15.1.2 If casters are used, they shall be of sufficient size to provide a clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm). Casters, if provided, shall be easily cleanable, durable and of a size that will permit easy movement of the Italian cheese moulder.

D16 **Guards**

D16.1 Guards required by a safety standard that will not permit accessibility for cleaning and inspection shall be designed so that they can be removed with the use of simple hand tools.

D17 **Nonproduct Contact Surfaces**

D17.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, be readily cleanable and those surfaces to be coated shall be effectively prepared for coating.

D18 **Information Plate**

D18.1 Cheese moulders which have temperature limitations for operations or cleaning shall have appropriate cautionary wording on the machine nameplate or on an information plate in juxtaposition to the nameplate. (See Appendix H.)

D18.2 Cheese moulders which have plastic coated product contact surfaces shall display appropriate cautionary wording about cleaning materials or procedures on the machine name plate or on an information plate in juxtaposition to the nameplate. (See Appendix H.)

D18.3 All identification or information plates shall be attached to the exterior of the cheese moulder in such a way as to be effectively sealed.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08 %. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM[6] specifications A351/A351M, A743/A743M and A744/A744M.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 µm), when measured according to the recommendations in American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)[7] B46.1 - *Surface Texture*, is considered to be equivalent to a No. 4 finish.

G **PRESS-FITS AND SHRINK-FITS**

Press-fits or shrink-fits may be used to produce crevice free permanent joints in metallic product contact surfaces when welding is not practical. Joints of this type may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example: they may be used to assemble round pins or round bushings into round holes. In both types of fits, the outside diameter of the part being inserted is greater than the inside diameter of the hole. In the case of the press-fit the parts are forced together by applying pressure. The pressure required is primarily dependent upon the dimension of the parts, the amount of interference and the distance the inner member is forced into the outer member.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is *Machinery's Handbook* published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

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

H **INFORMATION PLATE(S)**

Manufacturers should provide an information plate in juxtaposition to the nameplate giving the following information or cautionary statement which may be required on some cheese moulders as outlined in Section D18. The specific information displayed on the information plate will vary among manufacturers. The following examples are for illustration purposes only and are not intended to specify precise wording of the statements:

H1 **CAUTION**

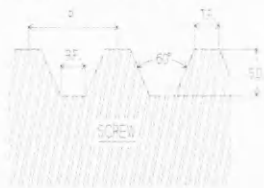
Do not operate or clean this machine at temperatures above (__°F (__°C). Exceeding this temperature may cause serious damage.

H2 **CAUTION**

During handling or cleaning of this machine, avoid abrasion or rubbing of the plastic coated surfaces. Do not use metal scrapers, brushes, or any abrasive scouring pads. Follow recommended cleaning instructions in your operators manual.

I **THREADS**

I1 Figure 1 - American Standard Stub Acme Thread Specifications



P = PITCH	P = 1/T.P.I.
S.D. = SINGLE DEPTH	S.D. = 0.432 * P
T.F. = TOP FLAT	T.F. = 0.259 * P
B.F. = BOTTOM FLAT	B.F. = 0.227 * P
T.P.I. = THREADS PER INCH	

J **O-RING GROOVE RADII**

TABLE 1 - Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568[10])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[11])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

These standards are effective November 24, 2002.

[10] The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15096 (412-776-4970).

[11] The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 56, CH-1211, Geneva, Switzerland (41-22-749-1300).

72-01

3-A® Sanitary Standards for Italian-Type Pasta Filata Style Moulded Cheese Chillers, Number 72-01

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Italian-type pasta filata style moulded cheese chiller specifications heretofore or hereafter developed which so differ in design, materials, arrangement or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. **NOTE**: Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A SCOPE

A1 These standards cover the sanitary aspects of Italian-type pasta filata style moulded cheese chillers including but not limited to mozzarella and provolone cheese. The equipment described in these standards is used to cool the moulded cheese. The equipment shall begin at the point where the warm moulded cheese enters, and terminates where the formed-chilled cheese exits the mould. The equipment may include individual or combined components such as cheese moulds, conveyors, direct cooling media systems, and cheese demoulding apparatus. These standards include methods for direct cooling of the cheese and may include one or more of the following uses of the cheese cooling media: immersion, spray, cascade, circulation or recirculation. With regard to the use of steam, water, or cooling media, the equipment shall begin and end at the manufacturer's supplied fittings.

A2 In order to conform to these 3-A Sanitary Standards, Italian-type pasta filata style moulded cheese chillers shall conform to the following design, material, and fabrication criteria.[1]

B DEFINITIONS

B1 *Product:* Shall mean cheese derived from milk and milk products.

B2 *Italian-Type Pasta Filata Style Cheese Chiller (referred to hereafter as a moulded cheese chiller):* Shall mean a process unit or vessel in which heated Italian type pasta filata style cheese is chilled within a mould to impart dimensional characteristics to the product.

B3 *Solutions:* Shall mean water and/or those homogeneous mixtures of cleaning agents and/or sanitizers and water used for flushing, cleaning rinsing, and sanitizing.

B4 *Direct Cooling Media:* Shall mean any safe and sanitary media used to cool the cheese involving contact with product or product contact surfaces.

B5 Surfaces

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

B5.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B6 Cleaning

B6.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement circulation or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means or equipment or systems specifically designed for this purpose.

[1] Use current revision or edition of all referenced documents cited herein.

B6.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B7 Surface Modification

B7.1 *Surface Treatments:* Shall mean a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable, typically less than 1 µm, build-up of new material or removal of existing material.

B7.1.1 Surface treatments include:
1. Mechanical (shot peening[2], polishing)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carburizing, nitriding)
4. Chemical (etching, oxidation)
5. Electropolishing

B7.2 *Coatings:* Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable, typically more than 1 µm, build-up of new material.

B7.2.1 Coating processes include:
1. Chemical (conversion coatings)
2. Electrodeposition[3]
3. Spraying (pneumatic, flame, plasma, arc spray)

B8 *Soil:* Shall mean the presence of unwanted organic residue or inorganic matter, with or without microorganisms, including food residue, in or on the equipment.

B9 *Sanitizing or Sanitization:* Shall mean a process applied to a cleaned surface which is capable of reducing the numbers of the most resistant human pathogens by at least 5 log cycles (99.999%) by applying hot water or steam or by applying an EPA registered sanitizer according to label directions. Sanitizing may be effected by mechanical or manual methods.

B10 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B11 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by an employee from the floor, platform, or other permanent work area.

B12 *Inspectable:* Shall mean all product contact surfaces can be made available for close visual observation.

B13 *Simple Hand Tools:* Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench or hammer.

B14 *Nontoxic Materials:* Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug and Cosmetic Act of 1938, as amended.

B15 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use including expected contact with product and cleaning or sanitizing compounds or solutions.

C MATERIALS

C1 Metals

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[4] or corresponding Alloy Cast Institute[5] (ACI) types (See Appendix, Section E.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

[2] MIL-S-13165C-7, Military Specification: *Shot Peening of Metal Parts*: Available from Standardization, Document Order Desk (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA. 19111-5094 (215) 697-2167.

[3] Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), with Amendment 4. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited). Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, D.C. 20407 (202) 755-0325.

[4] The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the Iron and Steel Society, 186 Thorn Hill Road, PA 15086 (724) 776-1535.

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

C1.1.1 Moulds made of the materials provided for in C1.1 may have their product contact surfaces modified by surface treatment or coating(s).

C1.1.2 Drive shafts and knives may also be made of stainless steel of the AISI 400 Series that is made as corrosion resistant as AISI 300 Series by surface treatment or coating(s) or made of nontoxic, nonabsorbent metal that is as corrosion resistant, under the conditions of intended use, as stainless steel of the AISI 300 Series.

C2 Nonmetals

C2.1 Rubber and rubber-like materials may be used for gaskets, curtains, seals, plungers, plunger coatings, hoses, pneumatic-discharge components, and parts having the same functional purposes.

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

C2.2 Plastic materials may be used for gaskets, curtains, sight and light openings, bearings, bushings, conveyors, sprockets, cut-off devices, seals, plungers, hoses, pneumatic discharge components, guide rails, spray devices and spray device components, slip sheets, moulds and mould components and parts having the same functional purposes.

C2.2.1 Plastic materials may also be used as coatings for moulds, mould components, and cut-off devices and parts having the same functional purposes.

C2.2.2 Plastic materials when used for the above-specified application(s) shall conform to the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

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

C2.4 The final bond and residual adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic.[6]

C2.5 Where materials having certain inherent functional purposes are required for specific applications, such as shaft seals, carbon, and/or ceramic materials may be used. Carbon and/or ceramic materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble and shall be resistant to scratching, scoring and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C3 Nonproduct Contact Surfaces

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

D FABRICATION

D1 Surface Texture

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

D1.1.1 Product contact surfaces may be modified to an R_a 125 µin. (3.2 µm) finish through shot peening on augers, auger troughs, auger components, auger supports, fill necks, discharge ports, hoppers, bodies, baffles, dividers, frames, moulds and mould components, knives, chutes, and eject plungers.

[6] 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 512-1800.

D2 Permanent Joints

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded, except that:

D2.1.1 In such cases where welding is impractical, press-fitting or shrink-fitting may be employed where necessary for essential functional reasons such as bearings. (See Appendix ,Section G.)

D2.2 Product contact surfaces joined by welding, press-fitting and shrink-fitting shall have product contact surface texture which is in compliance with D1.1.

D3 Coatings

D3.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, spalling, blistering and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

D3.2 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces when used on stainless steel. When these surfaces are other than stainless steel, the minimum thickness of electrodeposited coatings shall not be less than 0.002 in. (0.05 mm).

D3.3 Plastic materials, when used as a coating, shall be at least 0.0005 in. (0.0127 mm) thick.

D4 Cleaning and Inspectability

D4.1 A moulded cheese chiller that is to be mechanically cleaned shall be designed so that the product contact surfaces of the moulded cheese chiller and all nonremoved appurtenances thereto can be mechanically cleaned and are readily accessible and inspectable. Demountable parts shall be readily removable.

D4.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible and inspectable either when in an installed position or when removed. Demountable parts shall be readily removable. When parts having product contact surfaces are too large or heavy for manual handling, an appropriate mechanical means for handling shall be provided.

D5 Draining

D5.1 All product contact surfaces shall be self-draining or drainable except for normal adherence.

D6 Sanitary Fittings, Valves, Connections and Tubing

D6.1 All sanitary fittings and connections shall conform to the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D6.2 All sanitary valves shall conform to the 3-A Sanitary Standards for Plug-Type Valves for Milk and Milk Products, Number 51-; 3-A Sanitary Standards for Compression-Type Valves for Milk and Milk Products, Number 53-; 3-A Sanitary Standards for Diaphragm-Type Valves for Milk and Milk Products, Number 55-; and 3-A Sanitary Standards for Vacuum Breakers and Check Valves for Milk and Milk Products, Number 58-.

D6.3 All instrument connections having product contact surfaces shall conform to the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number 74-.

D6.4 All metal tubing shall conform to the applicable provisions for welded sanitary product pipelines found in the 3-A Accepted Practices for Permanently Installed Product and Solution Pipelines and Cleaning Systems Used in Milk and Milk Product Processing Plants, Number 605- and with the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D6.5 All flexible connections which constitute a hose assembly shall conform to the 3-A Sanitary Standards for Hose Assemblies for Milk and Milk Products, Number 62-.

D7 Pumps for Circulated Direct Cooling Media

D7.1 Pumps, if provided, shall conform to the 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products, Number 02-.

D8 Heat Exchangers for Circulated Direct Cooling Media

D8.1 Tubular heat exchangers, if provided, shall conform to the 3-A Sanitary Standards for

Tubular Heat Exchangers for Milk and Milk Products, Number 12-.

D8.2 Plate heat exchangers, if provided, shall conform to the 3-A Sanitary Standards for Plate-Type Heat Exchangers for Milk and Milk Products, Number 11-.

D9 **Gaskets**

D9.1 Gaskets having a product contact surface shall be removable or bonded.

D9.2 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D9.3 Grooves in gaskets shall be no deeper than their width unless the gasket is readily removable and reversible for cleaning.

D9.4 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in Section D6.1.

D10 **Radii**

D10.1 All internal angles of less than 135° on product contact surfaces, shall have radii of not less than 1/4 in. (6.35 mm), except that:

D10.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in shaft seals. In no case shall such radii be less than 1/32 in. (0.794 mm).

D10.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm) except those for standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D6.

D10.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section J.

D10.1.4 The minimum radii for fillets of welds in product contact surfaces shall be not less than 1/4 in. (6 mm) except that the minimum radii for welds may be 1/8 in. (3.18 mm) when thickness of one or both parts joined is less th 3/16 in. (4.76 mm).

D11 **Threads**

D11.1 There shall be no threads on product cont surfaces, except where necessary for attach shuttle base mounting, and for weight, fill chute adjusting.

D11.1.1 In such cases, the threads shall be ACME type specified in the 3-A Sanitary Standards Sanitary Fittings for Milk and Milk Produ Number 63- or the American Standard Stub Ac Thread. These threads shall conform to Fig (1), the American Stub Acme Thread. (S Appendix Section I.) The threaded angles sh not be less than 60° and not more than 8 thre to the inch, nor less than 5/8 in. (15.88 mm) ma basic diameter. The length of the nut shall ! exceed three quarters of the thread's basic ma diameter and the nut shall be of the open ty Equipment components with exposed threads described above shall be designed for man cleaning.

D12 **Springs**

D12.1 Any coil spring having product contact surfa shall have at least 3/32 in. (2.38 mm) openi between coils, including the ends, when spring is in the free position.

D13 **Shafts and Bearings**

D13.1 Shaft seals, when provided, shall be of a packi type and sanitary in design, and shall be reac accessible for cleaning and inspection.

D13.2 Bearings having a product contact surface shall of a nonlubricated type.

D13.3 Lubricated bearings, including the perman sealed type, shall be located outside the prod contact surface with at least 1 in. (25.4 m clearance open for inspection between the bear and any product contact surface.

D13.4 Where a shaft passes through a product cont surface without a shaft seal, the portion of opening surrounding the shaft shall be protec to prevent the entrance of contaminants.

D14 **Openings and Covers**

D14.1 Sight and light openings provided shall conform to the applicable provisions of the 3-A Sanitary Standards for Sight and/or Light Windows and Sight Indicators in Contact with Milk and Milk Products, Number 65-.

D14.2 The access port cover shall be flu inside or outside swing type. If the cover swings inside, it shall also swing outside away from the opening for disassembly and cleaning. No threads or ball joints shall be employed within the product zone to attach the access port cover and its appendages. The access port cover and its appendages shall be removable without tools. The access port cover for a top-entering access port opening shall be of the outside swing type.

D14.3 Openings through a fixed bridge and either hinged or removable covers, to which connections are not permanently attached, shall be flanged upward at least 3/8 in. (9.52 mm). All sanitary pipelines and other appurtenances entering through the cover shall be fitted with a sanitary umbrella deflector that overlaps the edges of the opening. Other openings, with the exception of agitator openings, shall have a removable cover, which shall be downwardly flanged to make close contact with the upper edges of the upwardly flanged opening in the cover surface. When the removable cover is located in the main cover, it shall remain in position when the main cover is raised.

D14.4 Covers and bridges shall slope to an outside edge(s).

D14.4.1 Permanent covers and bridges shall be integral with or continuously welded to the liner.

D15 **Fines Basket**

D15.1 Where a perforated basket is required for the collection of cheese fines, the basket shall be constructed so that perforations in product contact surfaces shall be readily accessible and inspectable. Perforations shall not be less than 1/32 in. (0.794 mm) in diameter. Slots shall be at least 1/32 in. (0.794 mm) wide. All perforations shall be free of burrs.

D16 **Supports**

D16.1 The means of supporting a moulded cheese chiller shall be one of the following:

D16.1.1 If legs are used, they shall be smooth with rounded ends or with flat, load bearing feet suitable for sealing to the floor, and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall provide a minimum clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm).

D16.1.2 If casters are used, they shall be of sufficient size to provide a clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm). Casters, if provided, shall be easily cleanable, durable and of a size that will permit easy movement of the Italian moulded cheese chiller.

D17 **Guards**

D17.1 Guards required by a safety standard that will not permit accessibility for cleaning and inspection shall be designed so that they can be removed with the use of simple hand tools.

D18 **Nonproduct Contact Surfaces**

D18.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, be readily cleanable and those surfaces to be coated shall be effectively prepared for coating.

D19 **Information Plate**

D19.1 Moulded cheese chillers which have temperature limitations for operation or cleaning shall have appropriate cautionary wording on the machine nameplate or on an information plate in juxtaposition to the nameplate. (See Appendix H.)

D19.2 Moulded cheese chillers which have plastic coated product contact surfaces shall display appropriate cautionary wording about cleaning materials or procedures on the machine nameplate or on an information plate in juxtaposition to the nameplate. (See Appendix H.)

D19.3 All identification or information shall be attached to the exterior of the moulded cheese chiller in such a way as to be effectively sealed.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08 %. The first reference cited in C1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM[7] specifications A351/A351M, A743/A743M and A744/A744M.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 min. (0.80 mm), when measured according to the recommendations in American National Standards Institute (ANSI) / American Society of Mechanical Engineers (ASME)[8] B46.1 - *Surface Texture*, is considered to be equivalent to a No. 4 finish.

G **PRESS-FITS AND SHRINK-FITS**

Press-fits or shrink-fits may be used to produce crevice free permanent joints in metallic product contact surfaces when welding is not practical. Joints of this type may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example they may be used to assemble round pins or round bushings into round holes. In both types of fits, the outside diameter of the part being inserted is greater than the inside diameter of the hole. In the case of the press-fit the parts are forced together by applying pressure. The pressure required is primarily dependent upon the diameter of the parts, the amount of interference and the distance the inner member is forced into the outer member.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is *Machinery's Handbook* published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

H **INFORMATION PLATE(S)**

Manufacturers should provide an information plate in juxtaposition to the nameplate giving the following information or cautionary statement which may be required on some moulded cheese chillers as outlined in Section D19. The specific information displayed on the information plate will vary among manufacturers. The following examples are for illustration purposes only and are not intended to specify precise wording of the statements:

H1 **CAUTION**

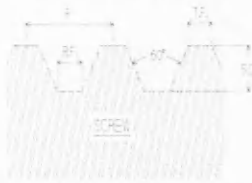
Do not operate or clean this machine at temperatures above (__°F (__°C). Exceeding this temperature may cause serious damage.

H2 **CAUTION**

During handling or cleaning of this machine, avoid abrasion or rubbing of the plastic coated surfaces. Do not use metal scrapers, brushes, or any abrasive scouring pads. Follow recommended cleaning instructions in your operator manual.

I **THREADS**

I1 Figure I - American Standard Stub Acme Thread Specifications



P = PITCH	P = 1/T.P.I.
SD = SINGLE DEPTH	SD = 0.453 * P
TF = TOP FLAT	TF = 0.308 * P
BF = BOTTOM FLAT	BF = 0.227 * P
T.P.I. = THREADS PER INCH	

J **O-RING GROOVE RADII**

TABLE I - Groove Radii Dimensions for Standard O-Rings

O-Ring Cross Section, Nominal (AS 568[9])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[10])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

These standards are effective November 24, 2002.

[7] Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

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

[9] The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15096. (412-776-4970).

[10] The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 56, CH-1211, Geneva, Switzerland (41-22-749-1240).

COMING EVENTS

APRIL

- **2-4, Missouri Milk, Food and Environmental Health Association Annual Educational Conference,** Ramada Inn, Columbia, MO. For more information, contact Linda Haywood at 417.829.2788.
- **3-5, Fresh-Cut Produce Association's 16th Annual Conference and Exhibition,** Tampa, FL. For additional information, contact IFPA at 703.299.6282.
- **7-8, Ensuring Meat Safety: *E. coli* O157:H7 — Progress and Challenges,** Embassy Suites, Lincoln, NE. For more information, contact Pauline Galloway at 402.472.9751; E-mail: pgalloway2@unl.edu.
- **10-11, Carolinas Association for Food Protection Annual Spring Meeting,** Litchfield Beach Resort, Litchfield Beach, SC. For more information, contact Jeff Rhodehamel at 864.433.2514.
- **22-25, ICCR 2003 – 3rd International Conference on Cryogenics and Refrigeration,** Hangzhou, China. For more information, visit http://www.cmee.zju.edu.cn/ICCR3.htm.
- **23-24, Kansas Association of Sanitarians Annual Spring Meeting,** Rock Springs Camp, Junction City, KS. For more information, contact Tim Wagner at 800.527.2633.
- **24-25, Oregon IFT Workshop on Allergens and GMOs,** Holiday Inn, Portland International Airport, Portland, OR. For more information, contact Brian Campbell at 800.366.5262; E-mail: BCampbell@janas.com.
- **25, Seventh Annual Symposium on Industrial and Fermentation Microbiology,** Radisson Center, LaCrosse, WI. For more information, contact Dr. S. N. Rajagopal at 608.785.6976; E-mail: rajagopa.s@uwlax.edu.
- **26-May 1, 29th National Conference on Interstate Milk Shipments,** Doubletree Hotel, Seattle, WA. For more information, contact Leon Townsend at 502.695.0253; E-mail: ltownsend@ncims.net.
- **28-30, HTST Training Seminar,** Murfreesboro, TN. For more information, call 205.595.6455; E-mail: us@randolphconsulting.com.
- **30-May 1, Managing Your Food Safety and Quality Systems,** Oak Brook, IL. For more information, contact Silliker at 800.829.7879 or go to www.silliker.com.

MAY

- **5-9, Diploma in Food Hygiene and Safety,** Guelph, Ontario, Canada. For more information, contact Guelph Food Technology Centre at 519.821.1246; E-mail: gftc@gftc.ca.
- **6-7, Dairy and Food Plant Wastewater Short Course,** Madison, WI. For more information, contact Dr. Bill Wendorff at 608.263.2015.
- **6-8, PACex International,** Toronto International Centre, Toronto, Canada. For more information, contact Maria Tavares at 416.490.7860 ext. 219; E-mail: mtavares@pacexinternational.com.
- **8-11, 3rd International Exhibition and Conference for Food Technology,** International Trade Fairs Ground (Hall 2), Cairo, Egypt. For more information, contact Mahmoud Helmy at 202.30.50.898; E-mail: info@agd-exhibitions.net.
- **13-14, Pennsylvania Association of Milk, Food and Environmental Sanitarians Spring Meeting,** Nittany Lion College. For more information, contact Eugene Frey at 717.397.0719.
- **15-16, Consumer Complaint Conference,** Santa Fe, New Mexico. For more information, contact Jennifer Epstein at 202.637.4818; E-mail: jepstein@nfpa-food.org.
- **20-21, Associated Illinois Milk, Food and Environmental Sanitarians Annual Spring Meeting,** Bloomington, IL. For more information, contact John Ellingson at 815.490.5523.
- **21, Dairy HACCP Workshop,** Madison, WI. For more information, contact Marianne Smukowski at 608.265.6346.
- **21, Microbiology VI: *Salmonella* Control,** Guelph, Ontario, Canada. For more information, contact Guelph Food Technology Centre at 519.821.1246; E-mail: gftc@gftc.ca.
- **28, Metropolitan Association for Food Protection Annual Spring Meeting,** Cook College, Rutgers, New Brunswick, NJ. For more information, contact Carol Schwar at 908.689.6693.

JUNE

- **13-20, International Workshop/Symposium on Rapid Methods and Automation in Microbiology XXIII,** Kansas State University, Manhattan, KS. For more information, contact Daniel Y. C. Fung at 785.532.5654; E-mail: dfung@oznet.ksu.edu.
- **14-18, AFDO Annual Educational Conference,** Oakbrook Hills Resort, Chicago, IL. For more information, contact Cheryl Bortner at 717.757.2888; E-mail: afdo@afdo.org.
- **25-27, South Dakota Environmental Health Association Annual Meeting,** Ramkota Convention Center, Pierre. For more information, contact Clark Hepper at 605.773.3364.

JULY

- **6-9, Home Economics International Consumer Science Conference,** University of Wales Institute, Cardiff, Wales. For more information, contact Ms. Zoe Fearn at 44.29.2041.6306; E-mail: zfearne@uwic.ac.uk.
- **16-20, 12th World Congress of Food Science and Technology,** Chicago, IL. For more information, visit the Congress site at www.worldcongress.org.

IAFP UPCOMING MEETINGS

AUGUST 10-13, 2003
New Orleans, Louisiana

AUGUST 8-11, 2004
Phoenix, Arizona

AUGUST 14-17, 2005
Baltimore, Maryland

International Association for Food Protection

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Des Moines, IA 50322-2864, USA
Phone: 800.369.6337 • 515.276.3344
Fax: 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

For information on membership with the International Association for Food Protection, Circle #100 on this card.

Reader Service Card *FPT* March '03

Expires: July 31, 2003 (International expiration: September 30, 2003)

Name _____ Title _____

Company _____

Address _____

City _____ State/Prov. _____

Country _____ Zip/Postal Code _____

Phone Number _____

100	115	130	145	161	175	190	205	220	235	250	265	280	295	310	325	340	355
101	116	131	146	162	176	191	206	221	236	251	266	281	296	311	326	341	356
102	117	132	147	163	177	192	207	222	237	252	267	282	297	312	327	342	357
103	118	133	148	164	178	193	208	223	238	253	268	283	298	313	328	343	358
104	119	134	149	165	179	194	209	224	239	254	269	284	299	314	329	344	359
105	120	135	150	166	180	195	210	225	240	255	270	285	300	315	330	345	360
106	121	136	151	167	181	196	211	226	241	256	271	286	301	316	331	346	361
107	122	137	152	168	182	197	212	227	242	257	272	287	302	317	332	347	362
108	123	138	153	169	183	198	213	228	243	258	273	288	303	318	333	348	363
109	124	139	154	170	184	199	214	229	244	259	274	289	304	319	334	349	364
110	125	140	155	171	185	200	215	230	245	260	275	290	305	320	335	350	365
111	126	141	156	172	186	201	216	231	246	261	276	291	306	321	336	351	366
112	127	142	157	172	187	202	217	232	247	262	277	292	307	322	337	352	367
113	128	143	158	173	188	203	218	233	248	263	278	293	308	323	338	353	368
114	129	144	160	174	189	204	219	234	249	264	279	294	309	324	339	354	

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E-mail Donna Bahun
at dbahun@foodprotection.org
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The Food Safety Training and Education Alliance (FSTEA): http://www.fstea.org

FSTEA is an alliance of government, industry, and academicians working to improve food safety training at the retail level.

The Web site offers training materials and links to national and local rules and regulations, directories, and information on food safety funding.

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