



ORACBA News

United States Department of Agriculture Office of Risk Assessment and Cost-Benefit Analysis

Setting the Appropriate Level of Protection in Trade by John Greifer, USDA, APHIS, Trade Support Team

Introduction

Developing prescriptive guidelines or rules to discipline how governments set their "appropriate level of protection" (ALP) is a particularly challenging task given that the ALP varies according to a variety of dynamic scientific, social, and political factors. The decision making process regarding the ALP is often unclear both in terms of who ultimately makes the ALP decision and the lack of established, transparent criteria for guiding that decision. At best, decisions regarding the ALP appear to be based on a complex combination of scientific information, past precedent, economic, and socio-political considerations. Despite these complexities, there continues to be interest in developing a greater understanding of the ALP concept with the aim of further reducing arbitrariness in ALP decision making and promoting greater stability and predictability in trade.

This paper examines the ALP concept with regard to its application in trade, particularly the application of protection levels for animal and plant health. This paper begins by describing relevant terms and

disciplines provided by the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (herein referred to as the SPS Agreement). This is followed by discussion and draft policy principles for ensuring greater consistency and clarity in ALP decision making. This paper does not purport to be a statement of existing USDA policy, but is simply meant to stimulate dialogue on a complicated subject. Finally, this discussion paper is not intended to cover the application of the ALP concept in the consumer health arena.

SPS Agreement

The SPS Agreement defines the ALP as "the level of protection deemed appropriate by the member establishing a sanitary or phytosanitary measure to protect human, animal, or plant life or health." A note is included indicating that "many members otherwise refer to this concept as the acceptable level of risk."

In setting its ALP, the SPS Agreement requires countries to "*avoid arbitrary or unjustifiable distinctions in the levels of protection it considers to be appropriate in different situations, if such distinctions result in discrimination or a disguised restriction on international trade*" (Article 5.5).

The objective is to prevent arbitrary behavior when it comes to setting the ALP for different commodities. Different levels of protection may exist for different commodities for justifiable reasons. However, countries should be prepared to provide a science-based rationale for such differences.

Under the SPS Agreement, countries must be sure that their *SPS measures* are not more trade restrictive than necessary to achieve an appropriate level of

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protection (Article 5.6). According to the SPS Agreement, a measure is not more trade-restrictive than required unless there is another reasonable measure available that provides the appropriate level of protection sought by the importing country and which is significantly less restrictive to trade (Article 5.6 footnote). The burden of demonstrating that another technically feasible and less trade restrictive option exists is on the exporting country.

Countries are required to provide information regarding their risk assessment procedures (including the factors that were taken into consideration) as well as information on how and why a particular level of protection was selected (Annex B.3 (a)). The emphasis on making our regulatory decisions and actions transparent is intended to discourage countries from setting their ALP for different commodities in an arbitrary fashion.

The SPS Agreement contains many references to risk assessment and the obligation of countries to base their measures on scientific evidence and principles. However, the SPS Agreement does not provide clear guidance on the relationship between risk assessment and the ALP concept. The SPS Agreement does not require the ALP to be based on a risk assessment.

The following are some basic terms and principles drawn from the SPS Agreement:

Risk Assessment--The SPS Agreement defines risk assessment as *“the evaluation of the likelihood of entry, establishment or spread of a pest or disease within the territory of an importing Member according to the sanitary or phytosanitary measures which might be applied, and of the associated potential biological and economic consequences; or the evaluation of the potential for adverse effects on human or animal health arising from the presence of additives, contaminants, toxins, or disease-causing organisms in food, feedstuffs and beverages”* (Annex A).

Risk Assessment Factors--The SPS Agreement identifies a number of factors

which countries shall take into account when conducting a risk assessment. According to the SPS text, countries should take into account the following when making import determinations: *“relevant processes and production methods, relevant inspection, sampling and testing methods; prevalence of specific diseases or pests; existence of pest- or disease-free areas; relevant ecological and environmental conditions; and quarantine or other treatments”* (Article 5.2).

Economic Consequences--The SPS Agreement requires countries to take the following economic factors into account: *“potential damage in terms of loss of production or sales in the event of the entry, establishment or spread of a pest or disease; the costs of control or eradication in the territory of the importing Member; and the relative cost-effectiveness of alternative approaches to limiting risk”* (Article 5.3). Again, this list of economic factors identified in the SPS text is not definitive. Countries may include other relevant economic considerations as long as they can be shown to be appropriate. Provisions in Article 5.3 only apply to animal and plant health, not human health issues.

The SPS Agreement does not include other basic terms from the field of risk analysis, including risk analysis, risk management, and risk communication. It may be inferred that the usage and definitions of these terms are to be guided by the appropriate standard-setting bodies (Codex Alimentarius, Office International des Epizooties, and International Plant Protection Council).

Discussion

The SPS Agreement currently provides little guidance on how contracting parties should approach the ALP for the purpose of promoting consistency. The SPS Committee is currently seeking to develop such guidelines, pursuant to the mandate in Article 5.5.

The effort underway in the SPS Committee to develop guidelines on the ALP, as mandated by Article 5.5, has been difficult. Consensus on the meaning of Article 5.5, including agreement on the basic obligation contained in that Article, is beginning to emerge. For the most part, the SPS Committee agrees that consistency in the ALP for different situations is not an obligation in the SPS Agreement, but rather an objective. The obligation is to avoid arbitrary or unjustified distinctions in the ALP which result in a disguised barrier to trade.

The difficulty in developing ALP guidelines has been in part due to the differing views on the relationship between risk analysis and the ALP. Initially, a number of delegations held the view that consistency in the ALP could be best achieved through procedurally consistent approaches to assessing risks. Today, SPS Committee members are beginning to arrive at a common view that risk assessment and ALP decision making are two distinct activities. The general view is that risk analysis is a scientific undertaking while decisions regarding the ALP are based on socio-political values in addition to the underlying science.

Also, the difficulty of moving forward in developing guidelines as required under Article 5.5 is due in part to the fact that the SPS Committee is seeking to address the ALP from a single, combined human, animal, and plant health perspective. Approaching this task of developing ALP guidelines, as mandated under Article 5.5, that apply equally to these three disciplines makes the task more challenging, given that placing values on human health/life is more controversial than placing values on the loss of animals or plants.

The SPS Agreement makes an important distinction between the way the ALP may be set for plant and animal health versus human health. Article 5.3 allows contracting parties to take into account economic factors (e.g., loss of production, costs of control or eradication) when establishing the ALP for plant pests and animal diseases.

Draft ALP Principles

Failure to develop a common understanding on the

relationship between risk analysis and ALP decision making may lead to the perception that the strength of animal and plant health measures need not be linked to the findings of the risk assessment.

Risk analysis identifies and gauges a particular biological risk and the potential consequences. The risk analysis also provides a basis for identifying appropriate risk mitigation options to manage the identified pest or disease risks. Generally, the risk assessment process is a systematic approach for:

- organizing and evaluating information regarding the risk of a particular commodity or pathway;
- quantifying or categorizing risks, thereby providing a basis for comparing risks and ensuring like risks are treated consistently;
- clarifying the potential losses associated with the unmitigated and mitigated risk;
- making informed decisions particularly in situations where several options may exist for responding to a particular risk; and
- ensuring national regulations are consistent with the rules of the SPS Agreement.

Risk assessments and the selection of the ALP vary, depending on the particular circumstances and risks presented by the commodity in question. Nonetheless, the process for selecting the ALP should be:

- *Consistent*--The decision regarding the ALP for a particular risk should be consistent with the ALP adopted for similar, identical, and comparable risk situations.
- *Linked to the Risk Assessment*--The strength of SPS measures should be commensurate with the risks identified and documented in the risk assessment. The risk assessment is the stage where relevant scientific information and data are considered and evaluated. By quantifying or categorizing the risks, the risk assessment process provides a basis for comparing risks and ensuring like risks are treated consistently.
- *Well-documented*--The process used to determine the ALP should be recorded in a systematic and transparent manner and in sufficient detail to allow interested parties to review and understand the process.

- *Flexible*--Because of the variety of pest and disease situations that need to be addressed with risk analyses, specific analytical methods that apply to one situation may be irrelevant to another situation. While acknowledging that various methodologies can be used, governments are able to articulate the reasons for why a particular ALP may have been chosen over another. Flexibility also means that the risk assessment process and the ALP can be modified to accommodate new, updated information.
- *Open to Review*--Governments acknowledge their responsibility to document the risk assessment process and procedure for selecting the ALP and allowing interested parties to provide relevant information and comments on these processes.

Decisions regarding the ALP for animal and plant health risks should be guided by the risk analysis, particularly estimates regarding potential consequences of the unmitigated and mitigated risk. Wherever possible, government will state its ALP for specific pest or disease risks in order that other countries understand in advance the degree to which they must reduce a particular risk to a level acceptable to the importing country.

Plant and animal regulatory officials should consider undertaking an effort to standardize terms such as "tolerable risk," "acceptable risk," "negligible risk," and "unacceptable risk." Defining these may be the first small step towards delineating certain broad categories of the ALP.

Conclusion

The SPS Agreement puts countries on a path toward harmonizing their SPS measures on the basis of international standards as well as

effectively reducing arbitrariness in technical regulations by requiring countries to base their measures on scientific evidence and principles. A more difficult issue has been the question of harmonizing countries' ALP and ensuring countries are not arbitrarily inconsistent about where they set their ALP for different or comparable risk situations.

The consideration of economic factors, especially in regard to potential consequences, is permitted under the SPS Agreement in the animal and plant health area. However, the decision maker should be transparent in his/her use of evaluating consequences.

To achieve greater consistency and transparency in ALP decisions, the decision maker should adopt a standardized process and adhere to some basic principles. Some basic principles are outlined above. To further the work of developing a harmonized ALP decision making process, governments can work together, on a regional basis, to develop a framework of criteria and factors for assessing consequences, including reasonable approaches for considering potential losses. An important task in developing this framework is to establish reasonable and appropriate parameters for deciding the ALP for animal disease and plant pest risks.

Regulatory officials should rely on the definitions of terms (e.g., "arbitrary," "unjustified," "disguised barrier," and others such terms contained in the SPS Agreement) which may be developed by trade policy officials participating in the WTO SPS Committee. However, terms such as "negligible," "tolerable," "acceptable," and other terms and concepts for denoting/defining categories of risk should be developed by the regulatory agencies ultimately responsible for safeguarding plant and animal resources rather than trade policy officials.

Director's Corner by Nell Ahl

Toxicological and chemical risk assessments have been performed for 30 years or more. However, biological risk assessment for pests and pathogens is barely 10 years old. In addition to the difference in their time of

development, there are a number of substantive differences between toxicological and biological risk assessments which warrant discussion. These differences include the nature of the phenomena

themselves, the assumptions associated with the risk assessments, and the models which are appropriate for evaluating hazards. The character of toxicological and biological hazards are such that contrasts and comparisons are interesting. This essay explores some of these hazard characteristics.

Toxicological risk assessment (TRA) is a complex field, but generally begins with a question about a defined compound whose chemical structure is often known. This chemical may be a pesticide, a food additive or compound used for other purposes. The amount of the chemical or toxin may be known or estimated from production and use data or, in some cases, from incidence data. Generally it is known where and how the compound moves through the environment, and into biological organisms, including humans or wildlife (fate and transport). For a given amount of chemical introduced into the environment, the amount will not increase but it may be dispersed, concentrated, or transformed into a new chemical, or metabolite of the parent compound, which may have effects different from the original compound. The question of risk concerns how, who or what is exposed; how and what dose is delivered; and what are the potential effects across the population and/or environment of concern. In contrast, **biological risk assessment** (BRA) deals with agents which multiply. Given the proper conditions and a little time, one bacterium can become billions. One female insect laden with fertilized eggs, undetected in an imported agricultural commodity, can lay hundreds of eggs. Upon hatching, the population of pests may explode in their new habitat and cause devastation to crops or other plant species. The original quantity or number of agents bears little relationship to the final state once the biological agents have propagated.

Chemicals may be benign and necessary to plant and animal life at one level, but may be toxic at another. For example, zinc is a nutrient which is essential for optimal functioning of human and animal bodies. However, the difference between the recommended daily allowance and the toxic level of zinc is very small. The challenge is to predict a safe level of exposure through diet or mineral supplements, yet avoid ingestion of excessive amounts: **the quantity creates the hazard**. Contrast this with exposure to microbes

and practices associated with microbial risk assessment. The ordinary strain of *Escherichia coli* is a mammalian commensal, benignly living in harmony with its host. However, some *E. coli* strains have been genetically transformed so that they cause illness in humans (e.g., O157:H7). Dose-response analyses suggest that only one bacterium may cause human illness. In this case, **it is the quality of the bacterial organism that makes the hazard**. For BRA, complete risk assessment should also include information on time, temperature, and other conditions under which the bacteria exist in a particular product (predictive microbial modeling) in order to predict the size or magnitude of the hazard.

Concentrations versus numbers of bacteria presents another contrast. The amounts of chemical or toxins are continuously variable, so a minuscule amount in food or drink can present negligible risk. For microbial risk, bacteria occur in discrete units and must be treated appropriately in statistical analysis. The lowest number that can exist is, of course, one. Half a bacteria is not a living entity. Does one bacterial pathogen represent a negligible risk? Tests have shown, at least in some people, that one bacterium in food can cause human illness (see above). Moreover, bacteria do not stop replicating in food. Multiplication can continue after food is consumed during transit through the digestive tract. This is particularly true in vulnerable individuals such as the young, elderly, or immune suppressed. The warm, moist conditions, and plentiful food in the digestive tract favors growth and development of bacteria.

Movement of a chemical, in many cases, can be tracked through the environment relatively easily while bacteria, pests and agents can require more cumbersome identification processes to perform the tracking. Chemicals are transported passively in generally predictable ways. The actual movement of biological organisms through the environment may be either passive or active. In addition, environmental pathways for biological organisms may be quite variable.

Modification and evolution are important. Though

the chemical structure of a compound can be modified during environmental transport, this fact is often predictable. Biological organisms can evolve from benign to harmful in several, and sometimes unpredictable, ways. First, random genetic changes in a bacterium with resultant selection (natural or artificial) can result in a population of bacteria far different from the original one. Bacterial resistance to antibiotics has increased, over the years, by this method. By yet another method, a plasmid or gene for a toxin or for antibiotic resistance in one species can be transmitted to a different bacterium instantaneously. These transfers can occur across species boundaries. The transference of the *Shigella* plasmid, which produces verotoxin, to *Escherichia coli* O157:H7 is an example.

Dilution and persistence present other contrasts. Chemicals may be diluted or concentrated or changed to yet new chemicals. The constancy or variability of the chemical entities can continue to present a challenge, for they never "die." The EPA's Superfund sites are an example of this continuing challenge. On the other hand, individual

organisms die. If all members of a population die or are killed, the risk subsequently disappears with one exception: toxins released by bacteria can survive bacterial death. Dilution or dispersion of bacteria, however may actually increase their vigor. Without competition for space or food from members of the original population, bacteria have an open environment in which to reproduce. The upshot is that dilution of bacterial populations may, under some circumstances, actually increase the total population of pathogens. Furthermore, when biological agents are dispersed, the hazard is not contained or eliminated; it is spread and the risk of harm is increased.

The issues involved in toxicological risk assessment and biological risk assessment are many and complex. This essay is a brief attempt to compare and contrast the phenomena and to suggest that risk assessments must take into account the differences. There are other issues in contrasting and comparing TRA and BRA, and your thoughts and input are welcome. If you are interested in further dialog, send your ideas, thoughts, etc., to <aahl@oce.usda.gov>

USDA Risk Assessor in Profile: Dr. Wes Nettleton

Wesley Nettleton, a 17-year veteran of the USDA Forest Service, is the Entomology Group Leader for the Forest Health Protection Staff in the State and Private Forestry Southern Regional Office, located in Atlanta, GA. (In addition to the Entomology Group, the Forest Health Protection Staff includes a Pathology Group and a Pesticide Use Coordination Group.) The Staff's mission is to evaluate forest pest risks on forested lands (both federally and privately owned) in the South and to identify opportunities for cost-effective risk management strategies. Nettleton has devoted the bulk of his career to managing the southern pine beetle (S.B.), the most destructive pest of southern yellow pine in the Southeastern United States.

Smaller than a grain of rice, the beetles attack living pine trees, boring directly through the bark. They prefer loblolly and shortleaf pine. The adults construct egg galleries in the inner bark, girdling the tree. The S.B. also introduces a blue staining fungus that

accelerates tree death by blocking the tree's vascular system. Dense stands, in which individual trees are stressed by competition for resources, and senescent mature stands are most susceptible to S.B. infestations. Due to the warm southern climate, S.B. goes from egg to adult in about a month and can have up to 7 generations per year. Spot infestations can expand to involve thousands of trees within a few weeks. The insect is in outbreak status somewhere within its range nearly every year, and across the southern pineries, timber losses due to S.B. vary from \$10 million to \$300 million per year.

In order to better manage the risks associated with the southern pine beetle, Nettleton's group supported the development of an S.B. "early warning system." Based on a procedure developed by Dr. Ron Billings of the Texas Forest Service, the activity begins each year at the time the dogwoods bloom across the South. Traps baited with a synthetic S.B. pheromone (sex attractant)

and turpentine (to produce host odors) are hung in several counties throughout each State for 4 weeks. The group predicts infestation trends based on the number of S.B. caught per day and the relative abundance of the checkered beetle, the primary predator of the southern pine beetle. Estimates based on the trapping procedure have proven at least 80% accurate in predicting the directional trend of local S.B. population levels. Armed with this information, Nettleton's group adjusts the intensity of monthly aerial surveillance for S.B. infestations conducted during the summer throughout the region. Nettleton is hopefully eyeing developments that may lead to more accurate predictions of S.B. population trends based on field data collected during the late summer or early fall of the previous year. This earlier prediction capability would enable the group to better estimate the funding needs for S.B. suppression activities earlier in the fiscal year and permit States or national forests to better prepare for potential outbreaks.

The most common S.B. control method, according to Nettleton, is to commercially salvage both infested

trees and a buffer strip of uninfested trees. Other traditional suppression methods include felling infested trees and a buffer strip and leaving them in the forest or felling the infested trees and either spraying them with an approved pesticide or piling and burning them. The traditional southern pine beetle control measures can pose a risk-risk tradeoff, however, because the endangered red-cockaded woodpecker nests in mature, living southern pines. Several research groups are currently working on new S.B. control techniques that do not involve felling as many trees as the traditional methods. These methods under development use either S.B. pheromone or host odors to repel attacking S.B. adults and disrupt S.B. spot growth. Nettleton notes that it might be a year or more, however, before these S.B. control methods will be available for general use.

For further information about the Southern Region Forest Health Protection Unit, point your web browser at: <http://www.rtp.srs.fs.fed.us/fhp/r8/>

November Risk Forum: Dr. Clifford Rice

At the November Risk Forum, Dr. Clifford Rice from the USDA Agricultural Research Service's Environmental Chemistry Lab discussed environmental monitoring as a vital component of conservation programs and ecological risk analyses.

Dr. Rice introduced the subject of environmental monitoring by reviewing EPA's 1992 "Framework for Ecological Risk Assessment." In this framework environmental monitoring is a process which should occur during all stages (Problem Formulation, Analysis, and Risk Characterization) of the risk assessment. Rice pointed out however, that there is sometimes resistance to comprehensive monitoring efforts, as they can be costly and can lead to the identification of program inadequacies. Yet in effect, no program can be scientifically evaluated unless the risk assessment measurement endpoints (measurable attributes of the natural resource values to be protected) are monitored during and after implementation.

Particular USDA conservation programs which were addressed in Rice's presentation were the Conservation Reserve Program (CRP) and the Environmental Quality Incentives Program (EQIP). Given the enormous impact these programs could have on reducing risks to natural resources (e.g., soil, water, and wildlife habitat), monitoring ecological endpoints, such as water quality, is essential to evaluating the success of these programs. The environmental benefits (the avoidance/reduction of environmental risks) which stem from these programs cannot be adequately evaluated without comprehensive monitoring efforts.

Rice then outlined for the audience what a monitoring program should entail. The Federal Task Force for Implementing and Improving Monitoring Approaches in Government under the Committee on Environment and Natural Resources (CENR) has listed 24 items which comprise a successful monitoring strategy. Among these items are integration with existing government programs, coordination across agency

boundaries, and identification of critical regions and resources not currently addressed. Additional guidelines for successful monitoring presented by Rice were to develop clear goals, plan for failure, choose indicators carefully, and include trained statisticians and biologists in the process.

Other elements of Rice's presentation included common pitfalls in the effectiveness of monitoring programs, steps to setting up a monitoring program, and experimental design and indicator selection for programs. The audience and Rice discussed the rationale for choosing certain biological indicators as risk assessment endpoints and the validity of some of these choices. Existing USDA monitoring and evaluation programs were also presented with emphasis on how some of these

are viewed by outside agencies as models for successful monitoring efforts. In closing, Rice summarized the goals and activities of the EPA's Environmental Monitoring and Assessment Program (EMAP) which is designed to "monitor the condition of the Nation's ecological resources to evaluate the cumulative success of current policies and programs, and to identify emerging problems before they become widespread or irreversible."

In summary, Rice's talk demonstrated, in a comprehensive and clear manner, the necessity of environmental monitoring for guiding conservation programs and measuring their effectiveness.

December Risk Forum: Dr. Lynn J. Frewer

Dr. Lynn Frewer of the Institute of Food Research, Reading Laboratory, United Kingdom, addressed food safety risk communication at the December ORACBA Risk Forum in her presentation "Public Acceptance of Genetically Modified Food in the UK and Europe." Frewer has extensively studied public perceptions and behavior surrounding the introduction of genetically modified (GM) plants into the food supply in Europe. Her research focuses on integrated models of consumer decision making in which consumer preferences, consumer risk perception, and consumer benefit perception are all considered. She presented some of her data at the forum, as well as outlined the psychological models of public decision making.

Frewer began the seminar by reminding us that "zero risk" in food safety is unachievable unless people simply "do not eat." Thus, careful and honest communication about the risks of novel functional foods must be a priority.

Studies indicate that GM foods are perceived as "high" risk by the "average" person in the UK, when compared to other food safety risks such as BSE and food poisoning in the home. In addition, food technologies, such as genetic modification and irradiation, are thought of as "risky" types of

technology when compared to "good or beneficial" technologies such as solar energy and surgical methodologies. In fact, food technology has a perceived risk similar to that of nuclear energy or toxic waste disposal technology.

The typical responses in European countries to "Should GM food be developed?" and "Would you consume GM food?" are negative (i.e., 60-80% say "no"). Frewer raised certain hypotheses during the forum as to the reason(s) for this lack of acceptance: 1) perception is driven by factors other than probability of risk (i.e., spiritual, such as "tampering with nature"), 2) benefits of GM food are not clearly communicated or observed, and 3) GM food production processes are not well-understood (i.e., fear of what we do not understand).

Risk communication strategies and their effectiveness were summarized by Frewer. The source of communication, immediacy of the risk, and fervor of the argument interact in various ways to determine how deeply people think about the issue, how willing they are to trust the communicator, and how likely they are to change their opinion based on the new information. In general, in the UK, medical doctors are the most trusted communicators and government regulators/scientists the least. Vital attributes of

communication strategies include being factual, open, proactive, and having consumer welfare in mind rather than producer benefits.

putting them in control of their fears, and conveys to the public a message of openness and honesty.

Frewer's forum was thought-provoking and brought to the forefront of the audience's minds the importance of risk communication as an integral component of risk analysis.

The recent requirement by the European Union (EU) to label GM foods was a point of discussion during the question-and-answer portion of the forum. In Frewer's opinion, labeling is a positive step towards lowering public biases about GM foods. Labeling gives the public a choice about something they do not fully understand, thus

Risk Resources

This issue we are featuring resources that should prove useful to anyone who has searched for literature citations or abstracts to prepare a paper or speech. The National Library of Medicine (NLM) at the National Institutes of Health now provides free Internet access to two data base search engines. Many of you are familiar with the original Grateful Med search engine that has been available for about 10 years for those with accounts and passwords at the NLM. Now, anyone with internet access can use Internet Grateful Med to do their own free MEDLINE searches at: <http://igm.nlm.nih.gov/>.

The ORACBA staff have found this site to provide easy and rapid access to NLM citations.

PubMed is a newer search engine that should prove as popular as Grateful Med. PubMed provides access to literature citations and links to their full-text versions at publishers' Web sites. PubMed provides access to MEDLINE, PREMEDLINE, and citations supplied electronically by publishers. You may access PubMed through the Internet Grateful Med address above or at: <http://www.ncbi.nlm.nih.gov/PubMed/>

Risk Calendar

January 1998

The annual meeting for the Society for Integrative and Comparative Biology (SICB) is scheduled for January 3-7 in Boston, MA. For more information, contact the SICB business office at (800) 955-1236 or (312) 527-6697; FAX: (312) 245-1085; or E-mail: sicb@sba.com

The ORACBA Risk Forum will be Wednesday, January 14 from 10-11:30 a.m. in Whitten 107-A. Dr. Stephen Crutchfield of the Food Safety Branch, Economic Research Service, will present "ERS

Research on the Economics of Food Safety Risks." For more information, please call (202) 720-8022.

February 1998

The ORACBA Risk Forum will be Wednesday, February 11 from 10-11:30 a.m. in Whitten 107-A. Dr. David Heron of Biotechnology and Scientific Services, PPQ, APHIS, will present "USDA Environmental Assessments for Genetically Engineered Plants." For more information, please call (202) 720-8022.

“The Agricultural Outlook Forum ‘98,” sponsored by USDA will be presented February 23-24 at the Omni Shoreham Hotel in Washington, DC. This meeting will provide the latest information on commodity outlooks, managing risk, food safety and other information. For further information, call (202) 720-3050 or visit the web site:
<http://www.usda.gov/oce/waob/agforum.htm>

Call for Papers: The second International Conference on Marine Pollution and Ecotoxicology will be held June 10-14 in Kowloon, Hong Kong. Proposals are sought for presentations and submissions are due February 15, 1998. For information, contact the conference secretary at 852-2788-7402; FAX: 852-2788-7406; or E-mail: bhconf@cityu.edu.hk

March 1998

The annual meeting of the Society of Toxicology (SOT) is scheduled for March 1-5 in Seattle, WA. For more information, contact SOT at (703) 438-3115; FAX: (703) 438-3113; or E-mail: sothq@toxicology.org

An International Conference on Emerging Infectious Diseases will be convened on March 8-11, 1998, at the Marriott Marquis Hotel, Atlanta, GA. Major topics will include surveillance, epidemiology, research, communications and training, and prevention and control of emerging infectious diseases as well as topics related to emergency preparedness and response. For information, call (202) 942-9248 or send an E-mail message to: meetinginfo@asmusa.org

The ORACBA Risk Forum will be Wednesday March 11 from 10-11:30 a.m. in Whitten 107-A. Dr. Patricia Milner of the Beltsville Research Center, ARS, will present “A Systems Approach to Determine Effects of Preharvest Use of Manures on Postharvest Fruits and Vegetable Quality and Food Safety.” For more information, please call (202) 720-8022.

On March 29-31, EPA, NIEHS, and ATSDR are sponsoring, “Practical Issues in the Use of Probabilistic Risk Assessment and its Application to Hazardous Waste Sites,” at the Hyatt Sarasota,

Florida. For more information, contact Jennifer Doody at (352) 392-4700, ext. 5500, or visit the conference web site:
<http://www.niehs.nih.gov/sbrp/newweb/sbrp/tdy/upcomf96.htm>

April 1998

May 1998

On May 10-13, the Maryland Department of Natural Resources, will sponsor, “Conference on Conservation of Biological Diversity: A Key to the restoration of the Chesapeake Bay Ecosystem and Beyond,” at the Holiday Inn in Annapolis, MD. For more information contact Rob Northrop at (410) 836-4551 or E-mail: rnorthrop@dnr.state.md.us

June 1998

On June 15-16, the NE-165 Regional Research Committee on Public Policies and Private Strategies in the Food System, and the Farm Foundation, will host a conference on “The Economics of HACCP: New Studies of Costs and Benefits,” at the Sheraton City Centre Hotel in Washington D.C. For more information and registration materials, please contact Barbara Talenda, Conference Administrator, Dept. of Resource Economics, Box 32040, Univ. of Massachusetts, Amherst, MA 01003-2040, at (413) 545-5732 or E-mail: talenda@resecon.umass.edu

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