

Poultry HEALTH REPORT

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Summer 2002

NPIP Sets Direction on LPAI

Delegates push for NPIP to lead industry monitoring, control efforts

Low-pathogenic avian influenza (LPAI) received high priority at the recent 36th biennial conference of the National Poultry Improvement Plan (NPIP). Delegates approved several resolutions relating to avian influenza, and called for the establishment of an LPAI working group that will present suggestions for model state avian influenza programs to the U.S. Animal Health Association (USAHA) Transmissible Diseases of Poultry Committee.

As expected, official delegates to the 2002 National Plan Conference held June 1 in San Antonio, Texas, ratified Proposal 17. This proposed change had been approved on an emergency basis by the General Conference Council in early May after a conference call discussion.

The action allowed the establishment of a U.S. Avian Influenza Clean program for turkey breeding flocks. The proposal, which now is going through rule-making procedures, calls for primary breeding flocks to test at least 30 birds of more than four months of age at 90-day intervals using the agar gel immunodiffusion (AGID) test to retain the AI Clean classification. Multiplier breeding flocks need to test 30 birds at 180-day intervals.

The delegates also passed a resolution calling for NPIP to play a key role as the USDA's Animal and Plant Health Inspection Service (APHIS) considers options for regulatory changes to enhance the prevention and control of avian influenza. A resolution passed by delegates pointed out that the NPIP's U.S. Avian Influenza Clean certification program for poultry breeding flocks has been recognized internationally for its effectiveness.

This resolution asked that the present NPIP U.S. Avian Influenza Clean program for poultry breeding flocks be recognized as an integral part of the official national avian influenza program.

"The delegates wanted to make a strong statement," said Dr. Andrew Rhorer with USDA-APHIS-Veterinary Services, who serves as senior coordinator for the NPIP program.

"Delegates wanted to point out that, as the U.S. poultry disease monitoring and control entity, NPIP provides oversight of state and industry programs developed for the control of avian influenza."

Delegates sent a recommendation

to the Agriculture Secretary "that the NPIP should continue its leading role in protecting the U.S. poultry breeding industry with its disease control and certification programs."

A resolution also called for the NPIP to immediately establish an LPAI work group to propose a model program for state avian influenza control programs for H5 and H7 subtypes of LPAI, with the goal of eventually providing state status recognition.

That group was established, and subcommittees were appointed, representing commercial layer, broiler and turkey interests. More than 30 industry leaders were involved in the process as options were discussed in meetings and conference calls over the summer. Findings are scheduled to be presented at the USAHA annual meeting in St. Louis.

NPIP also approved a rapid Salmonella test at the biennial conference, the first rapid commercial method for identification of the Salmonella ever to be approved by the organization.

The new Pathigen test developed by IGEN International gives results in approximately 48 hours, as compared with conventional tests that take three to nine days. The new test also lends itself to automation, officials said, which could help poultry companies process a large volume of samples. The poultry industry began Salmonella reduction programs, starting with primary breeders, in the early 1990s.

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Agreement on New Veterinary Certificate Lifts Russian Trade Ban

The long-running poultry trade dispute between the United States and Russia has been resolved. Agriculture Secretary Ann M. Veneman, Commerce Secretary Donald L. Evans and U.S. Trade Representative Robert B. Zoellick announced in late August that both sides have agreed to a new veterinary certificate that will allow for the continuation of U.S. poultry exports to Russia.



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"I am extremely pleased that we have successfully concluded the negotiations with Russia on the new veterinary certificate," Agriculture Secretary Veneman said. "This agreement comes at a critical time for the U.S. poultry industry and will allow trade flows to resume with much greater certainty."

Russia imposed the ban March 10. Extensive talks have been underway for several months between both countries' technical teams in Washington and Moscow. A wide range of technical issues were addressed throughout the development of the new certificate, including testing requirements and procedures, inspection guidelines and process, hygienic requirements,

and documentation and procedure.

Veneman, Evans and Zoellick commended the extraordinary efforts of all members of the U.S. negotiating team and expressed appreciation for the support they received from members of Congress. The team included representatives from several federal agencies, including USDA's Foreign Agricultural Service, Food Safety and Inspection Service, and Animal and Plant Health Inspection Service, as well as the Food and Drug Administration and the U.S. Trade Representative's Office.

Russia is the largest market for U.S. poultry exports, with sales last year exceeding one million tons valued at over \$600 million. "The Russian market is extremely important to the economic viability of the U.S. poultry industry," Veneman said.

NPIP Leaders Selected During Biennial Conference

Dr. Rick Sharpton with Perdue Farms, Inc., was elected as the member-at-large of the General Conference Committee (GCC) of the National Poultry Improvement Plan (NPIP) by the official delegates of its biennial conference held in San Antonio, Texas. As the member-at-large, Dr. Sharpton will be the chairperson of the GCC.



Dr. Rick Sharpton

The GCC is the official advisory committee for the Agriculture Secretary on matters pertaining to poultry health. Dr. Sharpton was elected to a four-year term of office.

Other new members elected to

the NPIP's General Conference Committee include:

South Atlantic Regional Member

Dr. Julie Helm
Clemson Laboratory
Columbia, S.C.

East North Central Regional Member

Dr. Zheko Kounev
Purdue University
West Lafayette, Ind.

North Atlantic Regional Member

Dr. Jarra Jagne
ISA Babcock
Ithaca, N.Y.

Western Regional Member

Dr. David Frame
Utah State University
Ephraim, Utah

Vitamin E Supplement Helps Turkeys Resist Disease

One way of keeping turkeys healthy on their way to market is to guard them against infection by pathogenic *Listeria monocytogenes* bacteria. Food Safety Consortium scientists have found that Vitamin E helps the turkeys resist the infection because it increases their white blood cell counts.

Vitamin E is a dietary supplement that boosts turkeys' immune response, explained Dr. Irene Wesley, a microbiologist at the National Animal Disease Center (NADC) in Ames, Iowa, where she is leading the FSC study with Iowa State University faculty researchers Aubrey Mendonca and Dong Ahn. Previous studies by Ahn showed that Vitamin E fed to turkeys prolonged shelf life of turkey meat.

"Vitamin E in the bird increased a type of immune cells known as T lymphocytes," Dr. Wesley said. "The lymphocytes that are increased in the presence of Vitamin E are lymphocytes that have a certain marker on them known as CD-4. These are helper lymphocytes that are needed to boost the immune response. Those are the good guys."

Birds treated with Vitamin E also

have lymphocytes labeled CD-8 that kill infected cells and help eliminate foodborne pathogens.

Vitamin E can provide a bonus of preventing the off-odors that occur after oxidation, the combination of oxygen with the turkey meat.

"Vitamin E tends to inhibit meat deterioration and the off-odor so the quality of the meat is protected," Dr. Wesley said. That much was known because of Ahn's earlier work on Vitamin E, which prompted the researchers to look into its qualities of pathogen protection.

The poultry industry is interested in future findings on Vitamin E's impact on pathogens in turkeys, but it's too soon to determine if the vitamin should be a significant dietary supplement for turkeys.

"We know from our contacts in the turkey industry that the use of antimicrobial drugs in turkey production is going to be phased out," Dr. Wesley said.

"Vitamin E, since it boosts the immune response, will lead to a healthier bird and therefore diminish the use of antimicrobials."

Dr. Wesley's research team is test-

ing both natural Vitamin E and synthetic Vitamin E to find out if either is more effective in boosting turkeys' immune responses.

After researching the effects on *Listeria monocytogenes*, the scientists will begin investigating Vitamin E's effects on *Salmonella* in turkeys. "One of our studies has us trying Vitamin E with *Salmonella* to see if we get the same kind of lowering of the *Salmonella* levels that we saw with *Listeria*," Dr. Wesley said. "We're expecting to see a boost in the immune response and associate this with a diminution of carriage of foodborne pathogens."

Meijun Zhu conducted experiments elucidating the immune response of Vitamin E-primed turkeys experimentally infected with *Listeria monocytogenes*. Wasin Charerntantanakul is measuring immune parameters in Vitamin E-treated turkeys experimentally infected with *Salmonella*.

CLA shows promise, too. Vitamin E is just one vehicle for potentially reducing foodborne pathogens in animals. Another one in conjugated linoleic acid, commonly known as CLA. The researchers' preliminary studies indicated that CLA in the diet changed the meat's fatty acid content and influenced the meat's storage stability.

The use of Vitamin E or CLA, separately or in combination, may improve the birds' immune response and reduce the colonization of potential foodborne pathogens in their intestines, Dr. Wesley said. Either dietary supplement can also lessen the changes in turkey meat caused by oxidation and enable the turkeys to keep the original color that consumers want to see on display in the market.

USDA Approves Virginia AI Indemnity

The USDA's Animal and Plant Health Inspection Service (APHIS) has announced that it will provide up to \$69.2 million to Virginia contract growers and owners for poultry destroyed because of low-pathogenic avian influenza (LPAI).

USDA will pay all eligible losses of contract growers and up to 50 percent of eligible losses of owners, minus any amount paid to the contract grower of a flock.

Additionally, USDA is provid-

ing that the value of poultry destroyed due to LPAI may be determined after destruction and disposal of the poultry, and, except in limited situations, is requiring a waiting period of 7 days following cleaning and disinfection before premises that contained poultry affected by the disease may be restocked.

The Virginia LPAI outbreak resulted in 197 farms being quarantined and depopulation of nearly 5 million birds.

Lagoon BMPs Help Control Mosquitoes That Can Transmit West Nile Virus

As concern over West Nile encephalitis continues to grow, live-stock and poultry producers may be able to reduce populations of mosquitoes that may carry the virus. One species, *Culex quinquefasciatus*, shows a preference for breeding in waste lagoons, said North Carolina State University Extension entomologist Mike Stringham.

While it is not known whether the *Culex* mosquito plays a major role in transmitting West Nile virus, "the prudent decision is to assume that the risk is great enough to be sure mosquito-control Best Management Practices (BMP) are in place for lagoons," he said.

Two factors, vegetation and the characteristics of the effluent in the lagoon, make the difference between a lagoon that produces few mosquitoes and one with a teeming population of *Culex quinquefasciatus*.

Previous North Carolina State University research demonstrated that mosquitoes can be all but eliminated from animal waste lagoons with good vegetative control and reduction of floating debris. "The nitrogen, organic matter and oxygen content of lagoon water also discourage mosquito breeding when they are above or below a specific range," he said.

Managing vegetation around the lagoon is critical, since mats of floating plant material and other debris provide hiding places and food for the developing larvae. Heavy, unmowed vegetation that hangs into the water along a

lagoon's shoreline provides additional cover for mosquito larvae. It also serves to trap floating plant material, manure and trash that further enhances the habitat for mosquito breeding.

"It is particularly critical to follow mosquito control BMPs from mid-July through late October, when the transmission of encephalitis viruses is most likely," Stringham said.

Those practices include:

- Eliminate weedy growth along lagoon shorelines. A well maintained grass groundcover is much better than a mixed stand of broad-leaf weeds. Grasses are easier to maintain and less prone to hang into the water. Tall fescue, bermuda, centipede and carpetgrass are examples of grasses that may be used to stabilize lagoon banks.

- Mow bank vegetation frequently. Weekly or biweekly mowing will eliminate rank growth and reduce the volume of clipped plant material left floating in the water after mowing.

- Regularly clear floating debris from the lagoon surface.

The amount of total Kjeldahl nitrogen (TKN), the chemical oxygen demand (COD) and total organic carbon (TOC) will dramatically affect the suitability of a waste lagoon for the larvae

of the *Culex* mosquito. TKN values for lagoon water of less than 50 mg per liter or greater than 500 mg per liter (4.2 pounds per 1,000 gallons) kills early stage mosquito larvae. TOC values that fall outside the range of 100 to 1,000 mg per liter are also effective, as are COD values of less than 400 mg per liter and

greater than 2,000 mg per liter.

"There is a catch, however," Stringham pointed out. "Effluent values that are in the appropriate range for mosquito control may not be effective if bank vegetation and floating debris are neglected."

Total nitrogen appears to be the most important characteristic of lagoon water when it comes to controlling mosquitoes. High TKN values alone will dramatically reduce larval survival even when TOC and COD values are ideal for mosquito production. Stringham advises growers to test lagoon water in May or June to evaluate its suitability for mosquito production.

Populations of mosquito larvae and pupae in lagoons may become high from time to time in spite of the best prevention efforts. The appropriate use of insecticides will bring an infestation under control within 1 to 3 days. Check with entomologists in your state to find approved larvicides, insect growth regulators or other compounds.

Because mosquito breeding occurs in a zone about 10 feet wide from the shoreline outward, it is not necessary to treat the entire surface area of the lagoon. Calculate treatment needs based on a 10-foot-wide band around the circumference of the lagoon.

Animal facilities may be treated to control adult mosquitoes using either pyrethrin fogs or permethrin surface sprays. Fogging should be done at dusk and requires that the building be closed for 15 to 30 minutes for effective knockdown. Surface sprays should be applied to mosquito resting sites. These generally include interior wall surfaces (especially corners), under building eaves and other surfaces in locations protected from high volume air movement.

West Nile likely will be in the headlines for some time to come. "Awareness and appropriate precautions will go a long way towards minimizing the impact of this disease," Stringham concluded.



Food Safety Expert to Head Turkey Federation

The National Turkey Federation (NTF) has announced the selection of Dr. Alice L. Johnson, a veterinarian with extensive food safety expertise, as the federation's new president effective Nov. 4.

Dr. Johnson will implement the federation's strategic plans as well as promote the interests of all NTF members in the marketing, legislative affairs and regulatory areas. Dr. Johnson has had previous experience with the meat and poultry industry, government and veterinary medicine.

"The Executive Committee and I have complete confidence in Dr. Johnson's leadership skills and turkey industry expertise, and we have no doubt that she will excel in



Dr. Alice L. Johnson

her new role," said NTF Chairman Ron Prestage. "Because of her previous experience with the NTF membership and staff, Dr. Johnson offers us an almost seamless transition."

Before taking the reins at NTF, Dr. Johnson was vice president of food safety programs at the National Food Processors Association (NFPA). Dr. Johnson directed the NFPA's food safety activities related to food inspections, Hazard Analysis Critical Control Point (HACCP) inspection and crisis management.

Prior to working with NFPA, Dr. Johnson served as NTF's vice president of scientific and regulatory affairs from March 1997 to May 2001. Her duties with the federation included serving as the turkey industry's spokesperson and liaison to USDA and other federal regulatory agencies. Dr. Johnson provided detailed analysis as well as hands-on assistance to NTF members in

the areas of animal health, food processing and food safety.

Before March of 1997, Dr. Johnson worked for the American Meat Institute (AMI) as director of scientific and technical affairs. At the institute, she conducted training courses to help AMI members prepare for implementation of USDA's HACCP pathogen reduction plan.

Dr. Johnson also worked with USDA's Food Safety Inspection Service as a circuit supervisor, where she ensured compliance with federal requirements in 27 meat and poultry processing facilities. She was a member of the HACCP Special Team, which developed the food safety concept for use in the meat and poultry industry.

Dr. Johnson received her B.S. degree in biology from Pfeiffer College in Misenheimer, N.C., and earned a Doctor of Veterinary Medicine from Tuskegee Institute in Tuskegee, Ala.

USDA to Amend Newcastle Regulations

The USDA has announced that it is amending its regulations by removing Denmark from the list of regions considered free of exotic Newcastle disease.

The action was taken because Denmark has confirmed an outbreak of exotic Newcastle disease.

This action restricts the importation of poultry carcasses, parts or products of poultry carcasses and eggs (other than hatching eggs) of poultry, game birds or other birds from Denmark, and is necessary to help prevent introduction of exotic Newcastle disease into the U.S.

Exotic Newcastle disease is a contagious and fatal viral disease affecting all species of birds. Previously known as velogenic viscerotropic Newcastle disease, exotic Newcastle is probably one of the most infec-

tious diseases of poultry in the world. Exotic Newcastle is so virulent that many birds die without showing any clinical signs. A death rate of almost 100 percent can occur in unvaccinated poultry flocks. Exotic Newcastle can infect and cause death even in vaccinated poultry.

This interim rule is effective retroactively to July 16 and was published in the Sept. 20 Federal Register. APHIS documents published in the Federal Register and related information, including the names of organizations and individuals who have commented on APHIS dockets, are available on the Internet at: www.aphis.usda.gov/ppd/rad/webrepor.html.

Consideration will be given to comments received on or before

Nov. 19. Send an original and three copies of postal or commercial delivery comments to Docket No. 02-089-1, Regulatory Analysis and Development, PPD, APHIS, Station 3C71, 4700 River Road, Unit 18, Riverdale, MD 20737-1238. If you use e-mail, address your comments to regulations@aphis.usda.gov. Your comments must be contained in the body of the message; do not send attached files. Please include your name and address in the message and use "Docket No. 02-089-1" on the subject line.

Comments may be reviewed at USDA, Room 1141, South Building, 14th Street and Independence Avenue, S.W., Washington, D.C., between 8 a.m. and 4:30 p.m., Monday through Friday, except holidays. Persons wishing to review comments should call ahead on (202) 690-2817 to facilitate entry into the comment reading room.

Food Safety Research

Biosensors Promise Rapid Detection of Food Pathogens

Biosensors being developed at the University of Arkansas can detect harmful bacteria during food processing in a matter of hours, much faster than conventional methods that take days to detect pathogens.

Dr. Yanbin Li, a Food Safety Consortium researcher and biological engineer for the Arkansas Agricultural Experiment Station, is leading an interdisciplinary research team to develop fast, reliable methods for detecting *E. coli*, *Salmonella typhmuri*um and other illness-causing bacteria during poultry processing. "The food industry would like to detect a host of pathogens in a matter of minutes, to keep up with the pace of food processing, and we're working toward this," Dr. Li said.

The methods developed in Dr. Li's lab employ sensors with names like immuno electrochemical biosensor, capillary column bioseparator/bio-reactor, chemiluminescent optical fiber biosensor and impedance immunosensor.

"These are prototypes for tools that will help industries ensure safe foods for consumers," Dr. Li said. "Our ultimate goal is to develop working models that can detect the smallest possible presence of several types of pathogens, as rapidly as possible. We'd also like to have it in a portable unit."

The first step in measuring the presence of pathogens is to separate the target bacteria from the food sample, Dr. Li said. Then the sensor must produce a signal that can be converted to readable data that measures the presence of pathogens.

Most of the sensors he's developed use antibodies to trap specific bacteria. Dr. Li said an immuno-optical capillary column-based biosensor, for example, pumps the sample solution through capillary

columns (tiny tubes) lined with antibodies that can capture bacteria. The sensor then uses secondary antibodies labeled with an enzyme, such as alkaline phosphatase, to produce a signal that can be measured optically or electrochemically. A cluster of capillary columns, each one using a different antibody, could be used to test for multiple pathogens in the same sample.

At this point, Dr. Li is focusing on methodology, working with University of Arkansas scientists in poultry science, food science, biochemistry and electrical engineering. They are exploring new technologies that can make sensors smaller, more accurate or faster.

The prototype sensors he has developed detect several pathogens, including *Salmonella* and *Listeria*, but so far he's had the most reliable

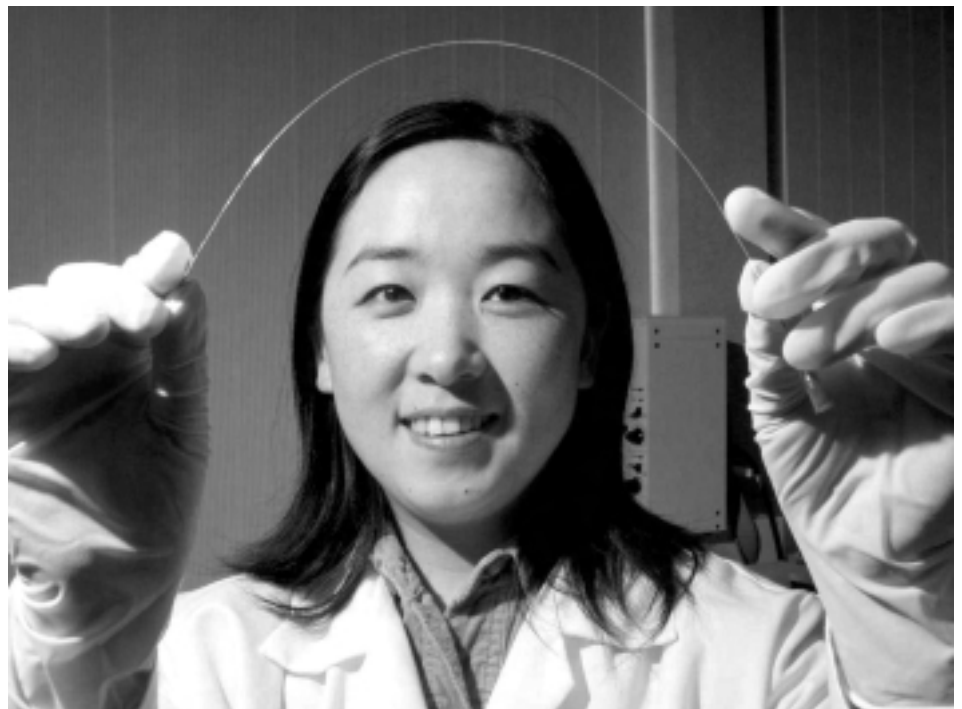
results with *E. coli* 0157:H7, one of the most prevalent illness-causing bacteria found in foods.

"We have to evaluate antibodies and enzymes to find the ones that are most suitable for each pathogen and are stable enough for use on sensors," Dr. Li said.

The next step will be to automate detection. "We want to be able to simply drop the sample in a unit and wait for the results."

Dr. Li said the University of Arkansas is working with a Fayetteville firm to create a company through which this technology will be transferred to the poultry industry.

"Speeding up the detection of pathogens in processed chicken could save the food industry millions of dollars by avoiding product recalls," he said. "And consumers can have more confidence that they are buying safe foods."



University of Arkansas research specialist Zhenyu Zhang examines a capillary column used as an electrochemical sensor to detect harmful bacteria in food products. Such sensors promise to speed up detection of harmful bacteria in food processing industries. (Photo courtesy of The Food Safety Consortium)

Featherless Fails to Show Fewer Skin Contaminants

Researchers have been searching many years for ways to cleanse chicken feather follicles of bacteria and other potentially harmful microbes during or after processing. Researchers theorized that feather follicles, which are empty and open after feathers are plucked, harbor skin surface contaminants. But researchers with the USDA's Agricultural Research Service have shown that feather follicles apparently don't harbor bacteria.

ARS scientists R. Jeffrey Buhr, Mark E. Berrang and John A. Cason of the Poultry Processing and Meat Quality Unit in Athens, Ga., bred featherless chickens,

which do not have feather follicles, to compare against their feathered siblings. The researchers found that the amount of *E. coli* and *Campylobacter* organisms found on the skin surface of the birds was basically the same, with or without feathers.

The first step in this research was breeding featherless, or scaleless, chickens that would be of comparable size to feathered chickens of the same age. By the use of artificial insemination, the offspring of featherless roosters and commercial broiler breeder hens were bred to produce both feathered

and featherless chicks.

The birds received oral exposure to the *Campylobacter* organism a week before processing, during which the birds were handled in alternating batches of four feathered and four featherless chickens. The breast skin, under sterile conditions, was then removed from the carcass and tested for *Campylobacter*, *E. coli* and other bacteria.

From all carcasses, the recovery of *E. coli* did not differ between feathered and scaleless fowl, showing that the presence or absence of feathers and empty follicles did not impact the level of bacteria recovered from the breast skin.

Iowa State University Launches National Food Safety Site

An Iowa State University Extension research team debuted its new food safety information Web site at the 2002 Farm Progress Show in Iowa. The site, funded by a USDA grant, is unique in that its content is based on the most current food safety information.

"This site has answers to more than 500 of the most commonly-asked food safety questions," said Dan Henroid, Iowa State University food safety Extension specialist and site development director. "This site brings together the expertise of universities, federal and state government, trade associations, and the food industry to give people one centralized, up-to-date source for research-based food safety information."

The site, www.FoodSafetyAnswers.org, combines interactive search tools and topic-specific browsing to give information seekers answers any time of the day. If the online question and answer database does not

fulfill the visitors' needs, they will eventually be able to submit questions to a national food safety expert for advice.

"A significant advantage of having this information database on the Internet is that people have access to food safety information when they need it, 24 hours a day, seven days a week," Henroid said. "If for some reason the site does not have what site visitors need, they will be able to send their questions to one of our national food safety experts to be answered."

The site targets two primary audiences—consumers and foodservice personnel—because some of the information is minutely different for in-home food preparation than it is for commercial foodservice institutions.

"Iowa State is proud to be coordinating www.FoodSafetyAnswers.org, a site vital to food safety education,"

Henroid said. "We were awarded this grant because of our reputation for proactive consumer- and foodservice-oriented food safety education. This site, a collaborative effort among the leading food safety organizations and personnel from across the United States, exemplifies Iowa State University's dedication to a safe and wholesome food supply."

North Carolina Lifts Poultry Restrictions

North Carolina state officials have lifted the suspension of poultry exhibitions, sales and auctions provided the events do not handle birds from Virginia or West Virginia.

State Veterinarian Dr. David Marshall imposed restrictions in April as a way to contain the spread of low-pathogenic avian influenza in the area. The remaining restrictions on states where AI has been confirmed will be lifted 60 days after depopulation, cleaning and disinfection of the state's last positive AI case, he said.

AHI Survey: Antibiotic Use Decreasing

A survey of Animal Health Institute members shows that the volume of antibiotics used in animals in the U.S. steadily declined over the past three years. In 2001, 21.8 million pounds of antibiotics were sold, dropping from 23.7 million pounds in 2000 and 24 million in 1999.

The survey data include antibiotics used for both farm and companion animals.

Dr. Herman Goossens of the University of Antwerp presented the findings at the recent Inter-science Conference on Antimicrobial Agents and Chemotherapy.

It is the world's premier scientific meeting on infectious diseases and

antimicrobial agents.

"Veterinarians and livestock and poultry producers are constantly evaluating their use of antibiotics as part of the judicious use of these products," said AHI President and CEO Alexander S. Mathews. "While meat production between 1999 and 2001 rose 1.1 million pounds, use of antibiotics is not rising. The amount of antibiotics used per pound of meat produced is going down."

Mathews said the trend is due to judicious use of antibiotics and continuing improvements in production practices that reduce the need for antibiotics; continued improvements in production and preventative care practices; and the ongoing efforts of various public health and consumer advocacy groups to raise awareness of the issue.

Therapeutic use of antibiotics to treat, control and prevent disease

continues to comprise more than 80 percent of total use, despite claims that a majority of antibiotics are fed unnecessarily to healthy animals.

Mathews pointed out that the European ban of antibiotics for use in growth promotion has sparked significant increases in the use of more modern antibiotics, and those in classes used in human medicine.

Denmark, frequently cited as a model of responsible antibiotic use, has seen a 96 percent increase in the use of therapeutic drugs for animals since 1996. "The striking increase in animal disease and the need for therapeutic intervention works against the interests of public health," he said.

Mathews added that AHI is continuing in its efforts to provide the most accurate assessment possible of the types of veterinary antibiotics being used and their specific applications.

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