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"IN THIS ISSUE"

TOXICOLOGY TIDBITS

VET TIDBITS

ELECTROMAGNETIC FIELDS NOT LINKED TO CHILDHOOD CANCER

There is no evidence that exposure to electromagnetic fields (EMF) increases the risk of childhood leukemia or any other childhood cancer, UK and New Zealand scientists report in two separate studies. "This study provides no evidence that exposure to magnetic fields associated with the electricity supply in the UK increases risks for (childhood cancers)," lead author of the UK study Dr. Nick Day and colleagues write in the December 4th issue of *The Lancet*.

Day, of the University of Cambridge in the UK, and other British scientists estimated average exposure to EMF for

2,226 UK children. The investigators divided the children into two groups: those exposed to high levels of EMF and those exposed to low levels of EMF. The children in the high-exposure group did not experience any higher rates of leukemia or other childhood cancers than children in the low-level exposure group, Day and colleagues report. The authors write that the results from their study and other studies show that exposures to high levels of EMF "do not increase the risk of childhood leukemia." They add, however, that it remains unclear whether EMF at extremely high levels may cause leukemia.

In the New Zealand study, Dr. John D. Dockerty of the University of Oxford in the UK and colleagues at the University of Otago in Dunedin, New Zealand, measured EMF levels in the homes of 113 children with leukemia. The investigators placed the children into three exposure groups: lowest, middle and highest. Dockerty and colleagues found "no significant association between leukemia" and exposure to the highest levels of EMF, which was the same as the high levels in the UK study.

But in a commentary on the studies, Dr. Michael H. Repacholi of the World Health Organization in Geneva, Switzerland, and Dr. Anders Ahlbom of the Karolinska Institutet in Stockholm, Sweden, say that the UK study "is not the 'definitive' study many scientists have been hoping for." Repacholi and Ahlbom point out problems with both studies, which include a low number of children in the higher exposure categories.

In an interview with Reuters Health, Repacholi said, "It is disappointing to us that there was only a small number of children in the higher exposure category." He noted that a National Cancer Institute study in 1998 found an association between cancer and high levels of exposure, and that a National Institute of Environmental Health Sciences study classified EMF "as a possible human carcinogen."

In an interview with Reuters Health, Day of the UK study said, "One of the main problems with the suggestion that EMF increase risk for childhood malignancy is the lack of any plausible mechanism. The work by Liburdy was almost the only experimental work indicating an effect." **Research in 1992 by Dr. Robert Liburdy of the Lawrence Berkeley National Laboratory found a link between EMF and cancer at the cellular level, but the US Department of Health and Human Services deemed the research fraudulent earlier this year.**

Day added, "The fact that (the Liburdy) work has now been retracted, or admitted to have been falsified, leaves the proponents of a link (between) EMF and childhood cancer short of a plausible mechanism. The large NIH study, and the Canadian study published earlier this year, gave results very similar to ours for the range of exposure seen in the UK. So the admission by Liburdy, and the two large North American studies, together with ours, converge on the conclusion we came to in our paper, namely that for the vast majority of children, the level of EMF exposure to which they are subject does not lead to an increase of risk for leukemia or other types of childhood cancer."

Repacholi noted another problem with both studies is that they did not measure transients, which are spikes in the EMF when "...you turn on a switch, for example." He added, "It could be that currents induced by transients could induce different effects, and we would like to see if this leads to cancer in animal and human studies."

"We need more focused research to answer the question, "is it a carcinogen or isn't it?" he said. He added that the studies "would better have been done in the US because there are more people in the high-exposure category." Repacholi said, "If there is any risk, it's twice in the US" because the US uses a higher current in its electricity supply.

Repacholi and Ahlbom say that the Japanese study "in conjunction with those being done in Germany and Italy, may be one of the last hopes of finally resolving the vexing issue of whether there is truly an increased risk of childhood cancer from exposure to magnetic fields or whether the weak association is occurring by chance." (SOURCE: *The Lancet* 1999; 354:1918-1919, 1925-1931, 1967-1968.)

REF: *Reuters Health*, December 06, 1999.

PESTICIDE-RESISTANT HEAD LICE FOUND IN U.S.

Researchers from the Harvard School of Public Health have verified what many parents have suspected: there are head lice in this country that are not susceptible to one of the most frequently used pediculicides (anti-louse insecticides), permethrin. Their report on this issue is entitled "Differential Permethrin Susceptibility of Head Lice Sampled in the United States and Borneo."

The researchers collected head lice from infested patients in two areas of the U.S., Massachusetts, and Idaho. In a laboratory the lice were exposed to progressively higher doses of permethrin. Most of the lice collected from these two sites were not killed by the permethrin. In comparison, and to validate the assay, the researchers collected lice from Borneo, where permethrin is rarely used as a pediculicide. The lice from Borneo were quickly killed by permethrin.

These findings have implications for the treatment of lice in this country. Traditionally, if over-the-counter medications failed to kill lice, then patients would seek prescription-only alternatives. Some prescribed medications simply contain a higher concentration of permethrin. If you have head lice and an over-the-counter medication containing permethrin does not solve your problem, then neither will a prescription for a higher dose of permethrin. If you have permethrin-resistant lice, then trying something else that uses a different active ingredient is best.

Perhaps the most critical action to take to end a head louse infestation, despite the use of any pediculicide, is to practice good, anti-louse grooming. Special combs are available for combing living lice and their eggs from the scalp and hair. However, because the effectiveness of these combs depends upon their construction of tightly spaced teeth, they are difficult or impossible to use with some hair types or styles. These combs are of limited use for people with curly, coarse hair, or for those with braids or other styles through which hair cannot be combed.

The full extent of the resistance remains unknown. The U.S. lice tested were collected from the heads of children by nurses assigned to the schools in Massachusetts and in Idaho. The parents or guardians of these children were asked to answer a questionnaire regarding family knowledge of this and any prior louse infestations. Nearly every child had been previously treated with a pediculicide.

What this research has shown is that if an over-the-counter preparation does not end an infestation, then additional treatments with the same product or higher concentrations of the same active ingredient will not help either. But what this study has not addressed, is the prevalence of permethrin-resistant lice in the United States. Research to assess the extent of this problem is currently "under way."

For newly diagnosed head-lice infestations, it is recommended that grooming and over-the-counter pediculicides remain the first choices for eradication. A head lice information resource is available from the Center's website (http://www.hsph.harvard.edu/headlice.html). This site contains information about the life stages of head lice and what is known about treatment methods. For further information, call (617)432-3952. (Harvard School of Public Health Press Release; September 14, 1999.)

REF: *Chemically Speaking*, November 1999.

FDA WILL NOT ADOPT NEW LOWER LEAD LIMITS FOR CALCIUM-CONTAINING SUPPLEMENTS

FDA has informed a consumer group and two dietary supplement associations that it will not, at this time, adopt new

lower lead limits for calcium-containing dietary supplements and antacids. The agency said it supports the concept that lead levels of calcium-containing products should be as low as practicable and it is actively investigating the feasibility of establishing lower limits of lead in calcium-containing products. In the meantime, however, FDA denied a Jan. 27, 1997, Natural Resources Defense Council (NRDC) petition asking the agency to limit the presence of lead in calcium-containing supplements and antacids to no more than 0.5 ug of lead in the recommended daily dose of such products.

In a Sept. 28 letter, FDA told the NRDC it denied the petition because an adequate basis for the requested action was not provided in the petition. However, FDA said that it has asked the U.S. Pharmacopoeia to review analytical methods that could be used in the future to establish a lower limit for lead in calcium products. NRDC's petition asked FDA to adopt a low lead limit based on California's Proposition 65. California's lead tolerance level is 500 ug per day, but Proposition 65 requires that Californians be protected by a 1,000-fold factor beyond this safety level. Therefore, the Proposition 65 limit for lead is 0.5 ug per day.

Council for Responsible Nutrition's Annette Dickinson, director of scientific and regulatory affairs, said: "Our feeling is that there is no need to change the lead limits. The current limit of 3 parts per million is sufficient to protect the public. Another thing that is important to remember is that calcium inhibits the absorption of lead. While 3 parts per million is safe for all food ingredients, it is particularly safe for calcium supplements."

REF: *Food Chemical News*, (41)38, November 8, 1999.

AGING -- GREAT EXPECTATIONS

Alas, life may indeed be too short, but it is on average much longer than it used to be. From 1900 to 1996, life expectancy at birth for women in the U.S. climbed from 48.3 to 79 years, a stunning gain of slightly more than three decades. Life expectancy for men during the same period increased from 46.3 to 73 years, a gain of almost 28 years. More than 30,000 Americans will ring in the 21st century next month, 100 years or more after being born in or before the first year of the 20th.

Harvard researchers studying centenarians living in eight towns near Boston have shown that **the very old also tend to be the very healthy.** Maybe it isn't so surprising that the fittest would survive the longest, but it underscores the point that chronological age is a biological reward for past health and refutes a countervailing theory that longer life works to expand morbidity not compress it. "The older you get, the healthier you have been," the researchers wrote in the August 21, 1999, *Lancet*. A study published in the April 8, 1998, *New England Journal of Medicine* of 1,741 University of Pennsylvania graduates confirmed that **bad health habits come back to haunt people in the form of disability in old age.**

Where the gains came from

A handful of hyperoptimistic scientists are promising that some children born in 2050 will live to see their 150th birthday in the year 2200. But it is important to keep in mind that the spectacular gains in life expectancy this century have actually slowed down. Almost two-thirds of the roughly 30-year gain occurred before 1950. The single decade with the largest increase was 1910-1920, when life expectancy at birth jumped by five years. By 1980-1990, the rate of increase by decade had slowed to 1.49 years. During the first half of the century, the infant mortality rates dropped from 100 infants dying per 1,000 live births in 1900 to 29.2 per 1,000 live births in 1950, and the maternal mortality rate (the number of women dying from childbirth) plummeted from 6-9 per 1,000 live births to an average of 0.8 per 1,000 live births. The advent of antibiotics and vaccines that reduced the risk of death from infectious diseases accompanied these drops. Gains in life expectancy in the second half of the century had to come primarily from victories in the expensive, scientifically demanding wars against the chronic diseases of middle and older age,

principally heart disease and cancer.

There is no question that odds increasingly favor getting old and indeed, for some, extremely old. **The over-85 age group is the fastest growing in the country.**

REF: *Harvard Health Letter*, 25(2), December 1999.

CVM RELEASES DRAFT RISK ASSESSMENT ON FLUOROQUINOLONE RESISTANCE FOR REVIEW PRIOR TO DECEMBER 9-10, 1999 WORKSHOP

The Center for Veterinary Medicine (CVM) on December 2 released its draft assessment document on fluoroquinolone-resistant *Campylobacter* infection in humans linked to chicken consumption. The release was timed in advance of CVM's Dec. 9-10 workshop on risk assessment and establishing antimicrobial thresholds. The draft can be found at: http://www.fda.gov/cvm/fda/mappgs/ra/risk.html

The five-part risk assessment is intented to address microbial safety issues. The sections are:

- Section 1 of CVM's risk assessment estimates the total burden of campylobacteriosis by using the number of *Campylobacter* culture confirmed cases in the U.S. population (CVM estimates the total number of *Campylobacter* cases in 1998 at 2 million).
- Section 2 details how distributions (as opposed to point estimates) are used to extrapolate from the number of culture confirmed cases in the U.S. to the total number of campylobacteriosis cases.
- Section 3 estimates that in 1998 roughly 5,000 people were infected with quinolone-resistant *Campylobacter* as a result of eating chicken, and received fluoroquinolones as part of medical treatment.
- Section 4 estimates that 1.45 billion pounds of boneless product carrying fluoroquinolone-resistant *Campylobacter* was consumed in one year.
- Section 5 details how the fluoroquinolone model can be used to manage the risk, and proposes ways to measure and control the risk.

CVM will also hold a workshop Feb. 22-24, 2000, on pre-approval studies on antimicrobial resistance. This workshop will explore CVM's current thinking on designing studies in food animals that will predict how much time it will take to see changes in susceptibility to a drug, and determine a drug's potential to increase pathogen load in the target animal.

REF: *Food Chemical News*, 41(42), December 6, 1999.

Toxicology Tidbits

USDA approves irradiation of meat

USDA has officially approved the use of irradiation on meat and meat products, finalizing rules that have taken five years to work their way through the bureaucratic labyrinth of both FDA and various agencies within the Department of Agriculture. USDA plans to publish the final rules in the *Federal Register* in the next week, and they will take effect 60 days after publication.

The final rules will permit the use of irradiation on refrigerated or frozen raw meat and meat products. Irradiated products must continue to meet all other food safety, sanitation, and pathogen reduction requirements, even though the technology can significantly reduce or eliminate the presence of harmful microorganisms. USDA is requiring irradiated meat products to bear the radura symbol for irradiation and a statement that the product was treated by irradiation. Irradiated meats used in products such as sausages must also be labeled. Unpackaged meat products that do not have labels must be accompanied by the statement and logo at the point of sale to consumers. These labeling requirements do not apply to products purchased through foodservice operations and restaurants.

It is still unclear how much of the industry will take advantage of this technology, which has been approved for years for use on poultry with little interest from the industry. Much of the industry is nervous to invest in technology that may or may not be accepted by consumers. In a related effort, USDA is streamlining the approval process for food additives by ending the requirement that food additives be approved separately by FDA and USDA. This time-saving effort will speed the use of irradiation of ready-to-eat products like hot dogs and lunch meats that have been implicated in many recalls and outbreaks.

REF: *Food Chemical News Daily*, 2(122), December 15, 1999.

Triax Metabolic Accelerator

Triax Metabolic Accelerator is a potentially dangerous hormonal drug that is being marketed as a dietary supplement that supports weight loss, according to FDA as reported by AP. The product contains tiratricol, a thyroid hormone that at above-normal levels can increase the consumer's risk of heart attack, stroke, and high blood pressure. One company that sells the product has vowed to challenge FDA's claims in court.

REF: *Food Chemical News*, 41(39), 11/15/99.

Aristolochia

Health Canada is advising consumers not to use manufactured products containing aristolochia without discussing it with their health care providers. Aristolochia, an herb that produces aristolochic acid and has long been used in traditional Chinese medicine, can cause cancer, mutations in human cells, and is known to cause endstage kidney

failure, the agency said. Products labeled to contain mu tong may also contain aristolochic acid. There have been numerous international reports of death or injury from kidney failure due to ingestion of products found to contain aristolochic acid, but none have been reported in Canada, the agency said.

REF: *Food Chemical News*, 41(39), 11/15/99.

Diseases Not Associated With Exposure to Certain Herbicide Agents

The Department of Veterans Affairs has published a list of illnesses it says are **not associated with herbicides** to which Vietnam veterans may have been exposed. The list includes: hepatobiliary cancers, nasal/nasopharyngeal cancer, bone cancers, breast cancer and female reproductive cancers, urinary bladder cancer, renal cancer, testicular cancer, leukemia, abnormal sperm parameters and infertility, motor/coordination dysfunction, chronic peripheral nervous system disorders, metabolic and digestive disorders, immune system and circulatory disorders, skin cancer, cognitive and neuropsychiatric effects, reproductive effects in male veterans, and gastrointestinal tumors and brain tumors.

This article can be viewed at: http://frwebgate.access.gpo.gov/

REF: *Federal Register*, 64(211), November 2, 1999.

Boffo Buffer Zones. How Big Is Big Enough?

"Conventional agriculture must be replaced with sustainable agriculture." How many times have you heard such statements uttered by politicians and policy makers who talk about sustainability as if it were an immediately available off-the-rack technology? Such a myopic perspective doesn't consider that today's seemingly sustainable practices may not be functional as tomorrow's technology.

This article written by Dr. Allan Felsot, can be viewed at http://www2.tricity.wsu.edu/aenews/.

REF: *Agrichemical and Environmental News*, 163, November 1999.

Bald Eagle to be Removed from the Endangered Species List

The American bald eagle, the living symbol of the United States since 1782, is back from the brink of extinction and can now be removed from the endangered species list. Celebrating a three-decade struggle to protect the bald eagle

against issues such as pesticides and encroachments on its habitat, the U.S. Fish and Wildlife Service formally proposed that the eagle be declared fully recovered, and announced a process that is expected to remove the bird from the list by July 2000.

REF: *Chemically Speaking*, August 1999.

The Chlorpyrifos Risk Assessment. Part 1: A Tale of Two Sciences

As mirrors reflect an obverse reality, popular accounts of EPA's recently released risk assessment for chlorpyrifos seemed to be objective but somehow wrong. An Associated Press release contended that chlorpyrifos was so pervasive that "a majority of Americans, including children, face potential health risks." As if pervasiveness was somehow synonymous with hazard. The Washington Post on-line declared boldly, "EPA Says Dursban May Harm Health." The Post went on to say that exposure to Dursban on the skin, in food, or by inhalation could be harmful to human health. And of course, the Environmental Working Group (EWG) always enters the fray with its press release de résistance, subtitling it "Children Found Especially Vulnerable" as it demanded chlorpyrifos be banned. Echoing the Washington Post (or was it the other way around?), EWG stated that chlorpyrifos "poses excessive safety risks to millions of Americans each year who are exposed when they use the chemical to kill bugs in their homes or gardens, or consume food contaminated with the compound."

This article written by Dr. Allan Felsot, can be viewed at http://www2.tricity.wsu.edu/aenews/.

REF: *Agrichemical and Environmental News*, 164, December 1999.

A Natural Fatty Acid in Cow's Milk and Dairy Products May Reduce the Risk of Breast Cancer

A natural fatty acid in cow's milk and dairy products may reduce the risk of breast cancer, according to a study published in the December issue of the *Journal of Nutrition*. The study found that only 50% of rats fed with butter enhanced with conjugated linoleic acid (CLA) developed mammary tumors when given high doses of carcinogens. In contrast, 93% of the rats who were not fed CLA-enhanced butter developed mammary tumors. "This research demonstrates for the first time that natural CLA in foods is biologically active and that we can use a designer-foods concept to enhance the natural level of anti-carcinogens in foods," said Dale Bauman, a professor of animal science at Cornell University.

REF: *Food Chemical News*, 41(42), December 6, 1999.

A High-Sodium Diet Increases the Risk of Cardiovascular Disease

A high-sodium diet increases the risk of cardiovascular disease and mortality among overweight individuals, said a National Institute of Health-funded study conducted by Tulane University researchers. The study found that overweight individuals with a higher consumption of sodium relative to caloric intake had a **63% higher risk of death from cardiovascular disease** than those with the lowest sodium intake.

REF: *Food Chemical News*, 41(42), December 6, 1999.

Honey product said to have very active antimicrobial properties

The first pure honey treatment for wounds and sores has been produced in Australia, according to the National Honey Board, Longmont, CO. The product, Medihoney, was developed in association with Capilano Honey Ltd. and researched by the Agency for Food and Fiber Sciences and the University of Waikato's honey research unit in New Zealand. The board said scientific literature shows that highly active antimicrobial honey from the nectar of particular *Leptospermum* trees has been used to successfully heal a wide variety of wounds and infections, which have not responded to other treatments. Research conducted by the university's P.C. Molan showed that the antimicrobial component of the *Leptospermum* honey is particularly effective against virulent "golden staph" (*Staphylococcus aureus*) bacteria even when diluted more than 50 times.

REF: *Food Chemical News Daily*, 2(119), December 10, 1999.

VETERINARY TIDBITS

CAST RELEASES REPORT ON ANIMAL AGRICULTURE

The Council for Agricultural Science and Technology (CAST), an international consortium of 38 scientific and professional societies, recently released a report *Animal Agriculture and Global Food Supply*. A CAST international task force of 13 scientists discussed in the report, projected demand for human food and the importance of animal agriculture in meeting these needs.

Animal agriculture is an integral part of food-producing systems, with foods of animal origin representing about one-sixth of human food energy and one-third of the human food protein on a global basis, the report says.

These are a few of the interesting facts released in the CAST report:

- Animals consume one-third of the global cereal grain supply.
- Global demand for meat is projected to increase more than 60% of current consumption by 2020.
- The biological value of protein in foods from animals is about 1.4 times that of foods from plants.

The CAST task force scientists conclude that meeting projected demand for foods of both plant and animal origin in 2020, while sustaining the productive capacity of the land, will be challenging but feasible. Animal agriculture will continue to be an important part of food-producing systems. Investment in agricultural production research and development and implementation of policies that encourage production, while protecting the environment, will be essential to achieving the goal of an adequate global food supply. (LCI News, July/August 1999).

REF: Penn State Veterinary News, November 1999.

COMPARATIVE PHARMACOKINETICS IN DIFFERENT PRODUCTION CLASSES OF CATTLE

Increasing attention has been directed to the influences of gender and physiological states, such as pregnancy and lactation, on the pharmacokinetics of human drugs. Gender and physiological state also influence the pharmacokinetic parameters of veterinary drugs. This potential influence of gender and physiology on drug elimination could impact the regulation of drug use in cattle. Witkamp et al. (1992) reported that the half-life of sulfamethazine was about 75 percent and 40 percent lower in female goats and cattle, respectively, than in males of the same species. The half-life of thiamphenicol is shorter in 4-6 month old beef and dairy calves compared to mature lactating dairy cows (Abdennebi et al., 1994). Furthermore, Bengtsson et al. (1997) found statistical differences between pregnant and lactating sheep in the clearance, volume of distribution, and elimination half-life of penicillin-G.

More info can be obtained from: http://www.fda.gov/cvm/fda/infores/fdavet/1999/1999toc.html

REF: *FDA Veterinarian*, September/October 1999.

GUIDANCE AVAILABLE ON DIOXIN IN ANIMAL FEED

The Food and Drug Administration (FDA) announced the availability of a guidance for industry entitled "Dioxin in Anti-Caking Agents Used in Animal Feed and Feed Ingredients" (#98) in the October 15, 1999, *Federal Register*. The guidance is intended to notify members of the feed industry of recent findings regarding the presence of dioxins in mined clays that may be used as anti-caking agents in animal feeds and to offer general advice regarding monitoring of these clays.

Approximately two years ago, a multi-agency investigation tracked a previously unknown source of dioxins in the human food supply back to a mined clay anti-caking agent, called ball clay, used in animal feeds and feed ingredients.

Together, industry and government moved to swiftly eliminate the use of ball clay in the animal feeds, and thereby, removed a source of dioxins in the human food chain. On October 7, 1997, FDA sent a letter regarding this issue to members of the feed industry. In that letter, we stated that the ultimate origin and the scope of dioxin presence in clay deposits were unknown and, for that reason, mined clay products of all types should be used with caution in the production of animal feeds. We advised companies offering mined clay products for animal feed uses to ensure that their products were not contaminated with dioxins.

Since that time, FDA has been collecting additional data. The information thus far indicates that dioxins can be present in mined clay products other than ball clay and that dioxin congeners other than 2,3,7,8-tetrachlorodibenzodioxin may be present in important amounts. The guidance summarizes the data and suggests the need for increased caution in industry surveillance for dioxins in feed ingredients.

Copies of this guidance document may be obtained on the Internet from the CVM Website or by calling or writing CVM's Communications Staff at FDA/Center for Veterinary Medicine, HFV-12, 7500 Standish Place, Rockville, MD 20855, 301-594-1755.

Written comments on the guidance document may be submitted at any time to the Dockets Management Branch (HFA-305), Food and Drug Administration, 5630 Fishers Lane, Room 1061, Rockville, MD 20852. The full title of the guidance document and Docket No. 99D-4201 should be included on the comments.

Further information about the guidance document is included in the October 15, 1999, *Federal Register* announcement. General questions regarding the guidance document may be directed to Judy A. Gushee, Center for Veterinary Medicine (HFV-230), Food and Drug Administration, 7500 Standish Place Rockville, MD 20855, 301-827-0150, e-mail: jgushee@cvm.fda.gov. Scientific questions regarding the guidance document may be directed to Dr. Randall A. Lovell, Center for Veterinary Medicine (HFV-222), Food and Drug Administration, 7500 Standish Place, Rockville, MD 20855, 301-827-0176, e-mail: rlovell@cvm.fda.gov.

REF: *FDA Veterinarian*, XIV(VI), Nov/Dec 1999.

FINAL RULE EXTENDS *E. COLI* TESTING TO SHEEP, GOATS, HORSES, AND OTHER SPECIES

The Food Safety and Inspection Service is extending testing requirements for generic *Escherichia coli* to establishments that primarily slaughter sheep, goats, equines, ducks, geese, and guineas. This final rule, published November 29, 1999 in the *Federal Register*, builds on the Pathogen Reduction/Hazard Analysis and Critical Control Point rule that was published in 1996.

Today's final rule extends *E. coli* sampling and testing requirements already applied to establishments that slaughter cattle, swine, chickens, and turkeys to establishments primarily slaughtering sheep, goats, equines, ducks, geese, and guineas. Regular microbial testing by slaughter establishments is necessary to verify the adequacy of an establishment's process controls for the prevention and removal of fecal contamination and associated bacteria.

"I am very pleased with this rule," said FSIS Administrator Thomas J. Billy. "The successful implementation of HACCP has aided us in establishing this rule, which is another step forward in our efforts to improve food safety."

FSIS is requiring that sheep, goat, and equine establishments be sampled at the same frequency now required for cattle, one test per 300 carcasses. Duck, geese, and guinea establishments are to sample at the same frequency required for turkeys, which is one test per 3,000 carcasses.

Sheep, goat, equine, duck, geese, and guinea establishments defined as "very low volume" may use an alternate

sampling frequency of at least one sample per week, starting the first full week of operation after June 1 of each year. They must continue sampling at a minimum of once each week that the establishment operates until June 1 of the following year or until 13 samples have been collected, whichever comes first.

The final rule will be effective January 25, 2000.

REF: *Food Safety and Inspection Service News Release*, Nov. 29, 1999.

LEAD TOXICOSIS: CVDLS Lab Notes

Lead toxicosis caused ataxia, blindness, staggering, and salivation in four beef animals in a small herd one to two days prior to death. Small particles of lead were found in the stomach contents. Fifteen animals in a group of 130 beef cattle exposed to a bucket of litharge (lead oxide) were found dead in another herd.

REF: *CVDLS Lab Notes (*UC Davis), 12(3), Fall 1999.

COPPER TOXICOSIS IN CATTLE AND SHEEP: CVDLS Lab Notes

Copper toxicosis caused the death of a recently fresh dairy cow with lesions of severe centrilobular hepatic necrosis and 257 ppm liver copper level. On another dairy, copper toxicosis also caused neurologic signs due to hepatic encephalopathy followed by death over two days in four Holsteins that were 3-5 months old. The calves had earlier received copper injections and water troughs contained copper sulphate to control algae.

Copper toxicosis caused the death of 15 of 100 4-H sheep with signs of hemoglobinuria, icterus, and liver failure. The suspected source of excess copper was from a new feed purchased from a mill that mixed animal feeds. Possible contamination of the sheep mix with cattle feed may have led to excessive copper levels for sheep. Following immediate treatment with ammonium-thiomolybdate and D-penicillamine, no further deaths occurred.

REF: *CVDLS Lab Notes (*UC Davis), 12(3), Fall 1999.

ONION TOXICOSIS: CVDLS Lab Notes

Onion toxicosis resulted in hemoglobinuria, weakness, and centrilobular liver necrosis due to anemia in approximately 10 pregnant 18- to 20-month-old Holstein heifers in a group of 400. Three heifers died before the onions were removed. The heifers had been on pasture for five months and were underweight and copper deficient. Signs

began one week after the animals were moved to a feedlot and fed processed onions, carrots, and hay. Two hundred well-conditioned heifers and steers that had been on the same feed with higher onion content had no clinical signs.

REF: *CVDLS Lab Notes (*UC Davis), 12(3), Fall 1999.

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Back to the Beginning