

327 Control of *Listeria monocytogenes* in dairy processing plant environments. P. A. Hall*, *Kraft Foods - North America*.

Control of *Listeria monocytogenes*(LM) in processing plant environments is a multi-faceted approach requiring diligence and dedication throughout the entire organization. There are five elements that add up to effective LM control in a processing facility. The so-called Listeria equation consists of Traffic Patterns + GMPs + Dry, Uncracked, Clean Floors + Sanitary Design + Sanitation Procedures. A breakdown in any one of these elements can lead to an unacceptable risk of LM contamination in the plant environment and, ultimately, the finished product. Essential to effective LM control is a rigorous, aggressive environmental monitoring program. It is recommended that the genus *Listeria* be used as an indicator for LM and that a sufficient number of equipment and other sites be monitored (dependant on the size of the facility) on a weekly basis to ensure that the processing environment is under control. Incentive must be provided to plant personnel to aggressively find and eliminate LM in the environment. In order to ensure this, plant employees must be provided with the proper tools and training, and the criticality of LM control must continuously be reinforced. This presentation will cover the key elements and specifics required to ensure effective LM control in dairy processing facilities.

Key Words: *Listeria monocytogenes*, Food safety, Environmental monitoring

Horse Symposium: Nutrient management

329 Knee deep in manure: what do horse owners do with it? L. K. Warren*, *Colorado State University, Fort Collins, CO USA*.

The average 455-kg horse produces 26 L of manure per day or 9.5 m³/yr. When bedding material is added, the volume can easily exceed 20 m³/yr per horse. How do horse owners manage all of this manure? The National Animal Health Monitoring System (NAHMS) Equine '98 Study found that approximately 11% of horse operations in the U.S. had manure removed from their property, 78% utilized or stored manure on-site, and the remaining 11% reported "other" means of disposal. Over half of the operations surveyed by NAHMS reported that the application of manure and stall waste on fields and pastures was the primary means of disposal. Those that allowed waste to accumulate or "left it to nature" made up 29% of the operations, and this practice was more likely to be employed when fewer horses were housed on the property. Hauling waste to a landfill or combining manure with household garbage for pickup was also more likely to be used as a disposal option with small, 1 or 2 horse operations. On-farm composting of horse manure was attempted by approximately 36% of those surveyed by NAHMS and was more prevalent in the northeast and western states. The increasing trend for horses to be housed on small, 1-35 acre "hobby" farms and in boarding stables means a larger number of horses are being housed on smaller parcels of land with less acreage available for spreading manure. Add to this greater restrictions on landfill dumping and the expense of hauling manure off-site and it becomes evident that horse owners are quickly losing waste disposal options. And simply "leaving it to nature" is not acceptable due to the risk of runoff and leachate from manure polluting watercourses and domestic water supplies. Educational programs are needed to inform horse owners about environmentally sound and neighbor-friendly waste management practices. In addition, markets must be found for horse waste or composted horse manure. And methods to reduce the waste stream (e.g., efforts to minimize bedding, feeding highly digestible feeds) should be investigated.

Key Words: Horse, Manure disposal, Waste management practices

330 Nutrient management regulations and the North Carolina equine industry. R. Mowrey*¹, ¹*North Carolina State University*.

In 1992, NC state regulations covering waste discharge required confined animal feeding operations above species based thresholds including equine operations with 75 or more head, to develop a waste management plan. Additional regulations developed by the Environmental Management Commission, govern surface water loading of nutrients in 3 of 17

328 The *Listeria* risk assessment: Dairy foods. S. Dennis*, J. Hicks, C. Carrington, and R. Whiting, *Food and Drug Administration, College Park, MD*.

The HHS/USDA *Listeria monocytogenes* risk assessment was issued in draft for public comment in January 2001. The purpose of the risk assessment was to systematically examine available scientific data and information to estimate the predicted relative risk of serious illness and death associated with consumption of ready-to-eat foods. The types of foods evaluated in the risk assessment include seafood, produce, dairy foods, meats, and deli salads. The dairy foods include five types of cheeses, milk, ice cream and other miscellaneous dairy products. This risk assessment is a tool that regulatory agencies can use to evaluate the effectiveness of current policies, programs, and regulatory practices. Using newly available data, information, and modeling techniques, the draft risk assessment will be revised in 2003. If the revised risk assessment is released before the meeting, the latest information on the predicted risks will be presented.

Key Words: Risk assessment, *Listeria monocytogenes*

NC river basins. The Tar-Pamlico River Basin (TPRB) nutrient management strategy requires agricultural operations to collectively achieve a 30% reduction in nitrogen from 1991, loading within a 7 year period. The N.C. Horse Council-Environmental Issues Committee (NCHC-EIC) monitors development of nutrient management regulations, recommends best management practices (BMP's) to control nutrient loading and serves as the horse industry liaison working with government agencies. Current recommended TPRB regulations require horse operations with 20 or more head to participate in a pasture point system based on pasture BMP's. The NCHC-EIC assists in development of BMP's with pre-assigned point values. Producers who implement BMP's will earn points. When BMP's are implemented and a required point total is reached, producers will be exempt from additional nutrient management efforts. Potential BMP's include exclusion from water sources, non-fertilizer zones, alternate water sources and dietary nutrient management. A lack of equine research data to support BMP's has hindered the approval process. The NCSU Animal Science and Biological Engineering Departments received FY 2003 to 2005 grant funding from the U.S. Environmental Protection Agency to conduct manure and pasture management educational programs. A series of producer educational conferences and field days will demonstrate BMP's on horse farms that improve water quality. The project will be implemented with the assistance of Regional Equine Information Network System volunteers in multi-county areas. Demonstrations will focus on developing and testing improved animal crop and waste management systems to provide maximum environmental protection. This information will be essential to support the development of future equine BMP's to enhance water quality.

Key Words: Equine, Pasture management, Water quality

331 Potential impact of new Concentrated Animal Feeding Operation regulations on the equine industry. D. R. Topliff*, *West Texas A&M University*.

The new regulations from EPA concerning the definition of Animal Feeding Operations (AFO) and regulation of certain AFOs as Concentrated Animal Feeding Operations (CAFO) have been finalized. These new regulations contain provisions that have potentially serious consequences for the horse industry. EPA has adopted a three-tiered plan for regulation of CAFOs that classify them as Large, Medium, or Small and places the number of confined horses necessary to qualify for a particular status at 500 and 150 for the first two categories and authority of regional directors to specify operations for the third. Any AFO that discharges pollutants directly into the waters of the U.S. or has animals in direct contact with waters of the U.S. may be designated as a CAFO regardless of the number of animals confined. Data was provided to EPA from the

American Horse Council requesting that horses be counted in the same manner as feedlot cattle, however EPA chose to continue counting each horse as two animal units. Thus, any operation that has 150 or more horses in confinement (including stalls or dry lots) for a total of 45 days or more in any 12-month period or is otherwise designated as a CAFO has a duty to seek coverage under an NPDES permit. Many stables, breeding farms, and exhibition facilities that have not previously been

affected may now have to meet the requirements of the new regulations, including a provision to be able to contain all of the runoff from a 25-year, 24-hour storm event. The economic cost could be devastating to the industry.

Key Words: Equine industry, CAFO regulation, Environmental regulations

Southern Branch ADSA Symposium: How can we best work together to serve tomorrow's dairy industry?

332 How best can we work together to serve tomorrow's dairy industry: university extension faculty perspective. L. O. Ely*, *University of Georgia*.

The Cooperative Extension Service was created with the Smith-Lever Act of May 8, 1914. Extension work was to "consist of giving instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications and otherwise". At this time the population of the US was rural and education for most was finished at the eighth grade level. Basic information in animal and human nutrition was being discovered. Today extension work has the same objective but the audience is much different. Only a small percent of the US population is rural and engaged in agriculture. The education level is post high school. The need is not for basic information but for fine tuning management decision-making. Producers are looking for ways

to handle the overload of information and records that are available to them. Extension can provide resources that will aid in utilization of record keeping systems and decision-making programs that analyze these records. These programs may be web based for independent use by producers instead of one on one or group meetings between producers and extension specialists. Society has demanded impact and accountability statements that have left agriculture with low scores because of small clientele numbers. Evaluation of quality is not part of these scores, as it is not easily quantified. Other countries have privatized their extension services. In the US there has been an increase in private companies developing their sales force into an extension service that competes with the land grant system. The new objective may be that extension service and industry must cooperate to provide programs and resources to the dairy industry. How does the leadership in college administration evaluate this paradigm shift?

Key Words: Dairy industry, Extension service, Function

Animal Health: Diseases and mammary health

333 Changes in the mechanical properties and the lesion score of the sole horn in first lactation dairy heifers. B. Winkler and J. K. Margerison*, *University of Plymouth, Seale Hayne*.

This experiment compares mechanical tests of the sole horn toughness with the pattern of lesion formation, in the pre- and postpartum heifers. Mechanical tests were completed on samples of sole hoof horn taken from 20 heifers at 2 months before parturition (p1) and 100 days postpartum (p2). Simultaneously, all claws were assessed for the lesions score levels (LS) of sole horn. Heifers were kept at pasture prepartum and housed loose in a straw-bedded yard postpartum. Hoof samples were collected from all claws and analysed for elastic modulus (ELM) and puncture resistance (PR). Each measurement was replicated five times on the same area of each claw. PR force required fracture sole horn was significantly greater in front claws (FC) when compared to hind claws (HC) ($P < 0.05$) (FC 9.7, HC 8.8N), but there was no significant difference between the inner and outer claws. PR force, ELM and LS significantly increased postpartum compared with prepartum ($P < 0.01$) (p1- 7.8N, 86.9N/mm² and 73.1; p2- 10.7N, 118.0N/mm² and 186.5). LS was significantly greater in the HC compared with the FC during the postpartum period ($p < 0.001$) (HC 223.7, FC149.3). In the HC the outer claws presented a significantly ($p < 0.05$) greater LS when compared to the inner claws in both periods. In the FC the LS was significantly higher in the inner claws ($P < 0.01$) postpartum. Prepartum ELM and PR force were not correlated with lesion score either pre or postpartum. However, postpartum ELM and PR force were significantly negatively correlated ($p < 0.01$) to the increase in lesion score between periods ($R = 0.65$). Differences of EML and PR between FC and HC may be related to the different pressure distribution in these claws. Mechanical tests reflected increases in sole lesions and LS following

Key Words: Lameness, Sole tissue, Mechanical testing

334 Muscle protein tyrosine nitration patterns during chronic subclinical intramuscular parasitism: Co-localization to fiber type and ubiquitin. T. H. Elsasser*¹, S. Kahl¹, J.L. Sartin², R. Fayer¹, A. Martinez³, F. Cuttitta³, and J. Hinson⁴, ¹USDA-ARS, Beltsville, MD, ²Auburn University, Auburn, AL, ³NIH-NCI, Bethesda, MD, ⁴University of Arkansas, Little Rock, AR.

The present study was conducted to determine whether the inflammatory oxidative response to chronic intramuscular parasitism, as modeled

with the protozoan parasite *Sarcocystis cruzi*, results in protein nitration damage and whether a pattern to its localization can be characterized. Holstein steer calves (n=10; av.wt.= 124 kg) were assigned equally to control (C) and infected (I, 25,000 Sarco sporocysts) groups. Calves were slaughtered on d56 postinfection and samples of rectus femoris (RF) and psoas major (PM) harvested. Xanthine oxidase (XO) was measured in muscle homogenates by fluorescence (resorufin, 587 nm). Frozen sections (9 μ) were immunostained (IHC; horseradish peroxidase/DAB) for nitrotyrosine (NT) or ubiquitin (UBI) or co-localization of NT with fibertype (staining v nonstaining with mouse anti-myosin fast twitch), or NT with UBI via confocal immunofluorescence. Extracted muscle proteins were extracted, separated on 4-20% SDS PAGE gels, transferred to nitrocellulose, and probed for nitrated proteins using an anti-NT or anti-bovine-UBI. XO activity, a source of superoxide, was 2.3 times greater in I than C ($P < 0.01$). Western blot demonstrated that >80% of the increase in NT was associated with an increased number of protein bands ($P < 0.04$, I v C) with Mr >75 kD. IHC demonstrated very low levels of both NT and UBI staining in RF and PM of C but increased NT (42% more NT+ fibers, $P < 0.05$) in both RF and PM of I. NT immunostaining could be categorized into three distinct forms: a) peripheral fiber (I and C), b) dispersed intrafiber (I), and c) cyst-specific (I). Both fast and slow fibers displayed the peripheral localization of NT and UBI. Only slow twitch oxidative fibers displayed extensive co-localized intrafiber NT staining regardless of muscle source. The sarcocyst itself was highly nitrated and muscle proteins in the immediate vicinity of the cyst displayed increased NT co-localized with UBI. The data suggest that the oxidative inflammatory response to chronic low-level muscle-resident parasitism generates nitrated muscle proteins. The nitration appears to be more pronounced in slow oxidative fibers and supports prior observations of more severe impact of this parasitism on muscles with higher percentages of slow twitch fibers.

Key Words: Stress, Health, Muscle

335 A relative comparison of diagnostic tests for Johne's disease. T. Duffield¹, D. Kelton¹, K. Leslie¹, K. Lissimore¹, and M. Archambault², ¹Department of Population Medicine, University of Guelph, ²Animal Health Laboratory, University of Guelph.

Prevention and control of Johne's disease (JD) could be improved if diagnostic tests were reliable, rapid and economical. The objective of this study is to evaluate a commercial milk ELISA test relative to other diagnostic tests. 32 dairy herds in Ontario with a suspected high prevalence of JD had fecal and serum samples collected from all milking and dry