ARPAS Symposium: Current and Future On-Farm Auditing & Assessment

719 Animal welfare assessment and auditing. S. E. Curtis*, *University of Illinois*, *Urbana*.

The assessment and the auditing of animal welfare are related but distinct processes. An assessment protocol prescribes how the assessment will be accomplished in terms of indicators of animal state of being and their measurable goals. The auditing process aims to determine whether or not those goals have been achieved. Of course, an auditor must first assess, following the assessment protocol, to be able to determine that. The auditing process is the topic of another presentation in this symposium. Here the focus will be on the rational development of an assessment protocol. Several preliminary decisions have to be made as an approach to establishing an assessment protocol is set. In this author's opinion, the following guidelines should be followed: (1) The concept of animal welfare should be followed, not animal rights; (2) Objective criteria of evaluation should be employed, not subjective criteria; (3) An approach based on animal performance, not animal feelings, is favored; (4) The performance axiom, not the feelings axiom, is favored; (5) Animal-performance standards, not environmental-design standards, should rule; (6) Different goals for assessment —e. g., inter-herd comparison or intra-herd improvement—dictate different approaches; (7) Theoretical constructs often will still serve better than intuition (often flawed) or empirical data (not enough at hand); (8) Respective evaluation criteria should be subjected to weighting schemes as the final composite index of state of being is formulated (although developing such strategies is proving to be a difficult task); and (9) the mixed model of motivation should serve as the guide when developing a variable-weighting scheme.

Key Words: Assessing Animal Welfare

720 Auditing and assessing nutrient management for water quality. A. L. Sutton*, *Purdue University*, *West Lafayette, IN*.

Concentrated animal feeding operations (CAFO) and many mid-sized animal feeding operations (AFO) are required to comply with state and federal environmental regulations specifically related to the protection of water quality. Most current regulations are based on the need to account for and control nutrient flow on-farm to minimize buildup, leaching and runoff of nutrients that may pose a risk to surface and ground water quality. In addition, there is pressure for producers to control pathogens, antibiotics, hormones and endocrine disruptors in the waste stream, soils and water. Attempts to encourage best management practices to control nutrient flow include the requirements for nutrient management plans, comprehensive nutrient management plans, conservation practice plans, storm water pollution prevention plans, chemical and fuel handling, animal mortality management, and emergency action plans. The overall goal of the nutrient management plan on a livestock and poultry farm is to sustain as much as possible a whole farm nutrient mass balance while producing animal products efficiently and profitably. An extensive auditing and assessment program evaluates the status of nutrient management on-farm and develops an action plan specific for CAFO and AFO to minimize water pollution and sustain water quality standards. An annual audit and review checks the performance of the CAFO and AFO on environmental stewardship and identifies areas needing improvement. Critical control points that need to be audited and assessed for each farm are 1) nutrients imported on-farm, 2) nutrients exported off-farm, 3) nutrient status of soils and water, 4) manure handling and storage facilities, 5) conservation practices, 6) runoff waste water control, 7) land application practices, 8) animal mortality practices, 9) record keeping system, 10) operation and maintenance plan, and 11) alternative treatment systems, if applicable. Professionals involved currently and in the future that audit and assess nutrient management on-farm will be discussed including the role of animal scientists in this process.

Key Words: Nutrient Mass Balance, Animal Feeding Operations

721 Auditing and assessing nutrient management for air quality. N. A. Cole*[1], R. W. Todd[1], B. Auvermann[2], and D. B. Parker[3], [1]*USDA-ARS-CPRL*, *Bushland, TX*, [2]*Texas Agricultural Experiment Station*, *Amarillo*, [3]*West Texas A&M University*, *Canyon*.

The potential adverse effects of concentrated animal feeding operations (CAFO) on the environment are a growing concern. The air quality concerns of CAFO vary with the location, type of operation, and other factors. In general, those of most concern include ammonia, hydrogen sulfide, particulate matter (PM), volatile organic compounds (VOC), green house gases (GHG), and odors/odorants. Some states have initiated their own air quality regulations, in part because only PM and VOC are regulated under the Clean Air Act. However, in the future, ammonia and hydrogen sulfide may be regulated under the Superfund (CERCLA) and(or) "Right-to-Know" (EPCRA) Acts. The U.S. EPA and poultry, swine, and dairy industries recently agreed to the National Air Emissions Monitoring Study (Consent Agreement) to fund research on emissions of ammonia, hydrogen sulfide, PM, and VOC from U.S. production farms. Air quality regulations may be based on actual emissions, atmospheric concentrations, human perception (odors) or via limiting the size or location of CAFO. Measuring the concentrations or emissions of most air pollutants is expensive, complex, and labor intensive. Because of large spatial and temporal variability, concentrations and emissions must be measured continuously over an extended period of time. Because different methods/models can give widely varying results with the same data set, it is preferable to use a multitude of methods simultaneously and a mass balance should be run to assure emissions estimates are plausible. In the future, requirements for monitoring of air emissions from CAFO will probably vary from state to state and among different types of operations. Most likely, producers, and not the government, will be responsible for the costs of any air quality monitoring program. Processed-based and empirical models need to be developed so that emissions and(or) concentrations of air pollutants can be estimated from readily obtainable diet, animal, facility, and environmental variables. Auditors will need to be trained in a variety of disciplines including animal sciences, chemistry, engineering, micrometeorology, instrumentation, mathematical modeling, and logic.

Key Words: Air Quality, Regulation, CAFO

722 Training and certification of animal auditors. A. K. Baysinger*, *Farmland Foods*, *Bruning, NE*.

Animal auditing as a profession is in its infancy. Oversight of a profession that can and will have a significant impact to animal agriculture was the motivation to create the Professional Animal Auditor Certification Organization (PAACO). PAACO is an organization of

five animal industry organizations with extensive expertise on best management practices and current science in animal agriculture. The organization's purpose is to promote the humane treatment of animals through education and certification of animal auditors and to promote the profession of animal auditors. Founding and current organizations are the Federation of Animal Science Societies (FASS), American Registry of Professional Animal Scientists (ARPAS), American Association of Swine Veterinarians (AASV), American Association of Bovine Practitioners (AABP) and American Association of Avian Pathologists (AAAP). Website: www.animalauditor.org. PAACO does not create audits nor determine protocols within animal agriculture. Its role is to work with the species organization to train and certify auditors to the industry determined standards.

PAACO, Inc. Background

Successful livestock, dairy and poultry producers and their related industry partners provide sound animal care on commercial farms and harvest plants. Most animal and meat producer organizations have guidelines that are consistent with sound science and a consideration of economic realities. The process by which auditors are qualified, trained and certified continues to be developed by PAACO. Many groups require auditors and audit firms to have specific qualifications, experience and abilities. FASS, ARPAS, AABP, AAAP and AASV are professional, independent, science-based groups that have come together to initiate training and certification for on-farm and harvest plant auditors. PAACO has anticipated the need to evaluate, train and qualify candidates that want to pursue animal auditing as a career. Animal welfare is only the first of many aspects of livestock production to be audited at the farm level. It is in agricultures best interest to verify the qualifications of the potential auditors.

Key Words: PAACO, Audit, Welfare

Breeding and Genetics - Livestock and Poultry: Dairy Cattle III

723 Analysis of calving ease trait in Canadian Holsteins. A. Sewalem*[1,2], F. Miglior[1,2], G. Kistemaker[2], P. Sullvian[2], and B. Doormaal[2], [1]*Agriculture and Agri-Food Cananda*, *Guelph, Ontario, Canada*, [2]*Canadian Dairy Network*, *Guelph, Ontario, Canada*.

The aim of this study was to examine the level of calving ease trait across parities and to estimate genetic parameters in Canadian Holsteins. Data consisted of 271,789 cows from 11,283 herds sired by 2,276 sires. At time of calving the calving ease was recorded as unassisted or unobserved, easy pull, hard pull and surgery. The distribution of each score across parities was 61.38, 31.15, 7.21 and 0.26% for unassisted or unobserved, easy pull, hard pull and surgery, respectively. The statistical model included the fixed effects of herd-year-season, age at calving, sex of calf and the random effects of service sire and animal. A single trait animal model was used. The distribution of each category in the first parity were 49.16, 37.70, 12.84 and 0.30 % for unassisted or unobserved, easy pull, hard pull and surgery, respectively. The corresponding figures in the second parity are 64.53, 30.54, 4.81 and 0.13% and in the third parity 65.18, 29.92, 4.74 and 0.17%. The phenotypic correlations of calving ease trait for parity 1 and 2 was 0.21, for parity 1 and 3 0.17 and for parity 2 and 3 is 0.24. Heritability values from a single trait analysis (as trait of the dam) for parity 1, 2 and 3 were 0.096, 0.132 and 0.129, respectively. Estimation of genetic parameters using a multiple trait animal model is under progress.

Key Words: Calving Ease, Genetic Parameters, Canadian Dairy Breeds

724 Genetics of grass dry matter intake, energy balance and digestibility in Irish grazing dairy cows. D. P. Berry*, M. O'Donovan, and P. Dillon, *Moorepark Dairy Production Research Center*, *Fermoy, Co. Cork, Ireland*.

The objective of this study was to estimate genetic parameters for grass dry matter intake (DMI), energy balance (EB) and cow internal digestibility (ID) in grazing Holstein-Friesian dairy cows. Grass DMI was estimated up to four times per lactation on 1,588 lactations from 755 cows on two research farms in southern Ireland. Simultaneously measured milk production and body weight records were used to calculate EB. Cow ID, measured as the ratio of feed and faecal concentrations of the natural odd carbon-chain n-alkane pentatriacontane, was available on 583 lactations from 238 cows. Random regression and multi-trait animal models were used to estimate residual, additive genetic and permanent environmental (co)variances across lactation. Results were similar for both models. Heritability for DMI, EB, and ID across lactation varied from 0.10 (8 days in milk; DIM) to 0.30 (169 DIM), from 0.06 (29 DIM) to 0.29 (305 DIM), and from 0.08 (50 DIM) to 0.45 (305 DIM), respectively when estimated using the random regression model. Genetic correlations within each trait tended to decrease as the interval between time periods compared increased for DMI and EB while the correlations with ID in early lactation were weakest when measured mid-lactation. The lowest correlation between any two time periods was 0.10, -0.36 and -0.04 for DMI, EB and ID, respectively suggesting the impact of different genes at different stages of lactations which has repercussions for genetic selection. Eigenvalues and associated eigenfunctions of the additive genetic covariance matrix revealed considerable genetic variation among animals in the shape of the lactation profiles for DMI, EB and ID which may be exploited in breeding programs. Genetic parameters presented are the first estimates from dairy cows fed predominantly grazed grass and imply that genetic improvement in DMI, EB and ID in Holstein-Friesian cows fed predominantly grazed grass is possible.

Key Words: Grass Dry Matter Intake, Energy Balance, Genetics

725 Principal components approach for estimating heritability of mid-infrared spectrum in bovine milk. H. Soyeurt*[1,2], S. Tsuruta[3], I. Misztal[3], and N. Gengler[1,4], [1]*Gembloux Agricultural University*, *Gembloux, Belgium*, [2]*FRIA*, *Brussels, Belgium*, [3]*University of Georgia*, *Athens*, [4]*FNRS*, *Brussels, Belgium*.

Mid-Infrared spectrometry predicts the milk components (e.g., %fat, %protein) from spectral data reflecting the milk composition. The data included 9,663 test days on 1,937 cows in 1 to 12 parity recorded from April 2005 to May 2006. Each sample was scanned by MilkoScan FT6000 into 1,060 points. Due to the high dimension, principal components approach (PCA) was done to reduce the traits and indicated