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SYMPOSIA AND ORAL SESSIONS

Beef Species: Enterprise Integration for Sustainable Beef Production

614 Applications of grazingland simulation models. J. D. Hanson*, *USDA/ARS, Mandan, ND.*

The demand for goods and services produced from grazinglands has continued to accelerate over the past twenty. Complex interactions of environment, nutrients, plants, and animals within regions containing grazingland reduce the probability of consistently producing enough high quality crops and forages to maintain a stable and productive livestock enterprise. Simulation modeling has been used to examine the effects of agricultural management practices on environmental quality and to develop improved management practices, which are environmentally sound and profitable to the producer. These models are designed to represent the complex interaction of many factors. Models have been developed for the entire management system and for individual components of the system. The purpose of this paper is to examine various applications of simulation models to beef cattle production, forage production, carbon sequestration and storage, and other problems associated with grazingland management. The objectives of each modeling effort will be presented along with any lessons learned and gaps in our existing knowledge and abilities. An overall evaluation of the current ability to use simulation models to address natural resource problems will be addressed.

Key Words: Grazingland, Forage production, Beef cattle

615 Whole farm integration: Silvopastoral systems. J. P. S. Neel* and D. P. Belesky, *USDA-ARS Appalachian Farming Systems Research Center, Beaver, WV.*

Silvopasture integrates tree and forage production, creating unique microclimates. These microclimates significantly impact forage physiology, growth and development, and thus nutritive value. Integration of silvopasture into the farm system will influence nutrient availability, balance and cycling throughout the year. It also impacts overall farm productivity and income by increasing the production and value of saleable product. This is accomplished (dependent on geographic location) either by increased management of existing woodlots, thinning lower value trees and decreasing tree canopy to the point where herbage plants can be sustained, or introduction of trees to open pasture. We have found silvopasture herbage generally contains higher levels of nitrogen relative to energy when compared

to that growing in open pasture. This energy:nitrogen relationship provides unique opportunities from both an animal nutrition and farm systems standpoint. Nutritionally, silvopasture can be a source of nitrogen rich herbage to be utilized as a supplement to forage that is nitrogen deficient. From a systems standpoint, these areas may provide a means of capturing excess or waste nitrogen due to the inherent plant need for increased nitrogen levels because of microclimate conditions. Sustainable beef production is dependent on the reduction of off-farm inputs and the efficient utilization and integration of on-farm resources. For many beef enterprises, the incorporation of silvopasture or improved management of existing silvopasture, will enhance resource management and increase the chances for sustainability. We present experiences in the establishment and management of silvopasture as well as knowledge on nutritive value and pasture productivity.

Key Words: Silvopasture, Sustainable, Nutritive value

616 Sustainable beef production systems: An international perspective. G. R. Hagevoort*, *New Mexico State University Agricultural Science Center, Clovis.*

Animal production internationally is in the midst of a 'Livestock Revolution', which unlike the 'Green Revolution' is driven by demand. Income levels, population and urban growth in developing countries are drivers for this revolution, which is predicted to generate growth in meat and milk production till the year 2020 at rates of 2.8% and 3.3% annually in developing countries vs. 0.6% and 0.2%, respectively for developed countries. These rates of growth imply intensification of production systems, which historically have been associated with unsustainable practices. To achieve this growth, a shift from roughage-based systems to cereal-based systems is predicted, which would require annual feed consumption of cereals to rise by 292 million metric tons between 1993 and 2020. Production systems are predicted to emphasize land-divorced industrial production systems with large nutrient outflows. Sustainability can be achieved in most of the world's production systems by implementing a systems approach at a higher level, thereby restoring the balance between land and livestock, and closing nutrient cycles. Biodiversity appears to be key in all approaches. Consensus is that available technologies will only be adopted if the appropriate policy framework is established. Financial incentives,

regulatory instruments such as zonation, institutional ownership changes, empowerment, awareness and education are mentioned as instruments of change. In general it is accepted that the rural poor and landless, especially women, could benefit from an intensification of animal agriculture, and the 'Livestock Revolution' could contribute to the alleviation of poverty. However, rapid industrialization supported

by widespread subsidies for large-scale credit and land use could harm this mechanism of income and asset generation by the poor. The goal of this presentation is to address some technologies available for the different production systems throughout the world's climate zones.

Key Words: Sustainable animal agriculture, World trade, Farm policy

Breeding and Genetics: Beef, Sheep & Swine Breeding

617 Connectedness in Targhee and Suffolk flocks participating in the U.S. National Sheep Improvement Program. L. A. Kuehn*, R. M. Lewis, and D. R. Notter, *Virginia Polytechnic Institute and State University, Blacksburg.*

Connectedness among animals in separate flocks reduces risks associated with the across-flock comparison of EBV. The objective in this study was to assess levels of connectedness in the genetic evaluation of weaning weight among Targhee and Suffolk flocks participating in the U.S. National Sheep Improvement Program (NSIP). Among flocks currently participating in NSIP, a total of 25,404 weaning weight and 35,794 pedigree records were available for 16 Targhee flocks, and 14,017 weaning weight and 18,311 pedigree records were available for 24 Suffolk flocks. Connectedness was measured using two different methods. First, numbers of progeny with recorded weaning weights from linking sires (defined as sires with progeny in multiple flocks or sires born in one flock with progeny in another flock) were counted. Second, connectedness was measured by calculating the average prediction error correlation of mean flock EBV (flock r_{ij}). Benchmarks for flock r_{ij} were established with 0.10 and 0.05 representing low and moderate risk of comparing EBV among flocks, respectively. From 1995 through 2004, 44% of Targhee lambs but only 23% of Suffolk lambs with weaning weights were born to linking sires. Average flock r_{ij} were 0.10, 0.19, and 0.28 and 0.02, 0.02, and 0.04 in 1990, 1995, and 2005 among Targhee and Suffolk flocks that participated in NSIP in all 3 yr. Among all active flocks in 2005, flock r_{ij} averaged 0.13 in Targhee and 0.03 in Suffolk. Hierarchical clustering of flocks based on flock r_{ij} revealed that all active Targhee flocks connect at a level near or above 0.10. In Suffolk flocks, two distinct clusters had formed in which connectedness was relatively high within each cluster (flock r_{ij} near 0.10) but near zero between clusters. Risk in comparing EBV among flocks in Targhee is low; however, caution should be exercised when comparing EBV between Suffolk flocks from different clusters.

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Key Words: Connectedness, Prediction error, Sheep

618 Role of sire referencing schemes in terminal sire sheep to improve carcass quality in crossbred lambs. R. M. Lewis^{1,2}, A. M. van Heelsum², W. Haresign³, M. H. Davies⁴, R. Roehe², L. Bünger², and G. Simm², ¹*Virginia Polytechnic Institute and State University, Blacksburg*, ²*Scottish Agricultural College, Edinburgh, Scotland, UK*, ³*University of Wales, Aberystwyth, Wales, UK*, ⁴*ADAS Rosemaund, Preston Wynne, England, UK*.

In sire referencing schemes (SRS) genetic links are created among flocks by sharing rams. These links allow for across-flock genetic

evaluations creating a larger pool of candidates for selection and quicker genetic progress. In the early 1990s, SRS were introduced in the Charollais, Suffolk and Texel breeds in the UK resulting in gains near 2% per annum in a Lean Growth Index (LGI). In this study, the consequence of that gain on carcass traits of terminal sire cross lambs was tested. Thirty rams from SRS in each breed, half high and half low in LGI, were mated to 4,800 crossbred ewes between 1999 and 2002. Mean LGI differed by 5 s.d. between index groups. At target finish of 11% subcutaneous fat (SCF), the 6,584 lambs were weighed and slaughtered. Cold carcass weights were recorded. The right side of 978 carcasses was processed into retail cuts including leg steaks, cutlets and chops. A linear mixed-model was fitted using REML with year, sire index category and breed, sex, birth-rearing rank, dam age and, as a covariate, estimated SCF as fixed effects. Rearing dam and residual were random effects. A sire index category by breed interaction was found ($P < 0.05$) but did not cause re-ranking. Offspring of high as compared to low index sires weighed 1.1 ± 0.10 kg more at finish yet were no older, with 0.56 ± 0.047 kg heavier cold carcass weights. High index lambs yielded 0.47 ± 0.090 kg more saleable meat with increased weights of leg steaks, cutlets and chops ($P < 0.001$). In 2004, the average value per kg carcass was £2.62 (US\$4.60) in the UK. If over its lifetime, a ram sires 240 reared lambs and each lamb produces 0.56 kg extra carcass weight, a high index ram would earn an extra £353 (US\$620). In the UK, where roughly 10.1 million terminal sire cross lambs are marketed annually, this could generate £15 million (US\$26.2 million) more income. Clearly, within-SRS selection on LGI results in crossbred lambs yielding more saleable lean meat allowing substantially higher market returns.

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Key Words: Sire referencing, Carcass quality, Crossbred lamb

619 Genetic factors influencing different body weights of Thalli sheep in Pakistan. P. Akhtar*, A. Hussain, S. Ali, and M. Younas, *University of Agriculture, Faisalabad, Punjab, Pakistan.*

Thalli is the native sheep breed of Thalli area of the Punjab, Pakistan. Data on 17030 birth records of 5421 Thalli sheep maintained at Livestock Experiment Station, Rakh Ghulaman, district Bhakkar during 1975-2004 were utilized in the present study with the objective to evaluate the performance of Thalli sheep in Pakistan. The data were analyzed using GLM procedure of SAS to study the influence of environmental sources of variation on various performance traits. The genetic parameter estimation was done using DFREML 1997 procedure fitting an Individual Animal Model. The average birth weight was 4.11 ± 0.82 kg, which was significantly affected by year, type of