weaning until d 2 post-wean then returned to pre-wean level by d 3 for all treatments. Short-term differences in calf performance warrant further exploration of the possible long-term effects on heifer development and steer feedlot performance.

Key Words: weaning, stress, calf performance

SE ARPAS SYMPOSIUM

36 Preweaning causes of morbidity and mortality. David R. Smith, *Mississippi State University College of Veterinary Medicine.*

Prior to weaning, beef calves are susceptible to a variety of traumatic, infectious, parasitic, nutritional, and metabolic diseases. Calves less than three weeks of age are particularly vulnerable to weather-related factors that may induce hypo- or hyperthermia, predation and other forms of physical injury, and metabolic diseases often related to starvation. The most common infectious cause of death in calves less than three weeks of age is diarrhea due to a variety of viral, bacterial, and protozoal infections. The leading cause of death in calves from 3 weeks of age to weaning is pneumonia, although parasitism and nutritional deficiencies are common causes of impaired productivity at that age. Both neonatal calf diarrhea and calf pneumonia can be explained in part by age-related susceptibility due to loss, or failure to acquire, maternal immunity from colostrum. The waning of passively-acquired maternal immunity, in the gut in the case of neonatal calf diarrhea, or systemically in the case of pneumonia, prior to the onset of a strong acquired immunity creates an age-related window of susceptibility for these two important infectious diseases of calves prior to weaning. Most pathogens associated with diarrhea or pneumonia are endemic to most cattle herds. The adult cow herd serves as the reservoir of these agents from one year to the next. Between birth and weaning, pathogens are primarily transmitted between calves by direct contact or through contaminated environmental surfaces. The incidence of both neonatal calf diarrhea and calf pneumonia are affected by population dynamics that create opportunities for effective contacts. The system of management either creates or averts the relative opportunities for all forms of calf-hood diseases, and the design of beef cattle production systems that favor disease prevention remains an important scientific endeavor.

Key Words: pneumonia, diarrhea, preweaning

35 Economic Considerations of Pre-Weaning Calf Health Management. John M. Riley, Courtney Hurt, Derrell Peel, Kellie Raper, *Oklahoma State University.*

The impacts of bovine viral diarrhea virus (BVDv) and persistently infected (PI) are felt across the cattle industry. This project utilized data and parameters from a meta-analysis of reported results along with partial budgeting procedures to determine economic costs and benefits of herd and calf health management. A base herd of 100 head, consisting of 50 breeding females, 43 calves, and 7 replacement heifers and bulls was implemented. Ninety- six percent of cow-calf operations are uninfected from BVDv. Introduction of an enhanced health program as an uninfected herd resulted in a net loss of $7.64 per bred cow in the first year of the program and a net loss of $6.46 in year two. First-year costs were higher due to initial testing, while second-year costs did not include testing under the assumption that carriers were culled. Infected herds incurred net losses of health program implementation of $96.21 per bred cow for the first year but a gain of the program of $27.96 in year two. First-year losses were larger due to increased testing and eradication costs. Gains in the second year stemmed from increased productivity across the herd. Furthermore, gains were discovered beyond cow-calf operations. Evaluation of downstream demand for calves (i.e., stocker operations) resulted in gains of $4.39 per stocker for a producer that retains ownership of their calves and $48.89 for producers purchasing calves from cow-calf operators (commercial). Commercial stocker operators benefited from fewer health issues without added cow-calf level costs. These results indicate cow-calf producers would carry the burden of the costs of managing, and attempting to eradicate, BVDv/PI across the industry. These results provide industry stakeholder groups and policymakers benchmarks for incentives to induce health programs, targeted largely at the cow-calf level

Key Words: herd health, bovine viral diarrhea virus, economics

37 Carry-over effects of health management through the production chain. Daniel U. Thomson, *Kansas State University.*

The beef supply chain has many segments for live animals and beef products. Live cattle are sold from the ranch to the stocker to the feedlot and then to the packer. Animals get sick due to an overwhelming exposure to a pathogen or a suppressed immune system.

Many times, disease infections can occur in one segment of the industry but not present clinically until the cattle are stressed during transfer to a subsequent beef production segment in the supply chain. These diseases can have an impact on cattle reproductive efficiency, performance efficiency, food safety, and economics due to decrease animal health. The lack of vaccination, biosecurity, and diagnostic surveillance can result in animals being exposed to disease causing pathogens on the ranch, during marketing, or after they arrive at the feedlot. New animals entering the herd can bring diseases into a cow/calf operation. Calves leaving a cow/calf operation can carry agents such as infectious bovine rhinotracheaitis, bovine viral diarrhea, Leptospira bacteria, bovine leukosis virus and other pathogens into the stocker, backgrounder, or feedlot operation. Commingling occurs routinely in auction markets and feedlots. We can decrease disease exposure through diagnostic monitoring, biosecurity, and proper vaccination programs. We can improve the functioning immune system through preparing cattle for market transfer through animal husbandry, nutrition, comfort, and more. Health management in the beef supply chain is dependent on decreasing disease exposure and decreasing stress in cattle.

Key Words: beef cattle, disease, health, production

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39 Thoughts on the energetic efficiency of grazing cattle.
Stacey Gunter[1], Corey A. Moffet[2], [1]*USDA-ARS, Southern Plains Range Research Station,* [2]*USDA-ARS*

Energetic efficiency of cattle is a significant issue in the beef industry. Ruminant nutritionists have made strides in improving production efficiency, but we still see significant variation among individuals. A popular method for evaluating the cattle efficiency is selection based on residual feed intake. This method has some limitations because of mounting evidence that it has a genotype x environment interaction. Individuals deemed most efficient being fed in confinement are not most efficient when their environment is grazing. Hence, cattle efficiencies need to be evaluated in appropriate environments. Because it is impossible to directly measure DMI by grazing cattle, we need to develop proxies to assess the animal's efficiency. By using experimental methods such as breath cloud analysis to provide individual estimates of total heat of production and known constants for retained energy in BW gain, we can calculate ME energy intake. However, we still lack the ability to measure DMI without the true digestibility of the grazed diet. The greatest energy expenditure is basal metabolism and if we are to decrease it, we will need to examine their body composition and protein-turnover rates. The rates of protein and fat deposition in the carcass affects an animal's efficiency and ADG chiefly because of the higher energy density of fat. However, with great protein deposition, there also is a higher ME requirement for its maintenance because of the high protein turn-over rate. Energy expensed for protein turnover is approximately 23% of the total energy intake by average cattle. Management that decreases body protein turn-over rate probably would result in a decreased basal metabolism. The research needed to truly improve the energetic efficiency of grazing cattle will be time consuming and expensive, but for progress to be made it will be required.

Key Words: beef, grazing, respiration

43 Improved grazing system productivity, efficiency and sustainability through novel approaches.
James P.S. Neel, *USDA-ARS-PA-GRL*

A grazing system includes unique soil, plant, and animal attributes. Interactions between these entities will necessarily invoke reactions by the other players in the system. History shows us that manipulation of any one component of the system may or may not have negative ramifications on the system's overall productivity and health. Novel approaches to improve nutrient use efficiency and product output from forage based livestock production systems are essential if we hope to provide high quality, nutrient dense, and high biological value livestock food products to an ever increasing world population. Furthermore, to ensure grazing systems' health and sustainability these novel approaches must be evaluated for merit in a scientific and multidisciplinary manner. The Appalachian region is noted for its beautiful mountains, with farms generally containing a higher percentage of wooded area than pasture. If farm livestock productivity were to be increased, a novel approach was needed to bring woodlots into forage production. A long term research project was conducted at the Appalachian Farming Systems Research Center, in Beaver, WV, to determine how wooded areas could be transitioned into forage production systems in a sustainable manner. A multidisciplinary team was utilized to determine the implications of silvopasture development on soil and water quality, plant community response, and livestock productivity. Silvopasture was found to be a viable option for improving an