

WSASAS Symposium-Beef: Beef Production in Arid Environments

296 Significant research accomplishments applicable to arid environments. J. Paterson,* *Montana State University-Bozeman, Bozeman*

The improvement in the production and sustainability of beef cattle in the US has been remarkable over the past 50 yrs. Research has been responsible for producing beef cattle which require 10% less feed energy, 30% less land, 14% less water and produce 18% less greenhouse gases. Beef produced per cow has more than doubled during the past 50 yr (91 vs. 227 kg/cow/yr) and yet we have the lowest cow inventory since 1952. Thirty years ago it required approximately 600 d to grow calves from birth to slaughter; today its 480 d. Research has shown the benefits of crossbreeding, and its effects on weaning weights (25% improvement), genetic correlations, survivability, stayability, performance testing, accurate selection decisions based on EPDs and evaluation of sires based on residual feed intake (RFI). Selection of animals for low RFI can result in 10% lower feed intakes and a 25% reduction in methane production; clearly desirable under drought conditions. Using DNA from a Line 1 Hereford was the basis of a bacterial artificial chromosome library and the bovine genome sequence. Sixty years ago, ranchers did not have ready access to frozen semen, estrus synchronization, prostaglandins, ultrasound, freezing of embryos or vaccines for reproductive diseases. One of the most widely adapted management strategies has been the use of body condition scoring and its relationship with return to estrus, conception rates, and feeding strategies. Research have shown the consequences of protein restriction of the cow on the depression in the productivity of her calves (fetal programming). To improve nutrient utilization, routine usage of ionophores (\$250 million dollar savings in feed), implants, grain byproducts and non-protein nitrogen usage have been widely adopted. Sixty years ago, one of the major accomplishments was the benefits of supplementation with P and protein to increase forage intake, growth and reproductive efficiency. Laboratories that routinely provide nutrient analyses are based on forage and grain chemistry research and confirmatory trials conducted during the 1970s and 1980s. Consumer concerns over animal care has resulted in implementation of beef quality assurance programs. Beef cattle production in the western US will depend on the utilization of high forage diets for the cowherd. Challenges for the future will include high input costs, consumer perception about beef safety, animal welfare, carbon footprint and end product quality. Research will be judged as to whether the outcomes are sustainable in terms of economic, social and environmental acceptance.

Key Words: beef research, arid environment

297 Cows that fit arid environments. B. H. Dunn,* *South Dakota State University, Brookings.*

For any cow, the challenge to be both biologically and economically efficient in the production system they are in is the basic measure of fitness. The ability of a cow to annually reproduce within its given feed environment over a relatively long period is the most important factor in the determination of fitness. For cows in production systems located in arid environments, this basic production phenomenon becomes even more critical, as the feed environment, when compared with that found in more temperate environments, is not only regularly restricted by drought, but subject to greater levels of change, and the importation of supplements expensive. Climate change could also be altering the boundaries associated with historic climatic regions, and exasperate the average, as well as the range, associated with annual precipitation

within regions. It follows then, that a functional understanding of how a cow partitions feed energy first to maintenance, second to growth, then to lactation, and lastly to reproduction, is critical in determining cows that fit arid environments versus those that do not. Also, it is important to understand the limitation of using genetic selection as a tool for improving fitness to arid environments because of the low level of heritability for reproductive traits when compared with other economically important traits. As breed differences for economically important traits continue to moderate, using mating systems to breed cattle that have the genetic potential to thrive in arid environments becomes more challenging. In the future, masking problems associated with raising cattle in arid environments that do not fit, by supplementing them with imported feed resources could be increasingly problematic, as transportation costs, as well as opportunity costs for alternative uses, price supplements beyond economic reason.

Key Words: beef cattle, cow size, cow efficiency

298 Supplementation strategies in arid environments. D. W. Bohnert,* *Eastern Oregon Agricultural Research Center, Oregon State University, Burns.*

The principle goal of most supplementation programs designed for beef cattle is to improve performance by providing the limiting nutrient(s) for the specific production scenario; however, in arid environments most supplementation strategies routinely have this and one other equally important goal: modifying grazing behavior. When this is taken into consideration, along with extensive pastures, variable topography, limited water availability, herd sizes, and inconsistent forage production common to the arid regions of the western US, developing effective supplementation strategies can be a challenge. Also, many of the arid regions grazed by beef cattle in the western US contain sensitive resource areas, such as riparian zones, critical wildlife habitat, and recently burned areas, which should be considered when developing a supplementation program. This is further complicated with the management challenges often faced by producers that utilize public lands in their grazing programs. Areas of research that I will discuss include grouping animals into contemporary groups, infrequent supplementation, variation in supplement intake due to form of supplement, and supplement placement as a tool to modify grazing behavior. This presentation will provide information that can be used in developing supplementation strategies that decrease the costs associated with supplementation while meeting acceptable levels of production. In addition, concepts that can be used to develop supplementation strategies that attract cattle away from critical areas and lure them into underutilized areas while maintaining or improving performance, thereby meeting production and conservation goals, will be provided.

Key Words: behavior, cattle, supplementation

299 Restocking the cow herd. D. Peel,* *Oklahoma State University, Stillwater.*

The US beef cow herd has decreased 14 of the last 16 years. On January 1, 2012, the beef cow inventory was 29.88 million head, the lowest beef cow inventory since 1962. The drought in 2011 pushed cow inventories lower despite growing market incentives for herd expansion. At the same time, high concentrate feed prices are affecting forage values with implications for all sectors of the cattle industry. Record high feeder

prices increases profit potential for cow-calf production but rising and volatile input prices makes cost of production uncertain. Rebuilding the cow herd will be a slow and difficult process due to the critically low numbers and the record high prices for breeding animals. This symposium presentation will cover factors that have contributed to the continued decline in cow inventories; the implications of the current herd size; and the challenges of rebuilding the herd in coming years.

Key Words: beef cow inventory, herd expansion

300 A systems approach to ranching in arid environments. C. P. Mathis,* K. C. McCuiston, and R. D. Rhoades, *King Ranch Institute for Ranch Management, Texas A&M University-Kingsville, Kingsville.*

Ranches are complex systems driven by internal and external forces. All ranches are different, but are still affected by the laws of systems. The laws of “unintended consequences,” “worse before better,” and “compensating feedback” are all real in ranching or any other business organization. It may not be obvious, but success in ranching is affected by how well managers understand the reality of these laws as they make decisions affecting complex ranching systems. In arid environments where variable precipitation and low forage production associated with drought is generally the greatest risk to a sustainable ranching operation, often the most important decision a manager makes is the selection of

enterprises in which the ranch engages. The thoughtful mix of cow-calf, stocker, and other livestock enterprise, especially when complemented with wildlife enterprises, helps create income diversification and the flexibility in stocking rate needed to cope with drought or capitalize on excess forage availability. The external forces of nature and commodity prices cannot be controlled; however, adaptability and diversification can help mitigate those risks. In arid environments in North America, cow-calf enterprises are generally the core of the ranching operation. Management decisions relating to the cow-calf enterprise should also incorporate consideration of the effect of those decisions on the ranch as a whole. According to standardized performance analysis (SPA) data from the Southwestern US, labor, depreciation, and purchased feed comprise the majority of costs to a cow-calf enterprise. These categories are also generally the top 3 expenses to arid land ranching operations as a whole. Further, SPA data reveals that ranches in the top net income quartile not only raise the highest value calves at weaning, but they also have the lowest cost of production compared with the less profitable quartiles. Understanding individual drivers of profitability is important; however, managers are encouraged to look past simply optimizing the pieces of the ranch operations. To develop a highly successful and sustainable ranching business, the relationship among the enterprises on the ranch must be maximized.

Key Words: systems, ranching, drought