STRATEGIES FOR MANAGING HEIFERS IN THE SOUTHEAST

0057 Influences of feeding and housing practices on the behavior and performance of dairy calves.
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Approaches to rearing replacement dairy heifers vary widely between farms across the Southeast, and the behavior and performance of the calf early in life is highly subject to management practices. There is also increasing evidence that early life environment and experiences can have longer-term effects on the performance and health of the growing heifer and mature cow. This presentation will review the current understanding of the short and longer-term behavioral and performance implications of early life management factors that may vary on-farm, including milk feeding method, solid feed provision, and social housing. First, on-farm milk-feeding levels typically range between conventional restricted feeding programs to free-access feeding. From a behavioral standpoint, milk feeding level influences milk meal frequency and diurnal patterns of feeding time before weaning. Early rate of weight gain is dependent on milk feeding level, and there is evidence that differences in performance may be maintained postweaning and have later benefits in life. A main goal of rearing replacement heifers is to wean them successfully from milk to solid feed, and early solid feed intake is critical for this transition. Solid feed types and presentation directly affect intake and feeding patterns, and there is evidence that feed experiences during the milk-feeding stage may have a longer-term influence on feeding behavior of weaned dairy calves. For example, postweaning feed sorting behavior appears to depend on feed preferences, which are formed by prior feed experiences, as well as an early opportunity to perform this behavior, as provided by access to a mixed diet. Finally, the housing environment can be highly influential in the social development of the calf and may also interact with feeding methods, having both immediate and longer-term effects on performance and behavior. Social contact has been demonstrated to be beneficial in encouraging early solid feed intake and supporting weight gain through weaning. Further, early social environment influences social development, and may have longer-term effects on the behavior of the calf. Group-housing facilities introduce the possibility of competition for feed access, and this may also influence the development of social and feeding behavior. The extent to which all of these early rearing factors may influence long-term behavioral development and performance into lactation remains largely unknown and requires further investigation.

Key Words: behavior, dairy calf, feeding

0058 Developing replacement heifers that get pregnant and maintain pregnancy.
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Reproductive failure is one of the most substantial barriers to profitability in dairy herds. Management issues, cow infertility, bull infertility, heat stress, embryonic mortality (EM), and poor heifer development are all contributing factors to reproductive inefficiency. Developing heifers that successfully establish and maintain a pregnancy, give birth to live offspring, and stay in the herd for a number of years is critical. In addition to proper selection of these heifers, minimizing reproductive inefficiency, specifically EM, is vital. Embryonic mortality is generally considered to be the primary factor limiting conception rates in cattle and occurs early (<d 25) or late (≥d 25) during gestation (d 0 = estrus). In cattle, the incidence of early EM is approximately 25% and the incidence of late EM is varied, approximately 3.2 to 42.7%. However, in heifers, these numbers are thought to be decreased but are still a major issue. Significant effort has been directed toward understanding the mechanisms resulting in early EM; however, relatively little is known about the causes or mechanisms associated with late EM, most of which occurs around the time of placentation. Mechanisms associated with reproductive loss around the time of placentation may be associated with inadequate placental development or function. Binucleate trophoblast cells constitute 15 to 20% of the ruminant placenta trophoblast population, appear around d 19 to 20 of gestation in cattle, and secrete pregnancy associated glycoproteins (PAGs), along with other products. Bovine PAGs are commonly used to diagnose pregnancy success in cattle and have recently been reported to be a potential marker of late EM in dairy cattle (Pohler et al., 2015). Based on positive and negative predicative value analysis, we have identified circulating concentrations of PAG that are 95% accurate in predicting EM at d 28 of gestation. This talk will highlight some of the work our group, as well as others, are focusing on with regard to selecting high fertility heifers, as well as management strategies to decrease reproductive loss in those heifers using PAG testing. In summary, based on the experiments and relevant literature, PAGs seem to be a good marker for predicting EM, but also may provide a useful tool for selection of high fertility heifers. Advancements in our understanding of the mechanisms associated with EM may lead to development of strategies to overcome these reproductive losses.

Key Words: cattle, pregnancy, placenta, embryonic mortality

0059 Benefits of fly control in dairy heifers.
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This presentation discusses the role of the horn fly (*Haematobia irritans*) in the initiation and spread of staphylococcal mastitis among dairy heifers, how this insect vector can be managed, and the benefits of control for animal health and well-being, as well as producer profits. The horn fly is an irritant to livestock, and in response to the incessant painful biting, blood sucking, and stress, cattle expend a great deal of energy in defensive behavior, resulting in elevated heart and respiratory rates, reduced grazing time, decreased feeding efficiency and rate of gain, and reduced milk production. Additionally, the horn fly can serve as a disease vector, such as in the initiation and spread of mastitis in dairy heifers. As such, it is one of the most economically important pests of cattle worldwide. In the United States, $700 M to $1 B in losses are attributed to the horn fly each year, while additional $60 M is spent annually on parasite control. Herd surveys have revealed that the prevalence of mastitis in heifers is markedly lower in dairy herds using some form of fly control compared with herds without a pest control program. The horn fly has a demonstrated role in the development of teat lesions on heifers that develop into chronic *Staphylococcus aureus* mastitis, which is then spread among heifers by these same insect vectors. Such infections, if left untreated, negatively affect the development of milk-producing tissues in the udder, resulting in less than optimal yield and quality during the first and subsequent lactations. The implementation of horn fly control measures such as aerosols, bait, strips, foggers, dust bags, traps, oilers, ear tags, pour-ons, natural predators, and insect growth regulators is instrumental in reducing the new infection rate, while existing mastitis cases can be eliminated with antibiotic therapy. Such management practices will promote animal health and well-being, as well as ensure that heifers calve with low SCC and the potential for maximum milk yield, thereby enhancing producer profits.

Key Words: horn fly, dairy heifer, staph mastitis

0060 Economic trade-offs between replacement rates and improved genetics.
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Genetic progress in sires used for AI is rapidly increasing. This means that replacement heifers are increasingly much better genetically than cows. Economically, this should lead to increased voluntary culling and thereby decrease cow longevity. On the other hand, lower culling rates are often viewed favorably because the costs and environmental impact to maintain herd size are generally lower. Thus, there is an economic trade-off between genetic progress and longevity in dairy cattle. Objective was to investigate these trade-offs. USDA results show that the annual increase in average predicted transmitting ability (PTA) of Net Merit dollars of Holstein sires is accelerating from $20/yr when the sire entered AI in 2000 to 2004, to $52/yr in 2005 to 2009, to $86/yr in 2010 to 2014. We expect that heifers born in 2015 are about $50 more profitable per lactation than heifers born in 2014. An elegant but older study is from Allaire (1981). He found that the economically optimal cull rates were in the range of 25 to 27%, compared with the lowest possible cull rate of 20%. There was only a small effect of using the best surviving dams to generate the replacement heifer calves. Genetic progress from sires also had little effect. Using a spreadsheet model to determine genetic lag in Net Merit PTA between service sires and dams shows that increased cow cull rates reduce the genetic lag only marginally. The ratio of annual genetic trend in sires' PTA for Net Merit and genetic lag was 6.6, 7.7, 8.7, and 9.4% for the annual cull rates of 20, 30, 40, and 50%, independent of the magnitude in sire genetic trend. These results confirm the findings of Allaire (1981) that cow depreciation costs overwhelm the value of the genetic superiority of the replacement heifers. Van Arendonk (1985) showed that the effect of changes in genetic improvement in milk revenue minus feed cost on herd longevity was relatively small. Reduced involuntary cull rates improved profitability, but also increased optimal voluntary culling. Finally, an economic optimal culling model with prices from 2015 confirmed that optimal annual cull rates were insensitive to heifer prices and therefore insensitive to superior genetics in heifers. In conclusion, economic cow longevity depends more on the difference between heifer raising costs and cow cull prices than on genetic progress. This is confirmed by old and new studies.

Key Words: genetics, longevity, economics

ANIMAL BEHAVIOR AND WELL-BEING

0061 Utility of an online learning module for teaching disbudding in dairy calves, including cornual nerve block application.
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Although disbudding or dehorning dairy heifers is necessary for the safety of humans and other cattle, it has been identified as a key animal welfare issue when done without appropriate analgesia. Three-quarters of disbudding or dehorning is done by dairy producers or on-farm staff, the remainder is done by a veterinarian or veterinary technician. Reported use of pain control by dairy producers ranges from 15 to 60%. Cautery disbudding is the most commonly used method; best practices