BEEF CATTLE RESEARCH UPDATE

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Environmental Impact of Ruminants

The environmental impact of livestock production is a matter of continuing national and international debate. It appears that many consumers think that methane emissions are a new phenomenon. Recent research attempted to estimate historic (pre-European settlement, typically, before the 15th century) methane emissions from wild ruminants in the United States and compare these with present-day methane emissions from farmed ruminants (beef and dairy cattle, sheep and goats).[1] Wild ruminants included in the analysis were bison, elk, and deer (white-tailed and mule). Other species (such as moose, antelope, caribou, and mountain sheep and goat) were excluded from the analysis because their natural range is mostly outside the contiguous United States (i.e., Alaska) and in Canada or because they have relatively small population sizes. Present-day methane emissions for farmed ruminants were recent United States Environmental Protection Agency estimates. The numbers of wild ruminants in the pre-settlement period were estimated to be 50 million bison, 10 million elk, 30 million white-tailed deer and 13 million mule deer. This analysis estimated that methane emissions from bison, elk, and deer in the pre-settlement period were about 86% of the current methane emissions from farmed ruminants in the United States. Some scientists have estimated that the pre-European settlement bison population was 75 million. Using this bison population estimate instead of 50 million, it was estimated that wild ruminants in the pre-settlement period emitted about 23% more methane than the current domestic ruminants in the United States.

A Cornell University study (Capper et al., 2009) compared the environmental impact of modern (2007) US dairy production with historical production practices as exemplified by the US dairy system in 1944.[2] These researchers showed that modern dairy practices require considerably fewer resources than dairying in 1944 with 21% of animals, 23% of feedstuffs, 35% of the water, and only 10% of the land required to produce the same 1 billion kg of milk. Waste outputs were similarly reduced, with modern dairy systems producing 24% of the manure, 43% of the methane, and 56% of the nitrous oxide per billion kg of milk compared with equivalent milk from historical dairying. They estimated that the carbon footprint per billion kilograms of milk produced in 2007 was 37% of equivalent milk production in 1944.

Another Capper (2011) study compared the environmental impact of modern (2007) US beef production with production practices characteristic of the US beef system in 1977.[3] This analysis showed that modern beef production requires considerably fewer resources than the equivalent system in 1977, with 69.9% of animals, 81.4% of feedstuffs, 87.9% of the water, and only 67.0% of the land required to produce 1 billion kg of beef. Waste outputs were similarly reduced, with modern beef systems producing 81.9% of the manure, 82.3% of the methane, and 88.0% of the nitrous oxide per billion kilograms of beef compared with production systems in 1977. The carbon footprint per billion kilograms of beef produced in 2007 was reduced by 16.3% compared with equivalent beef production in 1977.

Both of these studies clearly illustrate that modern technology has both improved production efficiency and reduced the environmental impact of livestock production. The author of these studies concluded that in both the beef and dairy industry, it is essential that producers continue to adopt management practices and technologies that improve efficiency while reducing resource use and mitigating environmental impact.

Optimal Density of Steam Flaked Corn in Feedlot Rations Containing Sweet Bran

Steam flaking corn increases starch digestion and improves cattle performance. A 2007 survey of 29 consulting feedlot nutritionists conducted by Texas Tech University researchers reported that the average bulk density recommended for steam-flaked corn (SFC) was 27 lb/bushel; however, the most frequently recommended bulk density was 28 lb/bushel.[4] Many feedlots in the Southern Great Plains use Sweet Bran wet corn gluten feed as an energy and protein source, replacing part of the SFC and supplemental protein in growing and finishing diets (Cole et al., 2006).[5] However, the effects of the bulk density of SFC in diets containing Sweet Bran is not well-defined. Recent Texas Tech University research determined the effects of three bulk densities of SFC in rations containing 25% Sweet Bran (dry matter basis) on feedlot performance, carcass characteristics, and total digestive tract nutrient digestibility.[6] The density treatments were 22, 26, or 30 lb/bushel SFC. The experiment used 108 yearling steers (809 lb initial weight) fed an average of 163 days in 27 pens (4 steers/pen).

These researchers reported that the bulk density of SFC had no effect on overall performance of the cattle. Dressing percent and ribeye area increased linearly ($P \leq 0.05$) as SFC density increased, but other carcass traits were not affected by treatments. For a 5 day period before day 70 of the experiment, feed intake was measured and fecal samples were collected from each pen for measurement of nutrient digestibility. Intakes of dry matter (DM), organic matter (OM), and crude protein (CP) during this 5 day period did not differ among bulk densities; however, starch intake increased linearly ($P = 0.004$) as the density of SFC increased. Digestibilities of DM, OM, and CP tended ($P \leq 0.065$) to decrease linearly, and starch digestibility decreased ($P = 0.002$) linearly, as bulk density of SFC increased.

These authors concluded that the bulk density of SFC can be increased up to 30lb/bushel in rations containing 25% Sweet Bran without affecting performance of finishing beef steers. However, the digestibility of starch might be negatively affected by increased bulk density.

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