BEEF CATTLE RESEARCH UPDATE

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Prevalence and Impacts of Genetically Engineered Feedstuffs on Livestock Populations

The first genetically engineered feed crops were introduced in 1996 and their subsequent adoption has been swift. Since 2000, the USDA National Agricultural Statistics Service has been annually reporting the percentage of corn, cotton, and soybean acres in the United States that were planted with genetically engineered varieties. In 2000, genetically engineered varieties were planted on 25% of corn, 61% of cotton, and 54% of soybean acres.[1] In 2015, genetically engineered varieties were planted on 92% of corn, 94% of cotton, and 94% of soybean acres.[2] University of California, Davis researchers recently reviewed and summarized the scientific literature on performance and health of animals consuming feed containing genetically engineered ingredients and composition of products derived from them.[3] In the review, data on livestock productivity and health were collated from publicly available sources from 1983, before the introduction of genetically engineered crops in 1996, and subsequently through 2011, a period with high levels of predominately genetically engineered animal feed. These data sets represented over 100 billion animals following the introduction of genetically engineered crops.

In this review, these authors noted that commercial livestock populations are the largest consumers of genetically engineered crops, and globally, billions of animals have been eating genetically engineered feed for almost 2 decades. Globally, food-producing animals consume 70 to 90% of genetically engineered crop biomass. They concluded that numerous experimental studies have consistently revealed that the performance and health of genetically engineered fed animals were comparable with those fed near-isogenic (essentially identical genes) non-genetically engineered lines and commercial varieties. In addition, no study revealed any differences in the nutritional profile of animal products derived from genetically engineered fed animals.

Distillers Grains Supplementation Strategy for Grazing Stocker Cattle

Kansas State University research conducted at the Southeast Agricultural Research Center (SEARC) in Parsons, KS evaluating dried distillers grains (DDG) supplementation of stocker cattle grazing smooth bromegrass showed that DDG supplementation at 0.5% of body weight daily to be the most efficacious level from both an animal performance and economic perspective as compared to DDG supplementation 1.0% of body weight.[4] Based on these results, additional Kansas research at this same location (SEARC) evaluated DDG supplementation strategies that might increase the efficiency of supplement conversion by delaying supplementation until later in the grazing season, when forage quality starts to decline.[5] The effects of DDG supplementation strategy on grazing performance and subsequent feedlot performance of steers (predominately Angus breeding) grazing smooth bromegrass pastures in 2008, 2009, 2010, 2011, 2012, and 2013 (36 steers per year) was evaluated. The supplementation treatments evaluated were no supplement, DDG at 0.5% of body weight per head daily during the entire grazing phase, and no supplementation during the first 56 days and DDG at 0.5% of body weight per head daily during the remainder of the grazing phase. The average steers weight and duration of the grazing period were 450 lb and 196 days, 467 lb and 221 days, 448 lb and 224 days, 468 lb and 199 days, 489 lb and 142 days, and 502 lb and 195 days, respectively, in 2008, 2009, 2010, 2011, 2012, and 2013.

The effects of DDG supplementation strategies on grazing performance in each year are shown in Table 1. These researchers reported that supplementation with DDG during the entire grazing phase or only during the latter part of the grazing phase resulted in higher ($P < 0.05$) grazing gains than feeding no supplement. Steers on the delayed supplementation treatment consumed less DDG, but had gains ($P > 0.05$) similar to those supplemented during the entire grazing phase. Thus, steers supplemented only during the latter part of the grazing season would likely have been the most profitable treatment if the cattle had been marketed as feeder cattle at the end of the grazing phase. Supplemental DDG increased daily gain by an average of about 0.5 lb/day compared to non-supplemented steers (average increase of ~34%). The efficiency of supplementation (lb of DDG /lb of added gain) ranged from 2.0 to 6.6. The average conversion for the steers supplemented only during the latter part of the grazing phase was 3.25 vs. 3.88 for those steers supplemented during the entire phase.

Supplementation during the grazing phase had no effect (P > 0.05) on subsequent feedlot performance in 2008, 2010, 2011, 2012, or 2013 (data not shown). Whereas, in 2009 steers that received no supplement during the grazing phase had greater (P < 0.05) finishing gains and lower (P < 0.05) feed:gain ratios than those supplemented during the entire grazing phase. It was also noted that in 2008 and 2012, DDG supplementation during the grazing phase carried no advantage if ownership of the cattle was retained through slaughter. However, in 2009, 2010, 2011, and 2013, stocker cattle that were supplemented with DDG during the grazing phase maintained their weight advantage through slaughter.

Table 1. Effects of DDG supplementation strategy on available on grazing performance of steers grazing smooth bromegrass pastures.

	Level of DDG (% of body weight daily		
Item	0	0.5	0.5 delayed[c]
2008			
Daily Gain, lb	1.64[a]	2.15[b]	2.02[b]
Conversion, lb DDG/lb additional gain	---	6.5	6.6
2009			
Daily Gain, lb	1.47[a]	2.08[b]	2.06[b]
Conversion, lb DDG/lb additional gain	---	3.5	2.9
2010			
Daily Gain, lb	1.53[a]	1.93[b]	1.99[b]
Conversion, lb DDG/lb additional gain	---	3.4	2.8
2011			
Daily Gain, lb	1.29[a]	1.74[b]	1.83[b]
Conversion, lb DDG/lb additional gain	---	3.3	2.6
2012			
Daily Gain, lb	1.28[a]	1.86[b]	1.83[b]
Conversion, lb DDG/lb additional gain	---	3.1	2.0
2013			
Daily Gain, lb	1.50[a]	1.93[b]	1.85[b]
Conversion, lb DDG/lb additional gain	---	3.5	2.6
Six Year Average			
Daily Gain, lb	1.45	1.95	1.93
Conversion, lb DDG/lb additional gain	---	3.88	3.25

[a,b] Means within a row with different superscripts differ (P < 0.05).
[c] DDG not fed during first 56 days of grazing phase.
Adapted from Lomas and Moyer, 2013

[1] USDA National Agricultural Statistics Service. 2000. Acreage. USDA. p. 28-29. Available: http://usda.mannlib.cornell.edu/usda/nass/Acre//2000s/2000/Acre-06-30-2000.pdf

[2] USDA National Agricultural Statistics Service. 2015. Acreage. USDA. p. 25-27. Available: http://usda.mannlib.cornell.edu/usda/current/Acre/Acre-06-30-2015.pdf

[3] Van Eenennaam, A. L. and A. E. Young. 2014. Prevalence and impacts of genetically engineered feedstuffs on livestock populations. J. Anim. Sci. 92: 4255-4278.

[4] Lomas, L. W. and J. L. Moyer. 2009. Supplementation of Grazing Stocker Cattle with Distillers Grains. Kansas State Univ. SEARC Agricultural Research Report of Progress 1013: 1-8. Available: http://www.ksre.ksu.edu/doc15053.ashx.

[5] Lomas, L. W. and J. L. Moyer. 2014. Distillers Grains Supplementation Strategy for Grazing Stocker Cattle. Kansas State Univ. SEARC Agricultural Research Report of Progress 1105: 28-37. Available: http://www.ksre.ksu.edu/bookstore/pubs/SRP1105.pdf.