BEEF CATTLE RESEARCH UPDATE

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Effect of Milk Production in Beef Cows on Post-Weaning Performance of Their Progeny

A major focus in the beef industry has been to maximize profit by using trait selection through the use of expected progeny differences (EPD). Milk production EPDs in most breeds (including Hereford and Angus) has consistently increased since the 1990s while a few breeds' genetic trend is negative or static.[1] Breeds with a negative or static genetic trend including Gelbvieh and Simmental had a relatively high capacity for milk yield when they entered the US beef industry. Selection for increased milk production should result in increased weaning weights. However, this also results in an increase in cow maintenance energy requirements, increasing the cost of feed to maintain cows with greater milk production. Although milk selection traits may increase production by increasing calf weaning weight, the additional cost to maintain production goals with increased milk production may decrease profitability.

In a University of Tennessee study which I reviewed in the February 2017 issue of this newsletter, 24-hour milk production in spring-calving Angus and Angus crossbred cows was measured with a modified weigh-suckle-weigh technique using a milking machine on approximately days 58 and 129 after calving.[2] The milk yield data was used to retrospectively classify cows on actual milk yield as Low (14.5 lb/day), Mod (19.9 lb/day), or High (26.4 lb/day). Based on the results of this study, these researchers concluded "that even in management systems that modify the grazing environments with harvested feedstuffs, high milk production decreases reproductive efficiency without increasing calf BW at weaning". Furthermore, they recommended that "producers may need to discount high milk producing cows and take into account the requirements for maintaining a greater amount of milk, and the negative influences associated with a greater milk yield".

In an additional part of this research project, 91 weaned Angus steers and heifers were used to determine the influence of dam's milking potential on progeny performance and feed efficiency post-weaning.[3] At weaning each year, calf body weight (BW) was measured prior to entry into a GrowSafe Feeding System and again 10 days after to account for the acclimation period to the feeding system. The BW after the acclimation period was considered the initial entry BW. After the acclimation period, BW were recorded at a midpoint (~35 days post-acclimation) and at the termination of a backgrounding trial (~75 days post-acclimation). During both the acclimation and study period, steers and heifers were fed a corn silage-based growing ration and individual dry matter intake (DMI) was recorded daily. Average daily gain (ADG) and average DMI for each time point were utilized to calculate a feed conversion ratio (feed:gain) for individual animals. The overall feed efficiency was also measured as residual feed intake (RFI). RFI is defined as the difference between an animal's actual feed intake and its expected intake based on body weight and growth rate. Positive RFI animals eat more than expected in relation to their weight and gain, so they are less efficient. A negative RFI value is better and indicates a more efficient animal.

The effects of the dam's milk production level on post-weaning performance of the calves is shown in Table 1. Calves from Moderate and High milking cows had similar initial BW (700 lb) with progeny from Low milking cows having the lightest BW (655 lb; $P < 0.01$). Moderate and High calves maintained greater BW ($P \leq 0.03$) until the end of the backgrounding phase.

Even though calves from Low milking cows had the lightest BW during the study, BW gain and average daily gain were not different ($P > 0.45$) among groups over the total trial. Overall DMI was 10.7% greater ($P = 0.04$) in calves from High milking dams (27.36 lb) with no differences between calves from Low (24.30 lb) and Moderate cows (25.14 lb). As a result, feed conversion ratios were

16.9% lower (more efficient) in calves from Low and Moderate milking dams compared to calves from High milking dams (P = 0.04). In addition, calves from Low milking dams had a negative RFI value (-1.06) compared to Moderate (0.33) and High calves (0.69; P =0.03) indicating they were more efficient.

Table 1. Effect of dam's milk production level on post-weaning performance of the calves.

	Milk Production[1]			
Measurement	Low	Mod	High	P-value
Body Weight, lb				
Initial[2]	655[a]	699[b]	701[b]	<0.01
Midpoint[3]	745[a]	796[b]	776[ab]	0.02
Final[4]	833[a]	882[b]	864[ab]	0.03
BW Gain				
Initial to Midpoint	90[a]	97[a]	75[b]	0.05
Midpoint to Final	88	79	75	0.90
Initial to Final	179	176	150	0.45
Average Daily Gain, lb/day				
Initial to Midpoint	2.71[a]	2.80[a]	2.49[b]	0.06
Midpoint to Final	1.63	1.70	1.63	0.92
Initial to Final	2.09	2.18	2.03	0.49
Dry Matter Intake, lb/day				
Initial to Midpoint	22.29[a]	22.91[a]	25.84[b]	0.08
Midpoint to Final	26.99	27.23	27.78	0.62
Initial to Final	24.30[a]	25.14[a]	27.36[b]	0.04
Feed:Gain Ratio				
Initial to Midpoint	8.22[a]	8.19[a]	10.42[b]	0.03
Midpoint to Final	16.54	16.02	17.11	0.44
Initial to Final	11.60[a]	11.53[a]	13.52[b]	0.04
Residual Feed Intake	-1.06[a]	0.33[b]	0.69[b]	0.03

[a,b] Means with different superscripts differ (P ≤ 0.05).
[1]Milk production groups: Low (14.5 lb), Mod (19.9 lb), or High (26.4 lb).
[2]Initial BW occurred after 10 d acclimation period in the GrowSafe feeding system.
[3]Midpoint BW occurred ~ 35 d after initial BW.
[4]Final BW occurred ~ 75 d after initial BW.
Adapted from Mulliniks et al., 2017.

These researchers concluded that results from this study suggest that selecting for maternal traits of high milk production for increased calf growth results in decreased post-weaning feed efficiency. The data suggest that offspring from low milking beef cows have an increased post-weaning feed efficiency. They also noted that combining the cow performance results from their first study[8] and this study, "discounting the selection for milk production increases cow herd efficiency through the backgrounding phase". Thus, they concluded that "balancing genetic potential for milk yield with post-weaning performance of the offspring is necessary to develop efficiency in all beef industry segments".

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[1] Kuehn, L. A. and R. M. Thallman. 2016. Across-breed EPD tables for the year 2016 adjusted to breed differences for birth year of 2014. In: Beef Improvement Federation Annual Research Symposium and Convention, Manhattan, KS. p. 127-154.

[2] Edwards, S. R., J. D. Hobbs, and J. T. Mulliniks. 2017. High milk production decreases cow-calf productivity within a highly available feed resource environment. Transl. Anim. Sci. 1: 54-59.

[3] Mulliniks, J. T., S. R. Edwards, J. D. Hobbs, Z. D. McFarlane, and E. R. Cope. 2017. Postweaning feed efficiency decreased in progeny from high milk producing beef cows. Proc. West. Sec. Am. Soc. Anim. Soc. 68: 248-252.