

Benefits of net feed intake in a large commercial feedlot

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Abstract. This experiment investigated the benefits of feeding steers bred from parents known to be of high genetic merit for feed efficiency (HE; midparent net feed intake-estimated breeding value (NFI-EBV) ≤-0.3kg/day), medium efficiency (ME: midparent NFI-EBV >-0.3 to 0.14 kg/day), or low efficiency (LE; midparent NFI-EBV ≥0.16kg/day). The steers were evaluated over a 251-day feeding period in a large commercial feedlot. Genetic superiority in NFI had a favourable impact on the commercial performance of Angus steers by reducing feed consumed with no adverse effect on final turnoff weight. Each HE steer consumed on average 2.60t of feed compared to 2.87t by the ME and LE steers, with no compromise in weight gain. The HE steers gained less subcutaneous ribfat during the feedlot period but marbling scores were not influenced by NFI, and dressing percentage was higher in the HE steers. The feed efficiency benefit was sustained for 251 days and showed that genetic improvement of feed efficiency will reduce feed costs in a large commercial feedlot.

Keywords: net feed intake, steers, feedlot, efficiency.

Introduction

Genetic improvement in feed efficiency has the potential to reduce feed costs in a feedlot operation whilst still maintaining production levels. Net feed intake (NFI) is a measure of feed efficiency and is the difference between actual feed intake by an animal and its expected feed intake based on its requirements to maintain weight and for its growth. This experiment aimed to validate the benefits from feeding steers bred from parents known to be of high, medium and low genetic merit for NFI in a large commercial feedlot.

Methods

The steers were bred at the Agricultural Research Centre, Trangie, NSW, from sires and dams with known postweaning NFI-estimated breeding values (NFI-EBV). The mean of the sire and dams EBV-NFI ("midparent EBV-NFI") was used as the measure of genetic merit for feed efficiency. The steers were drafted into three groups differing in genetic merit for feed efficiency: high efficiency (HE; midparent NFI-EBV ≤-0.3kg/day), medium efficiency (ME: midparent NFI-EBV >-0.3 to 0.14 kg/day), and low efficiency (LE; midparent NFI-EBV ≥0.16kg/day), and sold to the cooperating feedlot. The steers were inducted into the feedlot at an average age of 447 ±17 (sd) days and each group placed into a separate pen. Animals were weighed at the start of the feeding period, at 113 days on feed (a typical period of short-term feeding), and after 231 days (a period typical of long-term feeding). Pen feed intakes were recorded for 251 days and then the animals were slaughtered. Carcasses were split and sides weighed separately before being chilled overnight. The left-side was quartered between the 7th and 8th ribs, and ribfat depth and eye-muscle area (EMA) and AUSMeat marble score (MS: 1 (nil) to 9 (abundant) by 0.1 unit scale) measured by an accredited grader. A full report of this experiment is given in Herd et al. (2009). In addition to comparison of means for each group for the feedlot performance and carcass traits measured, values for all the animals were regressed against their midparent EBV-NFI. Regression coefficients that were statistically different from zero were taken as additional evidence for association of variation in the trait with variation in genetic merit for feed efficiency measured as NFI.

Results

The genetically HE steers showed advantages in lower feed intake, no compromise in growth rate, and a superior feed conversion ratio (FCR) over the first 113 days on feed; advantages that were sustained over the full 251 days on feed. There was no difference in induction weight between the HE and LE group (Table 1). The HE steers grew faster than the LE group over the first 113 days and as fast over the 251 days. At slaughter the HE group was heavier than the LE group. Regression coefficients for each animal's induction and final weights, and ADG over 251 days, on their midparent NFI-EBV were not different from zero providing evidence for lack of strong association between variation in these weight traits with genetic variation in NFI.

Over the first 113 days and over the full 251 days, the pen of HE steers consumed less feed than the pen of LE steers (Table 1). Compared to the LE steers, the HE steers had a 14% lower (better) FCR over the first 113 days and a 10% lower FCR over the full 251 days in the feedlot, so should have been more profitable to feed.

Carcass weight and dressing percentage were lower, and ribfat depth greater, in the LE steers compared to the HE steers (Table 1). Regression coefficients for values for all animals for these three traits on each animal's midparent NFI-EBV were statistically significant and provided further evidence of association for variation in these carcass traits with genetic variation in NFI. Means for eye-muscle area and marble score were not different for the HE and LE groups, and neither trait was associated with midparent NFI-EBV.

Conclusions

This experiment demonstrated that genetic superiority in NFI had a favourable impact on the commercial performance of Angus steers by reducing feed consumed with no adverse effect on final turnoff weight. Each HE steer consumed on average 2.60t of feed compared to 2.87t by the ME and LE steers, that is, saved the feedlot 0.27t or $53 (at $200/tonne) of feed with no compromise in weight gain. The HE steers gained less subcutaneous ribfat during the feedlot period which may have an impact on meeting market specifications. However marble scores were not influenced by NFI, and dressing percentage was higher in the HE steers, which together would be expected to result in a greater yield of retail beef with no reduction in marbling grade. The feed efficiency benefit was sustained for 251 days and showed that genetic improvement of feed efficiency will reduce feed costs in a large commercial feedlot.

References

Herd R, Piper S, Thompson J, Arthur P, McCorkell B and Dibley K 2009, 'Benefits of genetic superiority in residual feed intake in a large commercial feedlot', in *Proceedings of the 18th Conference of the Association for the Advancement of Animal Breeding and Genetics,Sept. 28 – Oct. 1 2009, Barossa Valley, SA,* 18:476-479.

Appendix

Table 1. Means (±se) for feedlot performance and carcass traits for Angus steers in genetically high, medium and low efficiency groups, and regression coefficients (b-values) for the traits on each animals midparent NFI EBV.

	Efficiency group			Regression coefficient with midparent EBV-NFI
	High	**Medium**	**Low**	
Number of animals	68	72	68	
Midparent NFI EBV (kg/day)	-0.52 ± 0.02[a]	-0.09 ± 0.02[b]	0.62 ± 0.02[c]	
Weight at induction (kg)	435 ± 4[a]	448 ± 3[b]	432 ± 4[a]	-1.1 ± 4.2
ADG days 1-113 (kg/day)	1.31 ± 0.02[a]	1.28 ± 0.02[a,b]	1.22 ± 0.02[b]	-0.07 ± 0.03*
Weight at day 113 (kg)	583 ± 4[a]	593 ± 4[a]	570 ± 4[b]	-9.2 ± 4.8[†]
ADG days 1-251 (kg/day)	1.11 ± 0.02[a]	1.06 ± 0.01[b]	1.07 ± 0.02[a,b]	-0.03 ± 0.02
Final weight (kg)	713 ± 5[a]	714 ± 5[a]	701 ± 5[b]	-8.2 ± 5.6
FI days 1-113 (kg/day)[‡]	10.7	12.1	11.6	
FI days 1-251 (kg/day)[‡]	10.4	11.8	11.1	
FCR days 1-113 (kg/kg)[‡]	8.1	9.4	9.5	
FCR days 1-251 (kg/kg)[‡]	9.4	11.1	10.4	
Hot carcass weight (kg)	417 ± 3[a]	420 ± 3[a]	406 ± 4[b]	-8.0 ± 3.7*
Dressing percentage (%)	58.5 ± 0.2[a]	58.9 ± 0.2[a]	58.0 ± 0.2[b]	-0.44 ± 0.20*
Rib fat depth on carcass (mm)	15.6 ± 0.6[a]	17.6 ± 0.6[b]	20.7 ± 0.6[c]	4.7 ± 0.7*
Eye-muscle area(cm^2)	76.1 ± 0.4[a]	78.6 ± 0.4[b]	76.1 ± 0.4[a]	-0.26 ± 0.46
AUSMeat marble score	3.0 ± 0.1[a]	3.6 ± 0.1[b]	3.0 ± 0.1[a]	-0.07 ± 0.13

Means within rows with different superscripts differ significantly (P<0.05).

*denotes regression coefficient statistically-significant from zero at P<0.05; [†]at P<0.1.

[‡]Could not be statistically compared as individual animal data was not available.