

## Angus Bulls and Heifers Are More Efficient After Selection on Feed Efficiency EBV

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Net (or residual) feed intake (NFI) is the measure for feed efficiency adopted by the Australian beef industry for the purpose of genetic improvement. It is the difference between actual feed intake over a test period and expected feed intake predicted for an animal's size and growth rate. More efficient animals eat less than expected and have lower NFI. Estimated breeding values (EBV) for NFI have been available in the Angus breed since 2002. This experiment was to investigate whether selection of parents for high or low NFI-EBV would result in differences in efficiency in their progeny.

In 2004, at the Trangie Agricultural Research Centre, NSW, Angus bulls and cows with low NFI-EBV were mated to each other, as were bulls and cows with high NFI-EBV. The anticipated merit of the progeny is the mean of the parent's EBV: midp-NFI-EBV. Following weaning in March 2006, a group of 60 heifers with midp-NFI-EBV  $\leq -0.14$  kg/d, and a group of 60 heifers with midp-NFI-EBV  $\geq 0.14$  kg/d, were transported to the Vasse Research Centre, WA. A group of 78 bull calves with a wide range in midp-NFI-EBV were sent to the Beef CRC "Tullimba" Research Feedlot, Armidale, NSW. At both locations they underwent a standard 70-day NFI test: from May to July 2006 at Vasse, and June to September 2006 at "Tullimba", following the protocols described in Arthur *et al.* (2005). Following each test, subcutaneous fat depths at the P8 rump and 12/13 rib sites were measured ultrasonically. The dataset contained 189 calves from 22 sires with an average of 9 progeny each (range: 1 to 23). Data were analysed using general linear models. To detect differences between efficiency groups and compute LS-means, the models contained age at start of test, sex and group (based on above midp-NFI-EBV cut-offs). The regression coefficients for traits against midp-NFI-EBV were determined in similar models to evaluate change in performance relative to a 1kg/d change in midp-NFI-EBV. There were no significant interactions ( $P > 0.1$ ) for sex with group or with midp-NFI-EBV for most traits.

**Table 1. Mean (sd) midp-NFI-EBV and age of Angus bull and heifers from parents with low or high NFI-EBV, LS-means (se) for NFI test and fat traits and regression coefficient (b, with se) with midp-NFI-EBV**

	Low NFI parents	High NFI parents	P	b	P
Number of progeny	87	96			
midparent NFI-EBV (kg/d)	-0.49 (.20)	0.61 (.23)	***		
Age at start of test (d)	305 (29)	319 (24)	***	7.6 (2.3)	**
Start weight (kg)	293 (3)	296 (3)	ns	3.3 (3.2)	ns
End weight (kg)	412 (3)	410 (3)	ns	-3.3 (4.1)	ns
Average daily gain (kg/d)	1.71 (.02)	1.64 (.02)	*	-0.09 (.03)	**
Daily feed intake (kg)	9.7 (.1)	10.5 (.1)	***	0.66 (.12)	***
Net feed intake (kg/d)	-0.97 (.07)	-0.04 (0.07)	***	0.79 (.09)	***
Feed conversion ratio (kg/kg)	5.8 (.08)	6.6 (.08)	***	0.80 (.09)	***
Rump fat (mm)	10.1 (.3)	11.5 (.3)	**	1.15 (.33)	***
Rib fat (mm)	7.6 (.2)	8.9 (.2)	***	1.08 (.26)	***

ns  $P > 0.05$ ; \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

Selecting and joining bulls and cows with low NFI-EBV resulted in progeny, be they bulls tested at "Tullimba" or heifers at Vasse, that grew quicker, ate less, had lower NFI and lower (better) feed conversion, than progeny from bulls and cows with high NFI-EBV (Table 1). The progeny of parents with low NFI-EBV were leaner: this relationship was driven by a strong association in the bulls, with no association in heifers. Rib and rump fat depths were traits that showed an interaction with sex ( $P < 0.05$ ). Progeny of parents chosen for low NFI-EBV were younger at start of test (meaning they were born later). These results for fatness and calving date are consistent with results in Arthur *et al.* (2005) and need to be monitored. This experiment showed that choosing parents on the basis of NFI-EBV results in change in the feed efficiency of their progeny.

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