

## CARCASE AND YIELD CHARACTERISTICS OF STEERS FROM ANGUS MUSCLING SELECTION LINES WITH NORMAL AND MUTANT MYOSTATIN ALLELES

L.M. CAFE<sup>A</sup>, B. O'ROURKE<sup>B</sup>, W. McKIERNAN<sup>C</sup> and P.L. GREENWOOD<sup>A</sup>

Cooperative Research Centre for Beef Genetic Technologies, Armidale N.S.W. 2351

<sup>A</sup>NSW Department of Primary Industries Beef Industry Centre of Excellence, Armidale 2351 N.S.W.

<sup>B</sup>NSW Department of Primary Industries, Elizabeth Macarthur Agricultural Institute, Camden 2570 N.S.W.

<sup>C</sup>NSW Department of Primary Industries, Orange 2800 N.S.W.

Beef cattle genetics are being increasingly tailored to specific market requirements. Greater yield of lean beef or muscle is an important objective for supply to the domestic beef market in Australia and certain export markets such as the European Union. In addition to quantitative selection, mutations in the myostatin gene that result in non-functional myostatin protein markedly increase muscle mass in cattle (Grobet *et al.* 1997; Kambudur *et al.* 1997; McPherron and Lee 1997) resulting in the double-muscling phenotype (Arthur 1995). This study investigated carcass and yield characteristics after quantitative selection for high ( $H^{wt}$ ) and low ( $L^{wt}$ ) muscling Angus cattle that were homozygous for the functional myostatin gene (wild-type), and in cattle selected for high muscling that were heterozygous for a myostatin mutation ( $H^{Het}$ ).

The  $H^{Het}$  steers had a greater dressing percentage, eye muscle area and less fat trim than the  $H^{wt}$  steers which had higher dressing percentage, eye muscle area and less fat trim than the  $L^{wt}$  steers (all  $P < 0.001$ ). The  $H^{Het}$  steers had less weight of bone and had greater retail yield and less fat trim and bone as a percentage of cold carcass weight than the  $H^{wt}$  and  $L^{wt}$  steers (all  $P < 0.001$ ). The 3 groups did not differ significantly in liveweight ( $P = 0.46$ ), carcass weight ( $P = 0.98$ ), weight of retail beef ( $P = 0.14$ ), P8 ( $P = 0.15$ ) and rib ( $P = 0.40$ ) fat depths, AUS ( $P = 0.11$ ) and MSA ( $P = 0.17$ ) marbling scores, and ossification scores ( $P = 0.14$ ) at 25 months of age.

**Table 1. Least squares means for liveweight, carcass and yield characteristics of low and high muscling Angus steers at 25 months of age and equivalent carcass weight (358 kg) where appropriate**

Variable	Muscling genotype			s.e.d.
	Low, wild-type ( $L^{wt}$ )	High, wild-type ( $H^{wt}$ )	High, heterozygote ( $H^{Het}$ )	
Number of cattle	19	14	11	-
Liveweight (kg)	666	659	638	24.1
Carcass weight (kg)	359	360	357	13.5
Dressing %	53.9a	54.9b	56.0c	0.39
Ossification score	200	189	189	7.2
P8 fat	24.3	21.2	24.1	1.94
Rib fat (mm)	18.7	16.2	16.4	1.77
Eye muscle area (cm <sup>2</sup> )	70.4a	76.9b	85.0c	3.05
AUS marble score (0-6)	1.32	1.13	0.92	0.20
MSA marble score (100-1100)	329	324	288	24.3
Retail yield (kg)	218	221	234	8.5
Fat trim (kg)	32.5c	30.0b	25.8a	1.20
Bone weight (kg)	33.0b	33.6b	31.7a	0.49
Retail yield (% CCW)	61.8a	63.0a	66.5b	0.68
Fat trim (% CCW)	18.3b	17.1b	14.5a	0.75
Bone (% CCW)	18.7b	19.0b	17.9a	0.26

Mean values followed by different letters differ at  $P < 0.05$ . CCW, cold carcass weight.

The high muscling steers, heterozygous for the myostatin mutation, produced less fat and bone and more beef at an equivalent carcass weight, and had greater eye muscle area, than the  $H^{wt}$  and  $L^{wt}$  cattle. This suggests that a breeding program that targets one non-functional myostatin mutant allele (heterozygotes) can increase retail beef yield by about 3.5%. The extent to which this varies at different ages and weights warrants further study. We also need to know whether these genotypes differ in muscle structure and metabolism, and eating quality.

ARTHUR, P.F. (1995). *Aust. J. Agric. Res.* **46**: 1493-515.

GROBET, L., ROYO, L., PONCELET, D., PIROTTIN, D., BROUWERS, B., RIQUET, J., SCHOEBERLEIN, A., DUNNER, S., MENISSIER, F., MASSABANDA, J., FRIES, R., HANSET, R. and GEORGES, M. (1997). *Nature Genetics* **17**: 71-4.

KAMBADUR, R., SHARMA, M., SMITH, T.P.L. and BASS, J.J. (1997). *Genome Res.* **7**: 910-5.

McPHERRON, A.C. and LEE, S.-J. (1997). *Proc. Natl. Acad. Sci. USA* **94**: 12457-61.

Email: paul.greenwood@dpi.nsw.gov.au