Increased muscling and one copy of the 821 del11 myostatin mutation did not reduce meat quality in Angus steers

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Increasing the lean content of beef carcases without optimising fatness can reduce consumer acceptability. Myostatin mutations increase muscling, have variable effects on meat tenderness and often reduce fatness. Hence, reported effects on overall meat quality are variable (Warner *et al.* 2010). The effect of selection for live muscle score and one copy of the 821 del11 myostatin mutation (O'Rourke *et al.* 2009) on objective and sensory meat quality was studied in a herd of Angus cattle.

Steers from 2008- and 2009-born cohorts of low muscling (Low, n = 20) and high muscling lines without (High, n = 20), and with (High^{Het}, n = 40) one copy of the 821 del11 mutation were studied after grain finishing for approximately 100 d. Objective meat quality (Perry *et al.* 2001) was conducted on 7 d aged striploin and oyster blade samples, including intramuscular fat % on the 2009 striploin samples. Meat Standards Australia consumer taste panels (Anon. 2008) assessed 7d aged striploin, oyster blade and topside samples for sensory quality.

Statistical analyses used the REML methodology in Genstat to fit Linear Mixed Models, with fixed effects of muscling line, cohort, cut, and their interactions; random terms were cohort x kill replicate and sample position. Statistical significance for the χ^2 test was accepted at $P < 0.05$, tendency $P < 0.1$. Differences in objective and sensory meat quality were observed between cohort and cut, but no interactions were observed with muscling line, hence pooled means for all cuts are presented throughout.

No significant differences were observed between the three muscling lines for any of the meat quality traits, either objective (Table 1) or sensory (Table 2, all $P > 0.1$). There was a tendency for a lower Colour a* reading (ie hue less red) in High^{Het} striploin samples.

Table 1. Objective meat quality traits: predicted means for shear force (SF), meat colour (L*, a*, and b*), pH and cooking loss for steers from the three muscling lines.

	Low	High	H^{Het}	sed	$P(\chi^2)$
n (cuts)	40	40	80		
SF (N)	34.7	33.4	35.1	2.19	0.8
Colour L*	40.5	40.0	40.2	0.73	0.8
Colour a*	23.4	23.6	22.9	0.38	0.06
Colour b*	11.2	11.2	10.8	0.29	0.17
pH	5.58	5.60	5.59	0.02	0.2
Cook loss (%)	23.5	23.8	24.4	0.66	0.4

Table 2. MSA sensory score traits: predicted means for steers from the three muscling lines.

	Low	High	H^{Het}	sed	$P(\chi^2)$
n (cuts)	60	60	120		
Tender (0-100)	61.0	60.6	59.5	1.76	0.6
Juicy (0-100)	62.6	62.5	59.8	1.81	0.14
Flavour (0-100)	63.4	63.9	61.2	1.62	0.16
Satisfaction (1-5)	3.44	3.50	3.42	0.07	0.5
Overall like (0-100)	61.8	63.1	60.6	1.84	0.4
MQ4 (0-100)	62.1	62.5	60.3	1.67	0.3

The sensory MQ4 scores (Table 2) pooled for the three cuts indicate there was no significant difference in acceptability to consumers of the three lines. Other research has reported variable effects of one copy of the 821 del11 myostatin mutation on shear force, but there was no evidence of any effect on objective or sensory tenderness in these samples. As well as no significant difference between predicted means (χ^2 test), the small drop in Juiciness and Flavour scores of the High^{Het} carcases was not statistically significant on the t-test (Low vs High^{Het}, $P \geq 0.1$), but is consistent with the lower carcase marbling observed at carcase grading in these more extreme carcases, as reported by Cafe *et al.* (2014). Chemical intramuscular fat measured on the 2009 cohort striploin samples was also lower in High^{Het} samples (Low 6.2%, High 7.1%, High^{Het} 4.4%, sed = 0.7, $P<0.001$).

These results indicate that selection for increased muscling, and the inclusion of one copy of the 821 del11 myostatin mutation can increase retail meat yield without significantly compromising consumer acceptability. This is important for beef cattle producers preparing for value-based carcase payment systems.

References

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Special thanks to Meat and Livestock Australia for contributing to the funding of this work.