

EATING QUALITY OF LTL MUSCLE FROM CROSSBRED BEEF BULLS AND STEERS

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Abstract – Warner-Bratzler Shear Force (WBSF) and percentage Intra-Muscular Fat (%IMF) were analyzed on the *M. longissimus thoracis et lumborum* (LTL) muscle from crossbred bulls and steers from eight beef breeds (n=565 WBSF; n=500 IMF) to assess the effect of breed and gender on LTL eating quality. Results indicate that both breed and gender showed a significant effect on %IMF ($p < 0.001$) while only gender displayed significance on WBSF measurements ($p = 0.435$ breed; < 0.001 gender).

Key Words –Eating Quality, IMF, Warner-Bratzler

I. INTRODUCTION

Cattle breeds have been developed through extensive longterm selection for specific production attributes. Such selection has influenced muscle physiology and composition with consequences for eating quality of resultant meat, [1]. The gender effect in male cattle is known to influence growth rate and carcass yield in bulls and steers, but also aspects of meat quality, and has been proposed to influence fat deposition and tenderness[2]. However, in a study conducted by Prado et al. [3] consumers did not express a preference for steer versus bull beef. The objective of this study was to determine the effect of sire breed and gender on important aspects of eating quality in *M. longissimus thoracis et lumborum* (LTL).

II. MATERIALS AND METHODS

Crossbred beef bulls and steers (16±4 month old, n=565) were finished under controlled feeding and environmental conditions and slaughtered in 12 batches in a commercial plant using electrical stunning followed by exsanguination. Steaks (n=12) with a thickness of 2.54 cm were removed from the LTL at 48 h *post-mortem* (PM), vacuum packaged, aged for 14 days (WBSF) or 2 days (% IMF) at 4°C and finally, frozen at -20°C. The 2nd and 4th steak on each loin were selected for IMF and WBSF analysis, respectively. WBSF analysis was conducted according to AMSA (1995) guidelines using the Instron 4464 Universal testing machine (Instron Ltd., Buckinghamshire, UK), with a load cell of 500 N and a cross head speed of 50 mm/min. IMF % was determined using the Smart System-5 microwave moisture drying oven and NMR Smart-Trac rapid fat analyser (CEM Corporation, USA) using AOAC Official Methods 985.14 & 985.26, 1990. Statistical analysis was performed by two-way analysis of variance using Tukey-Kramer adjusted Generalized Linear Models procedures of SAS 9.4.

III. RESULTS AND DISCUSSION

Table 1 Effect of breed and gender on characteristics of the LTL muscle on crossbred bulls and steers sired by eight bull breeds

Trait	Breed								Gender		P-value	
	AA	BB	CH	HE	LM	PT	SA	SI	Bull	Steer	Breed	Gender
WBSF, N	41.3 (1.7)	41.7 (1.4)	41.4 (0.9)	35.9 (2.9)	44.5 (0.7)	41.6 (2.9)	43.3 (1.7)	49 (1.4)	45.4 (0.5)	38.1 (0.8)	0.435	<0.001
% IMF	2.7 (0.2)	1.2 (0.2)	1.9 (0.1)	2.9 (0.4)	1.7 (0.1)	0.9 (0.4)	2.2 (0.2)	1.4 (0.2)	1.2 (0.1)	2.8 (0.1)	<0.001	<0.001

N, Newton; (), denotes standard error of measurement; AA, Aberdeen Angus; BB, Belgian Blue; CH, Charolais; HE, Hereford; LM, Limousin; PT, Parthenaise, SA, Salers; SI, Simmental.

Breed had no effect ($p > 0.05$) on WBSF measurements (Table 1), however, gender had an effect ($p < 0.001$). Steers (presented in Table 1) were shown to be more tender than bulls, with an average WBSF value of 38.1 N, which would be classified as “tender” category while with an average WBSF of 45.4 N the bulls would be classified as “tough,” according to the criteria of Shackelford et al. [4]. Although the effect of breed was not significant, the largest numerical difference in WBSF least square means values amongst breeds was between the British Hereford and the continental Simmental breeds respectively. Both breed and gender had an effect on % IMF ($p < 0.001$). Bulls had less than half the IMF % of steers, bulls (1.2%); steers (2.8%), with a difference of 1.6% IMF observed between the two genders, which may also contribute to the lower WBSF of steers. The results presented in Table 1 indicate that the traditional early maturing British breeds (Aberdeen Angus and Hereford) had more than double the IMF % of the two breeds which had the least amount of IMF, i.e. continental Belgian Blue and Parthenaise breeds. This is in line with the findings of Kraft et al. [5] indicating that late maturing continental breeds develop more muscle mass and less IMF than early maturing traditional British breeds.

IV. CONCLUSION

The results indicate that gender has a significant effect on Warner-Bratzler shear force values, while breed has no effect. Both breed and gender are indicated to have a significant effect on IMF %.

ACKNOWLEDGEMENTS

This work is funded by the Breed Quality project (11/SF/311) which is supported by The Irish Department of Agriculture, Food, and the Marine (DAFM) under the National Development Plan 2007-2013. We acknowledge the Irish Cattle Breeding Federation for supply of samples.

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