Genetic background and rearing conditions: finding the best compromise to optimize meat quality

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Introduction and aim of the study

Crossbreeding beef on dairy is a common practice that allows an improvement of animal productivity. The genetic evolution of beef cattle requires an adaptation of feed recommendations and a constant monitoring of the quality beef meat, in order to select the best crosses and breeding conditions to provide high-quality beef meat to the market.

The aim of this study was to assess meat quality indicators from 3 different crossbred fattening bulls receiving one of two corn silage-based diets and slaughtered at different weights (Figure 1) corresponding to Swiss practices.

Experimental procedure

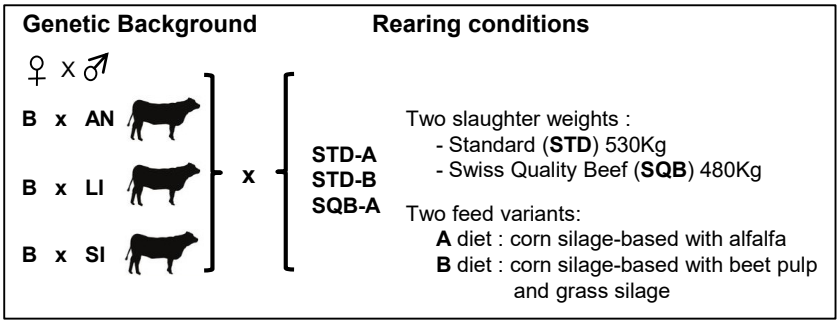

Figure 1: Diagram of the experimental procedure. 71 crossbred fattening bulls of Brown Swiss (**B**) dairy mothers and sires of Angus (**AN**), Limousin (**LI**) and Simmental (**SI**) breeds in combination with three rearing conditions as indicated.

Longissimus thoracis **(LT) (10-12th ribs)**

Intramuscular fat (**IMF**) content
IMF composition: **SFAs**: saturated fatty acids; **MUFAs**: mono-unsaturated fatty acids; **PUFAs**: poly-unsaturated fatty acids.

14 days of maturation at 4°C under vacuum, then frozen until analysis.

Cooking on grill plate, determination of Warner Bratzler Shear force (**WBSF**), water holding capacity: thawing loss (**TL**) and cooking loss (**CL**), lipid oxidation (**TBARS**)

Sensory analysis; 8 panelists; flavor, juiciness and tenderness (scale: 1= slight, dry and very tough and 10 = strong, juicy and very tender).

Results

		Genetic background (GB)			Rearing conditions (RC)				*P-value*		
Item	**Unit**	**AN**	**LI**	**SI**	**STD-A**	**STD-B**	**SQB-A**	**SEM**	***GB***	***RC***	***GB X RC***
Instrumental Meat Quality											
WBSF [N]	[N]	26.4	27.7	29.3	27.2	27.3	28.9	1.21	*0.1*	ns	ns
TL [%]	[%]	**9.1^{a}**	**10.1^{b}**	**9.5^{a,b}**	9.7	9.4	9.5	0.28	***<0.05***	ns	ns
CL [%]	[%]	18.7	18.5	19.1	**18.5^{x}**	**17.8^{x}**	**20.0^{y}**	0.42	ns	***<0.001***	ns
IMF and Lipid Oxidation											
IMF	[g/100g of meat]	**1.57^{a}**	**1.11^{b}**	**0.96^{b}**	**1.26^{x,y}**	**1.38^{x}**	**1.00^{y}**	0.995	***<0.001***	***<0.05***	ns
TBARS	[eq. MDA/Kg of meat]	0.3	0.31	0.21	**0.27^{x,y}**	**0.34^{x}**	**0.21^{y}**	0.052	ns	***<0.05***	ns
IMF Composition											
∑ SFAs	[g/100g of FA]	43.7	43.7	43.8	43.9	43.7	43.6	0.33	ns	ns	ns
∑ MUFAs	[g/100g of FA]	41.6	38.8	37.8	39.3	40.5	38.5	1.27	*0.07*	ns	ns
∑ PUFAs	[g/100g of FA]	**10.7^{a}**	**15.3^{a,b}**	**16.2^{b}**	14.2	12.9	15.2	1.80	***<0.05***	ns	ns
Sensory analysis											
Flavour		5.73	5.62	5.61	5.82	5.69	5.45	0.135	ns	ns	ns
Juiciness		**5.72^{a}**	**5.43^{a,b}**	**4.98^{b}**	**5.28^{x,y}**	**5.09^{x}**	**5.70^{y}**	0.162	***<0.001***	***<0.05***	ns
Tenderness		**5.21^{a}**	**5.15^{a,b}**	**4.70^{b}**	5.14	4.78	5.17	0.153	***<0.05***	ns	ns

Table 1: Means, SEM and effects of *post mortem* meat quality indicators. Statistics were performed using MANOVA test (linear model with breed and rearing conditions as fixed effects and for sensory analysis judge and session as random effects). $^{a-c}$ within a row indicate differences between breeds; $^{x-z}$ within a row indicate differences between rearing conditions ($p<0.05$). Trends ($p\leq0.10$) are highlighted in grey. For AN, SI, STD-A and STD-B groups, n=24, for LI and SQB-A groups, n=23; for IMF composition 9 animals per group were considered.

Conclusions

Meat of the AN crossbreed stood out for its tenderness, its IMF content and juiciness, but the amount of PUFAs was less important. LI crossbreed shows intermediate meat quality values between those of the Angus and Simmental crossbreeds. For this reason, the LI crossbreed may represent a good compromise between AN and SI crossbreeds, providing optimal sensory and nutritional quality.
Rearing conditions mainly influence water holding capacity and IMF content affecting juiciness of meat. STD-A provides intermediary values compared to STD-B and SQB-A rearing conditions.

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