

BEEF-ON-DAIRY VS. REARING CONDITIONS: EVALUATION OF MEAT QUALITY

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I. INTRODUCTION

Beef-on-dairy crossbreeding of cattle is very commonly used in specialized beef production systems in Switzerland, also raising interest worldwide [1]. However, keeping this system competitive requires regular monitoring of the genetic resources adaption to local rearing conditions, and of the quality of the meat produced. To evaluate the quality, several properties of the meat have to be considered: instrumental (tenderness, colour, water-holding capacity), nutritional (chemical composition) and organoleptic [2]. In this study, three of the most common crossbreeds used in Switzerland were evaluated for the quality of their meat. Animals were reared in conditions mimicking, in terms of diets, those of the three typical geographical areas of animal production in Switzerland (lowlands, hills and mountains). In this report, data from the first two trials are reported.

II. MATERIALS AND METHODS

Three different beef-on-dairy crossbreeds – Angus (AN), Limousin (LI) and Simmental (SI) sires on Brown-Swiss brown cows – were reared in two successive trials characterized by diets mimicking the intensive lowland (LOWLAND, bulls) and semi-intensive hill (HILL, bulls) conditions typical of corresponding areas of Switzerland. Within each trial, two isoenergetic and protein diets were compared. Diets were mainly based on maize silage for LOWLAND and a mix of maize and grass silages for HILL. The animals were slaughtered at 530 kg of body weight. Forty-eight hours after slaughtering, the *Longissimus thoracis* was excised, and meat slices were aged up to 14 days prior to assessments of Warner-Bratzler shear force (WBSF), intramuscular fat content (IMF) and composition and meat sensory analysis according to previously described protocols [3, 4]. Statistical relevance was evaluated by a multivariate analysis of variance (crossbreed and diet as fixed factors and for the sensorial analysis, judge and session as additional random factors).

III. RESULTS AND DISCUSSION

All the results discussed in this section are reported in Table 1. No interaction was observed between crossbreed and diets, and only the crossbreed effect was considered in this report. The slaughter age of animals in the LOWLAND trial was 343 ± 4 days, whereas in the HILL trial, this age was 358 ± 4 . In the LOWLAND trial, AN meat had a higher IMF than LI and SI. Assessing the nutritional value of meat also includes looking at IMF composition, particularly PUFA. Strategies for feeding cattle often target the PUFA/SFA ratio as there is a negative association between the ratio and the risk of cardiovascular diseases in humans [5]. In this trial, the values of polyunsaturated fatty acids (PUFA) content and the ratio of PUFA to saturated fatty acids (SFA) were lower in AN than in LI and SI, but these differences did not reach statistical relevance. Sensory tenderness and juiciness, assessed by a trained panel, were higher for AN than SI, with LI in between. Differences in tenderness were supported by the WBSF values.

In the HILL trial, the IMF of AN meat was higher than LI and SI, but its composition (less PUFA in favour of increased SFA proportions) was less suitable than that of LI and SI. Consequently, the PUFA/SFA ratio was also lower in AN than in LI and SI. Finally, AN crossbred meat was more tender (instrumental tenderness, but not sensory) and more flavourful than LI and SI meats.

The data of the two trials can't be directly compared because they were conducted at different times. However, it is interesting to note that in the HILL conditions IMF, and WBSF values were globally superior to the LOWLAND assay, yet the PUFA content in IMF was lower.

Table 1 Most relevant results obtained in the three trials

	LOWLAND					HILL				
	AN	LI	SI	SEM	p	AN	LI	SI	SEM	p
n	16	16	16			17	18	18		
IMF (g/Kg meat)	18.9 ^b	13.4 ^a	12.6 ^a	0.98	<0.001	20.6 ^b	16.4 ^a	13.3 ^a	1.22	<0.001
SFA (g/100g FA)	42.9	40.9	42.2	1.10	0.459	45.3 ^b	42.6 ^a	42.7 ^a	0.65	0.002
PUFA (g/100g FA)	10.4	15.3	14.9	1.92	0.169	8.81 ^a	13.6 ^b	13.5 ^b	1.12	0.001
MUFA (g/100g FA)	42.2	39.2	38.3	1.42	0.167	41.3	39.2	39.4	0.89	0.10
PUFA/SFA	0.25	0.38	0.36	0.06	0.196	0.20 ^a	0.32 ^b	0.32 ^b	0.03	0.001
WBSF (N)	25.1 ^a	26.9 ^{a,b}	29.3 ^b	1.22	0.007	27.9 ^a	32.8 ^b	33.0 ^b	1.52	0.009
Tenderness	5.16 ^b	5.08 ^{a,b}	4.58 ^a	0.18	0.046	5.21	5.15	5.35	0.15	0.660
Juiciness	5.52 ^b	5.33 ^{a,b}	4.73 ^a	0.18	0.008	5.19	5.18	5.26	0.17	0.126
Flavour	5.76	5.72	5.60	0.16	0.852	5.95 ^b	5.54 ^a	5.63 ^a	0.13	0.048

Only least square means, standard errors of mean (SEM) and p-values for crossbred effect within trial (LOWLAND or HILL) were considered. AN: Angus; LI: Limousin and SI: Simmental crossbreds; FA: fatty acids. Statistically different groups ($p \leq 0.05$) were indicated by superscript letters (a-c).

IV. CONCLUSION

Globally, the meat obtained in these two trials was of high sensory quality irrespective of the crossbreed considered. LI and SI meats were more favourable from the nutritional point of view, in particular in the HILL trial, whereas AN meat was slightly superior in tenderness in both trials and juicier in the LOWLAND trial.

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