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Sambucana sheep breeding in Valle Stura di Demonte and meat characteristics: Present situation and outlooks on future

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SUMMARY – In Valle Stura di Demonte (NW Italian Alps), sheep breeding is a traditional activity based on Alpine summer pasture exploitation. This study aimed to assess the meat quality of heavy lambs. Sixteen Sambucana lamb *in vivo* and slaughter traits were surveyed. The nutritional characteristics, as well as the physical and technological properties of the meat, were analysed. On the basis of a survey on the composition and quality of summer pasture vegetation, a grazing management more compatible with the herbage conservation and regeneration was defined. In order to individuate the optimal moment for sheep exploitation, four pastoral vegetation types were studied, and quality "routes" that shepherds should adopt to ensure the best forage quality were drawn. The relation between breeding systems, grazing land management and meat quality still have to be specified by further research.

Key words: Heavy lamb, typical meat quality, fatty acids, rangeland management.

RESUME – *"Elevage de la brebis Sambucana dans la Valle Stura di Demonte et caractéristiques de la viande : Situation actuelle et perspectives pour le futur". Dans la Valle Stura di Demonte (Cuneo, NO d'Italie), l'élevage des ovins de race Sambucana représente une des activités les plus traditionnelles. L'objectif de la recherche est de mieux connaître et de valoriser la qualité de la viande des agneaux d'alpage (les tardouns) : seize animaux ont été suivis depuis leur naissance jusqu'à l'envoi aux abattoirs, en effectuant sur leur viande des analyses physiques et chimiques qui ont permis de constater et de caractériser la qualité du produit. Les études sur la végétation et ses analyses de laboratoire ont permis de proposer aux bergers un système de gestion du pâturage en fonction de la qualité et de la productivité de l'herbe, pour la valorisation et la conservation de la végétation d'alpage. Les effets de la gestion des pâturage sur la qualité de la viande seront l'objet d'ultérieures recherches.*

Mots-clés : *Agneau d'alpage, viande de qualité, acides gras, gestion du milieu et du pâturage.*

Introduction

Relationships among livestock policies, livestock systems, farming practices and the environment are very complex, especially in mountain and marginal areas. In this context, in order to face the competition, the production of a high quantity of meat should not be the target. A diversification on the market may be achieved only by improving a production system for typical meat, based on the link between the product and the land. Adequate conditions can be found in Valle Stura di Demonte (Cuneo, NW Italy) where a typical product such as Sambucana meat, the environmental characteristics and the cultural reality may together play an important role for the territory.

The surface of grasslands and rangelands of this mountain region (60,135 ha) amounts to more than 15,000 ha. Moreover, summer pasture (25% of total surface) represents an important element of tradition and cultural heritage of the valley.

Sambucana sheep breed is of medium size [60-70 cm withers height at a live-weight (LW) of 85-90 kg for the rams; 50-60 cm withers height at a live-weight of about 65-70 kg for the ewes]; with a medium trunk length and a wide and muscular rump. The fertility rate is 97% and the prolificacy rate is 140%. Adults supply 3.5 kg of medium quality wool, but the main attitude of Sambucana is meat production: light lambs, 12-15 kg LW, slaughtered when they are 1.5-2 months old; heavy lambs (named *tardouns*), 35-45 kg LW, slaughtered at an age of 5-6 months after summer grazing period.

At present, in Valle Stura di Demonte the livestock population counts 3700 adults, stabled during winter and carried to alpine pastures during summertime. Nevertheless, the increasing presence of large carnivores and the risk of sheep predation discourage shepherds to guide their animals on more remote and inaccessible pastures. Sambucana sheep is no more in the list of the extinction-threatened breeds (FAO-UNEP, 1993). Since 1985, local initiatives for sheep safeguarding have been carried out by the local sheep breeders associations, like the *Consorzio Escaroun,* such as: selection of rams and ewes, with a progressive increase in number of heads (Bianchi *et al.*, 1998); constitution of a *Rams Centre* for performance test; promotion of the local meat and wool marketing; assistance to the sheep breeders; organisation of social and cultural meetings.

The main objectives of this study were the Sambucana heavy lambs meat characterisation and the proposal of a management model for the pasturelands compatible with the conservation of the Valle Stura di Demonte rangelands.

Materials and methods

Sixteen Sambucana lambs were bred in four different small farms in Valle Stura di Demonte and led to three different mountain pastures during summer (Table 1). They were slaughtered in the same slaughterhouse, near Cuneo. Age, live weights at birth and at slaughter, live weight gain (LWG) and hot dressing were determined. Samples of *longissimus thoracis et lumborum* (9^{th} *th.* – 6^{st} *l. vertebra*) were taken 24 hours after slaughtering from the right side of the carcass and analysed for pH (pH_{24}). After six days at 0÷4°C some nutritional and physical parameters were evaluated: colour (L, a_L, b_L Hunter system; Boccard *et al.*, 1981); drip loss (DL; Barton-Gade *et al.*, 1994); cooking loss (CL; Barton-Gade *et al.*, 1994); Warner Bratzler (WB) shear force on cylindrical cores (1.25 cm in diameter; Chrystall *et al.*, 1994); water, protein, fat (AOAC, 1970); fatty acids composition. Total lipids were extracted according to Folch *et al.* (1957) and methyl esters of fatty acids were prepared by the methylation procedure of Metcalfe and Schmitz (1961) and analysed by means of a gaschromatograph fitted with flame-ionization detector (FID) (equipped with a 30 m fused silica capillary column). The column temperature programming was 190°C for 4 minutes, and then the temperature was increased by 5°C/min up to 240°C and held for 8 minutes.

Table 1. Main characteristics of the rangelands exploited during summer

Summer pasture	Pastoral value	Altitude (m)		Surface (ha)		Sheep (No.)	Stocking rate (season) (UBA/ha)	Main vegetation types[†]
		Min	Max	Total	Grazing			
Ischiator	15.9	1604	2700	824	441	465	0.09	*Festuca paniculata, Nardus stricta, Festuca* gr. *ovina*
Perdù	15.9	1745	2613	841	405	625	0.12	*Brachypodium coespitosum, Festuca* gr. *ovina, Sesleria varia*
Stau	13.0	1750	2760	476	327	505	0.11	*Festuca* gr. *ovina, Festuca violacea, Festuca paniculata*

[†]Cugno (2001).

The vegetation of the main vegetation types, as representative of Sambucana summer pastures, was studied with the phytopastoral method (Daget and Poissonet, 1969). The herbage mass was assessed by cutting 1 m^2 area with a portable lawnmower, taking also note of the phenologic stage. Herbage samples were oven dried at 70°C and analysed to determine forage quality on the basis of: organic matter digestibility, OMD % (Aufrère, 1982); nitrogen content in forage, N % (Kirsten, 1983); amount of energy for physiological maintenance and animal productions, MFU (milk forage unit).

Results and discussion

The overall means and standard deviations of LW and LWG (Table 2) showed a wide variability. Nevertheless, Sambucana meat presented a good hot dressing (50%) and a normal pH value (5.64). In relation to chemical composition, the standard deviation (SD) of water, fat and protein was very low. The fat content was fair and its values were low, differently to what it is generally supposed for rustic and prolific breeds (Kempster, 1980; Fahamy *et al.*, 1992). Concerning the physical parameters meat colour was dark with lightness (36.27) and the red index (14.47) particularly variable. CL resulted more variable than DL, and similar to the value observed in the *light* Rasa Aragonesa lamb, typical rustic Mediterranean breed (Sanudo *et al.,* 2000).

Table 2. *In vivo*, at slaughter and meat traits[†]

	Mean	SD
Live weight (kg)	32.13	4.66
Age (d)	186.00	9.00
LWG (g/d)	141.00	19.27
Hot dressing (%)	49.82	2.33
pH 24	5.64	0.09
T 24 (°C)	8.96	2.83
L	36.27	1.85
a_L	14.47	1.62
b_L	5.42	0.87
DL (%)	1.14	0.28
CL (%)	12.66	2.86
WBs (%)	3.77	0.89

[†]LWG = live weight gain; T = temperature; L = lightness; a_L = red index; b_L = yellow index; DL = drip loss; CL = cooking loss; WBs = Warner Bratzler shear force.

The WBs was lower than the one observed in lambs slaughtered at the same LW (32 kg; Polidori *et al.,* 2001), but higher than the one (2.02 ± 2.83) reported by Safari *et al.* (2001).

The fatty acid composition of lambs meat (Table 3) showed an unfavourable low value (0.19) for the P:S ratio [(C18:2 n6+C18:3 n3)/(C12:0+C14:0+C16:0)] according to Department of Health report guidelines (1994) whose recommended value is 0.45 for the diet as a whole. Sambucana lambs P:S value is anyway better than the one reported by Enser (1998) for light lambs. Grass-fed lambs showed a lower n6/n3 ratio (2.5), lower then the one recommended by the same Department of Health (4.0). The n6/n3 ratio is important for health, and offsets the low P:S ratio, as ruminant meats are the only significant sources of preformed C_{20} and C_{22} polyunsaturated fatty acids (PUFA) in the diet (Enser *et al.*, 1998).

Table 3. Chemical characteristics and fatty acid composition of meat[†]

	Mean	SD
Water (%)	77.46	0.94
Fat (%)	1.14	0.52
Protein (%)	19.99	0.78
n3 (%)	3.13	1.26
n6 (%)	7.92	3.60
n6/n3	2.52	0.26
SFA (%)	50.78	5.12
MUFA (%)	38.17	2.29
PUFA (%)	11.05	4.85
SFA/UNSFA	1.05	0.21

[†]SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids; UNSFA = unsaturated fatty acids.

As regard to forage quality, the study pointed out some temporal fluctuations in OMD %, N % during the grazing season. According to these variations, a different calendar of exploitation, more compatible with the ecologic conditions of vegetation and its regeneration, was suggested to maximize digestibility and energy intake (Table 4).

Table 4. Optimum grazing period and main characteristics of grazing quartiers

Date	10th June - 15th July 11th Sept. - 30th Oct.	16th - 31st July	1st - 20th Aug.	21st Aug. - 10th Sept.
Ecologic condition	Low quartiers, S-SW-SE exposition, dry soil	Medium quartiers, S-SE exp., slightly dry soil	Medium-high quartiers, W-NW exp., slightly damp soil	High quartiers, North exp. and snow patch swards, damp soil
Vegetation type	*Brachypodium coespitosum, Helianthemum* spp., *Sesleria varia*	*Festuca paniculata, Festuca* gr. *ovina, Nardus stricta*	*Nardus stricta, Festuca* gr. *rubra Festuca* gr. *ovina*	*Poa* and *Plantago alpina, Trifolium alpinum, T. thalii*
Herbage mass (t/ha)	2.11	1.46	1.22	0.82
N (%)	1.70	1.10	1.30	2.00
OMD (%)	52.00	50.00	63.00	66.00
Energy (MFU/kg DM)	0.57	0.58	0.68	0.75

Conclusions

Resulting from the physical and chemical analyses, Sambucana, as a heavy lamb of a rustic breed, has tender meat with low fat content, low fatty acids n6/n3 ratio and good water retention. As a consequence, the *tardoun* meat shows an interesting quality and nutritional characteristics based on which it might be well diversified on the market, protecting producers and consumers from illicit introductions. In a period of serious slump of livestock husbandry, Sambucana sheep breeding, when linked to the land, could represent for the Valle Stura di Demonte a productive and environmental potentiality, giving an important contribution to the image of livestock breeders. In fact, this traditional breeding offers all the requirements for a typical niche production (authenticity, genuineness, culture, tradition, territory, healthiness), with satisfaction of consumers' demands and valorisation of this mountain region, at the mean time. Very often, unfortunately, breeding conditions are still inadequate to assure high and constant meat quality, which is very heterogeneous at the moment.

Improvements in the genetic of the race, in breeding conditions, and in the grazing management (especially in the exploitation of summer pastures) seem to be essential features to promote the product and to enhance the effectiveness of marketing.

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