

ORGANIC LAMB FROM AUTOCHTHONOUS BREEDS OF THE APULIAN REGION

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Introduction

Of the wide range of typical Italian sheep breeds, some are particularly right for the territory features. Some rustic breeds have been selected from the southern regions of the peninsula being characterized by very hard feeding and environmental conditions. This mainly relates to the Apulian area, bordering on the Basilicata region with steppe landscape which is recently under special protection by declaring it National Park of the Alta Murgia. This area, boasting remote shepherd vocation, is the place where sheep breeds have been selected due to their ability to survive the aridity of poor pastures, thus creating since long ago, a whole system based on wool and meat production, which is slowly disappearing following to the specialized breeds spreading.

Among these selected breeds, the Gentile di Puglia one originated, in the XV century, by Merinos breed substitution on Apulian autochthonous breeds, above all on the Apennines mountains population Garfagna (Dell'Aquila et al., 1995; Sarti, 1996). Today the breed is raised openair, permanent and transhumance, in medium-sized and large flocks in the Apulia, Basilicata and Calabria regions for meat production. The breed is known for standing hard local conditions (hills and mountains). It is characterized by a white elegant wool fleece with a rectilinear profile head. Rams are strong loop horned and the females are polled. They are mainly used for wool and meat production, above all the typical lean lamb, slaughtered at 50-70 days of age (live weight 14-20 kg). Wool production which once equaled the best foreign merinos has by now no market.

Another typical native local breed from the area is the "Altamura", found in Bari and Foggia provinces. The animals are white and occasionally have dark spots on the face. Adult males weigh on average 52 and females 37 kg with an average wither height of 70 and 65 cm respectively. These sheep have coarse/carpet type wool and all animals are polled. The breed is adapted to live on arid soils. It is raised openair (often with little transhumance) for milk that is employed for the production of a traditional fresh cheese, the "Canestrato", branded IGP (Protected Geographical Indication) according to E.C. rules.

Both breeds are at risk of extinction and have been inserted in FAO databank protection program DAD-IS (Domestic Animal Diversity - Information System). Numerically, the "Gentile di Puglia" and "Altamura" breeds in 2004 were respectively 4,587 and 409 heads (Asso.Na.Pa., 2005). In the study area the profitability of sheep rearing is mainly connected with milk production, mostly coming from other specialized breeds. A correlated production of remarkable importance is represented by the lamb

meat. It represents a legacy of popular tradition, primarily consumed on occasion of the Catholic celebrations. The possibility of adding milk income, coming from the sale of improved lambs (crossbreeding among breeds with different attitude), can constitute a valid opportunity and, consequently, allow the recovery of autochthonous genotypes such as Altamurana, though their low productivity. The preservation of the genetic purity of crossbreeding breeds is ensured by the commercial target of the hybrid lambs, which are never used for flock reconstitution.

Objectives

The aim is to recover and to preserve the biodiversity of autochthonous sheep legacy in the steppe highlands (Murgia) of Apulia, through the productive exploitation of the lean lamb, raised according to the organic system. To improve lamb productive performances we used the effect that meat-type rams (Gentile di Puglia) produce when crossbred with a milk-type sheep (Altamurana). At the sametime this allows the recovery important genotypes, produced over centuries of selection. In a previous paper (Schiavone et al., 2005) some quanti-quality traits of crossbreed lamb have been considered. The present paper shows the real opportunities offered by this type of crossbreeding through the comparison between the genotypes and the evaluation of other parameters.

Methodology

Eighteen male single-birth lambs, six of Altamurana breed (A), six half-breed (Gentile di Puglia x Altamurana - GA) and six Gentile di Puglia (G), have been naturally suckled from birth to 68 days; their mothers were reared on pasture. Lambs were weighed at birth, before and after slaughtering. The daily mean increase, the slaughtering yield and the cool loss were calculated. pH values were surveyed, using a glass electrode, on shoulder, *Longissimus dorsi* (Ld) muscle and thigh at slaughtering (pH₁), after refrigeration to +4°C for 24 (pH₂₄), 48 (pH₄₈) and 72 hours (pH₇₂). Carcasses were divided in two parts and that right part subdivided in commercial cuts, according to ASPA (1996) indications. The weights of the single cuts were recorded. On a sample of Ld muscle the color was estimated by the Hunter Lab system using a colorimeter (illuminant D 65), which measured the values of Lightness (L), Redness (a) and Yellowness (b) by making 5 readings for each meat sample, approximately 2.5 cm thick. Tenderness was measured using a Warner Bratzler shear device applied to an Instron 5544 and expressed as the cutting force (kg/cm²) required to shear perpendicularly to the direction of the fibres half an inch diameter cylinders of raw and cooked meat, taking three measurements for each subject. Data were analyzed for variance using the GLM procedure of SAS (1999/2000).

Results & Discussion

Weights at birth (Table 1) were greater for GA lambs (4,450 g) than A subjects (3,600 g; P <0.05) and G (4,350 g). This difference in weight was also found at slaughtering, where half-breed showed the highest weights (GA: 21,176 g; G: 20,000 g;

A: 19,379 g). The daily weight increase was higher for GA lambs (242.98 g/d) than A (232.05 g/d) and G (230.00 g/d) subjects. Santos-Silva et al. (2002) recorded different data in the half-breed Merino Branco and Ile de France, while a positive heterosys effect, according to our results, was observed by Teixeira et al. (1996) in the crossbreeding of Brånçagnano sheep (a mountain-type breed of northern Portugal) and Suffolk and Merino Precoce rams. The carcass weights have been influenced, though with no statistical significance, by the genetic composition of the animals, according to Boujenane et al. (2002) in the crossbreeding of three genotypes. Major greater weights were measured for F1 animals, with 13,283.33 g, against 12,533.33 g for G and 12,116.67 g in A groups. Yields at slaughtering were almost identical among the groups. The differences emerged for cool loss were not significant, probably because the animals were slaughtered at a low weight and therefore related to a narrow range. pH (Table 2) and color (Table 3) values were always found very close among groups, attesting a substantial preservation of the qualitative peculiarities, typical of crossing genotypes. Particularly the lightness (L) of lamb meat, very appreciated by consumers, was higher ($P<0.05$) in the half-breed meat than that from the two genotypes. The incidence of commercial cuts (Table 4) on the half-carcass weight showed no statistical difference, although the fleshy cut weights of the half-breed animals were close to those of the G subjects, attesting a preservation of the conformational characteristic, as found by other authors (Santos-Silva et al., 2002). Finally the lean/fat/bone relationship (Table 5) of the leg fairly matches values from half-breed lambs and the meat-type breed ones (Gentile di Puglia).

Conclusions

More attention to autochthonous breed/populations, even if low productive, have to be paid in order to protect genetic variability. Crossbreeding, then, is to be considered a valid tool to find solutions and meet with breeders' needs. The preservation of the Altamurana breed genetic pool, otherwise destined to a slow decline and to extinct, can well rely on "commercial" crossbreeding. The introduction of Gentile di Puglia genes, also risking extinction, positively weighs on lamb production, because of the heterosys effect, and offers an additional income for breeders. In conclusion, the characters of the crossing meat-type breed, i.e. the fast growth and the favorable muscular development, have been manifest in the first generation Gentile di Puglia x Altamurana half-breed and have not produced substantial modifications of the quality characters of the meats.

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Tables and Figures

Table 1. Productive performance and phisycal traits

	A	GA	G	D.S.E.
Birth weight (g)	3,600.00 b	4,450.00 a	4,350.00	645.497
Live weight (g)	19,379.50	21,176.33	20,000.00	3,627.896
Daily Mean Increase (g/d)	232.05	242.98	230.12	48.102
Carcass weight (g)	12,116.67	13,283.33	12,533.33	1,981.330
Yeld (%)	62.52	62.73	62.67	2.637
Cool loss (%)	2.05	2.45	2.32	1.060
Cooking loss (%)	36.09	38.59	37.44	2.3260
Raw meat tenderness (kg/cm ²)	1.745	1.567	1.611	0.4112
Cooked meat ten.ss (kg/cm ²)	2.132	2.167	2.045	0.7581

Table 2. pH

	A	GA	G	D.S.E.
pH ₁ Shoulder	6.45	6.36	6.44	0.283
Ld	6.41	6.36	6.33	0.181
Thigh	6.39	6.30	6.19	0.206
pH ₂₄ Shoulder	5.54	5.61	5.62	0.321
Ld	5.46	5.44	5.54	0.293
Thigh	5.40	5.62	5.65	0.390
pH ₄₈ Shoulder	5.73	5.68	5.61	0.221
Ld	5.48	5.57	5.37	0.206
Thigh	5.48	5.41	5.39	0.254
pH ₇₂ Shoulder	5.76 a	5.97 a	5.47 b	0.239
Ld	5.54	5.64	5.53	0.217
Thigh	5.55	5.60	5.55	0.231

Table 3. Ld muscle color

	A	GA	G	D.S.E.
Color ₂₄ L	38.69 b	43.36 a	41.43	2.888
a	13.28	16.73	11.03	9.542
b	13.57	14.49	14.78	1.212
Color ₄₈ L	36.69	39.92	41.77	2.032
a	12.17	11.23	11.52	0.816
b	15.52	16.28	14.83	1.214
Color ₇₂ L	39.71	39.40	42.52	2.776
a	12.35	11.65	11.42	1.311
b	16.42	16.52	16.75	1.734

Table 4. Commercial cuts (% on reconstituted half-carass weight)

	A	GA	G
Neck	12.06	11.48	11.52
Ribs	21.99	21.82	21.28
Shoulder	19.15	19.59	20.48
Loin	3.51	4.04	3.53
Brest	4.84	4.91	5.05
Leg	35.64	35.35	35.23
Shins	2.81	2.81	2.91

Table 5. Leg tissue composition (% on reconstituted leg weight)

	A	GA	G
Lean	62.50	62.37	62.61
Fat	7.07	6.73	6.25
Bone	30.43	30.90	31.15