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Effects of feeding and rearing system on carcass characteristics of Sarda breed pig: Preliminary study

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Abstract. The effects of feeding and rearing systems on carcass characteristics of Sarda breed pigs were studied. Twelve castrated male pigs, homogeneous for body weight (98.4±13.8 kg) and age (15 months) were randomly assigned to three feeding systems. A e B groups, reared en plein-air system in the woods and fed *ad libitum* with commercial concentrate and fed ground barley (1.8 kg/head/day) respectively; C, fed at pasture in the woods and receiving 500 g/head/day of barley grain. At slaughtering (22 months) carcass weight, biometric measures, pH (at 45' and 24 h after slaughter) and backfat thickness located at the first (1T) and the last (UT) thoracic vertebra and at the top of the *middle gluteus* (GM) were recorded. The live weight (kg) value was 294.0 (A), 170.7 (B) and 202.0 (C). Results showed differences between feeding systems: slaughter yield at 1 h after slaughtering was higher in group A (82.04%) compared to B (78.03%) and C (77.97%); the slaughter yield at 24 h after slaughtering was 80.37% (A) *vs* 76.27% (B) *vs* 76.33% (C). Also the fat thickness was higher (P<0.01) in group A.

Keywords. Sarda breed pig – Feeding system – Rearing system – Slaughtering yield.

Effet du système d'alimentation et d'élevage sur les caractéristiques de la carcasse des porcs de race Sarde : Études préliminaires

Résumé. *Ce travail a consisté en l'étude des effets de l'alimentation et du système d'élevage sur le rendement à l'abattage des porcs de race Sarde. Douze mâles castrés, de poids (98,4±13,8 kg) et d'âge (15 mois) comparables, ont été divisés en trois groupes (A,B,C) et soumis à différentes techniques d'élevage: A et B, élevés en plein air, alimentés respectivement* ad libitum *avec un aliment commercial ou avec une ration de 1,8 kg/tête/jour de farine d'orge (B); C, au pâturage dans un bois avec une complémentation quotidienne de 500 g d'orge en grain. À l'abattage (22 mois) ont été mesurés: le rendement à chaud et à froid de la carcasse, les mesures biométriques, pH à 45' et à 24 h après abattage) et l'épaisseur du gras au niveau de la première et de la dernière vertèbre thoracique et du muscle* Gluteus *moyen. Le poids vif (kg) était de 293,4±7,2; 171,1 ±7,2 et 202,0±7,2 pour les groupes A, B et C. L'analyse des résultats a montré des différences entre les divers systèmes d'alimentation: le groupe A présentait un rendement à l'abattage supérieur, aussi bien à 1 h [82,04% vs 78,03% (B) et 77,97% (C)], qu'à 24 h [(80,37% vs 76,27% (B) et 76,33% (C)]. L'épaisseur de gras dorsal des carcasses du groupe A était aussi nettement supérieure (P<0,01).*

Mots-clés. *Porc de race Sarde - Système d'alimentation - Système d'élevage - Rendement à l'abattage.*

I – Introduction

The biodiversity safeguard and the fight against the depopulation of the marginal areas is given also by the exploitation of the autochthonous species (Porcu, 2008). Indeed, the use of autochthonous breed pig, some of which are living in absolute freedom, provide high quality production and increased the rate of self-provision of the meat market, limiting importation. Moreover they could allow a wider and more rational exploitation of marginal areas. The autochthonous breeds are the perfect balance between the animal and the environment in which they live increasing the value of the local traditions and diversifying the production

(Goracci, 2008). Sarda pig inserts in this context very well (Porcu *et al*., 2010).

Available data on productive performances and pork quality about free-range or confinement reared pigs vary widely vary: several factors could affect the results such as climatic and environmental conditions, genotypes etc. (Filetti *et al.,* 2003). Among these, in particular the nutritional level and qualitative aspects of the food should be considered. Also, the growth of the animal and its productive performance (chemical composition and meat quality) vary in function of rearing system, age and weight at slaughtering. Only recently few researches have been conducted about Sarda breed pig on their growth (Porcu *et al*., 2010). Establishing the performances of local breeds may involve both consistent differences between rearing environment and interactions between management and breed characteristics (Pugliese *et al*., 2003).

The aim of the study was to evaluate the effect of different breeding and feeding systems on carcass characteristics of Sarda breed pigs.

II – Materials and methods

The study lasted seven months (July 2009-February 2010) and was conducted at the experimental farm of AGRIS agency in Foresta Burgos (Illorai, Sassari; 44°69 lat. North and 4°95 long. East). The experimental site is char acterized by a forest area of 40 ha divided in lots of various sizes and with altitude ranging from 830 to 930 m. Twelve Sarda breed pigs castrated male coming from the AGRIS agency (DIRPA), homogeneous for genetic, weight (98.4 ± 13.8 kg) , age (15 months) were randomly assigned to three experimental groups (A, B and C) that differed in the feeding systems: A, reared en *plein-air* system in a wood area of 4500 m^2 and supplemented with a commercial concentrate (*ad libitum)*; B, reared en *plein-air* in a wood area of 6000 m^2 and supplemented with ground barley (1.8 kg/head/day), through an automatic feeder; C, fed at pasture in the wood area of approximately 20 ha and supplemented with barley grain (500 g/head/day). Just before the slaughtering (22 months of age) live weight of each animal was recorded, then the carcass weight, the white offals weight and red offals weight were detected. The pH values: after 45 minutes (pH_1), after 24 hrs (pH_u), *post mortem,* at the top of the *middle gluteus* (GM), at the first (1T) and the last (UT) thoracic vertebra were recorded by a pH-meter (pH600 EUTECH Instrument) equipped with penetration probe.

After 24 hours of refrigeration at 4°C for each subject: carcass weight,and from the right half-carcass, pH_u and the thickness of dorsal fat located at the top of the middle gluteus (GM), at the first (1T) and the last (UT) thoracic vertebra, carcass length, inner and outer chest depth (Tables 2 and 3) were determined.

III – Results and discussion

The data (Table 1) showed that slaughter yield was significantly (P<0,001) higher in group A (82.04%) than B (78.03%) and C (77.97%).The slaughter yield at 24 h after slaughtering was 80.37% (A) *vs* 76.27% (B) *vs* 76.33% (C). Carcass length and chest depth were not different (Table 1). The fat thickness (Table 2), was higher in group A than the other ones.

Mean values of pH were reported in Table 3. No differences (P>0.05) were observed in pH_1, where the overall values were considered as normal for the examined muscles (range 6.15±0.07 → 6.55±0.11). Significant differences (P<0.05) between mean values of pH_u were observed (range 5.64±0.05 → 5.90±0.04). The pH_u values were highest in samples from group A (> 5.82), while resulted lowest in samples from group B (5.64).

The carcass characteristics showed the positive effects of different rearing and feeding systems on weight and fat thickness as reported by various authors (Liotta *et* al., 2005; Pugliese *et* al., 2003) on Nero Siciliano pigs fed *ad libitum* and reared indoor.

Table 1. Carcass yield at 0 and 24 h after slaughtering (ls means ± S.E.)

		Groups			
	N	A	B	C	P<
Live weight (kg)	12	294.0±12 a	170.7±12.0 b	202.0±12.0 b	0.001
Carcass weight 0 hr	12	241.2±9.7 a	133.2±9.7 b	157.5±9.7 b	0.001
Carcass weight 24 hr	12	236.3±9.4 a	130.2±9.4 b	154.2±9.4 b	0.001
White offals weight (kg)	12	13.6±1.2	17.1±1.2	14.6±1.2	0.18
Red offals weight (kg)	12	5.4±0.1 a	3.7±0.1 c	4.5±0.1 b	0.001
Carcass length (cm)	12	115.0±2.4	106.1±2.4	110.4±2.4	0.08
Chest depth (cm)					
Inner	12	25.6±1.1	23.4±1.1	27.1±1.1	0.12
Outer	12	29.1±1.5	26.9±1.5	28.9±1.5	0.51

a, b means with different letters within row were significantly different (P<0.05).

Table 2. Backfat thickness (mm) of Sarda breed pigs (ls means ± S.E.)

		Groups			
	N	A	B	C	P<
Fat thickness 1T					
Total	12	102±2.4 a	47±2.4 c	58±2.4 b	0.001
Inner	12	71±2.5 a	31±2.5 b	35.7±2.5 b	0.001
Fat thickness UT	12				
Total	12	108±3.1 a	49±3.1 b	56±3.1 b	0.001
Inner	12	79±4.3 a	32±4.3 b	41±4.3 b	0.001
Fat thickness GM					
Total	12	98±5.5 a	39±5.5 c	57±5.5 b	0.001
Inner	12	51±4.8 a	20±4.8 b	27±4.8 b	0.01

a, b means with different letters within row were significantly different (P<0.05).

Table 3. pH values of Sarda pig meat 45' and 24 h after slaughtering (ls means ± S.E.)

		Groups			
	N	A	B	C	P<
pH_1 1T	12	6.28±0.07	6.24±0.07	6.15±0.07	0.44
pH_1 UT	12	6.29±0.07	6.21±0.07	6.19±0.07	0.30
pH_1 GM	12	6.55±0.11	6.47±0.11	6.44±0.11	0.70
pHu 1T	12	5.90±0.04	5.73±0.04	5.83±0.04	0.08
pHu UT	12	5.82±0.04 a	5.66±0.04 b	5.73±0.04 b	0.03
pHu GM	12	5.86±0.05 a	5.64±0.05 b	5.70±0.05 b	0.04

<a, b means with different letters within row were significantly different (P<0.05).

IV – Conclusions

Data show that feeding and rearing system affected carcass characteristics. The typical backfat content in this local breed can be an important issue. In-fact, in similar conditions, an high content on unsaturated fatty acids was found in adipose tissue of outdoor-pigs, particularly

reared in wood (Pugliese *et al*., 2005; Cosentino *et al*., 2003). This aspect could be utilised to promote the quality of Sarda breed pig products. So the extensive feeding system represents the best compromise between performance and farming profit, as well as the valorization of local breed pigs can contribute to the economic and environmental sustainability of the traditional farming. However, being the data presented, the first scientific results obtained on the productive performance of Sarda breed pigs, further studies should be carried out in order to find the optimal rearing and feeding systems.

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