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in

De Pedro E.J. (ed.), Cabezas A.B. (ed.).
7th International Symposium on the Mediterranean Pig

Zaragoza : CIHEAM
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 101

2012
pages 367-371

Effect of feeding and rearing system on growth performance of Sarda breed pig: Preliminary study

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Abstract. Autochthonous Sarda pigs are usually bred in mountainous areas of Sardinia where they use mainly feeding resources in shrublands and forests. The aim of the study was to evaluate the effect of different feeding systems on some performances of Sarda pigs. Twelve, castrated male pigs, homogeneous for body weight (98.4±13.8 kg) and age (15 months) were randomly assigned to the following three feeding systems: A, reared en *plein-air* system in the woods and fed *ad libitum* with a commercial concentrate; B, reared en *plein-air* in the woods and fed with ground barley (1.8 kg/head/day), with an automatic feeder; C, fed at pasture in the woods and receiving 500 g/head/day of barley grain. Morphological measures and weight were recorded fortnightly until slaughtering (22 months of age). Preliminary results showed differences between feeding systems, with best performance in group A: weight and fat thickness were higher (294 kg and 84.5 mm respectively) than group B (170.7 kg and 29.7 mm) and group C (202.0 kg and 39.7 mm). Therefore extensive feeding systems is a right compromise between good performances and farming profit.

Keywords. Sarda breed pig – Growth performance – Feeding system – Rearing system.

Etudes préliminaires sur l'influence de l'élevage et de l'alimentation sur l'augmentation pondérale et biométrique des porcs de race Sarde

Résumé. *Le porc autochtone de race Sarde, traditionnellement élevé dans les régions montagneuses de Sardaigne, se nourrit principalement des ressources du sous-bois. L'objectif de ce travail était d'étudier l'influence des divers systèmes d'alimentation sur les performances productives de ces porcs. Douze mâles castrés, de poids (98,4±13,8 kg) et d'âge (15 mois) comparables, ont été soumis à trois régimes alimentaires différents: A, élevés en plein air dans un bois et alimentés* ad libitum *avec un aliment commercial; B, élevés dans le même système et alimentés avec de la farine d'orge (1,8 kg/tête/jour) au moyen d'un distributeur automatique; C, maintenus au pâturage dans un bois et complémentés avec de l'orge en grain (500 g/tête/jour). Les mesures morphologiques et le poids de chacun de ces animaux ont été relevés tous les 15 jours jusqu'à leur abattage à 22 mois. Les résultats préliminaires ont montré des différences significatives (P<0,05) entre ces systèmes d'alimentation avec de meilleures performances pour le groupe A: le poids vif et l'épaisseur de gras des porcs de ce groupe (respectivement 294,0 kg et 84,5 mm) étaient supérieurs à ceux des groupes B (170,7 kg et 29,7 mm) et C (202,0 kg et 39,7 mm). Toutefois, le système d'alimentation extensive représente le meilleur compromis entre performances de production et profit de l'éleveur.*

Mots-clés. *Porc de race Sarde – Gain de poids – Système d'alimentation – Système d'élevage.*

I – Introduction

The increased industrialization of agriculture and the greater market demand led the pig farmers to replace the "autochthonous breeds pig", less productive but well adapted to the environment, with the "cosmopolitan breeds pig". This trend started in Italy, since 1872 (Mascheroni, 1927), and caused the gradual replacement of the autochthonous breed pigs.

Among the 21 Italian breed pigs, recognized until the last century, nowadays only 6 survived (Franci *et al.*, 2007). Despite ancient origins of Sarda pig (Porcu, 2006), the study about the

local breed officially recognized (Ministerial Decree No. 21664 of 08/06/2006) has been started recently (Porcu *et al.*, 2007).

The exploitation of the autochthonous species can help the biodiversity safeguard and the fight against the depopulation of the marginal areas (Porcu, 2008). Indeed, in all rural societies, domestic pig breeding has played always an important role because represented, and represent still now, a source of food always available thanks to the spawning characteristics (high fertility and frequency of parts). *Sarda* pig has lived for centuries completely free in the Sardinia mountains showing a great ability to utilize poor food such as spontaneous fruits of woods and only occasionally was supplemented with flour or grains. Such as autochthonous pig (Zumbo *et al*., 2003), Sarda breed is characterized by a strong resistance to illness, a zoo-technical adaptability to different climatic conditions as well as the ability to procure food thanks to its strong inclination to grazing and its high rusticity.

Several authors (Cetti, 1774; Bonadonna, 1960; Porcu, 2004) described the Sarda breed pig as a small animal size that hardly could achieve heavy weight.

However Cetti (1774) stated that in some areas of Sardinia some pigs could reach greater size (over 200 kg). So is well-known that the productive and growth performances are influenced both by genetic factors and different environmental conditionings. Among these, the feeding and rearing systems should be considered particularly.

The aim of the study was to evaluate the effect of different breeding and feeding systems on growth performances of Sarda 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 characterized 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 castrated male pigs coming from the AGRIS agency (DIRPA), homogeneous for genetic, weight (98.4 ± 13.8 kg) and 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* system 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 a wood area of approximately 20 ha and supplemented with barley grain (500 g/head/day). Chemical composition of principal feedstuff used and main fruits of woody species fed during the experiment was measured (Table 1).

Table 1. Chemical composition of feed (% dry matter)

	Moisture	Ash	Crude protein	Ether extract	Crude fiber
Quercus pubenscens	54.50	2.47	5.76	2.31	14.83
Quercus ilex	56.91	2.23	4.82	1.70	16.88
Pyrus amygdaliformis	63.62	2.47	3.35	1.1	22.68
Commercial concentrate	14.04	7.69	16.79	2.8	4.91
Ground barley	12.04	2.67	9.11	1.94	7.36

On each animal, fortnightly morphological measurements were determined: live weight, withers and rump height, chest length, chest depth, chest width, rump width and subcutaneous fat thickness at the lumbar level (by RENCO LEAN-Meter instruments). The animals were slaughtered 22 months old.

Data of live weight and morphological parameters were tested by GLM procedure (SAS, 2001) using feeding system as fixed effects. Average daily gains (ADG) were tested by MIXED procedure (SAS, 2001) using feeding system, measurement period and their interaction as fixed effects and animal as random effect.

III – Results and discussion

As expected, pigs fed *ad libitum* with commercial concentrate (group A) have grown faster than those fed in controlled condition (Fig. 1, Table 2) and between these two groups, higher ADG has been observed in C than B group (P<0.001).

Table 2. Effect of feeding regimen (TR), period (NC) and interaction on average daily gain (AMG) of Sarda pigs submitted to different feeding systems (ls means ± S.E.)

	N	Groups			P<		
		A	B	C	TR	NC	TR*NC
ADG (kg/head/day)	12	0.910±0.03 a	0.351±0.03 c	0.469±0.03 b	0.001	0.001	0.001

a, b values with different letters are different (P<0.05).

Preliminary results (Table 2) showed differences between feeding systems, with best performance in group A: weight and fat thickness were higher in group A than group B and group C (Table 2). This is probably due to the higher energetic availability in the A group. Also the fat thickness was higher (P<0,01) in group A than group C; this result is in agreement with data of Pugliese *et al.* (2003) on Nero Siciliano pigs reared indoor. The lower backfat thickness found in groups B and C should be considered in relationships with the lower growth rate observed in these groups. Pugliese *et al.* (2003) reported that a slower growth rate usually favours muscle deposition with respect to fat, resulting in leaner carcasses.

Table 3. Live weight and morphological measurements of Sarda breed submitted to different feeding systems (ls means ± S.E.)

	N	Groups			P<
		A	B	C	
Live weight (kg)	12	294.0±12.0 a	170.7±12.0 b	202.0±12.0 b	0.001
Withers height (cm)	12	89.7±1.6 a	82.0±1.6 b	85.7±1.6 b	0.020
Rump height ”	12	91.0±1.5 a	83.5±1.5 c	88.0±1.5 b	0.020
Chest girth ”	12	172.2±3.0 a	129.7±3.0 c	139.2±3.0 b	0.001
Chest lenght ”	12	135.0±4.1 a	116.5±4.1 b	125.0±4.1 b	0.030
Chest depth ”	12	59.0±1.2 a	45.7±1.2 b	49.5±1.2 b	0.001
Chest width ”	12	46.0±0.7 a	35.7±0.7 b	37.0±0.7 b	0.001
Rump width ”	12	43.7±0.9 a	31.5±0.9 c	34.5±0.9 b	0.001
Fat thickness (mm)	10	84.5±3.8 a	29.7±2.7 c	39.7±2.7 b	0.001

a, b values with different letters are different (P<0.05).

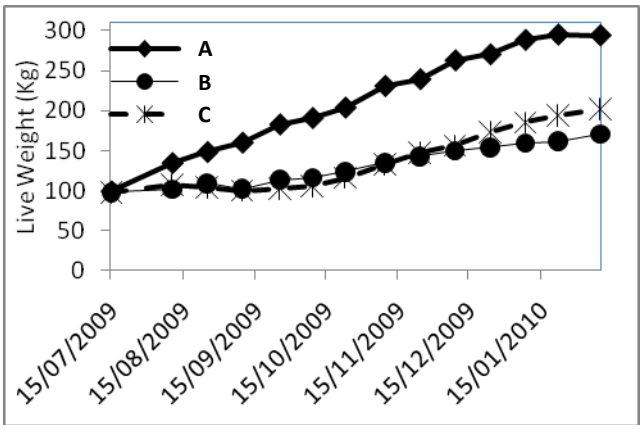

Fig. 1. Live weight trend (kg) of Sarda pigs submitted to different feeding systems (A, reared in plein-air system in the woods and fed *ad libitum* with a commercial concentrate; B, reared in plein-air in the woods and fed with ground barley (1.8 kg/h/d), with an automatic feeder; C, fed at pasture in the woods and receiving 500 g/h/d of barley grain).

IV – Conclusions

Data show that the performance *in vitam* were significantly influenced by the nutritional level as reported by Liotta *et al.* (2005). The extensive feeding system represents the best compromise between performance and farming profit. The preliminary results presented encourage to pursue research experiments to better understand which feeding and rearing conditions can allow good results by respecting the tradition and productive performance of Sarda breed pig.

Acknowledgements

The Authors want to thank S. Fois, G. Moro, A. Pireddu, L. Pitzolu, F. Ruiu, D. Tatti, G. Zoeddu, C. Manca, M. Delrio for their precious contribution.

The research was supported by Agriculture Assessorship of the Sardinia Region.

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