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in

Audiot A. (ed.), Casabianca F. (ed.), Monin G. (ed.).
5. International Symposium on the Mediterranean Pig

Zaragoza : CIHEAM

Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 76

2007

pages 39-42

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=800556>

To cite this article / Pour citer cet article

Chiofalo V., Zumbo A., Liotta L., Chiofalo B. **In vivo performance and carcass traits of Nero Siciliano pigs reared outdoors and in plein air.** In : Audiot A. (ed.), Casabianca F. (ed.), Monin G. (ed.). 5. *International Symposium on the Mediterranean Pig* . Zaragoza : CIHEAM, 2007. p. 39-42 (Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 76)



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In vivo* performance and carcass traits of Nero Siciliano pigs reared outdoors and in *plein air

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SUMMARY – *In vivo* and post mortem performances of "Nero Siciliano" pigs reared outdoors and *plein air* were studied. Thirty pigs were divided into two homogeneous groups, outdoors (OD, with access only to natural resources) and *plein air* (PA, fed with concentrate feed), in relation to the breeding system. Pigs were slaughtered at 80 kg of BW, on average. Carcass yield was calculated. The right sides were dissected into lean, fat and bone cuts. A loin sample was dissected into the major tissues. The OD group reached the slaughter weight after 250 days and the PA group after 160 days from the beginning of the trial. The slaughter yield between two groups (PA 83% vs OD 71%) was statistically significant. The backfat thickness was higher in PA (6.4 cm) than in the OD (2.45 cm) group. The rearing system influenced significantly ($P \leq 0.05$) the composition of loin sample for fat (PA 5.16% vs OD 3.43%).

Keywords: Nero Siciliano pig, *in vivo* performances, carcass traits.

RESUME – "Performances *in vivo* et caractéristiques de la carcasse de porcins Nero Siciliano élevés en extérieur et en *plein air*". On a étudié les performances *in vivo* et post mortem du porc "Nero Siciliano" en élevage extensif (exclusivement sur ressources naturelles) et en *plein air* (avec aliment concentré). 30 porcs ont été répartis en deux groupes homogènes, outdoor (OD) et *plein air* (PA) en relation au système d'élevage. Les porcs ont été abattus à 80 kg de poids vif. On a déterminé le rendement de la carcasse et la demi-carcasse gauche a été découpée. Un échantillon de longe a été disséqué pour déterminer les proportions de muscle, gras, os et peau. Le poids vif d'abattage a été atteint après 250 jours pour le groupe OD et après 160 jours pour le groupe PA. Le système d'élevage a affecté significativement le rendement de carcasse (PA 83% vs OD 71%), l'épaisseur du lard sous-cutané (PA 6,4 cm vs OD 2,45 cm) et le taux de gras de l'échantillon de longe (PA 5,16% vs OD 3,43% ; $P \leq 0,05$).

Mots-clés : Porc Nero Siciliano, performances *in vivo*, caractéristiques des carcasses.

Introduction

"Nero Siciliano" pig, autochthonous genetic type of the rural areas in north Sicily (Italy), lives in absolute freedom in the woods of the Nebrodi mountains (maximum altitude 1800 meters above sea-level). Its presence is proved by fossil remains and by references of the ancient writers, in the Greek period (VIII-VI B.C.). The breed shows high rusticity, good adaptability to often unfavorable environmental conditions and lives on undergrowth products (roots, tubers, acorns, spontaneous fruits, etc.). It has a slow and stunted growth, with a BW of 50-60 kg at 1 year old. Exploitation of autochthonous races, some of which living completely free, apart from providing high quality production and limiting importation, could allow, also, a wider and more rational utilization and the valorization of marginal areas. Animal husbandry, development and environment protection can operate in synergy or better can represent the necessary condition to avoid the socio-economic and environment decay, with interesting results for the preservation of biodiversity *in situ* (Chiofalo and Liotta, 2003). The aim of this research was to study some *in vivo* and *post mortem* performances of "Nero Siciliano" pigs reared outdoor and *plein air*.

Materials and methods

The trial was carried out on 30 "Nero Siciliano" pigs (16 castrates and 14 gilts), living in the Nebrodi areas, divided into two groups of 15, homogeneous for age (4 months) and Body Weight (BW = 39±2 kg), called "Outdoor" (OD) and "Plein air" (PA). Animals of OD group were allocated in a woody area of 12 hectares, appropriately enclosed, within Nebrodi park areas (Messina), where they fed the

spontaneous fruits of the undergrowth (acorns, tubers, chestnuts, hazel-nuts, etc.) variable in relation to the season and the year. Pigs of PA group, reared in plain-air system in the same rural area, had to their disposal movable wooden shelters, mangers, water ad libitum and concentrate (3% of BW). The chemical composition of the concentrate was: 87.7% dry matter (DM); on a DM basis: 17.90% crude protein (CP), 5.99% ether extract (EE), 3.42% crude fiber (CF) (AOAC, 2000). Animals, at the beginning of the trial, were identified by individual microchips (Portorider), situated on the subcutaneous region of the ear, to permit the identification by electronic system at a distance. At the beginning of the trial and monthly, the individual weights of the pigs were recorded, using an electronic weighting machine (Laumas Elettronica), to determine the average daily gain (ADG). Preliminarily, the animals, clinically healthy, were subjected to anti-parasite treatment and controlled periodically. At the final BW of 80 kg, on average, and previous 18 hours of fasting (ASPA, 1991), the animals were slaughtered: the carcasses were divided lengthwise in two sides; on each carcass the weight was determined (ASPA, 1991) in order to calculate the yield and the backfat thickness at the Last Thoracic vertebra (LT) level was measured using calipers. Right half carcasses were chilled at 4°C and jointed 24h *post mortem*, according to ASPA (1991) recommendation in the lean cuts (loin, ham, shoulder, neck, and lean residuals), fat cuts (belly, backfat, jowl, kidney fat) and bone cuts (head, feet). From loin a sample cut (including 2nd – 5th lumbar vertebra) was isolated and dissected into the major tissues, which were weighted (Pugliese *et al.*, 2004). Data obtained were subjected to statistical analysis according to GLM procedure of SAS (2001).

Results and discussion

In vivo parameters were significantly influenced by the breeding system, but no significant difference was observed between male and female, within the same group. Growth rate differed according to the breeding system, in fact OD group reached the slaughter BW (75 kg) at 250 days and PA group (80 kg) at 160 days (Table 1); the recorded ADG were 256 g for PA and 160 g for OD group. Of course, these results are due to the different vegetable availability for the animals belonging to the two groups and agree with the results obtained by Pugliese *et al.* (2003) on Nero Siciliano pigs reared outdoor and indoor. PA group showed (Table 1) a significant ($P \leq 0.001$) higher value of the slaughter yield and of the backfat thickness, which was measured at last thoracic vertebra, as reported by Liotta *et al.* (2002a) for the same genetic type reared outdoor and indoor. Yield value, measured 24 h *post mortem*, of PA group is in agreement with the results obtained on pigs of different genetic types, while the yield value of OD group is lower than the percentage reported by other authors (Campodoni *et al.*, 2001; Fortina *et al.*, 2001).

Table 1. *In vivo* and carcass traits of Nero Siciliano pigs reared Outdoor and Plain air

	Outdoor	Plein air	P
Final Body Weight (kg)	75±8.02	80±7.56	NS
Yield (%)	71±7.08	83±4.16	***
Backfat last thoracic vertebra (cm)	2.4±0.9	6.4±2.26	**

NS: not significant; ** $P \leq 0.01$; *** $P \leq 0.001$.

Table 2 shows the data obtained from slaughter and tissue separation; these results were influenced by the breeding system, too. Even if OD group had a lower ADG value than PA group, the percentage of lean cut showed no significant difference, while a significant ($P \leq 0.001$) lower percentage of the fat cuts and a significant ($P \leq 0.001$) higher percentage of the bone cuts (Table 2) were observed; these results are in line with the findings of Della Casa *et al.* (1991) on pigs fed with different nutritive levels and of Liotta *et al.* (2002 a) on Nero Siciliano pigs reared outdoor and indoor. The ham and shoulder percentages were not influenced significantly by breeding system (Table 2) as reported by Liotta *et al.* (2002 b) on Nero Siciliano pigs reared outdoor and indoor.

Table 2. Right half carcass composition of Nero Siciliano pigs reared Outdoor and Plein air

	Outdoor	Plein air	P
Lean cuts (%)	59.61±11.74	54.74±7.28	NS
Fat cuts (%)	29.90±8.13	37.84±5.55	***
Bone cuts (%)	15.4±4.2	12.4±1.7	***
Ham (%)	20±3.72	18.40±2.23	NS
Shoulder (%)	14.10±2.94	14.58±2.35	NS

NS: not significant; *** P ≤ 0.001.

While, breeding system influenced significantly the weight (P≤0.01) and the fat percentage (P≤0.05) of the sample cut (Table 3) as observed by Pugliese *et al.* (2004).

Table 3. Tissue composition of the sample cut of Nero Siciliano pigs reared Outdoor and Plein air

	Outdoor	Plein air	P
Sample cut weight (g)	572.8±114.2	720.8±101.7	**
Lean (%)	79.07±3.07	77.67±2.94	NS
Fat (%)	3.46±1.50	5.16±1.69	*
Bone (%)	17.4±2.92	16.9±2.68	NS

NS: not significant; * P ≤ 0.05; ** P ≤ 0.01.

Conclusions

The environmental situation of the Nebrodi mountain areas influences the living conditions, the metabolic-nutritional status of the animals which live outdoor (feed availability, intake level, feed utilization), as well as the productive performances, limiting the development possibilities of this zootechnic field, considerably. Data obtained showed higher growth performances, slaughter yield, backfat thickness and lower bone cut percentages on the pigs reared in plein air system, which had to their disposal shelter and concentrate, than those lived in extensive conditions. Therefore, feed integration and availability of shelter during critical periods (summer and winter), would provide these animals with the basic conditions of well-being, which is an indispensable factor for the improvement in quality and quantity of production, and for the protection of the territory that could not be subjected to the enormous damages caused by root during pigs searching for the food.

Acknowledgments

Research financed by PRIN 2003 (Prof. Vincenzo Chiofalo).

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