Genetic parameters of productive and reproductive traits in Cinta Senese pig

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RIASSUNTO – Stima di parametri genetici produttivi e riproduttivi nella Cinta Senese. *L'indagine è volta a evidenziare se esista o meno la possibilità di migliorare alcune caratteristiche produttive e riproduttive della razza Cinta Senese. Sono stati registrati i parti dal 1999 al 2004 in tre allevamenti "nucleo", è stata calcolata la media del numero di nati vivi ed il numero di svezzati per parto ed i relativi parametri genetici (ereditabilità, effetto materno, effetto della consanguineità, sia della madre, che dei nati). Sono stati inoltre presi in considerazione l'IMG, la percentuale di tagli magri, di tagli grassi e del prosciutto su 111 soggetti, stimandone l'ereditabilità e l'effetto che la consanguineità ha su di essi. I risultati indicano che un miglioramento dei caratteri riproduttivi è possibile solo attraverso un'attenta pianificazione degli accoppiamenti volta a ridurre la consanguineità mentre per i caratteri produttivi sembrerebbe percorribile anche la strada del miglioramento genetico per via selettiva.*

KEY WORDS: Cinta Senese, heritability, inbreeding, productive and reproductive traits.

INTRODUCTION – Cinta Senese breed, as other local breeds, suffered a bottleneck during the last century which produced a high level of inbreeding with a reduction of the productive and above all reproductive performances; average inbreeding coefficient of the piglets born in 2003 was 0.14 (Gandini and Gallo, 2004). Fresh and cured products derived from breeds like Cinta Senese fill a niche market both from quantitative and qualitative point of view. Meat derived from these breeds presents peculiar characteristics which render it more appreciated by consumers and different from meat of other improved breeds. Modern swine industry ascribes the great part of the carcass value to the ham and thus selection worked to favour the development of lean cuts. On the other hand, other cured products (lard, belly, sausages) derived from fat cuts are important source of revenues on autochthonous pig breeds. In these genotypes it is not so clear which would be the selection goal; selection borne to the improvement of productive performances (ADG, percentage of lean cuts) could give animals similar to those of the improved breeds with the losses of the peculiarity before mentioned. Obviously it would be desirable an improvement of the reproductive parameters that are decidedly worse than in improved breeds, even due to the high level of inbreeding of the local breeds. Waiting for individuation of the better selection goals to follow could be useful to deepen the knowledge of relative importance of additive genetic effects on productive parameters of these local breeds. The aim of the present paper was to estimate some productive and reproductive genetic parameters in Cinta Senese breed.

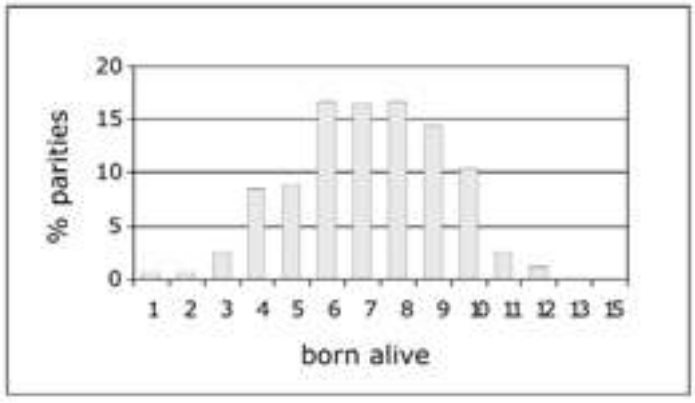
MATERIAL AND METHODS – Number of piglets born alive and of piglets weaned per litter were used. Data were recorded from 1999 to 2004 in three important farms of Cinta Senese which assured rigorous and reliable recording of reproductive events. Genealogical data were also recorded and linked to the database of the breed owned by ANAS. Coefficient of inbreeding was calculated for each sow and piglet.

As regard productive parameters, data from various experimental trials carried out at the Department of Animal Science were used. Data regarded growth rate and carcass composition of Cinta Senese male and female pigs slaughtered at the commercial live weight of 130-140 kg. For each animal genealogical information were recovered and inbreeding coefficient was calculated. Heritability and inbreeding effect on ADG, percentage of ham, lean and fat cuts were determined.

Variance components were estimated by using restricted Maximum Likelihood (REML) methodology applied to a single trait animal model (Boldman *et al.*, 1995). Two different statistical models were used either for reproductive or productive traits. The model for reproductive traits included fixed effects of parity order of the sow, herd and, as covariates, inbreeding coefficient of sow and litter. Random effects were additive genetic and common maternal effects. The model used for productive parameters included fixed effects of trial and sex of the pig, and, as covariate, its inbreeding coefficient as well as random effects of additive genetic and common litter effects.

RESULTS AND CONCLUSIONS – Figure 1 reports the distribution of piglets born alive for parity considering all the 672 observations.

Figure 1. Distribution of litter size.



Average inbreeding was 0.09 both for sows and piglets with ranges from 0 to 0.56 and from 0 to 0.48, respectively. Average number of piglets born and weaned and the genetic parameters are reported in table 1.

Table 1. Description of data set and genetic parameters for number of born alive and number of weaned piglets.

	Litter size at birth	Litter size at weaning
N° of animals in A^{-1}	5583	5583
Records	672	672
Dams with records	167	167
mean	7.16	6.27
min.	1.00	0.00
max.	15.00	12.00
h^2	0.07	0.02
m^2	0.08	0.07
F_x effect (per 10%)		
individual	-0.08	-0.19
maternal	-0.14	-0.22