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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 141-145

Proposal of sustainable management of pig farming on pastures in Tuscany

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Abstract. It is quite recent in Tuscany the rediscovery of rearing on pastures of rustic pig breeds. The utilization of the pastures is often implemented without a specific skill of the farmer and this often leads to feeding errors exceeding the carrying capacity and wasting the feed; this situation has negative impact on the ecosystem, the animal welfare, the quality of products and on the farm management. This paper is aimed to propose a practical scheme of Cinta Senese rearing on pastures focused on the use of wood as a factor characterizing the quality of production. The example (module to be replicated in case of larger farms) is a farm, with 9 sows producing progeny two times per year. Feeding plans, reported as graphs, provide forage chains suitable for the rearing area of Cinta Senese as well as the amount of feed (kg) to be used daily per animal during the entire growth-fattening phase. Length of rearing on pastures and feeding plan are function of season of birth, growth intensity and expected availability of pasture that will affect the final product quality.

Keywords. Cinta Senese breed – Rearing on pastures – Reproductive timetable – Feeding cycle.

Proposition de gestion durable de l'élevage porcin sur pâturages en Toscane

Résumé. En Toscane l'élevage en plein air des porcs des races rustiques a récemment été redécouvert. L'utilisation des ressources pastorales est souvent faite sans que l'éleveur soit un expert ce qui conduit souvent à des erreurs de rationnement avec surcharge ou déchets; l'impact négatif retombe sur l'écosystème, le bien-être animal, la qualité des produits et la gestion économique des entreprises. Cet article propose un diagramme d'application du pâturage pour l'élevage de la Cinta Senese, où l'accent est mis sur l'utilisation du bois comme élément caractérisant la qualité de la production. L'exemple (le module doit être répliqué dans le cas d'une grande entreprise) est un type d'exploitation agricole, avec neuf truies qui donnent deux portées par an. Les plans d'alimentation offerts, sous forme de graphiques, montrent les chaînes d'alimentation qui peuvent être proposées pour l'élevage de la Cinta Senese et montrent la quantité de nourriture à utiliser quotidiennement par tête, tout au long de la phase de croissance et d'engraissement. La durée de l'élevage et du plan alimentaire dépendent de la saison de naissance, de l'intensité de la croissance et de la disponibilité des pâturages, qui aura une incidence sur la qualité du produit final.

Mots-clés. Cinta Senese – Élevage extensif – Calendrier reproductif – Chaîne d'alimentation.

I – Introduction

The extensive production systems, in which pigs graze outdoors for much of their life, have an ancient tradition in many European countries. From the middle of the last century, economic and social reasons required to increase the efficiency of production and to contain production costs. Consequently systems of indoor intensive farming were established. The recent resurgence of outdoor farming was determined by a combination of factors: (i) the low value of the land in some marginalized areas; (ii) the increased cost of structures, management and equipment; (iii) the implementation of strict regulations about storage and distribution of manure; (iv) the breeder needs to answer the demand for "genuine" products by consumers; and (v) the awareness of the need for farming systems best suited to animal welfare and eco-friendly.

The outdoor farming with the use of grazing in the woods most of the year, however, can produce serious risk of degradation of this fragile ecosystem with a negative impact on the

environment and on the animals (Franci *et al*. 2004; Acciaioli *et al*. 2010) The aim of this paper is to propose a breeding scheme, calibrated on Cinta Senese breed, that through precise management of reproductive animals, allowing a diverse use of available resources, and allow to enhance the production while safeguarding the environment.

II – Materials and methods

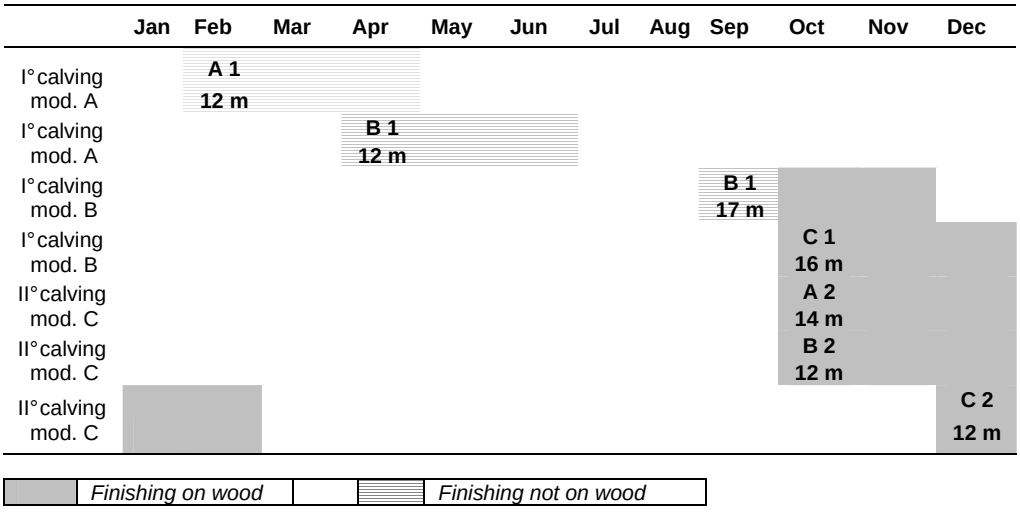
The work consists in the formulation of a management scheme, settled to the actual situation of Cinta Senese breed in Tuscany (Bonanzinga *et al*., 2007). The example is calibrated on the average number of animals found for Cinta Senese farms equal to 9 sows, divided into 3 groups (A, B and C) which foreseen scalar calving (every two months) with 2 calving per year (1 and 2) for each sow (Table 1).

Table 1. Calving timetable

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I° calving		A 1		B 1		C 1						
II° calving								A 2		B 2		C 2

Considering that: (i) it is not economically viable to prolong the breeding of animals over 18-19 months; (ii) the final product quality is essentially due to the feed received during the finishing period; (iii) the acorn and the pasture in wood are the elements that characterize this production; and (iv) the seasonality of forest resource does not allow to use it for the animals born during all periods of the year; it is proposed a scheme (Table 2) that allows to use the acorn in the finishing period by the largest number of pigs.

Table 2. Timetable of pasture in wood (only animals in the finishing phase, the groups are the maternal ones)



To achieve the use of the scheme a more or less rapid average daily gain has to be encouraged according to time of birth in order to reach at least 110 kg at the start of grazing in wood for all the animals.

Feeding of the animals follow different patterns, which have been identified and summarized in 3 models:

- Model A, on animals that do not use the wood: the growth will preferably be rapid because extending beyond 15 months at this stage would not have reasons neither economic nor for the quality of products;

- Model B, on animals that will undergo to slow growth waiting for the production of acorns in the fall in which they will have an age of about 16-17 months;

- Model C, relative to animals subjected to rapid growth so they will reach a reasonable weight before the introduction on wood pasture, despite their young age (12-14 months).

III – Results

The analysis of Table 2 shows that:

- Individuals born in February (group A1), do not use the wood for the fattening phase and they could be slaughtered from 15 months of age (Model A);

- Animals born in April (group B1) can be finished without wood (model A) or be slaughtered after grazing on wood (model B) extending the period of growth;

- All the animals born in June (Group C1) may be subjected to fattening in wood and they will be slaughtered at about 19 months of age (Model B);

- All the animals born in the second calving (A2, B2, C2) may be finished on wood and they will be slaughtered at an age between 15 and 17 months. (Model C).

The proposed scheme, which expects to produce some batches of animals without grazing in wood has some positive aspects including the fact that it has released by seasonality at least for a part of the production and it can also increase the farm production containing the load on the forest. In this case the feeding has to respond to qualitative criteria such as to obtain such a product that can be distinguished from products of intensive farming. This solution is particularly desirable in the years when acorn production is poor.

Figures 1, 2 and 3 reported examples of food plans, linked to the "models" proposed, and they show the amount of food used daily by each animal for the entire growing-fattening phase, expressed in kg of food such as (fresh weight). The use of wood pasture and grazing on grass and stubble is foreseen. The integration with concentrates is aimed at balancing the rations. Rations take into account the growth rate of the animals and the food present in the different periods of the year.

The variability of pasture resources in different years, does not allow the preparation of rigid plans and it is even harder to determine in advance the load; the use of all farm resources has to be done by changing from time to time the load and the rotation of the plots on basis of their productivity, and this will be the major objective for sustainable management, not forgetting to use the most valuable resources (acorn and chestnut) for finishing by transferring this value in the processed products in order to valorize them (Pugliese *et al*. 2007).

Figure 4 shows the food consumption for each of the proposed models, expressed in dry matter, for the entire cycle of rearing; it is evident that model C allows the use of more food coming from wood.

Table 3 finally reports the daily intakes and the total conversion indexes of the growth and fattening phases (from 20 to 140 kg), based on the proposed models and as a comparison it was included a column with data for fattening with only concentrates always reared outdoors with slow growth rate (370 g/d) (AA.VV., 2004). The conversion index of dry matter (kg food consumed/kg of daily gain obtained) is better when the farming systems are short due to the decrease of the overall cost for the maintenance of the animals.

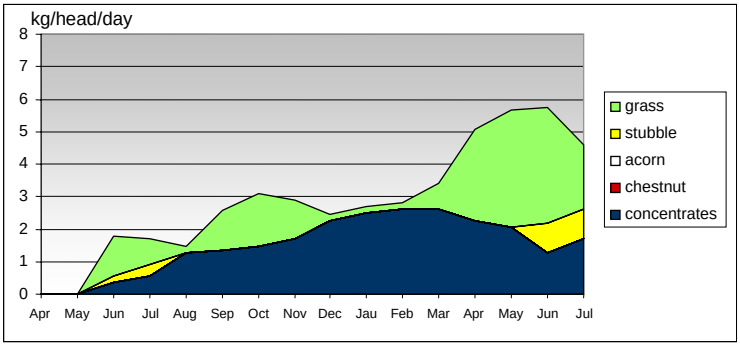


Fig. 1. Feed intake (kg of fresh weight) MODEL A: pig born in spring and slaughtered at 15 months of age, with normal growth and without finishing in the wood.

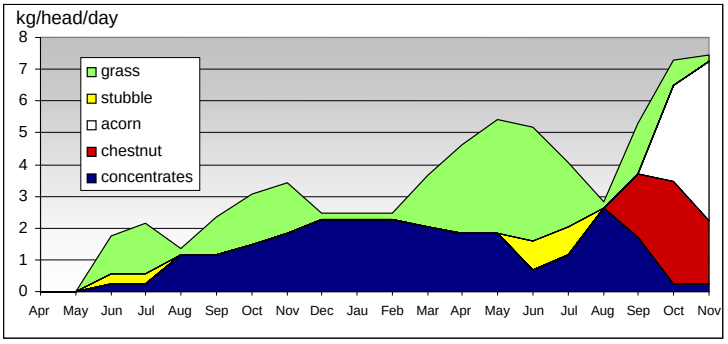


Fig. 2. Feed intake (kg of fresh weight). MODEL B: pig born in the spring slaughtered at 18 months of age, with moderate growth and finishing on pasture in wood.

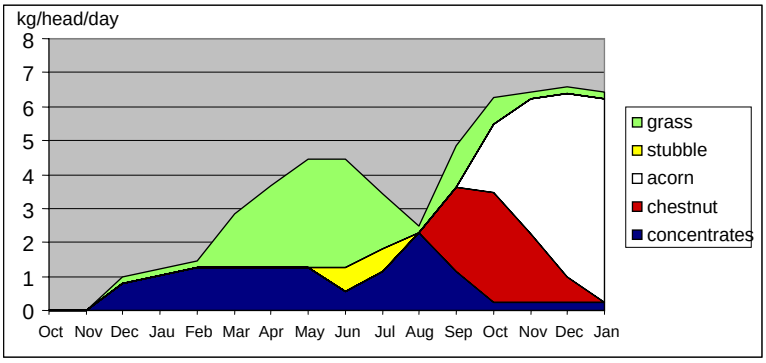


Fig. 3. Feed intake (kg of fresh weight) MODEL C: pig born in autumn and slaughtered at 15 months of age, with normal growth and finishing with grazing in wood.

IV – Conclusions

The knowledge and considerations reported here show that, under wild and semi-wild breeding it is difficult to both formulate plans and organize complex suitable feeding plans. In fact food availability will also change significantly over the year and affect the timing and the pattern of

body growth of animals. The Italian territorial reality, but also the breeding area of Cinta Senese is diverse and therefore we can only propose some solutions (Models) that surely can not reflect all the situations. For proper farm management it s also required to implement a consistent control of animals to confirm the correctness of the feeding plan adopted (body condition, health and behavior), and also the environment to ensure the balance of the grazing system.

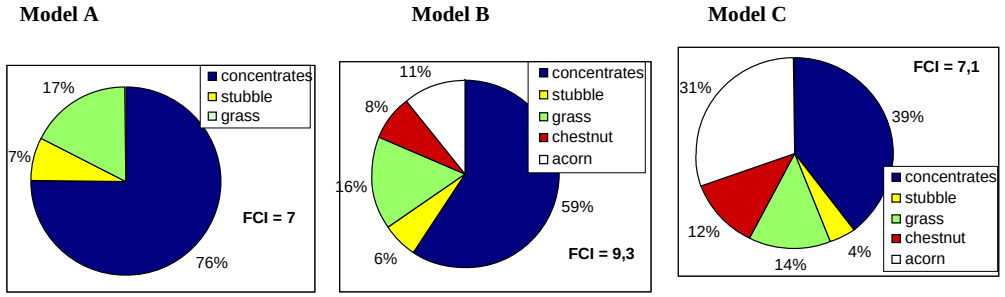


Fig. 4. Percentage of dry matter ingested in the 3 different systems of feeding offered during the whole growing-fattening period.

Table 3. Total consumption per animal to ensure an increase of 120 kg (20 to 140 kg) for each feeding plan considered

	Model A	Model B	Model C	Only concentrates
Feedstuff (kg t.q.)	784	753	474	922
Cereals on stubbles (kg t.q.)	76	72	41	-
Grass (kg t.q.)	600	726	522	-
Chestnut (kg t.q.)	-	217	210	-
Acorn (kg t.q.)	-	228	516	-
Total intake of DM (kg)	903	1108	925	811
Days	420	540	420	420
Conversion index of DM (FCI)	7	9,3	7,1	6,7 *

*with average daily gain of 370 g.

Acknowledgements

The authors wish to acknowledge the financial support received from ARSIA.

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