THE FAT TISSUE QUALITY: COMPARISON BETWEEN CINTA SENENSE × LARGE WHITE AND MORA ROMAGNOLA × LARGE WHITE PIGS

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ABSTRACT
Eighteen crossbred pigs, Cinta Senese × Large White (CS × LW, n = 10) and Mora Romagnola × Large White (MR × LW, n = 8) were included in the study. These two genotypes are used for the production of Casentino dry-cured ham, a typical product of the province of Arezzo, Italy. The comparison of fat tissue properties between two crossbreeds was made, in view of the fact that crossing CS × LW is well investigated whereas information on the crossing MR × LW is lacking. As regards the results, MR × LW pigs had fatter carcasses with thicker subcutaneous fat than CS × LW (33.0 vs. 24.4 mm, P < 0.05). MR × LW pigs showed higher fat percentage in loin portion than CS × LW (37.8 vs. 24.7, P < 0.05). Lean/fat ratio was higher in CS × LW than MR × LW pigs. As for chemical analyses, the fat of the CS × LW had higher percentage of moisture (12.93 vs. 7.46) and more SFA and PUFA content (43.0 vs. 40.2, P < 0.05 and 14.0 vs. 12.3%, P < 0.05), while MR × LW showed higher percentage of MUFA (47.5 vs. 42.9, P < 0.05).

Keywords: fat quality / Cinta Senese / Mora Romagnola / crossbreeding

1 INTRODUCTION

In Southern Europe local breeds are often crossed with improved modern breeds to exploit additive and non-additive genetic effects and to counterbalance some lower performance of autochthonous breed such as Iberian pig in Spain (Ramírez and Cava, 2007) and Cinta Senese pig in Italy (Franci et al., 2007; Sirtori et al., 2011). The use of the crossbreeding between Cinta Senese and Large White pigs in Tuscany has its origins early in last century and provides the so-called “Bigio” or “Tramacchiato”. This type of crossbreed was revitalized in the last decade following the recovery of the Cinta Senese. Recently, some studies on this genotype provided some guidance on the productivity of the cross between Large White and Cinta Senese pigs, making possible a characterization (Franci et al., 2005; Sirtori et al., 2011). Differently, the characteristics of Mora Romagnola, both as purebred or crossed, are less known also because of its limited diffusion, which has hampered the interest of the research. The more recent studies on this breed and on the surveys on the breeding area were published by Fortina et al. (2005, 2006) and Zambonelli and Bigi (2006). The official inclusion of Mora Romagnola breed, crossed with an improved breed, in the Technical Specifications of a traditional production as the “Prosciutto del Casentino”, determines the need to clarify its behaviour in relation to farming economy and quality of product. Cinta Senese and Mora Romagnola are characterized by a slow growth and by high fat deposition (Sirtori et al., 2011; Fortina et al., 2007). Being that adipose tissue is one of the main factors affecting carcass and products quality, the main aim of this study was to assess qualitative and quantitative differences of the fat tissue between these two different crossbreeds.
2 MATERIALS AND METHODS

The research was carried out on 18 pigs, 10 pigs were crosses of Cinta Senese × Large White (CS × LW) and 8 were crosses of Mora Romagnola × Large White (MR × LW). The two groups, balanced by sex, were kept in two separate outdoor fences and provided feed mixtures ad libitum. The slaughter was carried out when the farmer considered reaching visual maturity point of each crossbreed. A portion of loin (loin from the 2nd to the 5th lumbar vertebrae) was cut off the carcass and thickness of subcutaneous fat was measured. In order to calculate the lean/fat ratio, loin portion was dissected into subcutaneous fat, further divided into inner and outer layer, intermuscular fat, Longissimus lumborum (LL), Psoas major (PM) muscles and other lean. On LL and PM muscles ether extract content was determined (AOAC, 1990); i.e. intramuscular fat content. On subcutaneous fat, separately for outer and inner layer, the colour (CIE Lab) was recorded by Minolta colorimeter, and the following analyses were carried out: moisture (AOAC, 1990); total lipids (Folch et al., 1957); fatty acid composition by gas chromatography. Data were processed by GLM procedure of SAS (2007) using the following models (where B = Breed, G = Gender, L = fat layer, W = slaughter weight): for weight, age at slaughter, and average daily gain (ADG) $Y_{ijk} = \mu + B_i + G_j + \epsilon_{ijk}$; for adipose tissue measures and chemical analyses on LL and PM muscles $Y_{ijk} = \mu + B_i + G_j + b_i \times (W_{ijk}) + \epsilon_{ijk}$ for moisture, total lipids and fatty acid composition of backfat $Y_{ijkl} = \mu + B_i + G_j + L_k + b_i \times (W_{ijkl}) + \epsilon_{ijkl}$. All data of tables 2 and 3 are referred to 168 kg of live weight.

3 RESULTS AND DISCUSSION

As regards in vivo performances (Table 1), CS × LW pigs were heavier at slaughter than MR × LW. This data results from different age between the two groups due to differences in the reaching of the visual maturity point. ADG was more reliable information, showing the two crossbreeds had similar growth rate during the trial, confirming the values that have been previously reported by Fortina et al. (2006) for Mora Romagnola breed and by Sirtori et al. (2011) for CS × LW, both reared outdoor.

The characteristic of MR × LW to deposit more fat (Fortina et al., 2006) was confirmed by the dissection of the loin portion (Table 2). The thickness of subcutaneous fat was higher in MR × LW than in CS × LW, particularly the inner layer. During growth, middle and inner fat layers have a more dynamic development than the outer layer; differences in backfat between pigs are basically related to the different development of the middle and inner layers (Zudaire and Alfonso, 2013). Consequently the lean/fat ratio was higher in CS × LW than in MR × LW pigs. No significant differences were observed between the two crossbreeds in intramuscular fat content of LL and PM. As for instrumental colour, CS × LW showed higher b* value of fat probably due to the highest content of PUFA which are associated with the carotenoids (Maw et al., 2003).

Chemical analyses of backfat (Table 3) showed higher moisture in CS × LW than MR × LW pigs. In regard to fatty acid profile, subcutaneous...
The fat tissue quality: comparison between Cinta Senese × Large White pigs and Mora Romagnola × Large White pigs was characterized by higher values of MUFA in particular C18:1. The other groups of fatty acids (SFA and PUFA) were higher in CS × LW mainly due to higher percentage of C16:0 and C18:2, C18:3. These data show, that regardless of the diet, the genetic component has an important role in fatty acid composition of backfat, as previously reported (Wood et al., 2008; Pugliese et al., 2012).

4 CONCLUSIONS

The results showed that MR × LW crossbreed deposited more fat than CS × LW. This trend is evident in the subcutaneous fat. This result indicates that this crossbreed is able to reach an ideal carcass composition faster, with a good quantity of fat at lower weights and ages. The lower fat deposition of Cinta Senese crossbreed reduces the quantity of fat tissue in carcass and this favours a higher lean/fat ratio. This is important from an economic point of view for the “Prosciutto del Casentino” production for which a good lean/fat ratio is crucial.

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6 REFERENCES

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