Protein requirements of Cinta Senese pigs from 30 to 60 kg: preliminary results

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SUMMARY

Knowledge of protein requirements of pigs during the first phase of life is crucial for both achieving high growth rates and avoiding nitrogen waste. Autochthonous breeds possess specific requirements in this regard and the literature is poor even for the Cinta Senese breed. Thus, the effect of different levels of crude protein (CP) in Cinta Senese pigs, between 30 and 60 kg, was evaluated within the TREASURE* project. Twelve male pigs were individually reared indoor, fed with four isoenergetic diets with different levels of CP (18, 16, 14 and 12%) equally distributed among animals. The animals, with an initial average live weight of 27 kg, were fed ad libitum and slaughtered after 2 months of trial. Left side carcass was sectioned in six cuts: head, neck, loin, shoulder, ham and ribs. Each cut has been dissected into the main tissues. As regards in vita performance a slightly higher growth rates with decreasing protein levels were recorded (ADG of 0.781, 0.774, 0.755 and 0.729 kg/d respectively for 12, 14, 16 and 18% of CP), though only the two extreme levels of CP (12 vs 18%) resulted statistically different (P=0.05). Cuts weights and percentage of the main tissues were similar between diets. The diet with 12% of CP may be the optimal compromise for the growth of the Cinta Senese pigs from 30 to 60 kg of live weight.

INTRODUCTION

Protein excess in feeds for pigs increases feeding cost and determines higher N pollution in the environment. This excess causes higher N excretion which cannot be used for protein synthesis in tissues (Sirtori et al. 2010) especially in rustic breeds with low potential for lean growth. Excess or deficiency of protein appears to be counterproductive for both growth and feeding efficiency (Barea et al. 2006, 2007). To estimate the adequate protein level is also important to consider the genetic aspects. The optimal protein:energy ratio may well vary between breeds with different genetic potential for protein accretion (Nieto et al. 2002). The autochthonous pigs, characterised by low growth potential and high adipogenic capacity, (Franci et al. 2001)
need feeding strategies providing the appropriate concentration of dietary protein. Cinta Senese pigs moreover is reared on extensive plots of natural pasture. This rearing system leads to adjust the diet considering the type of natural resources available for the animal usually rich in fibre and low in protein (Sirtori et al. 2014). Previous researches studied the appropriate level of dietary protein for Cinta Senese breed (Sirtori et al. 2010; Sirtori et al. 2014) at high live weights and only for in vivo performance. The aim of this study was to test the effect of various dietary protein levels on in vivo performance and carcass traits in Cinta Senese pigs between 30 and 60 kg of weight.

MATERIAL AND METHODS

Twelve male pigs were individually reared indoor in 12 boxes of 3 m². with troughs and drinking nipples. The animals were equally distributed among four isoenergetic diets with different levels (18, 16, 14 and 12%) of crude protein (CP). The animals, with an initial average live weight of 27 kg, were fed ad libitum and slaughtered after 2 months of trial. The ingredients of diets, the proximate composition determined according to official methods (AOAC, 2000), and the essential aminoacids (AAs) and metabolizable energy content, calculated as sum of the relative tabulated values in the ingredients with synthetic amino acid integration, are reported in Table I. Live weight, backfat thickness and individual food consumption were recorded weekly. Fat thickness was measured (at last thoracic vertebra) with an ultrasound instrument (Aloka 500). Left side carcass was sectioned in six cuts: head, neck, loin, shoulder, ham and ribs. Each cut has been dissected into the main tissues (lean, fat and bone) and weighs of cuts and tissues were recorded.

In vivo data were analysed using the MIXED procedure (SAS, 2007) with the following model: \( Y_{ij} = \mu + P_i + b(X_{ij}) + E_{ij} \), where \( \mu \) = overall mean, \( X \) = protein percentage of diet; \( Y \) = days of trial; \( s \) =random animal effect; \( E \) = error. Continuous variables were tested up to the second degree maintaining the higher significance. For the carcass composition, a GLM procedure (SAS, 2007) with the following model: \( Y_{ij} = \mu + b(X_{ij}) + E_{ij} \) was used: \( Y_{ij} = \mu + P_i + b(X_{ij}) + E_{ij} \), where \( \mu \) = protein percentage of diet tested as discrete factor; \( b \) = regression coefficient on slaughtered weight (X); \( E \) = error. Student’s t-test was used to test the differences between the least square means. The statistical significance was established at \( P<0.05 \).

RESULTS

Weight gain was affected by protein level (Table II) with a slightly higher average growth rates recorded when protein level decrease (\( P=0.0004 \)). Significant differences were showed comparing final values of slaughter weight and ADG (average daily gain) between the two extreme diets (62.3 vs 59.6 and 0.781 vs 0.729 kg/d for 12 and 18% of CP respectively; \( P=0.05 \) (Table III). Increasing the protein level decreases the feed ingestion (\( P=0.0039 \)) (Table V) whereas no differences resulted for backfat thickness (\( P=0.8516 \)) and feed conversion rate (\( P=0.4723 \)) (Tables IV and VI). No statistical differences were found for percentage of main cuts and main tissues (on carcass weight) (Tables VII and VIII).

DISCUSSION

Despite these results are only preliminary the observed patterns suggest the possibility to change the level of protein for growing pigs of Cinta Senese breed...
respect to the improved breeds. However, differences were found for growth and feed intake traits. Different growth among diets was probably ascribable to different feed consumption between diets. These results are in general agreement with other works showing that protein excess in growing swine impairs growth and feed efficiency (Nieto et al. 2003; Barea et al. 2006). The results point out that protein requirement for maximize growth of the Cinta Senese pigs from 30 to 50 kg of live weight. Considering the cost of protein feed as well as the need to reduce the N pollution in the environment, the diet with 12% of CP may be the optimal compromise for the growth of the Cinta Senese pigs from 30 to 60 kg of live weight. Carcass quality traits were similar among diets indicating the 12% protein level as suitable for covering the need for body protein in Cinta Senese breed.

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BIBLIOGRAPHY