Effect of Pork Meat Meal in Broiler Diets on Performance, Processing Yields and Foot Pad Lesions

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Introduction

Since the Bovine Spongiform Encephalopathy crises at the end of the last century, regulations on the use of Processed Animal Protein (PAP) have been tightened. In December 2000, the EU has banned the use of all animal proteins from terrestrials in diets for farm animals. So far, no indications have been found that poultry and pigs are susceptible to BSE type diseases. Therefore, PAP derived from poultry and pigs could be used in compound feed without a risk. Some not well-founded claims, such as higher body weight gain, improved intestinal health and less feather pecking of PAP compared to vegetable protein sources have been stated for poultry. In a study of De Baere and Zoons (2003), vegetable broiler diets adversely affected litter quality, whereas more hock burns and foot pad lesions have been observed compared to diets with PAP. A broiler experiment was conducted to determine the effect of dietary inclusion of pork meat meal (PMM) on performance, processing yields and foot pad lesions.

Material and Methods

The experiment was carried out with 660 Ross 308 broilers from 0 to 35 days of age. Broilers were randomly allocated per gender to four dietary treatments, each having six replicates (3 with males and 3 with females). Broilers were housed in 24 floor pens bedded with wood shavings. In each pen ($1.5m^2$) 25 male or 30 female broiler chickens were placed in order to create a stocking density at slaughter age which was similar to stocking densities in practice. The dietary treatments were: a basal vegetable diet (T0) and three experimental diets with different contents of PMM. In the three iso-caloric and iso-nitrogenous experimental diets, soybean meal and potato protein were replaced by PMM (CP 67%), replacing 10, 17.5 and 25% of the amount of Crude protein (CP) in the basal vegetable diet (T10, T17.5 and T25, respectively). CP content of the diets was 230 and 203 g/kg in phase 1 (d 0-10) and 2 (d 11-35), respectively. All diets were pelleted (starter: 2 mm pellet and grower: 3 mm pellet). Feed and water were available ad libitum during the entire experiment. Diets were analysed for dry matter, crude protein, crude fat, crude ash, crude fibre, starch and the minerals Ca, P, K, Mg, Na and Cl. All broilers were group weighed per pen at arrival and at 10, 28 and 35 days of age. Feed intake was determined at 10, 28 and 35 days of age. Mortality was weighed and recorded on a daily basis. At 35 days of age, ten broilers per pen were sampled at random and slaughtered to determine processing yields. External quality (dirtiness of the breast, breast irritation, hock burns and foot pad lesions) was determined at 34 days of age. All exterior parameters were scored on a scale from 0 (no) to 3 (severe) except foot pad dermatitis which was scored on a scale from 0 (no) to 2 (severe) according to the Swedish method (Berg. 1998). Litter was sampled per pen at 10, 28 and 35 days of age to determine dry matter content, nitrogen content and caloric value. Performance results, processing yields, nitrogen content, caloric value were analysed with analysis of variance (ANOVA). For analysing dry matter content of the litter, time was also included as a variable in the model. IRCLASS was used for analysis of the external quality data (ordinal distributed data). Genstat™ Release 12.1 was used for statistical analysis and effects with $P \leq 0.05$ were considered to be statistically significant.

Results and Discussion

No interaction between diet and gender has been observed and therefore results are presented per dietary treatment. Overall, dietary treatments did not affect feed intake, body weight gain and mortality (Table 1). Feed conversion ratio (FCR), however, was affected significantly by dietary

treatment. FCR of broilers fed diets T17.5 and T25 were significantly higher (P<0.001) than FCR of broilers fed diets T0 and T10. No difference was found in FCR between T0 and T10. The higher FCR of broilers fed the diets T17.5 and T25 may partially be explained by a relative deficiency of valine and isoleucine. The ratio of valine and isoleucine to lysine was in T17.5 and T25 lower than in T0. It is well known that a deficiency of these amino acids can result in a retarded growth, feed conversion and breast meat yield.

Table 1 Performance of broilers from 0 to 35 days of age fed diets containing different levels of pork meat meal (PMM)

Parameter	**Control (T0)**	**T10[1]**	**T17.5[1]**	**T25[1]**
Body weight d 35 (g)	2303	2323	2285	2259
Body weight gain (g)	2260	2281	2242	2216
Daily body weight gain (g/d)	64.6	65.2	64.1	63.3
Mortality (%)	3.1	2.4	1.9	1.8
Feed conversion ratio (FCR)	1.560 [a]	1.567 [a]	1.593 [b]	1.607 [b]
Cumulative feed intake (g)	3520	3571	3566	3559
Daily feed intake (g/d)	100.6	102.0	101.9	101.7

[a,b] Means within a row without a common superscript differ significantly (P<0.05).
[1] Respectively 10, 17.5 or 25% of CP content in basal diet was supplied by PMM in the experimental diets.

Carcass yield seemed to be higher when PMM was included in the diets, however only broilers fed T10 had significantly higher carcass yield compared to T0. PMM in the diet did not affect legs, wings and breast meat yields. Breast dirtiness was more severe at highest inclusion levels of PMM (T17.5 and T25). Scores on foot pad lesions were not consistent. Incidence and severity of foot pad lesions were highest in broilers fed diets T17.5 and T25., A difference in response, however, has been observed for males and females. Male broilers fed diets T17.5 and T25 showed a higher incidence and more severe foot pad lesions compared to males fed the T10 and T0 diet. Female broilers fed T17.5 diets showed a higher incidence and more severe foot pad lesions than female broilers fed T0 and T25 diets. The high incidence and severity of foot pad lesions in female broilers fed T17.5 diets could not be explained. Dietary treatment did not affect dry matter content, nitrogen content and caloric value of the litter.

Conclusion

From this experiment it can be concluded that 10% of the amount of (vegetable) crude protein can be exchanged by inclusion of 3% PMM without adverse effects. Higher inclusion levels resulted in higher FCR, dirtier broilers and higher incidences and severity of foot pad lesions. FCR was adversely affected at higher PMM inclusion levels most probably due to a deficiency of valine and isoleucine. Animal protein is a high quality protein and the amino acid profile of animal protein is corresponding narrowly to the requirement of broilers. However, because of the large variation in nutritive values of PMM, it is essential that these values are well known for cost effective inclusion of PMM in broiler diets.

References

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