Growth performance, meat quality and carcass composition of broilers fed rapeseed-enriched diets

Karlsson, Anders H; Bredie, Wender; Petersen, Mikael Agerlin; Nielsen, Belinda; Danielsen, Bente; Petersen, J. S.; Katholm, A.; Dickow, Mia Schødt

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This paper describes the effect of a diet containing 15% rapeseed meal on growth performance, carcass composition, fatty acid composition, volatiles and sensory meat quality attributes on broilers pectoralis meat compared to 0%. The overall results show that the broilers performed well on the rapeseed meal diet used.

Key Words – Rapeseed-enriched broiler feed, Growth performance, Meat and carcass quality.

Introduction

The majority of European broiler production is feed based on soybean meal. However, Europe is facing increasing difficulties in obtaining and levying soybean meal. Two main aspects have been considered to increase the production of rapeseed meal: (i) reducing the use of soybean meal and increasing the use of rapeseed meal; (ii) increasing the production of rapeseed.

Rapeseed meal is a good protein source, but it contains a high content of saturated fatty acids, which may be responsible for the overall production economy being lower than that of soybean meal. This is because rapeseed meal contains a high percentage of oil, which is obtained during the harvest and is a significant loss when the rapeseed meal is processed. Therefore, it is important to assess the effect of rapeseed meal on the production of broilers.

Material and Methods

Birds and production: In total 720 broilers of the breed Ross 308 were divided into 12 pens, each containing 60 broilers. There were 30 males and 30 females in each pen. The birds were raised on a conventional broiler farm.

Broiler diet: The two diets were tested in a 2x2 factorial experiment on two factors: 1) age, 2) sex, and the interactions between these factors. The control diet contained 0% rapeseed meal, while the test diet contained 15% rapeseed meal. The diets were optimised to be equal regarding energy and protein. The rapeseed in the test diet replaced a part of the wheat, soy, and maize grain meal. From day 0 to the end of the experiment, the feed was consumed by the birds at 12% of their body weight. The feed conversion ratio (FCR) was calculated based on a standard curve for daily weight gain. On day 32, the birds were fed a finishing diet without any rapeseed meal and without any antioxidants.

Sensory evaluation: The lipids were extracted using chloroform/methanol solution (2:1, v/v), followed by homogenisation. The chloroform phase was used for methyl esterification (FAME) analysis. The methylated fatty acids were analysed on the gas chromatograph using an Omega FAME capillary column and flame ionisation detection. The data was analysed using Chemstation Software (Agilent Technologies) and the fatty acid methyl esters were identified by comparing retention times and FAME spectra with those of the standards.

Sensory study: The fatty acid composition in the diet. Therefore it was expected that the test diet did not have any negative impact on the digestion. FCR was highest on the test diet and overall production performance was best on the control diet.

Results and Discussion

Performance and carcass quality: Using rapeseed in the diet had no effect on the performance indicators registered (Table 2) or on carcass quality attributes (Table 3). Expected differences between sexes were also found in this study (Table 4).

All broilers performed well and the health status was good. The foot pad score was very low in both treatments indicating that the test diet did not have any negative impact on the digestion. FCR was highest on the test diet and overall production performance was best on the control diet.

Replacing part of soybean meal with 15% rapeseed meal did not have an influence on total fat content of the meat, as well as on the fatty acid profile. The saturated fatty acids (C14:0, C16:0 and C18:0) in the diet. The concentrations of the saturated fatty acids found (C14:0 and C18:0) and the levels of C18:1 were reduced when using rapeseed meal. Regarding concentrations of PUFAs, C18:2 was increased and C18:3 was reduced in the rapeseed meal diet when using rapeseed meal (Tab. 5). It is well-known that the fatty acid composition of rapeseed oil is mainly due to a high degree of raffinying the fatty acid composition in the diet. Therefore it was expected that the overall production economy could be affected by the use of up to 15% rapeseed meal in the diet.

Sensory study: The effect of broiler diet showed a significant effect on day 10 for crispness (p<0.05) with the rapeseed fed broilers scoring significantly higher on this attribute. The effect of storage time on each of the sensory attributes was significant for the attribute sweet (p<0.04) for the control diet only. In this case the sweetness was significantly higher after ageing the meatrefrigerated for 10 days. When modelling within the experimental units, only storage time and sex differences could be observed, but these could not be separately separated from the variability in the assessment of the control samples (Day 6). Therefore the overall mean sensory quality differences were judged to be relatively small with only effects occurring at the prolonged refrigerated storage.

Conclusion

Performance: The broilers performed well on a 15% rapeseed meal diet. Volatiles: Increased oxidation after feeding rapeseed diets, but not enough to be detected sensorily. Fatty acid composition: Feeding rapeseed did not influence total fat content, as well as the contents of the saturated fatty acids C16:0 and C18:0. MUFAs (C18:1) was reduced in the diet containing rapeseed. PUFAs C18:2 was increased, and C18:3 content reduced in the rapeseed meal diet. These results are expected as the fatty acid profile found in chicken meat reflect the raffinyed fats found in the diet.

Sensory: The overall measurable sensory differences were relatively small with only effects occurring at the prolonged refrigerated storage.

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