COMMUNICATION

The influence of different fat sources on fattening of turkeys and composition of fatty acids in breast muscles

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ABSTRACT

The aim of this research was to evaluate the influence that different fat sources (Bergafat-BF, Pronova Biocare Epax 3000 TG-PBE and rape oil-RO) have on fattening characteristics of turkeys and composition of lipids in breast muscles, if added separately in the amount of 3% and also equally combined in finishing diets. The research was carried out on 180 heavy hybrid turkeys of Nicholas 700 provenience. Different sources of fat did not have statistically significant effect (P>0.05) on finishing weights, average daily weight gain, consumption and feed conversion. However, supplementation of the above stated fat sources changed highly significantly (P<0.001) the content of SFA, MUFA and EPA+DHA in the lipids of breast muscles. Rape oil, which was added to diets, had positive effect on the content of SFA and MUFA. In comparison to non-supplemented diets, supplementation of Pronova preparation to diets resulted in doubling of the desirable EPA+DHA.

Key words: Turkeys, Fattening, Fatty acids, EPA+DHA

Introduction

There has been recently a significant emphasis put on turkey production in developed countries worldwide. Irregular nutrition of humans and their constant exposure to stress may cause some cardiovascular diseases, heart attach or stroke, leading often to death (Barlow and Pike, 1991, Calvani and Benatti, 2003). One of the factors to cause these diseases is the imbalanced ratio of omega n-6:omega n-3 acids. Supplementation of vegetable oils to poultry diets decreases the ratio of omega n-6:omega n-3, mostly through the ratio of linoleic (C18:2n-6) to α-linolenic (C18:3n-3) acid. However, within the group of omega n-3 polyunsaturated fatty acids, greater importance is given to eicosapentaenoic-EPA and docosahexaenoic-DHA acid (Ollis et al., 1999, Simopoulos, 2000, Komprda et al., 2003, Ivanković and Kralik, 2004). Consumption of at least 0.5 g of omega-3 fatty acids a day is proved to have positive effect on human health (Mantzioris, 2000; Simopoulos, 2000). The aim of this research was to determine the influence of different fats and oils on fattening of turkeys and on composition of fatty acids in the lipids of breast muscles.

Material and methods

The research was carried out on 180 turkeys of Nicholas 700 provenience. Turkeys were divided in six groups of 30, and the experiment was conducted in three replications during 15th-19th week of fattening. Diets fed to turkeys differed in supplemented fats, as overviewed in Table 1. During the experiment live weights were controlled, on the
4th group had (BF+PBE), the 5th (PBE+RO) and the 6th group were fed (BF+RO) combination of oils, all supplemented in equal amounts. Fatty acids content in diets with different fat sources is shown in Table 2. Content of fatty acids in the lipids of breast muscles was determined on 10 samples of each group by Chrompack CP-9000 chromatograph equipped with flame ionization detector (Csapo et al., 1986). Portions of SFA and MUFA, as well as EPA + DHA acids were shown as a percentage of a total of fatty acids in the lipids of breast muscles. Significance of differences was determined by analysis of variance (ANOVA), using Statistica for Windows v.6.0. Differences between mean values were tested through the LSD-test (P<0.05).

### Results and conclusions

Starting and finishing weights of turkeys, weight gains, feed consumption and conversion basis of which the average weekly weight gain was calculated. Feed consumption and conversion into live weight (g/g) were also determined and presented for the whole fattening period. The following fat sources in the amount of 3% were used as supplements in diets (Table 1): Bergafat (BF), Pronova Biocare Epax 3000 TG (PBE) and rape oil (RO). According to producer’s declaration, BF preparation contained 30-44% saturated fatty acids (SFA), 35-45% monounsaturated fatty acids (MUFA) and less than 4% arachidic acid (C20:0), as well as other fatty acids with 20 or more carbonic atoms in chain. The PBE preparation contained 27-29% SFA, 24-26% MUFA, 15.36% eicosapentaenoic acid (EPA, C20:5n-3) and 9.99% docosahexaenoic acid (DHA, C22:6n-3). RO contained 7.11% SFA and 58.71% MUFA in a total of fatty acids. There were no EPA+DHA determined in RO. The first group was fed diets with supplemented BF, the 2nd group had diets with PBE, and the 3rd group was fed with supplemented RO. The 4th group had (BF+PBE), the 5th (PBE+RO) and the 6th group were fed (BF+RO) combination of oils, all supplemented in equal amounts. Fatty acids content in diets with different fat sources is shown in Table 2. Content of fatty acids in the lipids of breast muscles was determined on 10 samples of each group by Chrompack CP-9000 chromatograph equipped with flame ionization detector (Csapo et al., 1986). Portions of SFA and MUFA, as well as EPA + DHA acids were shown as a percentage of a total of fatty acids in the lipids of breast muscles. Significance of differences was determined by analysis of variance (ANOVA), using Statistica for Windows v.6.0. Differences between mean values were tested through the LSD-test (P<0.05).

### Results and conclusions

Starting and finishing weights of turkeys, weight gains, feed consumption and conversion
are presented in Table 3. Different fat sources in finishing diets did not significantly affect the investigated traits in turkeys (P>0.05).

As presented in Figure 1, oils supplemented to diets and fed to turkeys had statistically very highly significant effect (P<0.001) on the content of SFA, MUFA and EPA+DHA in the lipids of breast muscles. The lowest content of SFA was found in the 4th and 3rd group (35.80% and 35.86%, respectively), being about 2% less than in other groups. As it was expected, the highest content of MUFA (23.68%) was obtained in the 3rd group of turkeys fed diets with 3% RO. Portion of MUFA being less than 20% was obtained only in the 5th group.

The highest values of EPA+DHA were determined in the lipids of breast muscles of turkeys that were given diets with added Pronova. Consequently, the content of desirable polyunsaturated fatty acids of omega n-3 type was 4.06% in the 2nd group, followed by the 4th and 5th group.

Figure 1. Content of SFA, MUFA and EPA+DHA (% of total fatty acids) in the lipids of turkey breasts.

| Groups | Starting weights | Finishing weights | Consumption | Gain | Conversion |
|--------|-----------------|------------------|-------------|------|------------|
| 1st    | 9539.87±561.72  | 11411.40±578.16  | 1987±699    | 468±246 | 4.25±0.98 |
| 2nd    | 9566.23±908.34  | 11808.69±1180.17 | 2193±515    | 561±215 | 3.91±0.39 |
| 3rd    | 9537.57±640.04  | 11854.17±1037.96 | 2207±535    | 582±158 | 3.80±0.34 |
| 4th    | 9461.93±573.83  | 11860.93±730.83  | 2201±539    | 600±162 | 3.70±0.22 |
| 5th    | 9329.20±662.93  | 11655.27±520.40  | 2252±370    | 584±109 | 3.86±0.16 |
| 6th    | 9514.07±524.28  | 11534.97±686.80  | 2127±330    | 505±166 | 4.21±0.56 |

Statistical significance
P=0.757 P=0.178 P=0.831 P=0.344 P=0.275
with 3.28% and 3.11% EPA+DHA, respectively. Content of EPA+DHA in turkeys fed diets with 3% BF, 3% RO and with both of those oils in combination, was 1.1%, 1.66% and 1.35%, respectively. Content of EPA+DHA in the lipids of muscles of the 2nd group was 3.69 and 2.45 times higher than in the 1st and 3rd group, respectively. In comparison with the 6th group, which received diets with 1.5% BF and 1.5% RO, supplementation of PBE combined with BF and RO in diets given to the 4th and 5th group resulted in 2.43 and 2.30 times higher portions of EPA+DHA, respectively. Rape oil in diets positively affected the content of SFA and MUFA. Diets supplemented with Pronova resulted in doubling of the EPA+DHA content, if compared to diets without it.

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