THE EFFECT OF REPLACEMENT FOR DIFFERENT LEVELS OF SUNFLOWER OIL INSTEAD OF SOYBEAN OIL IN BROILER PERFORMANCE

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ABSTRACT

An experiment was conducted to study the effect of different levels of replacement of sunflower oil in place of soybean oil in broiler diets. Control diet had 5% soybean oil and/or sunflower oil at five levels of oil inclusion (25, 50, 75, 100%). Diets were administrated to broilers from 1 to 42d of age. LDL, HDL and weight of thigh, breast, heart, pancreas and abdominal fat were not affected by type of oil fed. Broilers fed soybean oil were little efficient. HDL percent was lower in animals fed sunflower oil than in those fed soybean oil. Breast weight was significantly higher for birds fed sunflower oil. The fatty acids profile of the different tissues was reflected little to the dietary fatty acid profile of the oils. The result suggests that sunflower oil can replace soybean oil as suitable fat resource without any significant effects on total weight gain, feed intake and FCR in chicken diet.

Key words: Sunflower Oil, Broiler performance, LDL, HDL, Breast weight.

INTRODUCTION

The use of sunflower oil in poultry diets is often economic importance in some countries, such as Iran. Moreover the high levels of naturally occurring antioxidants (tocopherols) and phytosterols in the conventional sunflower oil (Sanchez et al., 2000), which are preserved in high-oleic acid sunflower oil, could maintain a better protective effect than some other monounsaturated oils. Sunflower oil also contains tocotrienols which are powerful free-radical interceptors in cell membrane (Cabrini et al. 2001.). In addition, research has shown that meat obtained from birds fed diets with a relatively high content of mono saturated fatty acids (MUFA) has a lower susceptibility to oxidation than meat from animals fed poly unsaturated fatty acid (PUFA) rich diets (Lopez-Bote, 2000) and shows a more favorable nutritional profile (Wood and Enser, 1997). The purpose of this experiment was to study the specific effect of different dietary fatty acids sources on performance parameters, carcass analyzing and blood parameters in broilers chickens.

MATERIAL AND METHODS

One day old broiler chickens of the Ross 308 strain were obtained form commercial hatchery (300 males) and were placed in 15 floor pens of 2×2 meters each. All chicks were allowed free access to water and food. Chicks were fed balanced isoprotein experimental diets from 1 to 42d. In this experiment 300 broiler chicks were tested in completely randomized design with 5 treatments and each treatment contain 4 repetitions (experimental unit or pen). Each pen had 15 broiler chicks.

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randomly, with nearly same average body weight in comparison of the other experimental unit. The experimental design consisted in random selection arrangement with two types of fat combination (sunflower oil, soybean oil) and 5 levels of inclusion (0%, 25%, 50%, 75%, and 100%). A total of five treatments were distributed randomly in 4 replicate. There were a total of 60 birds per treatments.

The weights and feed intakes of birds were recorded at 1d and 42d of age. At the end of experimental period, weight and food intakes per pen recorded birds were always derived of feed 12 h before being weighted. All of the male chickens were killed on day 42.

RESULTS AND DISCUSSION

Performance Parameters

Total weight gain and feed intake were not affected by the different diets. (Table 1) Feed intake decreased significantly as dietary sunflower oil increased. Feed conversion rate (FCR) was better in animals fed diets with 100% soybean oil because of the higher metabolisable energy (ME) content. Feed intake and weight gain were affected differently by the sunflower and soybean oil fats. Sunflower and soybean oil had not same effect. The effect of type of fat on FCR could be related with digestion of fat to degree of unsaturation. (Table 1).

Sunflower and soybean oils caused lower percentages of abdominal fat at both inclusion levels (50/50) (Table 2). Abdominal fat increased with increased fat concentration none significantly, which agreed with the results reported in literature. Authors used acid oils from tallow, soybeans, and sunflowers and reported lower percentages of abdominal fat in animal diets fed containing sunflower oil. With tallow diets, abdominal fat increased with increasing inclusion levels, whereas showed little change in sunflower diets. The lower abdominal fat deposition in birds fed sunflower and soybean oils, suggest an effect of dietary fat on fat deposition in broilers in agreement with Pan et al. (1979) and Sanz et al. (1999). Because abdominal fat pad is well correlated with body fatness in broilers, hence the dietary fat could also be reflected in total body fat. Therefore, birds fed sunflower and soybean could also decrease body fat deposition. In other words the abdominal fat content and perhaps the total body fat content could be influenced by the fatty acid profile, which might be due to an increase in energy expenditure.

Muscle fat and weight

Level and type of fat had no effect on weights and percentages of thighs and heart and did not significantly influence fat of thighs, pancreas, liver and breasts (Table 2). However, breast from birds fed a sunflower oil diet showed a slightly lower weight and higher lipid content than soybean oil. Kirchgessner et al. (1993) found an increase of fat content in breast muscle with increasing levels of linoleic acid in the diet. Scaife et al. (1994) observed that the lowest levels of muscle fat content were for tallow, in comparison with soybean, rape-seed, or marine oil. However, the differences were not significant.

Blood Parameters

High density lipoprotein (HDL) and triglyceride (TG) content were not significantly influenced by the dietary fatty acid profile only in treatment C soybean oil diets caused higher rates of HDL and TG than sunflower diets. The effect of dietary fatty acid profile on cholesterol content of broiler meat was also reported by Maraschiello (1998), who found higher levels of breast cholesterol for birds fed lard than for those fed olive or sunflower oil.
### Table 1: Comparison of the mean weight gain, feed intake, feed conversion ratio of different treatments.

<table>
<thead>
<tr>
<th>Treatment period (day)</th>
<th>Attribute</th>
<th>%100 Soybean oil</th>
<th>25 % Sunflower oil + 75 % Soybean oil</th>
<th>50 % Sunflower oil + 50 % Soybean oil</th>
<th>75 % Sunflower oil + 25 % Soybean oil</th>
<th>%100 Sunflower oil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starter(0-10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight gain average (gr)</td>
<td>177&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.0</td>
<td>167&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.9</td>
<td>147&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Grower(11-24)</td>
<td>1209&lt;sup&gt;&lt;/sup&gt;</td>
<td>52.0</td>
<td>1018&lt;sup&gt;&lt;/sup&gt;</td>
<td>30.2</td>
<td>947&lt;sup&gt;&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Finisher(25-42)</td>
<td>1254&lt;sup&gt;a&lt;/sup&gt;</td>
<td>67.3</td>
<td>1239&lt;sup&gt;a&lt;/sup&gt;</td>
<td>41.5</td>
<td>1151&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2461&lt;sup&gt;&lt;/sup&gt;</td>
<td>118.9</td>
<td>2423&lt;sup&gt;&lt;/sup&gt;</td>
<td>70.8</td>
<td>2360&lt;sup&gt;&lt;/sup&gt;</td>
</tr>
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<td>Starter(0-10)</td>
<td>221&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.4</td>
<td>216&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>4.7</td>
<td>206&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Grower(11-24)</td>
<td>1562&lt;sup&gt;a&lt;/sup&gt;</td>
<td>74.7</td>
<td>1562&lt;sup&gt;a&lt;/sup&gt;</td>
<td>18.1</td>
<td>1460&lt;sup&gt;b&lt;/sup&gt;</td>
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<td></td>
<td>Finisher(25-42)</td>
<td>2305&lt;sup&gt;&lt;/sup&gt;</td>
<td>170.4</td>
<td>2341&lt;sup&gt;&lt;/sup&gt;</td>
<td>97.6</td>
<td>2419&lt;sup&gt;&lt;/sup&gt;</td>
</tr>
<tr>
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<td>Total</td>
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<td>264.2</td>
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<td>112.9</td>
<td>4086&lt;sup&gt;&lt;/sup&gt;</td>
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<td>Starter(0-10)</td>
<td>1.24&lt;sup&gt;&lt;/sup&gt;</td>
<td>1.6</td>
<td>1.29&lt;sup&gt;&lt;/sup&gt;</td>
<td>3.02</td>
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<td>Grower(11-24)</td>
<td>1.51&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>1.53&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.09</td>
<td>1.54&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Finisher(25-42)</td>
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<td>04</td>
<td>1.88&lt;sup&gt;&lt;/sup&gt;</td>
<td>0.03</td>
<td>1.72&lt;sup&gt;&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Total</td>
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<td>2.49</td>
<td>1.7&lt;sup&gt;&lt;/sup&gt;</td>
<td>1.92</td>
<td>1.72&lt;sup&gt;&lt;/sup&gt;</td>
</tr>
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</table>

<sup>a,b</sup> Means in the same row with different superscripts differ significantly, P<0.05.
Results of this experiment suggest that dietary fatty acid profile plays an important role in lipid deposition and metabolism. Lower abdominal fat of birds fed PUFA suggests that these fatty acids could cause an inhibition of lipogenesis, redistribution of lipids in the body, or higher energy expenditure despite their higher digestibility respect to SFA.

**REFERENCES**


