Rapeseed Cakes as an Important Feed Raw Material for Laying Hens

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Abstract
The aim of our paper was to present the results of in vivo experiment. We carried out an experiment with a final type of hens Shaver Starcross 288 which fed a feed mixture with a share of the rapeseed cakes. The effectiveness of the feed mixture was followed mainly in relation to production indicators. The laying hens were placed individually in enriched battery cages. The trial was conducted in the first period of the laying cycle, laying hens’ age from 22 to 42 weeks. The experimental results confirmed that the rapeseed cakes are suitable feed raw material for laying hens. A proportion of 5% rapeseed cakes in the feed mixture are optimal with respect to maintaining body weight of laying hens and suitable to productive indexes, like are laying intensity and weight of table eggs.

Keywords: Body weight, laying hen laying intensity, rapeseed cake, weight of egg

1. Introduction

Rapeseed cake as feed livestock
Oilseed rape has wide application in agriculture and food science. It is grown for the purpose of obtaining oil for human consumption. The residues from extraction or pressing are the appropriate source of feed material. The last years are important for oilseed rapes also from aspect of the environment protection and human health. It uses as raw material to biodiesel production. There is growing interest within the feed industry in using rapeseed by-products in poultry feeding [1] and full-fat oilseeds in poultry diets. Full-fat rapeseed is a valuable source of energy and protein for poultry [2, 3]. The rapeseed cakes are a good source of crude protein, but the limiting factors in poultry nutrition is a high content of crude fibre and antinutritive components: glucosinolates, erucic acid and tannin [4]. Campbell et al. [5] estimated that feeding hens with rapeseed cake did not affect the egg production and mortality of hens. Feeding hens the diet with ground rapeseed increased polyunsaturated fatty acids n-3 and polyunsaturated fatty acids n-6 content of egg yolks, and had positive effect on polyunsaturated fatty acids n-6: polyunsaturated fatty acids n-3 ratio [6]. It has been demonstrated that its feeding value could be affected by incomplete rupture of the seed structure during feed processing. Nutrient encapsulation by cell walls may not be broken down in the poultry gastrointestinal tract, which can result in poor energy utilization. It has been documented that the use of an appropriate combination of cell wall-degrading enzymes can improve the nutritive value of oilseeds for poultry. Recent research by Meng et al. [3] demonstrated that supplementation of canola seed-containing diets with a combination of cell wall-degrading enzymes was effective in improving feed conversion ratio, dry matter and non-starch polysaccharide digestibility, and apparent metabolizable energy level. In recent years, a considerable amount of data on the mode of action...
of carbohydrases in rapeseed diets has been published [7-9] however, there is limited information available about processing of this raw material. Banaszkiewicz [10] stated that rapeseed was characterized by a high amount of protein (21%–22%), fat (above 40%), total phosphorus (6–8 g per kg), and gross energy content (26–27 MJ per kg). The amino acid composition of rapeseed protein is beneficial, with 6 g lysine, 2 g methionine, 4.6 g threonine, and 1.2 g per 16 g N of tryptophan. The digestibility of some amino acids in rapeseed meal was lower than that of soybean meal [11]. The protein digestibility of rapeseed and rapeseed cake for poultry amounted to 60%–70% [12], whereas the fat digestibility of rapeseed and rapeseed cakes amounted to 60%–70% and 80%, respectively [13].

Rapeseed and rapeseed cakes contain oil that is rich in oleic acid. A study by Kocher et al. [14] showed that rapeseed meal could replace soybean meal in broiler diets even at high levels without any loss in animal performance are limited in their usability by having nutritionally unfavorable substances such as glucosinolates, sinapine, tannin, and phytate [15], as well as by having a high dietary fiber and non-starch polysacharide content [14].

Rapeseed products contain about 200 g of total non-starch polysacharide [16] and have a negative effect on nutrient digestibility, mainly on crude fat and amino acids. The non-starch polysaccharides, which include cellulose, β-glucans, arabinoxylans, and pectins, may increase digesta viscosity and decrease nutrient digestibility. The production technology of rapeseed cakes is more environmentally friendly than that of rapeseed meal, which is often used in animal production [17].

The aim of our paper was to present the results of an in vivo experiment. We carried out an experiment with a final type of hens that fed feed mixture with a share of rapeseed cakes. The effectiveness of the feed mixture was followed mainly in relation to production indicators.

2. Material and methods

We carried out feed trial which has been conducted with laying type of hens Shaver Starcross 288. The laying hens were placed individually in enriched battery cages. The trial was conducted in the first period of the laying cycle, laying hens’ age from 22 to 42 weeks. The trial consisted of the control group (n = 29) in which laying hens were fed with the feed mixture commonly used in production conditions and experimental group (n = 34). The experimental group the feed mixture was added with 5% of rapeseed cakes. The laying hens were fed ad libitum.

Composition of feed mixture:

A) control group – maize 35%, wheat 35%, soybean meal 16.5%, fish meal 1.5%, feed wheat flour 2%, feed salt 0.3%, feed limestone 6%, mineral feed supplement 2.5%, supplement of vitamins, amino acids 0.2%, premix of DL-methionine 1%;

B) experimental group – maize 35%, wheat 35%, soybean meal 11.5%, fish meal 1.5%, feed wheat flour 2%, feed salt 0.3%, feed limestone 6%, mineral feed supplement 2.5%, supplement of vitamins, amino acids 0.2%, premix of DL-methionine 1%, rapeseed cakes 5%.

Content of nutrients and metabolizable energy in feed mixture were in accordance with the feed Code.

Egg samples were collected every day for laying intensity and once in a week for egg weight. Egg weight – scale, type 440-35 N, precision d = 0.01 g.

Body weight, beginning and end of the trial – scale, type Kern 440-49N, precision d = 0.1 g.

Consumption of feed mixture – difference between weight of feed in beginning and end of the trial. Different weight of feed was divided by the number of birds in group.

Raw data were statistically evaluated by analysis of variance (ANOVA) in SAS program system [18]. Differences were tested using t-test.

3. Results and discussion

Consumption of feed mixture

The laying hens consumed on average 114.05 g per bird of control feed mixture and 110.60 g per bird experimental feed mixture for the investigated period. The difference between groups was observed non-statistically significant (p>0.05). The consumption of feed was observed in this trial is typical for final hybrid laying hens. These results confirm literature knowledge [19].
Body weight
The laying hens weighed at end trial 1690.67 g in control group versus 1632.12 g in experimental group. Similar results of body weight of the same type hens were observed in another study [19].

Laying intensity
Intensity of laying 85.72% was observed in the first period in control group versus 83.87% in experimental group. The lower intensity of laying 71 to 81% was observed in another study [20, 21].

Egg weight
Average egg weight was 61.27 g in control group a 63.01 g in experimental group. The difference between groups were not statistically significant (p>0.05). Our results confirmed literary knowledge [20].

The aim study of Swiatkiewicz [21] was to evaluate the effect of different levels of rapeseed expeller cakes in the diet of laying hens on egg performance, egg quality. The experiment was carried out with different type of laying type Bovans Brown hens, from 28 to 53 weeks of age. Feed mixture contained 0, 4, 6 or 8% rapeseed cakes. During their experimental period, the dietary level of rapeseed cake had no significant effects on egg quality parameters.

4. Conclusion
The experimental results we can summarize the following points:

a) The results of trial with laying hens confirmed that rapeseed cakes are suitable raw material for the production of feed mixture for laying hens,
b) a proportion of 5% rapeseed cakes in the feed mixture is optimal with respect to maintaining body weight of laying hens,
c) a proportion of 5% rapeseed cakes in the feed mixture is suitable to productive indexes, like are laying intensity and weight of table eggs.
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References

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