THE EFFECT OF HEMPSEED CAKES ON BROILER CHICKENS PEROFORMANCE PARAMETERS

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Abstract: The aim of the experiment was to evaluate effect of 5% and 15% of hempseed cakes in feed mixtures on performance parameters of broiler chickens. A total of 75 sexed Ross 308 hybrid cockerels were divided into three equal groups. The two experimental groups obtained feed mixtures containing 5% and 15% of technical hempseed cakes (groups HS5 and HS15, respectively). The third group was without hempseed cakes (control group). In our study live weight, feed conversion ratio and carcass yield were evaluated. There were significant differences ($P<0.05$) in bodyweight gain. The 15% of hempseed cakes in diet decreased live weight and worst feed conversion ratio. The carcass yield was not affected by the hempseed contents. The addition of hempseed cakes (15%) negatively affected the growth of chickens. The final body weight of chickens with part of hempseed cakes in feed mixture was significantly lower ($P<0.05$).

Key Words: hempseed cakes, feed conversion ratio, carcass yield, poultry

INTRODUCTION

Cannabis sativa L., commonly referred to as hemp, is a widely cultivated plant of industrial importance, as an important source of whole seed, hulled seed, seed meal, oil, fibre (Callaway 2004). Hemp seed protein is free of trypsin inhibitors and oligosaccharides which be found in soybeans (Eriksson, Wall 2012).

Whole hempseeds contain approximately 25% of crude protein, 31% of crude fat, and 34% of saccharides. It is oil contains 75–80% polyunsaturated fatty acids, in addition to vitamins and minerals (Darshan, Rudolph 2000, Leizer et al. 2000, Callaway 2004). The gross energy (GE) content of an oil variety of hempseed has been estimated as 22.0 MJ/kg and hempseed proteins are regarded as easily digested (Callaway 2004). Industrial hempseeds have low contents of tetrahydrocannabinol (~0.3%) (Konca et al. 2014). Tetrahydrocannabinol (THC) is potent lipophilic antioxidants which stimulates appetite (Hampson et al. 2000, Koch 2001). Cannabinol (CBD) is a metabolite of tetrahydrocannabinol, with potential immunosuppressive and anti-inflammatory activities (Pubchem 2015).

After extracting the oil, the remaining hempseed cake may be used as a protein feed. Hempseeds cakes are with a high content of crude protein and the active substance remaining in seeds cakes. Although hempseed cakes seems to be a promising alternative protein feed for animals, there have only been a few studies published (Karlsson et al. 2010).

The aim of the experiment was to evaluate effect of 5% and 15% of hempseed cakes in feed mixtures on performance parameters of broiler chickens.

MATERIAL AND METHODS

A total of 75 sexed Ross 308 hybrid cockerels were fattened on conventional deep litter system. Wood shavings were used as bedding material. The trial was conducted from day 12 to day 37 of chicken's age. Room temperature and humidity were controlled. Lighting system was 16 hours light and 8 hours dark. Cockerels were divided into three equal groups. The two experimental groups received

feed mixtures containing 5% or 15% of technical hempseed cakes (groups HS5 and HS15, respectively). The third group was without hempseed cakes (control group).

Table 1 shows chemical composition of used hempseed cakes. The used hempseed cakes contained 0.017% of cannabidiol. The content of tetrahydrocannabinol (THC) and cannabinol (CBD) are non-detectable in feed or in feces (when these values were measured by gas chromatography system). The compositions of experimental rations are presented in Table 2. The rations were calculated according to the Recommended nutrient content in poultry diets and nutritive value of feeds for poultry (Zelenka et al. 2007).

The chickens were fed *ad-libitum.* Health status was evaluated daily and live weight measured every week during the trial. Body weight gain was measured individually.

At the end of experiment 6 birds were selected randomly from each group, weighed and slaughtered. Feathers were removed and chickens were eviscerated. Carcass yield was calculated. In these selected chickens were deboned and weighed breast muscle and leg muscle. These values were calculated by the percentage of live weight.

Table 1 Chemical composition of hempseed cakes

Dry matter (g)	928
Gross energy (MJ.kg^{-1})	18.92
Crude protein (g)	276.4
Crude fat (g)	89
Crude fibre (g)	302
Crude ash (g)	67.2

Table 2 Composition of feed mixture (g · kg^{-1})

Component	HS 15	HS 5	Control
Wheat	279	271.9	378.2
Corn	283	287.5	247
Hempseed cakes	150	50	0
Soybean meal	98	120	105
Soybean extruded	78	190	190
Rapeseed oil	40	30	20
Wheat gluten	30	10.1	18.8
Premix*	30	30	30
Monocalciumphosphate	5	6.5	7
Limestone milled	5	4	4
L-lysine	2	0	0
Chemical composition (per kg of diet)			
Dry matter (g)	922.1	924.1	922
Gross energy (MJ)	17.6	17.6	16.4
Crude protein (g)	209.1	201.2	194.1
Crude fat (g)	8.8	8.8	7.4
Crude fibre (g)	6.2	4.1	3
Crude ash (g)	5.7	5.7	5.4

** Premix contains (per kg): lysine 60 g; methionine 75 g; threonine 34 g; calcium 200 g; phosphorus 65 g; sodium 42 g; copper 500 mg; iron 2500 mg; zinc 3400 mg; manganese 4000 mg; cobalt 7 mg; iodine 30 mg; selenium 6 mg; tocopherol 450000 mg; calciferol 166700 IU; tocoferol 1500 mg; vit K 350 mg; Bl 140 mg; B2 230 mg; B6 200 mg; B12 1000 mg; biotin 7 mg; niaciamid 1200 mg; folic acid 57 mg, calcium pantothenate 450 mg; choline chloride 6000 mg; salinomycin sodium 2333 mg.*

Data has been processed by Microsoft Excel (USA) and Statistica version 12.0 (CZ). We used one-way analysis (ANOVA). To ensure evidential differences Scheffe´s test was applied and P<0.05 was regarded as statistically significant difference.

RESULTS AND DISCUSSION

Bodyweight gain

The mean bodyweight of chickens during the experiment were presented in Table 3. In the third week of the experiment it was found significantly lower (P<0.05) mean live weight for the group HS15 (789.80 ± 86.03 g) in comparison with control and HS5 groups. In the fourth week of the experiment live weight of the control group (1475.72 ± 114.61 g) was significantly higher (P<0.05) in comparison with all experimental groups (HS5 and HS15).

Table 3 Mean bodyweight per trial (g)

Week of trial	HS5					HS15					C				
	n	Mean ± standard deviation													
1	25	284.64	±	17.97	a	281.32	±	18.15	a		279.40	±	13.49	a	
2	25	462.00	±	37.73	a	442.00	±	32.98	a		456.28	±	27.67	a	
3	25	891.12	±	118.77	b	789.80	±	86.03	a		912.16	±	66.80	b	
4	25	1360.64	±	156.38	a	1296.68	±	184.29	a		1475.72	±	114.61	b	
5	25	2040.92	±	210.76	a	1875.04	±	149.82	b		2169.24	±	134.72	c	

[a,b,c] – different letters in one column - statistically significant differences (P<0.05)

Performance parameters

Final body weight was significantly higher (P < 0.05) in the control group (2169.24 ± 134.72 g) and significantly lowest in the group of HS15 (1875.04 ± 149.82 g). In accordance with the performance targets for ROSS 308, the average body weight of cockerels would be 2 493 g at 37 days of age (Aviagen Group 2014).

Table 4 shows average feed conversion ratio for each groups. The higher FCR was observed in the group of HS15 with value 2.04 kg.

Eriksson and Wall (2012) found in their trial at classification of hempseed cakes at 35 days of age chickens live weight of 1 194 g and 2.09 FCR. While in our experiment were observed higher live weight and a better FCR at 37 days of age chickens. Mahmoudi et al. (2015) found feed conversion ratio of 2.04 kg for the period of 1–42 days when including 25 g · kg^{-1} of hempseed cakes in diet of chickens.

Table 4 Feed conversion ratio, carcass yield

Parameters	n	HS5				HS15				C			
		Mean ± standard deviation											
Live performances													
FCR (kg)		1.87				2.04				1.76			
Slaughtering yields													
Carcass weight (%)	6	70.31	±	1.88	a	69.91	±	1.16	a	73.50	±	4.14	a
Breast muscle (%)	6	21.33	±	1.79	a	19.42	±	1.30	a	21.13	±	2.12	a
Leg muscle (%)	6	14.78	±	1.33	a	14.39	±	1.44	a	15.67	±	0.72	a

[a,b] – different letters in one line - statistically significant differences (P<0.05)

The highest carcass yield was found in the control group (73.50 ± 4.14%) but differences between groups were not significant. See Table 4. The lowest value was observed in group HS15. Carcass yield stated in the technological procedure for ROSS 308 (Aviagen Group 2014) is the 71.72% for 2 000 g of live weight.

Percentages of breast muscle of body weight (Table 3) were nonsignificant highest for experimental group HS5 (21.33 ± 1.79%), while the lowest value was observed in the group HS15. In the manual of hybrid Ross 308 (Aviagen Group 2014) is stated similar percentage of breast muscle

of body weight to our results. Technological manual indicates 21.20% of breast muscle at 2 000 g of liveweight.

Percentages of thigh muscle of body weight was attempted highest for control group (15.67 ± 0.72%), while the lowest value was observed in group HS15. The manual for the hybrid Ross 308 (Aviagen Group 2014) indicates a yield of leg meat 16.01% for 2 000 g live weight. The differences among groups in slaughtering yields were not statistically significant ($P > 0.05$).

Khan et al. (2010) observed in their experiment when including of 5% hempseed cakes carcass yield of 61.3%, 2.5 feed conversion ratio and live weight 1 717.2 g and 4 506.9 g of total feed intake at the age of 42 days of chickens.

CONCLUSION

The addition of hempseed cakes (especially dose of 15%) negatively affected the growth of chickens, because the final body weight of chickens (at 37 days of age) with part of hempseed cakes in feed mixture was significantly lower ($P < 0.05$). A higher proportion (15%) also worsened feed conversion ratio. Data of carcass yield were not affected ($P > 0.05$) by inclusion of hempseed cakes.

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