THE INFLUENCE OF MILK THISTLE SEED CAKES ON BROILER CHICKENS PERFORMANCE PARAMETERS

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Abstract: The aim of this study was to evaluate influence of the milk thistle seed cakes at dose 5 and 15% in feed mixture. Seventy five cockerels were divided into three equal groups. The experimental groups received feed mixtures containing 5% of milk thistle seed cakes (MT5), 15% of milk thistle seed cakes (MT15) and third group was control – without milk thistle seed cakes (C). Average feed consumption per one chicken was evaluated. Carcass yield was calculated for each group like as percentage of live weight. Feed consumption in the groups fed with milk thistle seed cakes was lower. Feed conversion ratio was a worse in experimental groups than the control group. Broiler carcass yield was negatively affected ($P<0.05$) by dietary treatment. Milk thistle seed cakes in the amount used in this experiment are not a suitable component in feed mixture of broiler chickens.

Key Words: broiler chickens, performance parameters, carcass yield, feed conversion ratio, milk thistle

INTRODUCTION

Milk thistle (*Silybum marianum L.*) have been used for almost 2 000 years as a natural treatment for the liver diseases (Ding et al. 2001). The main active substances occurring in milk thistle are flavonolignans, which are hepatoprotective substances. The seeds of milk thistle contain flavonoids quercetin, taxifolin, and particularly flavonolignans in an amount of 1.5–3%. The mixture of silydianin (10%), silychristin (20%) and silybin (50–60%) is known as silymarin (Opletal, Skrivanova 2010, Ding et al. 2001, Zahid, Durrani 2007). Silymarin complex exhibits chemopreventive activity against chemical, viral, bacterial and fungal toxins, inhibits lipid peroxidation, and stabilizes the cell membranes of the liver parenchyma (Opletal, Skrivanova 2010). Various trials showed that silymarin addition in diet or silymarin administration increased productive and reproductive performances and improved livestock health status of animals (Tedesco 2001).

This study was conducted to evaluate influence of the milk thistle seed cakes at dose 5% or 15% in feed mixture on performance parameters of broiler chickens.

MATERIAL AND METHODS

The experiment was performed with cockerels of Ross 308 hybrid (n = 75) which 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 chick'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% and 15% of milk thistle seed cakes (groups MT5 and MT15, respectively). The third group was without milk thistle seed cakes (Control group). The used milk thistle seed cakes contained 3.73% of flavonolignans. Table 1 shows chemical composition of used milk thistle seed cakes. 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 composition of feed mixtures is shown in Table 2.

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 six 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 milk thistle seed cakes (g · kg^{-1})

Dry matter (g)	927
Gross energy (MJ · kg^{-1})	18.8
Crude protein (g)	201.2
Crude fat (g)	9.3
Crude fibre (g)	27.1
Crude ash (g)	6.3

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

Component	MT15	MT5	Control
Wheat	269	271.8	378.2
Corn	251	282.4	247
Milk thistle seed cakes	150	50	0
Soybean meal	128	120	105
Soybean extruded	78	190	190
Rapeseed oil	40	30	20
Wheat gluten	40	15.2	18.8
Premix*	30	30	30
Monocalciumphosphate	7	6.5	7
Limestone milled	5	4	4
L-lysine	2	0	0
Chemical composition (per kg of diet)			
Dry matter (g)	925	920	912
Gross energy (MJ)	17.6	17.5	16.4
Crude protein (g)	213	200	194.1
Crude fat (g)	8.6	8.6	7.4
Crude fibre (g)	6	3.8	3
Crude ash (g)	6	5.8	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 average bodyweight gain of cockerels per each week of trial are shown in Table 3. From the second week of the experiment control group showed a significantly higher body weight compared to experimental group MT15 and from third week compared to both experimental groups.

At the end of trial we observed significant ($P<0.05$) higher weight (2169.24 ± 134.72 g) in control group.

Table 3 Mean body weight gain (g)

Week of trial	MT5	MT15	C
	n	Mean ± standard deviation	
1	25	282.12 ± 24.87 [a]	288.72 ± 15.14 [a]	279.40 ± 13.49 [a]
2	25	452.44 ± 43.87 [a]	399.24 ± 28.67 [b]	456.28 ± 27.67 [a]
3	25	821.56 ± 98.07 [a]	730.52 ± 66.99 [b]	912.16 ± 66.80 [c]
4	25	1322.68 ± 128.40 [a]	1190.20 ± 95.70 [b]	1475.72 ± 114.61 [c]
5	25	1970.20 ± 185.23 [a]	1846.16 ± 147.78 [b]	2169.24 ± 134.72 [c]

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

According to the technological procedure for ROSS 308, the average body weight of cockerels would be 2 493 g at 37 days of age (Aviagen Group 2014). This is much closer to the value of the control group (2169 g).

Suchy et al. (2008) in their experiment observed then the addition of 0.2% and 1% *Sylibum Marianum* seed cakes caused a decrease in the weight gain and feed conversion ratio. Gawel et al. (2003) found an increase in the slaughter weight in broilers when supplied with silymarin. Wojcik et al. (2002) added to fattened chicken with a silymarin supplement. They discovered lower slaughter weight and higher feed conversion ratio compared to the control group.

Feed consumption

The highest average feed consumption during the experiment was observed in the control group. See Table 4. Conversely, the lowest feed consumption showed MT15 group, making were also lower live weight of chickens. It seems therefore that a selected relatively high percentage of milk thistle seed cakes worsens feed intake, respectively it is palatability. This may be due to the content of substances with a bitter taste.

Feed conversion ratio

Feed conversion ratio was better in control group as compared to the experimental group MT15. FCR showed in Table 4. In the control group was found the highest feed consumption, but the best feed conversion ratio.

Table 4 Feed consumption, feed conversion ratio (kg)

Group	MT5	MT15	C
Feed consumption	3.1	3.0	3.3
Feed conversion ratio	1.8	1.9	1.7

Carcass yield

The carcass yield parameters of chickens at the end of experiment were presented in Table 5. In carcass yield was found the significant higher (P<0.05) differences in control group vs. MT5 in percentage of carcass and vs. MT5 and MT15 by percentage of leg meat. Carcass yield stated in the technological procedure for ROSS 308 (Aviagen Group 2014) is 71.72% for 2 000 g live weight.

The higher breast yield was found in the group 5% of milk thistle cakes (21.34 ± 0.97%). The differences among groups were not statistically significant (P<0.05). In the manual of hybrid Ross 308 (Aviagen Group 2014) is stated similar percentage of breast muscle of body weight to our results.

The highest significant difference (P<0.05) in leg meat yield was observed in the control group (15.67 ± 0.72%) compared to the experimental groups. The manual for the hybrid Ross 308 (Aviagen Group 2014) indicates a yield of leg meat 16.01% for 2 000 g live weight.

Liver weight was highest for MT15 group but differences were not significant (Table 5).

Table 5 Carcass yield

Group	n	Carcass	Breast meat	Leg meat	Liver
		Mean (%) ± standard deviation			
MT5	6	69.28 ± 0.85 [a]	21.34 ± 0.97 [a]	14.03 ± 0.66 [b]	2.33 ± 0.45 [a]
MT15	6	69.64 ± 1.55 [ab]	20.24 ± 1.65 [a]	14.50 ± 0.84 [b]	2.69 ± 0.18 [a]
C	6	73.50 ± 4.14 [b]	21.13 ± 2.12 [a]	15.67 ± 0.72 [a]	2.33 ± 0.45 [a]

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

Schiavone et al. (2007) observed in their trial that addition of silymarin did not significantly affect growth performances but slightly reduced slaughtering yields probably by feed consumption reduction and modulation.

CONCLUSION

The addition of milk thistle seed cakes (dose of 5% and 15%) negatively affected the growth of chickens, because the final body weight of chickens (at 37 days of age) with part of milk thistle seed cakes in feed mixture was significantly lower (P<0.05).

Feed conversion ratio was therefore a worse in experimental groups (5 and 15% of milk thistle seed cakes) than in the control group. Broiler carcass yield was negatively affected (P<0.05) by dietary treatment. Addition of milk thistle seed cakes at doses of 5 and 15% appears to be high. Milk thistle seed cakes in the amount used in this experiment are not a suitable component in feed mixture of broiler chickens.

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