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USE EXTRUDED RAPESEED MEAL IN THE FEED OF BROILER CHICKENS

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Abstract: The aim of the study was to investigate the effects of extruded rapeseed meal in the diet on broiler performance. Chickens of Ross 398 hybrid were used in the trial. The trial lasted 42 days. Rape seed meal was extruded prior to use and included in the diet at the level of 4% (group 2) and 8% (group 3), and control group of chickens (group 1) fed the standard mixture based on corn, soybean meal and soybean grits. Chickens of the control group scored the highest ranking and realized the final body mass of 2212 g, whereas the chickens of group 2 had the final body mass of 2191 g, and chickens of group 3 with final body mass of 2148 g were the worst. Falling behind of the trial groups in relation to the control group in regard to the body mass at the end of the trial was by 0,91% group 2 and by 2,89% for group 3. Feed conversion ratio was the best in group 2, followed by control group, and the worst was the group 3 (1,882; 1,866; 1,894, respectively). The lowest mortality rate was realized by chickens of the control group, followed by group 2 and group 3 (4,00%; 4,33%; 5,33%, respectively). The control group of chickens had the best production index value, followed by group 2 and the lowest value of the production index was established for chickens of group 3 (270,95; 265,18; 255,63, respectively). It can be observed that the depression in trial groups was within the limits of toleration, which indicates that extruded rapeseed meal can be included in the diets for fattening chickens in ratio up to 10%.

Key words: extruded rapeseed meal, broilers, production traits

Introduction

Rapeseed is important plant in production of plant oils which is present in several species within *Brassica sp*. but the two most popular are B. *napus L* .and *B. rapa L.* In the last decades, numerous varieties and hybrids have been created *(Stanaćev et al,. 2002; Sovero, 1993)*. The two most widespread crops are rapeseed (Sweden) and canola (Canada), which are very similar plant species. Rapeseed has

great industrial importance because it grain contains approximately 40% of oil and 18-23% proteins *(Munoz-Valenzuela et al., 2002; Stanaćev, et al., 2007)*. Large expansion of this crop is consequence of the utilization of its oil as biodiesel fuel and raw material used in manufacturing of motor oils and hydraulic lubricants. Millions of tons of lubricants and motor oils are produced worldwide fromthis crop. By most estimates, the largest consumers of this oil will be diesel powered vehicles and lubricants used in different engines.

Important secondary products after the extrusion of oil from the grain are cake and meal, which can successfully be used in nutrition of considerable number of species and categories of domestic animals. Rapeseed meal and cakes are standardized feeds on the market and they are declared as plant protein feeds. Protein content in meal is in the range from 35-38%, contents of carbon-hydrates 15-16,5% crude fibres 11-12,5%, moisture 8-10%, ash 6-6,5%, and oil 3,7% (NRC. 1994; Canola Council of Canada, 2005). Rapeseed meal contains significant quantities of mineral matters and vitamins, especially phosphorus, of higher availability in spite of presence of phytic acid *(Keith and Bell, 1987; Stanaćev et al., 2003; Stanaćev and Kovčin, 2004; Milošević et al., 2007)*.

Disadvantage of this feed is increased content of anti-nutritional substances. Rapeseed meal contains higher quantities of glucosinolate, some varieties even over 100 μmol/g and 4-5% erucic acid *(Donald and Basin, 1990; Stanaćev et al., 2005; Milošević et al., 2010)*. The second problem is low content of metabolic energy of approx. 2000 kcal/kg *(Jokić et al., 2004; Council of Canada, 2005)*. Content of anti-nutritional substances today has been significantly reduced by creating new varieties with very small amounts of glucosinolate and erucic acid. Additional possibility to solve the issue of anti-nutritional substances is by heat treatment of feeds (expanding, toasting, extruding). There are many examples of good heat treatment where the glucosinolates and erucic acid have been reduced to minimum, which greatly reduced the depressive effect of these substances in the animal nutrition, especially in monogastric animals (pigs and poultry). Poultry fed technologically well processed/treated rapeseed meal, shpws production performance at the same level as poultry fed diets based on soybean meal or slightly lower levels *(Newkrik and Classen, 2002; Tadelle et.al., 2003; Kralik et. Al,. 2003; Stanaćev et al., 2005; Milošević et al., 2010)*.

Rapeseed meal is acceptable also to be included in diets for domestic animals because of its lower cost compared to soybean meal. According to recommendations of the Canola Council of Canada, (2005) rapeseed meal, provided that it is heat treated or made from varieties with lower content of anti-nutritional substances, can be included in diets for pigs and poultry in ratio of up to 20 %. Recommendations by *Stanaćev et al. (2005)* and *Milošević et al. (2010)*. Are that rapeseed meal can be included in diets in ratio of up to 8% without any adverse effect on production performance and health condition of fattening chickens.

Objective of this paper was to investigate the possibility of more extensive inclusion of extruded rapeseed meal in diets for fattening chickens.

Materials and Methods

Nutritional value of extruded rapeseed meal was studied on the experimental farm «Pustara» in Temerin, of the Faculty of Agriculture in Novi Sad, using Ross 308 chickens. The methodology of the trial was common. The trial was carried out on three groups of chickens, in 4 repetitions, total 300 chickens per treatment. Trial lasted 40 days. Chickens were measured once per week. Chickens were measured in group during the first, second, fourth and fifth week, and in the third and sixth week of age they were weighed individually.

Health condition of chickens was regularly controlled during the study, as well as number of dead and culled chickens recorded. Chickens were reared according to usual technology for Ross 308 hybrid. They consumed food and water ad libitum. Chemical analyses were done on samples of starter and finisher mixtures and on samples of rapeseed meal, to determine the content of crude proteins, crude fibre, crude fat and crude ash. Also, the content of following macro-elements was determined: K, Na, Ca and P.

Table 1. Composition of starter diets, %

Ingredient	Groups					
	Starter			Finisher		
	1	2	3	1	2	3
Maize	48,59	47,74	45,78	54,70	53,35	51,90
Soybean meal	29,00	26,00	23,00	23,50	20,00	15,50
Full fat soybean extruded	14,00	14,00	15,00	14,00	14,00	15,00
Rapeseed meal extruded	0,00	4,00	8,00	0,00	5,00	10,00
Yeast torula	2,50	2,50	2,50	2,00	2,00	2,00
Oil	1,50	1,50	1,50	1,50	1,50	1,50
Moncalcium Phosphate	1,30	1,20	1,20	1,30	1,20	1,20
Limestone	1,60	1,60	1,60	1,50	1,50	1,50
Salt	0,30	0,30	0,30	0,30	0,30	0,30
DL - Methionine	0,21	0,16	0,12	0,20	0,15	0,10
Premix	1,00	1,00	1,00	1,00	1,00	1,00
Total	100,00	100,00	100,00	100,00	100,00	100,00
Chemical composition						
ME MJ/kg- (calculated)	12,738	12,672	12,614	13,035	12,995	12,989
Crude protein	23,16	23,19	23,28	21,14	21,35	21,05
Fat	5,91	6,01	6,26	6,08	6,18	6,44
Crude fibre	4,21	4,42	4,64	3.99	4.22	4.42
Calcium	0,94	0,94	0,97	0,89	0,89	0,91
Phosphorus (total)	0,70	0,71	0,74	0,68	0,69	0,74
Methionine	0,57	0,53	0,50	0,53	0,49	0,48
Lysine	1,29	1,30	1,33	1,15	1,17	1,21

Group 1: Control
Group 2: Rapeseed meal extruded - content in diet 4%
Group 3: Rapeseed meal extruded - content in diet 8%

Two mixtures were used in nutrition of chickens, initial mixture – starter and final mixture – finisher. In the last trial week, chickens were fed final mixture without any coccidiostats. Composition of used mixtures is presented in Table 1.

Results and Discussion

The effect of the application of extruded rapeseed meal in fattening of chickens on production performance is presented in Table 2.

Obtained results show that introduction of extruded rapeseed meal in nutrition of fattening chickens had no significant effect on decrease of major production parameters. The data shows that final body masses were slightly lower in groups of chickens fed extruded rapeseed meal in their diets, however the difference was below 5%. The feed conversion ratio was satisfactory in all groups, but again the best value was determined in chickens of control group. The mortality ratio was usual for broiler chickens, and identical in control and trial groups of chickens which received 4% of extruded rapeseed meal in diet, and slightly higher in trial group of chickens fed diets containing 85 of this feed.

Production index which represents aggregate number (production index = average body mass (g) x % of surviving chickens x 100 / feed conversion ratio x duration of fattening, days) was the best in chickens of control group, followed by chickens of group 1, and the lowest value of production index was determined for chickens of group 2.

Obtained results are in concordance with most of literature data, although there are references where rapeseed meal even showed better production performance in chickens than soybean meal *(Munoz-Valenzuela, 2002; Kralik et al., 2003; Tadelle et al., 2003; Stanaćev et al., 2008; Milošević et al., 2010)*.

Table 2. Performance of broilers chickens (42 days)

Parameters	Groups		
	1	2	3
Mortality	12	13	16
Body weight of day-old chickens, g	42,02	42,07	42,48
Body weight, g	2212^{b}	2191^{ab}	2148^{a}
Daily weight gain, g	51,67	51,17	50,20
Mortality rate,%	4,00	4,33	5,33
Feed conversion ratio kg/kg	1,866	1,882	1,894
EPEF	271	265	256
Decrease of body weight, %	0,00	0,95	2,89

a-c, values in rows followed with same letters are significantly different at $P \leq 0,05$

Conclusion

Based on conducted investigations it can be concluded that rapeseed meal is high quality feed that can be used in nutrition of broiler chickens. It can be used as substitute for plant protein feeds in various combinations. It can be used without any fear or reservations that certain significant depression in major production parameters in broiler chickens might occur and that it will have negative consequences on their health. The recommendation to farmers is that this feed can be used in significant quantity, since inclusion of this plant feed reduces the share of other expensive plant feeds, primarily soybean meal, and this reduces the cost of complete mixtures and in general improves the profitability of production of poultry meat.

Korišćenje ekstrudirane sačme uljane repice u ishrani brojlerskih pilića

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Rezime

Cilj ispitivanja je bio efekat ekstrudirane sačme uljane repice na proizvodne parametre brojlerskih pilića. Za ispitivanje su upotrebljeni pilići Ross 308 hibrida. Ogled je trajao 42 dana. Sačma uljane repice je pre upotrebe ekstrudirana i uključena u obroke u nivou od 4% (grupa 2) i 8% (grupa 3), a kontrolna grupa (grupa 1) pilića je hranjena standardnom smešom na bazi kukuruza, sojine sačme i sojinog griza. Utvrđeno je da je kontrolna grupa pilića bila najbolja u rangu i ostvarila završnu telesnu masu 2212 g, dok je grupa 2 imala telesnu masu 2191 g, a grupa 3 je bila najlošija sa 2148 g. Zaostajanje oglednih za kontrolnom grupom u telesnoj masi na kraju ogleda je bilo ispod 0,91% grupa 2 i 2,89% grupa 3. Konverzija hrane najpovoljnija je bila grupa 2, zatim sledi kontrolna grupa i najlošija je grupa 3 (1,882; 1,866; 1,894). Najmanji mortalitet su ostvarili pilići kontrolne grupe, zatim sledi grupa 2 i potom grupa 3 (4,00%; 4,33%; 5,33%). Kontrolna grupa pilića je imala i najbolji proizvodni indeks, potom grupa 2 i najlošiji grupa 3 (270,95; 265,18; 255,63). Uočava se da je depresija u oglednim grupama bila u tolerantnim granicama što ukazuje da se ekstrudirana sačma uljane repice može uključivati u obroke za tovne piliće do 10%.

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