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NUTRITIVE VALUE OF RAPESEED MEAL IN NUTRITION OF BROILER CHICKENS

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SUMMARY: In this paper, results relating to nutritive value of rapeseed meal on production performances of fattening chickens are presented. Investigation was carried out on Ross 308 chickens in duration of 42 days. Control group of chickens (group 1) was fed standard mixture (starter, grower and finisher) based on corn, soybean meal and full fat soybean extruded as basic feeds, and share of rapeseed meal in diets for trial chickens was 10% (group 2) and 15% (group 3). Results showed that control group of chickens had realized final body mass of 2.250 kg, chickens of group 2 body mass of 2.243 kg, and group 3 had realized the lowest value - 2.181 kg. Feed conversion was equal in all three groups of chickens (1-1.864; 2-1.880; 3-1.861). Mortality was 3.16% in control group, 3.13% in group 2 and 7.16% in group 3. Production index had value of 270 in group 1, 268 in group 2 and 251 in group 3. Differences in all investigated parameters, with the exception of feed conversion, between group 3 and other groups were statistically significant (P<0.05). Presence of 15% of rapeseed meal in diets had exhibited depressive effect on production parameters of chickens and inclusion of this feed in higher percentage can have negative effect on success of broiler fattening.

Key words: *rapeseed meal, broilers, production traits*

INTRODUCTION

Rape seed is important plant culture for production of oils, plant proteins and renewable energy. There are several species within the group of *Brassica sp.* But two are the most popular *B. napus L.* and *B. rapa L.*, and many cultivars and hybrids grown within said species (Sovero, 1993, Straková et al., 2008). Two type most present are rapeseed (Sweden) and canola, which are very similar plant species.

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Significance of rapeseed as oil crop is increasing since rapeseed grain contains over 40% of oil and 18-23% of protein (Munoz-Valenzuela et al., 2002, Milošević et al., 2007). Reason for growing interest in this plant is also the fact that rapeseed oil is used as source of renewable energy (bio-fuel) and raw material for motor oils and hydraulic lubricants.

By-products in processing of rapeseed grain are cake and meal, rich in biologically valuable proteins used in nutrition of most of livestock species and categories. Until recently,

rapeseed meal was not used intensively in poultry nutrition, but it was established that it can be included into diets even for fattening broiler chickens (Stanaćev et al., 2006, Stanaćev et al., 2007, Milošević et al., 2007, Milošević et al., 2008, Lukić et al., 2009). Rapeseed meal is standardized feed which is sold on the market with protein content of 35-38%, carbon hydrate content of 15-16%, content of crude fibre of 11-12%, moisture 8-10%, ashes 6-7%, oil 3-4% (Newkrik and Classen,1999, Slominski et.al., 1999, Canola Council of Canada, 2005, Milošević et al., 2008). This feed also contains significant amounts of mineral matters and vitamins, especially phosphorus, of good availability even though phytine acid is present (Zeb, et al., 2002, Milošević et al., 2007). Disadvantage is increased content of anti-nutritive matters. It containes higher amounts of glucosinolate, some cultivars up to 100 μmol/g and 4-5% of erucic acid (Donald and Basin, 1990, Canola Council of Canada, 2005). Disadvantage of this feed is also low content of metabolic energy of approx. 2000 kcal/kg (Jokić, et al., 2004, Canola Council of Canada, 2005). New rapeseed cultivars contain significantly less anti-nutritive matters (glucosinolate and erucic acid). There are numerous examples where rapeseed meal exhibited significant production impact in broiler nutrition, and considering its very acceptable price it is used more and more in nutrition of this poultry category.

In great number of studies and researches it was confirmed that chickens fed diets containing rapeseed meal had realized production performance equal to those fed diets based on soybean meal or slightly behind (Tadelle, et al., 2003, Kralik, et al., 2003, Stanaćev, et al., 2006, Milošević, et al., 2005, Milošević, et al., 2008).

Rapeseed meal is interesting for use in livestock production because of the price, since use of this meal significantly substituted use of soybean meal which is three times more expensive. According to the recommendations of the Canola Council of Canada, (2005) heat treated rapeseed meal or rapeseed meal deriving from cultivars with low content of anti-nutritive matters can be included in diets for pigs and poultry up to 20%. Stanaćev, et al., (2006) and Milošević, et al., (2005) recommend that rapeseed meal in diets for fattening chickens can be used in the amount of up to 8 % without detrimental effect on production results and health condition of chickens.

Objective of this study was to investigate potential of significant inclusion of rapeseed meal in diets for fattening chickens.

MATERIAL AND METHODS

Investigation of the influence of rapeseed meal on production performances of fattening chickens was carried out on three groups of chickens in 4 repetitions on total of 300 chickens in each treatment. Trial lasted 42 days. In this trial Ross 308 chickens were used. Chickens were weighed individually and weekly. During the trial health con-

dition of chickens was regularly controlled as well as dead and rejected birds recorded. Chickens were reared according to standard technology for Ross 308 strain. Feed and water were ad libitum.

Mixtures used in this study were chemically analyzed in the Laboratory for examination of the quality of livestock feed of the Faculty of Agriculture, Novi Sad. Three mixtures were used in nutrition of chickens: initial or starter mixture, grower and final mixture or finisher. During the last week of the trial chickens were fed mixture without coccidiostats. Composition of used mixtures is presented in table 1. EPEF was represented aggregate number and calculated as EPEF = average body mass (g) x % surviving chickens x 100 / feed conversion x duration of fattening, days.

Table 1. Composition of starter, grower and finisher diets, %
Tabela 1. Sastav starter, grover i finišer smeša, %

No. Br.	Ingredient - *hraniva*	Starter - *Starter*			Grower - *Grover*			Finisher - *Finišer*		
		1	2	3	1	2	3	1	2	3
1	Maize - *kukuruzna prekrupa*	49.00	45.00	43.00	52.80	49.40	47.80	60.00	56.00	55.00
2	Soybean meal - *sojina sačma*	28.00	21.00	16.80	23.00	15.00	12.20	18.00	11.80	8.00
3	Full fat soybean extruded - *sojin griz*	13.80	14.10	15.00	14.20	15.00	14.00	12.00	11.00	10.90
4	Rapeseed meal - *sačma uljane repice*	-	10.00	15.00	-	10.00	15.00	-	10.00	15.00
5	Yeast torula - *kvasac torula, (sušen)*	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
5	Oil - *ulje*	1.80	2.70	3.00	2.60	3.40	4.00	2.60	4.00	4.20
6	MCP (monocalcium phosphate)-*MKF*	1.55	1.35	1.25	1.55	1.35	1.25	1.60	1.50	1.20
7	Limestone - *stočna kreda*	1.40	1.40	1.50	1.40	1.40	1.30	1.40	1.30	1.30
8	Salt - *so*	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
9	Methionine - *metionin*	0.15	0.15	0.15	0.15	0.15	0.15	0.10	0.10	0.10
10	Premix - *premiks*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Total - *ukupno*	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Chemical composition - *hemijski sastav,* %									
1	ME MJ/kg- (calculated - *izračunato*)	12.83	12.82	12.83	13.26	13.29	13.28	13.44	13.48	13.46
3	Crude protein - *sirovi protein*	22.61	22.84	22.95	20.98	21.04	21.14	18.63	18.70	18.69
6	Calcium - *kalcijum*	0.90	0.92	0.97	0.89	0.91	0.88	0.88	0.88	0.86
7	Phosphorus - *fosfor* – (total - *ukupni*)	0.76	0.78	0.80	0.74	0.76	0.77	0.73	0.77	0.74
8	Methionine - metionin	0.51	0.53	0.54	0.49	0.50	0.51	0.41	0.42	0.43
9	Lysine - *lizin*	1.26	1.30	1.32	1.14	1.16	1.17	0.95	0.99	0.99

Group 1 (*Grupa 1*): Control - *Kontrola*
Group 2 (*Grupa 2*): Rapeseed meal - content in diet 10% - *Sačma uljane repice - nivo u smeši 10%*
Group 3 (*Grupa 3*): Rapeseed meal - content in diet 15% - *Sačma uljane repice - nivo u smeši 15%*

At the end of the 6th week of fattening chickens were selected (10 males and 10 females per treatment) of average body mass, slaughtered manually and carcasses were processed for the purpose of investigation of slaughter parameters and share of abdominal fat in carcasses. Quantity of abdominal fat was placed into relation to body mass prior to slaughtering, and in this way relative share of abdominal fat in carcasses was calculated. Computer program Statistica 8, (2009) was used to establish mean values and variability measures. In the same way the variance analysis was done, and in regard to demonstration of statistical significance in variance analysis LSD test at the level of probability of 0.05% was used.

RESULTS AND DISCUSSION

Obtained results presented in table 2 show that final body masses of chickens fed diets with 15% of rapeseed meal at 42nd day of fattening were significantly lower compared to chickens of control group which were fed diets based on soybean and corn, whereas chickens fed diets containing 10% of rapeseed meal had final body masses similar to those of the control group. Depression of the chicken growth when rapeseed meal was used in percentage above 10% was established also by other authors (Zeb, et al., 2002, Stanaćev, et al., 2007, Milošević, et al., 2008). Adequate to final body masses also values for daily gains according to treatments varied. Average daily gains were realized at the level of slightly over 50g. Mortality of chickens was within technological norms in control group and group with 10% of rapeseed meal in diet, but significantly higher in group of chickens fed diet containing 15% of rapeseed meal. Difference was statistically significant (P<0.05) in relation to K and T2 group of chickens. Increased mortality in T2 group can not exclusively be attributed to increased amount of rapeseed meal, but also to random effect, since only few authors have obtained similar results (Karunajeewa, et al., 1999, Tadelle, 2003).

Table 2. Parameters of chicken meat production (42. day of age)
Tabela 2. Proizvodni parametri brojlerskih pilića (42. dana starosti)

Treatment *Tretman*	Start-*Početna*, B.W. - *T.M.**1*** g	Final-*Završna* B.W.-*T.M.* g	Growth/day, g *Dnev. prirast,* g	Mortality,% *Uginuće,*%	Conversion *Konverzija*	EPEF - *P.I.**2***
C (K)	41.2	2250**b**	52.29b	3.16b	1.863	270
T1	41.1	2243**b**	52.43b	3.13b	1.880	268
T2	40.5	2181**a**	50.96a	7.15a	1.860	251

[a-b] Means within a column with different superscripts differ significantly (P ≤ 0,05)
[a-b] Vrednosti unutar kolone sa različitim slovima značajno se razlikuju (P ≤ 0,05)
[1]T.M. – Body weight of chicken - *Telesna masa pilića*
[2] EPEF - *P.I. - Proizvodni indeks*

Feed conversion was satisfactory in all groups, with minimal diffrences between treatments, which were not statistically significant. According to EPEF chickens of the control group had the best values, followed by the group fed diets with 10% of rapeseed meal and the lowest value, but these differences were not statistically significant. Obtained results for feed conversion and production index are in concordance with most of literature references (Tadelle, 2003, Stanaćev, et al., 2006, Milošević, et al., 2005).

Table 3. Slaughter parameters according to treatments
Tabela 3. Klanični parametri po tretmanima

Treatment Tretman	Sex pol	B.W. g *T.M., g*	Processing percentage - *Randmani*						Ab. fat-*Ab. mast*	
			KO, g	KO, %	SZP, g	SZP, %	SZR, g	SZR,%	g	%
C(K)	M	2228	1848	82.96	1728	77.55	1571	70.53	18.80	0.84
	F(Ž)	1908	1591	83.39	1493	78.22	1356	71.07	17.00	0.89
	M+F	2138	1778	83.18	1665	77.89	1514	70.80	17.90	0.84
T1	M	2184	1832	83.87	1706	78.12	1549	70.91	15.20	0.66
	F(Ž)	1860	1548	83.25	1455	78.24	1314	70.62	19.80	1.06
	M+F	2046	1710	83.56	1600	78.18	1448	70.77	16.00	0.78
T2	M	2176	1832	84.18	1707	78.44	1543	70.90	16.60	0.76
	F(Ž)	1792	1478	82.45	1381	77.06	1236	68.96	17.80	0.99
	M+F	1984	1653	83.32	1543	77.75	1387	69.93	17.20	0.87

KO - Processing percentage traditional - *Klasična obrada trupa*
SZP - Processing percentage ready to roast - *Trup spreman za pečenje*
SZR - Processing percentage ready to broil - *Trup spreman za roštilj*

Rapeseed meal in diets had no effect on quality of carcasses. Differences in content of abdominal fat were also minimal except in group T1 where in male chickens lower content of fat in carcasses was established compared to other groups of chickens.

CONCLUSION

Based on these studies, it can be concluded that rapeseed meal is feed of high quality which can be used with certain limitations in broiler nutrition. It can be used as substitute for plant protein feeds in different combinations. It can be used in the amount of up to 10% in mixtures without any potential threat of serious depression in regard to production traits of broiler chickens, or negative consequences on health condition of chickens. Recommendation to farmers is to use this feed in nutrition of broiler chickens, because by introduction of this feed into diets other more expensive feeds can be substituted, primarily soybean meal, and this will reduce the cost of complete mixtures and increase the profitability of the poultry meat production.

REFERENCES

CANOLA CONCIL of CANADA.: Canola Meal, Canola Meal Feed Industry Guide. Nutrient composition, www. canola-concil. org/meal4.html. 2005.
DONALD, B. and BASSIN, P.: Rapeseed and Crambe, Alternative crops with potencial industrial uses. Agricultural Exp. Station, Kansas, USA, Bulletin 656, 1990.
GHEORGHE, A., CIURESCU, G., MOLDOVAN, I.: Productive effect of replacing the dietary soybean meal by various levels of rapeseed meal in broiler diets supplemented with enzyme preparations. Archiva Zootechnica, 8:107, 2005.
JOKIĆ Ž., S. KOVČIN, JOKSIMOVIĆ-TODOROVIĆ, M.: Ishrana živine. Univerzitet u Beogradu, Beograd, 2004.

KARUNAJEEWA, H., IJAGBUJI, E. G., REECE, R. L.: Effect of dietary levels of rapeseed meal and polyethylene glycol on the performance of male broiler chickens. British Poultry Science, 31(3)545-555, 1990.
KRALIK G., ŠKRTIĆ, Z., KUŠEC, G. KADLEC J.: The influence of rape seed/oil on the quality of chicken karakas. Czech. J. Anim. Sci., 48:77-84, 2003.
LUKIĆ, M., PAVLOVSKI, Z., ŠKRBIĆ, Z.: Savremeni aspekti ishrane živine. 18. Savetovanje živinara, Živinarstvo, 44(9)15-26, 2009.
MILOŠEVIĆ, N., STANAĆEV, V., KOVČIN, S., FILIPOVIĆ, S., STRUGAR, V.: Ekstrudirana sačma uljane repice u ishrani brojlerskih pilića. PTEP, 9(5)115- 117, 2005.
MILOŠEVIĆ, N., STANAĆEV, V., PERIĆ L. AND KOVČIN, S.: The effect of rapeseed meal in the feed of broiler chickens, 16th European Symposium on Poultry Nutrition. Strasbourg, France: WPSA, CD-Rom, ID P0118, 24-28, str. 201- 204, August, 2007.
MILOŠEVIĆ, N., STANAĆEV, V.,PERIĆ, L., KOVČIN, S., ŽIKIĆ, D.: The effect of rapeseed meal in feed of broiler chickens. 1st Mediterranean Summit of WPSA, Thessaloniki, Greece: University studio press, 7-10. May, str. 883- 887, 2008.
MUNOZ-VALENZUELA, S., BUZA, G. and Avalos-Perez, R.: Performance of canola in Southern Sonora, Mexico, p. 131-134. in Janick J., and A. Whipkey (eds.). Trends in new crops and new uses. ASHS Press, Alexandria, VA. 2002.
NEWKRIK, R.W. and CLASSEN. H.L.: The effects of standard oil extraction and processing on the nutritional value of canola meal of broiler chickens. Poult. Sci., 79(supl. 1)10, 1999.
SLOMINSKI, B.A., SIMBAYA, J., SLINGER, S.J.: Nutritive value of broilers of meals derived from newly developed varieties of yellow seeded canola. Anim. Feed Sci. Tehnol., 78:249-262, 1978.
SOVERO, M.: Rapeseed, a new oil crop for United States. p. 302-307. Janick J. and J.E. Simon (eds.), Mew crops. Wily, New York. 1993.
STANAĆEV, V., KOVČIN, S., FURMAN, T., NIKOLIĆ, R., SAVIN, L., TOMIĆ, M.: Hemijski sastav i hranljiva vrednost domaće sačme uljane repice. Traktori i pogonske mašine, 7(2)80-83, 2002.
STANAĆEV, V., KOVČIN, S., FILIPOVIĆ, S., MILOŠEVIĆ, N., BOŽIĆ, A.: Efekat sačme uljane repice u ishrani tovnih pilića. Savremena poljoprivreda, 55(1-2)212- 217, 2006.
STANAĆEV, V., KOVČIN, S., FILIPOVIĆ, S., MILOŠEVIĆ, N., BOŽIĆ, A., STANAĆEV, V.: Ekstrudirano zrno uljane repice u ishrani tovnih pilića. Savremena poljoprivreda, 56(1-2)69-74, 2007.
STRAKOVÁ, E., ŠERMAN, V., SUCHÝ, P., MAS, N., VEŽEREK, V.: Razlike u sadržaju hranjivih tvari u različitim sortama uljane repice. Krmiva, 50(4)215-224, 2008.
TADELLE, D., ALEMU, Y., MOGES, H. M., FASIL, K.: Effect of level of rapeseed (*Brassica carinata*) cake in rations on broiler performance. Livestock Research for Rural Development, 4:15, 2003.
ZEB, A., SATTAR, A., SHAH, A. B., BIBI, N., and TER MEULEN, U.: Effects of feeding increased levels of heat processed rapeseed meal on performance of broiler chicks. Archiv für Geflügelkunde, 66(4)158-163, 2002.

NUTRITIVNA VREDNOST SAČME ULJANE REPICE U ISHRANI BROJLERSKIH PILIĆA

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Izvod

U radu su prikazani rezultati nutritivne vrednosti sačme uljane repice na proizvodne parametre tovnih pilića. Ispitivanje je izvedeno na pilićima Ross 308 hibrida u trajanju od 42 dana. Kontrolna grupa pilića (gupa 1) hranjena je standardnom smešom (starter, grover i finišer) na bazi kukuruza, sojine sačme i sojinog griza kao osnovnih hraniva. Udeo sačme uljane repice u obrocima oglednih pilića bio je 10% (grupa 2) i 15% (grupa 3). Rezultati su pokazali da je kontrolna grupa pilića ostvarila završnu telesnu masu 2.250 kg, dok je grupa 2 imala telesnu masu 2.243 kg, a grupa 3, je bila najlošija sa 2.181 kg. Konverzija hrane je bila ujednačena kod sve tri grupe pilića (1-1.864; 2-1.880; 3-1.861). Mortalitet je bio 3.16% kod kontrolne grupe, 3.13% kod grupe 2 i 7.16% kod grupe 3. Proizvodni indeks je imao vrednost 270 kod grupe 1, 268 kod grupe 2 i 251 kod grupe 3. Razlike po svim ispitivanim parametrima, osim po vrednosti konverzije hrane između grupe 3 i ostalih grupa su bile statistički značajne ($P<0.05$). Pokazalo se da učešće sačme uljane repice od 15% u obrocima depresivno deluje na proizvodne parametre pilića i da njeno uključivanje u većem procentu može imati negativnog uticaja na uspeh tova brojlerskih pilića.

Ključne reči: sačma uljane repice, brojleri, proizvodne osobine.

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