KRMIVA

BREWERS YEAST IN BROILER FEED MIXTURES AS A SUBSTITUTION FOR FISH MEAL

UPOTREBA PIVSKOG KVASCA U KRMNIM SMJESAMA ZA PILIĆE U TOVU

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SUMMARY

The influence of brewers yeast on production results was investigated on 162 Ross 308 broilers Chickens were divided according to sex and according to protein source in feed. Control groups were fed commercial feed mixtures containing fish meal, soybean meal and sunflower meal in starter and soybean meal and sunflower meal in finisher. Experimental groups were fed commercial feed mixtures containing brewers yeast, soybean meal and sunflower meal in starter and finisher as a protein source. Body mass, body mass gain, feed conversion ratio, health status, mortality and carcass characteristics were investigated during 42 days of the experiment. Results showed that there were no significant differences between control and experimental group of the same sex. We concluded that brewers yeast could replace protein of animal origin in feed mixtures for fattening chickens.

Keywords: fattening chickens, production results, fish meal, brewers yeast

INTRODUCTION

The best sources of high quality proteins are feeds of animal origin whose quality significantly influences industrial meat production, especially the meat of poultry and pigs. However, occurrence of bovine spongiform encephalopathy has led to restrictions in the use of some feeds of animal origin (meat meal, meat-bone meal and bone meal), which tightened the selection of protein feeds of animal origin suitable for animal feeding to fish meal, milk and milk byproducts. According to research to this date, milk and milk byproducts, are not suitable for feeding poultry, leaving only fish meal as a protein feed of animal origin. Besides exceptional characteristics (amount and quality of protein, mineral composition, B-complex vitamins, good balance of unsaturated fatty acids) fish meal has its downsides. It has a negative effect on the smell of

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eggs and poultry meat products, it can be infected with salmonella, during improper storage the protein can degrade to toxic substances (histamine, cadaverine, putrescine, gizerozine) that can cause health problems in poultry (erosion and ulceration of digestive tract lining, intoxication) and people that consume the meat of such poultry.

The high price of fish meal (mostly imported) and other negative characteristics have imposed a need for alternative protein sources that will successfully replace protein sources of animal origin in poultry feed mixtures. Due to this fact, numerous trials have been conducted on a number of currently used plant protein sources such as sunflower meal (Šerman et al., 1996), soybean meal (Aziz et al., 2001), commercial feed additives “Protein gold” (Mikulec et al.,) and yeast as a single—cell protein source (Daghir and Abdul-Baki, 1977). Commercial yeast additive “Yea-Sacc” was incorporated into the diet of lactating cows (Huber et al., 1989). Effects of Yea-Sacc supplementation on reproduction and health of cows were not significantly different from controls. Two recent trials have been conducted to examine the response of growing pigs to the yeast culture (Harker, 1989). Both trials showed marked responses ($P<0,05$) in terms of feed intake and growth rate to yeast.

Brewers yeast (Saccharomyces) is a feed with those qualities. It is a byproduct of beer industry that pollutes the environment. Inactivated and dried brewers yeast contains a significant amount of good quality protein. It possesses a large amount of B-complex vitamins (except B_{12}), NFE is mostly glycogen, and the energy content ranges between 1.1 and 1.25 HJ/kg (feed unit per kg). The aim of our investigation was to determine the effect of including dried brewers yeast in feed mixtures on production results of fattening chickens.

MATERIAL AND METHODS

The investigation was performed on 162 sexed (81 male and 81 female) Ross 308 broilers (Veterinary station Đakovo hatchery). One-day-old chickens were divided according to sex into control and experimental groups with control groups numbering 40 and experimental groups 41 chickens. Fattening period lasted for 42 days and animals were kept on the floor (experimental facilities of the Department of animal nutrition). Animals were kept in the controlled zoohygienic environment (temperature, light, and moisture) and were fed ad libitum. In the first 21 days of the experiment chickens were fed starter feed mixture with 22% of crude protein. In the second half of the fattening period the chickens were fed finisher feed mixture with 18% of crude protein.

Starter and finisher nutritive values are presented in table 1.

Tablica 1. Hranidbene vrijednosti krmnih smjesa
Table 1. Nutritional value of feed mixtures

Kemijski sastav %	Početna krmna smjesa - Starter		Završna krmna smjesa - Finisher	
Chemical composition %	K	P	K	P
Sir. bjelančevine - Crude protein	22,12	23,12	18,38	18,49
Pepeo - Ash	6,46	6,29	6,33	7,03
Kalcij - Calcium	1,04	0,99	1,03	1,01
Fosfor - Phosphorus	0,67	0,69	0,58	0,60
Natrij - Sodium	0,20	0,20	0,20	0,20
Sirova vlaknina - Crude fiber	3,74	3,12	4,99	3,63
Sirova mast - Crude fat	4,72	5,76	4,26	5,27
ME (kJ-kg)	12,05	12,11	12,52	12,61

Tablica 2. Sirovinski sastav krmnih smjesa
Table 2. Composition of feed mixtures

Krmiva % Feedstuffs %	Početna krmna smjesa - Starter		Završna krmna smjesa - Finisher	
	K	P	K	P
Kukuruz - Corn	55,00	50,50	61,00	61,80
Sojina sačma - Soybean meal	28,50	33,00	22,00	19,20
Suncokretova sačma - Sunflower meal	-	-	2,00	2,50
Lucerna - Alfalfa meal	2,00	-	5,00	-
Kukuruzni gluten - Corn gluten meal	4,00	-	3,00	-
Riblje brašno - Fish meal	3,50	-	-	-
Kvasac - Yeast	-	7,00	-	7,00
Ulje - Oil	2,00	4,50	2,00	4,50
Predmješavina - Premix	5,00	5,00	5,00	5,00

The difference between control and experimental groups was in the protein source (Table 2). Protein sources in starter of the control groups were fish meal, sunflower meal and soybean meal while protein sources in finisher were sunflower meal and soybean meal. As basic protein feed the experimental groups had dried brewers yeast, soybean meal and sunflower meal in starter and finisher rations. All feed mixtures were produced in the Veterinary station Đakovo feed factory.

RESULTS AND DISCUSSION

Average body mass of female chickens in control and experimental group on day one of the trial was 41.08 g and 41.51 g respectively. Male chickens in the control and experimental group had an average body mass of 42.32 g and 41.71 g respectively. Differences in the body mass of chickens were not statistically significant (P<0.05).

At the end of fattening period the average body mass of female chickens in the control and experimental groups was 2024.85 g and 1975.90 g respectively. Average body mass of male chickens in the control and experimental groups was 2196.17 g and 2207.75 g respectively. Differences between the values obtained were not statistically significant (P<0.05).

Overall feed conversion ratio of female chickens in the control and experimental groups was 2.14 kg/kg and 1.94 kg/kg respectively. Male chickens of the control groups consumed 2.08 kg of food for 1 kg of gain and the experimental groups consumed 1.90 kg of food for 1 kg of gain. The differences proved to be statistically significant in male and female birds (P<0.05).

Similar results were recorded by Mikulec et al. (2003) in the trial where fish meal was replaced with a commercial product "Protein gold" (plant protein of balanced amino acid composition) in the diet of fattening chickens. After a fattening period of 42 days the body mass of the control and experimental groups was similar, while the feed conversion ratio was better in the experimental group. In the trial of Mikulec et al. (2004) fish meal was replaced with soybean and sunflower meal in the feed mixtures for fattening chickens. One experimental group received only soybean meal in starter and finisher rations, while the other group received soybean meal in the starter and sunflower meal in the finisher. After 42 days the results showed that neither alternative protein source could entirely replace fish meal in feed mixtures, especially sunflower meal. The group receiving sunflower meal recorded significantly (P<0,05) lower production results than the control group.

At the end of our investigation the breast and drumstick mass was measured for the control and

experimental group. Average breast mass of male chicks was 434.80 g and 526.25 g in the control and experimental group respectively. Average breast mass of female chicks in the control and experimental group was 404.50 and 472.78 respectively. While there was a difference in breast mass between the male control and experimental group ($P<0.05$) the female groups did not show statistically significant difference ($P>0.05$). Drumstick mass of male and female chickens in the experimental groups was slightly higher compared to the drumstick mass of control groups but the difference was not significant.

Possibility of replacing fish meal with corn gluten in fattening chickens was investigated by Babidis et al. 2002. Use of gluten as a protein feed in fattening chickens did not result in significant differences ($P>0.05$) in body mass and feed conversion ratio in comparison to the chicks fed feed mixture containing fish meal. However, the carcass yield was slightly better in the experimental group, although the differences were not statistically significant ($P>0.05$). Similar results were published by Aziz et al. (2001). Fish meal in feed mixtures for fattening chickens was partially (25, 50 and 75%) or totally replaced by soybean meal and the results acquired showed no statistical difference.

During the entire trial period there were no sick or dead chickens in the control and experimental group. That is due to the good microclimatic conditions, feeding regime and the manipulation of the birds corresponded to the Ross 308 broiler chick recommendations. Health status of the chickens was not challenged during the entire trial period. There is data in the literature (Kalivoda, 1990) suggesting that dried brewers yeast contains substantial quantities of purine nitrogen and that feeding large quantities of yeast increases the cases of uricosis in poultry. The deficit of vitamin E, selenium, metionine and cystine in yeast can cause liver necrosis. In the investigation performed by Mikulec et al. (2003) there was also no mortality which authors explain as good genetics and housing in appropriate conditions.

By reviewing the results of our investigation we can conclude that brewers yeast successfully replaced fish meal in feed mixtures for fattening chickens. However, further research is needed to determine what quantities of yeast, added to the starter and finisher, provide optimal health status, maintain good production results and ensure adequate meat quality.

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SAŽETAK

Istražena je upotreba pivskog kvasca kao bjelančevinastog krmiva u hranidbi muških i ženskih pilića u tovu. Istraživanje je provedeno na 12 tovna hibrida linije Ross 08. Pilići su bili podijeljeni po spolu i po vrsti hrane, odnosno bjelančevinastog dijela hrane, na kontrolne i pokusne skupine. Pokusne skupine su hranjene smjesama koje su kao izvor bjelančevina sadržavale pivski kvasac, a kontrolne skupine hranjene su uobičajenim smjesama koje su sadržavale riblje brašno (ali samo u početnoj smjesi za tov) kao izvor bjelančevine.

Tijekom 42 dana pokusa pilići su hranjeni po volji i držani su u kontroliranim zoohigijenskim uvjetima. Pored razlike u podrijetlu bjelančevina smjese su bile podjednake po sadržaju bjelančevina, energije i ostalih komponenti. Praćeni su prirasti tjelesne mase, utrošak hrane, zdravlje i mortalitet pilića. Rezultati istraživanja su pokazali da nema statistički značajnih razlika ($P>0,05$) između pokusne i kontrolne skupine istoga spola. Ovakvi rezultati nam govore u prilog zaključku da se bjelančevine životinjskog podrijetla uspješno mogu zamijeniti bjelančevinama pivskog kvasca.

Ključne riječi: tovni pilići, proizvodni rezultati, riblje brašno, pivski kvasac