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EFFECT OF PROBIOTICS ON PRODUCTION PERFORMANCE AND MEAT QUALITY OF FATTENING CHICKS[1]

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Contents: Trial was conducted at the laboratory of the Faculty of Technology in Novi Sad. The trial involved broiler chicks fed balanced diets with and without probiotic supplementation. The objective of the trial was to examine effects of probiotic supplementation not only on the production performance, but on the quality of poultry meat used in human nutrition.

Probiotic supplemented diets have shown positive effects on performance (weight gain), feed conversion, mortality as well as broiler meat quality. The following parameters were determined by the sensory evaluation methods: juiceness, tenderness, flavour and smell of chicken meat.

Key words: probiotic, production performance of fattening chicks, meat quality.

Introduction

As the result of continuous and growing demands of the professional public and consumers concerning the production of safe and healthy food and with due regard to environmental concerns and quality standards – new additives have been introduced in the broiler nutrition which positively effect poultry meat production and have no adverse impacts whateosever on the human health (*Savković T., 1995*).

From the point of view of healthy and safe food it can be said that the use of probiotics in animal feeds has many benefits and satisfies the basic requirement - exclusion of all additives leading to the occurrence of undesirable residues in the body or their accumulation in excreta, and consequently environmental pollution (*Sinovec Z., 1996*). This is the main and essential feature of the use of probiotics in animal feeding systems (*Sefton, 1988*).

Numerous research studies conducted in recent time have confirmed that dietary supplemented probiotics have positive effect on gain increase, improved feed conversion rate, and reduction in mortality (*Tortuero, 1973; Fuller R., 1997*).

Despite this considerable body of research about the positive effects of probiotics in chicken feeds, there are only few results about their effect on the quality of cooked broiler meat.

Ristić et al. (2000) found significant improvements of meat flavour in broilers fed with probiotics, designed as meat taste- enhancer

For these reasons, the objective of this paper was to examine effect of probitoics on the broiler chicks performance and meat quality.

Materials and methods

A trial conducted at the Faculty of Technology in Novi Sad involved 200 chicks of HYBRO hybrid line assigned in 2 groups (control and trial), with two replicates.

Day-old chicks were weighed at the beginning of the trial and housed in special pens under controlled ambient conditions (temperature, relative humidity and light). Chicks had ad libitum access to feed and water. Chicks received identical iso-protein and iso-energy diets without (control group) and with (trial group) probiotic supplementation. Probiotic «Probios» produced by the company Hansen Bio System from Denmark was included in the trial diets at 1 kg/1000 kg of feed.

The trial lasted 42 days (two 21-day periods). The first three weeks chicks were fed starter diets and then finisher diets until the end of the trial. Composition of trial diets is given in table 1.

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Table 1. Composition of experimental diets

Group	I	II
Additive	Control	Probiotic
Concentration		%
Maize	57,9	57,9
Soybean meal	30	30
Fish meal	6	6
Fat	2,85	2,85
Dicalcium Phosphate	1	1
Limestone	0,95	0,95
Salt	0,3	0,3
Premix	1	1
Probiotic	-	+
Total	100,00	100,00
Crude Protein	22,25	22,25
Metabolisable energy (MJ/kg)	12,25	12,26
M.E. (Kcal/kg)	3003	3003

\+ Supplemented Probiotic
K) Control mixture
E) Experimental mixture

Chickens were weighed individually at the beginning of the trial (at day 1), and at the end of the trial (at day 42). Feed intake was determined once a week. Weight gain, feed conversion and health status of the chickens were analyzed during the trial. At the end of the trial cooked breast meat was evaluated by the Sensory analysis. Sensory quality evaluation was performed using modified analytical descriptive scoring system.

Sensory evaluation of raw chicken meat quality included scoring of colour, texture, flavour and overall appearance (Table 2).

*Table 2. Sensory evaluation system of **raw** meat quality*

Score	EVALUATED TRAITS			
	Colour	Texture	Flavour	Overall appearance
1,0	Pale yellow-grey	Coarse fibers and bundles	Insufficiently expressed	Acceptable
2,0	Moderate yellow-grey	Medium fibers and bundles	Satisfying, acceptable	Satisfactory
3,0	Pale yellow-pink	Moderate fine fibers and bundles	Moderately expressed, characteristic	Good
4,0	Moderate yellow-pink	Fine fibers and bundles	Pleasant, characteristic	Very good
5,0	Yellowish pinky	Very fine	Optimally pleasant	Excellent

Sensory evaluation of cooked chicken meat quality included scoring of colour, texture, tenderness, juiceness, aroma and flavour (Table 3)

*Table 3. Sensory evaluation system of processed- **cooked** meat quality*

Score	EVALUATED TRAITS				
	Colour	Juiceness	Tenderness	Flavour	Overall appearance
1,0	Pale dark-grey	Dry	Firm	Pleasant enough	Acceptable
2,0	Moderate dark-grey	Moderate dry	Moderate firm	Satisfactory pleasant	Satisfactory
3,0	Brownish-pink	Moderate juicy	Moderate soft	Pleasant-good	Good
4,0	Moderate uniform brown-pink	Juicy	Soft	Very pleasant	Very good
5,0	Optimally uniform brown-pink	Very juicy	Very soft	Excellent	Excellent

Selected quality attributes (colour, texture, juiceness, tenderness, overall apperance) were evaluated by three experienced panel testers, employed at the Faculty of Technology in Novi Sad.

Results and discussion

Average resulting data on weight gain, feed conversion ratio and mortality during the tested period (day 1-42) are given in table 4.

Dietary supplementation of probiotics significantly influenced growth performance in studied chickens. Weight gain during the first three-week period when chicks were fed starter diets ranged from 681 g in control group to 723 g in experimental group.

Body weight of chickens fed probiotic supplemented diets was improved for 6,9% in relation to control group. Observed differences in body weight during this period are statistically significant.

With regard to the second feeding period during which chicks received finisher diets, significant differences were also found between treatments.

At the six weeks of age the lowest body weight of 1902 g was recorded in the birds from control group. Recorded body weight in the trial group, on the other hand, was 2 213 g, or 16,35% more as compared to control group.

Significant differences between the treatments were found for feed conversion and mortality, too. Birds from the probiotic supplemented group had for 15% lower feed intake for a kilo of weight gain in relation to control group.

Mortality rate was lower in trial group than in control group; 1,41% and 2,85%, respectively.

Similar results were obtained by *Nassif (1990*) who reported that probiotic supplemented diets have positive effect of on the immune status, optimize gastrointestinal microflora, improve and maintain animal health and positively influence broiler chicks performance. *Ramadan and Nekal (1988/89)* also reported that probitoic under name ASCOGEN - supplemented to the finisher diets had significant effect on the weight gain.

Mordenti (1986) documented positive effects of probiotics in monogastric animals in terms of increased yield up to 12% and feed conversion for about 10%.

Ivković S. (1999), Softić (2003) confirmed positive effects of probiotic-supplemented diets, from promoting growth and health status to providing safer and healthier final product of improved quality.

The results of fresh meat sensory traits: colour, flavour and texture of fresh breast meat cuts during age process are shown in table 5. Based on the obtained results, it can be concluded that the fresh meat was assigned the highest scores at day 1 and 21, with somewhat lower score at day 115.

As regards the results obtained after breast meat heat treatment, i.e cooking, it can be concluded (table 6) that fresh meat changed colour after cooking, while aging process had no significant affect on cooked meat colour. Control (C) group was assigned the highest number of scores for texture, however, trial (P_1) group was right behind it.

Trial (P_1) group received the highest grade for breast meat juiceness and tenderness, whereas flavour and smell in both groups were determined as pleasant and characteristic. At day 115 of aging process, flavour and smell were assigned much lower grades, being described as a little uncharacteristic.

Table 4. Bodyweight gain, feed conversion and mortality of fattening chicks (period: 1-42 days)

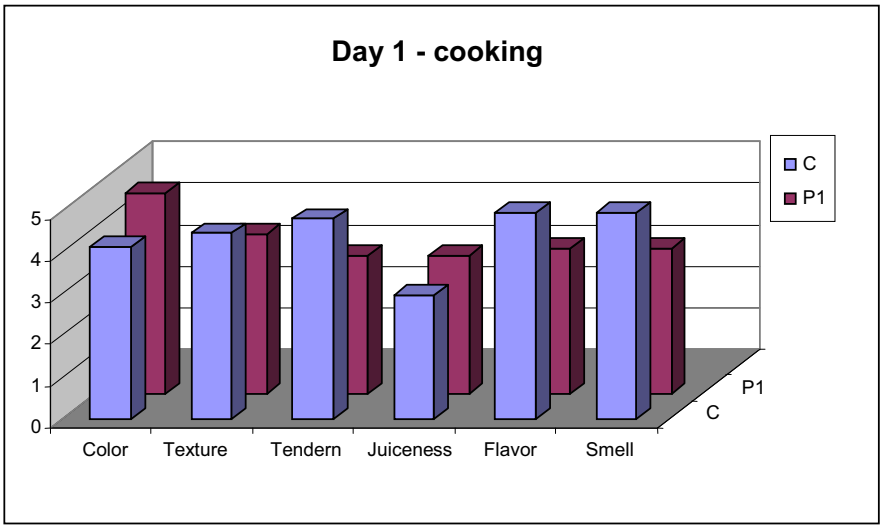
Groups	Control	Experimental
Initial live weight (g)	46	45
Live weight at 42 days (g)	1 902	2 213
Feed conversion(kg/kg)	2,140	1,719
Mortality (%)	2,85	1,41

Table 5. Mean score for sensory traits of raw breast meat

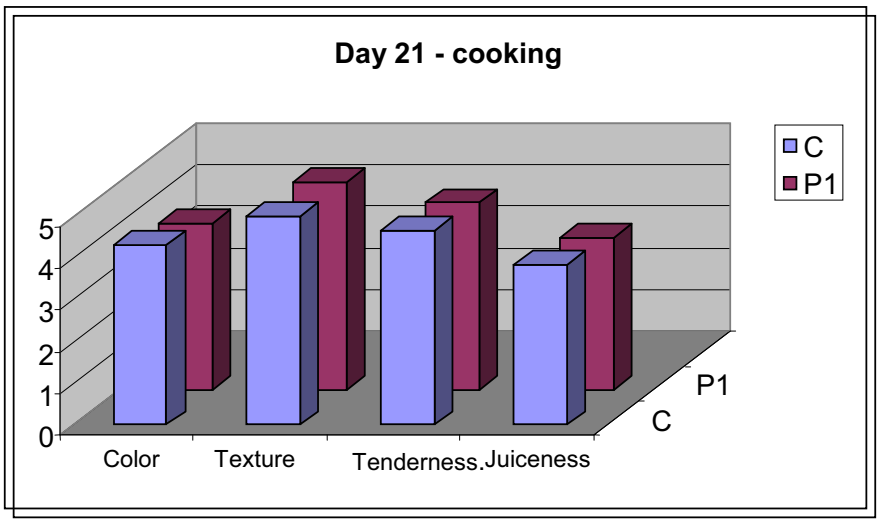
Analyzed traits	Measured post mortem					
	Day 1		Day 21		Day 115	
	C	P_1	C	P_1	C	P_1
Colour	5,0	4,5	4,5	3,5	4,0	3,0
Flavour	5,0	3,0	4,0	4,0	4,0	3,5
Texture	5,0	5,0	5,0	5,0	5,0	5,0

Table 6. Mean score for sensory traits of cooked breast meat

Analyzed traits	Time post mortem					
	Day 1		Day 21		Day 115	
	C	P_1	C	P_1	C	P_1
Colour	4,16	4,85	4,33	4,0	4,5	4,5
Texture	4,50	3,83	5,0	5,0	4,0	4,5
Tenderness	4,85	3,33	4,66	4,5	5,0	4,8
Juiceness	3,0	3,33	3,83	3,66	4,0	4,5
Smell	5,0	3,5	Characteristic, pleasant		A little uncharacteristic	
Flavour	5,0	3,5	Characteristic, pleasant		A little uncharacteristic	



*Graph 1. Mean sensory score for breast meat **cooked** at day 1*



*Graph 2. Mean sensory score for breast meat **cooked** at day 21*

Conclusion

Based on the studied nutritional, health and cooking properties of the fattening chicks, the following may be concluded

- Probiotic supplemented diets have been shown to increase growth performance at considerable saving in feed costs per a kilo of weight gain;
- Sensory analysis of cooked meat have shown improved juiceness and tenderness in the group receiving probiotic-supplemented diets;
- Probiotics use in broiler feeds have been shown to provide final product of better taste, improved cooking characteristics and safer and healthier for the consumer.

UTICAJ PROBIOTIKA NA PROIZVODNE PERFORMANSE TOVA I KVALITET TAKO DOBIJENOG MESA

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Rezime

Ogled izveden u biološkoj laboratoriji na Tehnološkom fakultetu u Novom Sadu. U ogledu su korišteni tovni pilići. Ispitivan je uticaj probiotika, ne samo na proizvodne performanse tova, nego i uticaj probiotika na kvalitet pilećeg mesa kao finalnog proizvoda koji se koristi u ishrani ljudi. Pilići su hranjeni izbalansiranim obrocima sa i bez dodatka probiotika.

Dodatak aditiva u smešama za tov pilića, pozitivno je uticao osim na proizvodne performanse (prirast telesne mase) konverzije hrane i mortalitet i na performanse kvaliteta mesa. Metodama senzorne analize su određena sledeća svojstva: sočnost, nežnost, miris i ukusu pilećeg mesa proizvedenog uz dodatak probiotika.

Ključne reči: probiotik, proizvodne performanse tova, kvaliteta pilećeg mesa.

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