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PROBIOTIC INFLUENCE ON ACID NUMBER, ACID DEGREE AND FATTY ACID CONTENT IN CHICKEN ABDOMINAL FATTY TISSUE[1]

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Contents: In our work we were examined influence of different probiotics on acid number, acid degree and content of fatty acids (oleic acid, lauric acid and ricinol acid) in abdominal faty tissue of slaughter chiken. We used for experiment 250 one day-old chicken Arbor Acres provenance, both sexes, divided into five groups, 50 units in each . Broilers were feeding with complete mixtures for chicken nutrition in fattening, standard row and chemical ingredients.

Control group of chicken were feeding with mixtures without probiotic, whilst experimental groups gets food with supplements of different probiotics. Demands parameters we were defined by JUS E.K8 standards. Acid number in control group was 1,082, in first sample group 1, 09, in second 0, 96, in a third 1, 14 and in a fourth 1, 33. Acid degree in control group was 1,47, in first sample group 2,01, in second 1,01, , in a third 1,47, and in a fourth 2,42. Percent of oleic acid in control group was 0,41, in first sample group 0,56, in second 0,50, in a third 0,54, and in a fourth 0,68. Percent of linoleic acid in control group was 0,30, in first sample group 0,41, in second 0,35, in a third 0,40, and in a fourth 0,49. Percent of ricinol acid in control group was 0,44, in first sample group 0,60, in second 0,52, in a third 0,56, and in a fourth 0,71. Given results indicates that probiotics in chicken nutrition affects on acid number, acid degree and on a percent of oleic acid, linoleic acid and ricinol acid.

Key words: abdominal fatty tissue, probiotics, acid number, acid degree, fatty acids, chicken

Introduction

Because of its composition chicken meat, especially amount of highly valued proteins and essential amino acids, fats and essential fatty acids, vitamins and minerals represent high quality and concentrated food and takes very important place in human diet. This kind of food, because of low fat content, especially meat from fattening poultry is easy welding and does not influence on human body weight (*Bakošev et al.,1985, Kralik et al., 1983)*.

Chicken meat production takes more attention because it is faster and chipper in comparison with other kinds of meat (pork and beef meat), there is no opposite religious and cultural aspects of consuming, has got sensor atractive quality, positive healthy aspect (chicken meat has low content of fats and high content of proteins) and has very popular price.

Chicken meat consumption worlwide will increase because of above mentioned reasons and because it is necessery that this production will be more safety for the human health and more economical.

One way for more safety and cheap production of chicken meat is usage of probiotics (*Ivanović S. 2003*).

First definition of probiotics was that they are organisms and supstances which contribute to equilibrium of interstinal microbial flora, respectively eubiosis (*Sperti, 1971*). Nowadays definition is that they are live organisms which are supplements to feed and produce benefits for animals in retainig of eubiosis (*Bilgilli, 1995, Clemmesen, 1989*).

Probiotics represent possibility of choise for growth stimulation using physiological potentials and metabolism of the animal. Usage of probiotics realise common efects as antibiotics but we avoid possible undesirable efects (residues, carence, rezistence, alergies, genotoxicity etc.) (*Collington, 1990*). Importance of usage desirable type of microorganizm as growth stimulator is based on simple fact that only healthy animal organizm can completly express genetic potential of production characteristics (*Sinovec and Šefković,1996, Sinovec and Šefković, 1998*).

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Present research allover the world mainly included on affect of probiotcs on poultry growth, but nobody investigated some other parameters of meat quality. There is one work that we can mentioned here is work of *Schreurs, 1999*. This author added cultures of bacteria Bacillus to fattened chickens in amount of 0,05% and had got 2,20% better daily growth in first period of fattening relating to control group. Feed conversion was better 3,10% in first period of fattening. With equial meat radmans (68%) in experimental group was 29, 10% less fat in cutted chicken bodies relating to control group.

Aim of our work was to investigate effects of probiotics on some chicken meat quality parameters.

Materials and methods

For our investigation we organized chicken feeding in group-control system experiment (five groups with 50 units each). Keeping, diet type and water suppling of control and experimental groups were identical. Feeding was performed with complet mixtures for chicken in fattening with standard feed content. Control group was fed with mixture cleared from probiotics. Experimental group I had got during the feeding period comercial probiotic with four cultures of bacteria (Lb. acidophilus, Lb. casei, Lb. plantarum and Str. faecium), II group had got probiotic with Streptococcus faecium-cernelle soy 68, III group probiotic which had live sporas of Bacillus cereus IP 5832 , and IV experimental group had got probiotic which content cultures of Bacillus Lichiniformis and Bacillus subtilis. Duration of chicken growning was 42 days. For investigation of acid degree, acid number and content of fatty acids we took 10 samples of abdominal fatty tissue of chickens from each group.

Content of acid degree, acid number and fatty acids we determined in agree with standard JUS ISO 1443:1991 (1).

Results and discussions

From table 1. we can see that the lowest acid number of abdominal fatty tissue was in chickens from first group and it was 0,82±0,05, while the highest was in chickens from fifth group and it was 1,33±0,12.

Table 1. Mean value of acid number in abdominal fatty tissue

Group number [(a)]	M	Sd	Se	Cv	Iv
1	0,82	0,05	0,02	0,06	0,75-0,88
2	1,09	0,09	0,03	0,09	0,95-1,25
3	0,96	0,13	0,05	0,14	0,75-1,21
4	1,14	0,08	0,03	0,07	1,00-1,28
5	1,33	0,12	0,04	0,09	1,15-1,48

Greatly significant statistical difference ($p<0,001$) of value of acid number in abdominal fatty tissue we found between chickens from first and fifth group, as well as between fourth and first group of chickens. Second and first group. Between second and first group of chickens was very significant statistical difference ($p<0,01$), while between other comparative groups we didn't find any significant statistical difference ($p>0,05$).

Average value of acid degree in abdominal fatty tissue was the lowest in chickens from first group (1,47+0,05), and the highest was in chickens from fifth group (2,42±0,20)(Table 2).

Table 2. Mean value of acid degree in abdominal fatty tissue

Group number [(a)]	M	Sd	Se	Cv	Iv
1	1,47	0,05	0,02	0,04	1,38-1,52
2	2,01	0,14	0,05	0,07	1,75-2,08
3	1,74	0,10	0,04	0,06	1,54-1,91
4	1,95	0,15	0,06	0,08	1,75-2,25
5	2,42	0,20	0,07	0,08	2,10-2,80

Greatly significant statistical difference ($p<0,001$) of average amount of acid degree in abdominal fatty tissue was between chickens from first and fifth group, as well as between first and third; fourth and first; second and first group. Between chickens from third and first group was very significant statistical difference ($p<0,01$), while between first and fourth group of chickens was significant statistical difference ($p<0,05$). Between other comparative groups were no statistical significant difference ($p>0,05$).

From table 3. we can see that the lowest average content of oleic acid was in abdominal fatty tissue of chickens from first group (0,41+0,03%), and the highest was in chickens from fifth group (0,68±0,03%).

Table 3. Mean value of oleic acid ($C_{17}H_{33}COOH$) in abdominal fatty tissue (in %)

Group number [(a)]	M	Sd	Se	Cv	Iv
1	0,41	0,03	0,01	0,08	0,35-0,46
2	0,56	0,04	0,01	0,07	0,50-0,62
3	0,50	0,03	0,01	0,05	0,47-0,55
4	0,54	0,04	0,02	0,07	0,49-0,61
5	0,68	0,03	0,01	0,05	0,63-0,74

Greatly significant statistical difference ($p<0,001$) of average amount of oleic acid in abdominal fatty tissue was between chickens from first and fifth group, as well as between first and third group, while between fourth and first group and second and first group was very significant statistical difference ($p<0,01$). Between first and fourth group, first and second , and third and first group of chickens was significant statistical difference ($p<0,05$). Between other comparative groups were no statistical significant difference ($p>0,05$).

The lowest average content of lauric acid was in abdominal fatty tissue of chickens from first group and it was 0,30+0,02 %, and the highest was in abdominal fatty tissue of chickens from fifth group and it was 0,49+0,03 % (Table 4).

Table 4. Mean value of lauric acid ($C_{11}H_{23}COOH$) in abdominal fatty tissue (in%)

Group number [(a)]	M	Sd	Se	Cv	Iv
1	0,30	0,02	0,01	0,08	0,27-0,35
2	0,41	0,03	0,01	0,07	0,37-0,46
3	0,35	0,03	0,01	0,08	0,30-0,39
4	0,40	0,02	0,01	0,06	0,35-0,42
5	0,49	0,03	0,01	0,07	0,44-0,55

There was greatly significant statistical difference ($p<0,001$) of average amount of lauric acid in abdominal fatty tissue between chickens from first and fifth groupe, while between first and third; first and fourth; second and first group was very significant statistical difference ($p<0,01$). Between other comparative groups were no statistical significant difference ($p>0,05$).

The lowest average content of ricinolic acid in abdominal fatty tissue was in first group of chickens and it was 0,44+0,04 %, and the highest was in fifth group of chickens and it was 0,73+0,03 % (Table 5).

Table 5. Mean value of ricinolic acid ($C_{17}H_{31}COOH$) in abdominal fatty tissue (in%)

Group number [(a)]	M	Sd	Se	Cv	Iv
1	0,44	0,04	0,01	0,08	0,39-0,49
2	0,60	0,02	0,01	0,04	0,55-0,63
3	0,52	0,03	0,01	0,05	0,48-0,56
4	0,56	0,04	0,01	0,06	0,52-0,64
5	0,73	0,03	0,01	0,04	0,68-0,78

Greatly significant statistical difference ($p<0,001$) of average amount of ricinolic acid in chicken abdominal fat tissue, we found between fifth and first, fifth and second and fifth and third group. Very significant statistical difference ($p<0,01$) exist also between fifth and fourth group, and significant difference ($p<0,05$) between second and first group and second and third group of chickens. Between the other comparative groups were no significant statistical difference ($p>0,05$).

In accessible literature, we didn't fortify that any author investigate influence of probiotics on acid number, acid degree or fatty acids, so we are not able to compare our results to anybody else.

Conclusions

On this results that we received, we can conclude that acid degree, acid index, and content of oleic, lauric and ricinolic acid in chicken fat tissue is greater in chickens who are fed with probiotics. These investigations are first and they have to be continued. It is obvious that probiotics that are added on feed on chicken meat quality. Maybe we should investigate the ratio of saturated and unsaturated fatty acids in that produced meat as well as their influence to human organism.

UTICAJ *PROBIOTIKA* NA KISELINSKI BROJ, KISELINSKI STEPEN I NA SADRŽAJ MASNIH KISELINA U ABDOMINALNOM MASNOM TKIVU PILIĆA

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Rezime

U našem radu ispitivali smo uticaj različitih probiotika na kiselinski broj, kiselinski stepen i na sadržaj masnih kiselina (oleinske, laurinske i ricinolne) u abdominalnom masnom tkivu zaklanih pilića. Za ogled smo koristili 250 jednodnevnih pilića Arbor Acres provenijence, oba pola, podeljenih u pet grupa od po 50 jedinki. Brojleri su hranjeni potpunim smešama za ishranu pilića u tovu, standardnog sirovinskog i hemijskog sastava. Kontrolna grupa pilića hranjena je smešama bez probiotika, dok su ogledne grupe dobijale hranu sa dodatkom različitih probiotika. Tražene parametre odredili smo po standardima JUS E.K8. Kiselinski broj kod kontrolne grupe bio je 1,082, kod prve ogledne grupe 1,09, kod druge 0,96, kod treće 1,14, kod četvrte 1,33. Kiselinski stepen kod kontrolne grupe bio je 1,47, kod prve ogledne grupe 2,01, kod druge 1,01, kod treće 1,47, kod četvrte 2,42..Procenat oleinske kiseline kod kontrolne grupe bio je 0,41, kod prve ogledne grupe 0,56, kod druge 0,50, kod treće 0,54, kod četvrte 0,68. Procenat laurinske kiseline kod kontrolne grupe bio je 0,30, kod prve ogledne grupe 0,41, kod druge 0,35, kod treće 0,40, kod četvrte 0,49. Procenat ricinolne kiseline kod kontrolne grupe bio je 0,44, kod prve ogledne grupe 0,60, kod druge 0,52, kod treće 0,56, kod četvrte 0,71. Rezultati koje smo dobili ukazuju da su probiotici u ishrani pilića uticali na kiselinski broj, kiselinski stepen i na procenat oleinske, laurinske i ricinolne kiseline.

Ključne reči: abdominalno masno tkivo, probiotici, kiselinski broj, kiselinski stepen, masne kiseline, pilići

References

1. BELTIĆ M. (1994)- Kontrola namirnica, Institut za higijrnu i tehnologiju mesa, Beograd.
2. BAKOŠEV D., BOGDANOVSKI A. i IVANOV V. (1985)- Spravoènik po othrane truda i tehnike bezopasnosti v živinovodstve, Kiev: Urožaj.
3. BILGILLI S.F. (1995)- Competetiveexclusion: the basics. Broiler Industry, nr. 9, p 18-25.
4. CLEMMESEN, J. (1989) - Antitumor effect of Lacobacilli substances: "L.bulgaricus effect". Mol. Biother, nr. 1, p. 279-282.
5. COLLINGTON, K., PARKER, S., ARMRSTRONG, G. (1990) - The Influence of inclusion of either an antibiotic or a probiotic the diet on the development of digestive enzyme activity in the pig. Br. J. Nutr., nr. 64, p 59-70.

6. IVANOVIĆ S. (2003) - Ispitivanje uticaja probiotika na odabrane pokazatelje kvaliteta i higijenske ispravnosti pilećeg mesa. Doktorska disertacija, Fakultet veterinarske medicine, Beograd.
7. KRALIK G., RASTIJA T., RISTIĆ S., LAKTIĆ Z., TURK DJ. (1983) - Kvalitet mesa i standardizacija. Zbornik referata, VII jugoslovensko savetovanje o problemima kvaliteta mesa i standardizacije, Bled, p 63-71, p 89-93, p. 95-105
8. SCHREURS F.J.G. (1999) - Postmodrtem changes in chicken muscle: some key biochemical processes involved in the conversion of muscle to meat. Ph D thesis, University of Wageningen, Wageningen, The Netherlands
9. SINOVEC Z.., ŠEFKOVIĆ N. (1996) Antibiotici-probiotici-prebiotici. VI Simpozijum tehnologije stočne hrane, p. 49-54
10. SINOVEC Z., ŠEFKOVIĆ N. (1998) - Ishrana i ekologija. VIII Simpozijum tehnologije stočne hrane, p.35-46.
11. SPERTI S. (1971) - Probiotics. Avi Publ. Co., West Pint, CT