POSSIBILITIES OF USING "PROTEIN GOLD" PREPARATION AS A FISH MEAL SUBSTITUTE IN FATTENING OF CHICKENS

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SUMMARY

In this study is investigated the effectiveness of protein preparation PROTEIN GOLD as a vegetable alternative for fish meal in mixtures (blends) for fattening of chickens. The investigation was conducted on altogether 120 male chickens of the line Ross 308 divided in control (K) and experimental (P) group. In the course of 42 days of fattening period the chickens were fed *ad libitum* under the controlled zoohyglenic circumstances. The blended fodders (maize, corn , soy-bean meal), used in investigating, were according to the volume of proteins and energy for both group equal. An essential difference represented a fish meal used in starting mixture for K-group in proportion of 3,5% while in starter fodder mixture for the chickens of P-group it had bean substituted by protein preparation PROTEIN GOLD. The fish meal has not bean used in formulation of finisher fodder mixtures for the last three weeks of fattening for not one group of chickens. The accompanied production results (increasing of body mass, feed conversion, mortality rate and slaughter-house's yield) did not maifest among the groups any statistically assential difference (P>0,05), so this contributes to a cconclusion that a fish meal in starter mixtures in fattening of chickens can be effectively substituted for the vegatavle protein preparation PROTEIN GOLD.

INTRODUCTION

The fodders of animal origin have been for many years past udes as sources of pure proteins with a high biologic value in fodder (feed) blends/mixtures for the poultry/fowls. In the meantime, manifestation and the way of expansion of diseases spread at the end of the 20th century all over Europe - herein is in the first place *bovine spongious encephalopathy (BSE)* - changed totally the European Market with raw materials for cattle-food production; this relates particulary to protein fodders. The cattle-food industry after prohibition of using flesh-bone meal concentrated itself toward an intensive use of still allowed animal fodders like fish meal. Fish meal in feeding (foddering) monogastric animals represents a remarkable source of proteins of the first-rate quality with regard to biologic value and digestibility. At the same time, a suitable ratio among unsaturated fatty acids, a high volume of particular minerals (available phosphorus) and vitamins (vit. A, D, B-complex) are for fish meal of specific nutritive importance.

However, the use of fish meal has also its bad points; except undesirable organoleptic effect on animal products herein must be before all understood a possibility of contagiousness (infectiousness) of causes of alimentary infections (catching) diseases like *Salmonellae spp*. The fact should not be forgotten that as fodder, rich with proteins, is perishable, so we should pay attention to storage; otherwise, it comes to decomposition of proteins (decarboxylation of aminoacids) and creation of toxic biogen amines (histamines, putrescines, cadaverines and sim.). The increased quantities of histamines may cause erosion of mucous membrane in gizzards of poultry. But more comprehensive pathologic changes in a sense of ulceration and destruction of mucous layers of mucous membrane in gizzard with consecutive bleeding and bloody vomiting in broiler chickens appear mostly in consequence of activity of very toxic substance ascertained that it arises out of fish meal named gizzerosine (2-amino-9-(4-imidazolyl)-7-asanonic acid) (Okazaki and associates, 1983). Gizerosine arizes from reaction of lysine-amono-group and of free histidine or histamine in causes of overheating fish meal in dehydration prosesses (Masumura and associates, 1981).

But, except manifestation of already mentioned sanitary problems of poultry in reference to use fish meal in cattle-food production should be mentioned public opinion of people as final consumers of animal products, too. During the past 15 years the attention of consumers, scientists and professionals in Europe and the world was mainly concentrated on one segment in animal productiona - it is nutrition. The fear of consumers is a matter-of-course after frequent appearance of many incidents (BSE, dioxine poisoning, numerous cases of salmonellosis) with remarkable common property - the way of expansion of diseases - the cattle-food. It resulted in raising of consciousness in public how the cattle-food production essentially makes a great and important link of chain in food-stuffs industry. Therefore, numerous associations of consumers who repeatedly insist upon exemption of fodders by animal origin in cattle-food production infuluence very much upon production of human food in the world today. For the same reason, the cattle-food productionof today turns to alternative sources of proteins, essentially known from earlier. Before all, this refers to vegetable proteins (Reddy and Eshwariah, 1989; Peter and associates, 2000; Aziz and associates, 2001; Babidis and associates, 2001) as well to those originated from monocellelar organisms (Daghir and Abdul-Baki, 1977; Onifade and Babatunde, 1996).
The news on the market is the appearance of albuminoid preparations which in their structures do not contain the fodders by animal origin, and they are using as a substitute for fish meal. One of such preparations is the examined albuminoid preparation PROTEIN GOLD.

MATERIAL AND METHODS OF PROCEDURES

The investigation was conducted on altogether 120 selected male chickens of hybrids in growing fat of the line Ross 308. The one-day old chickens are divided in two groups (control K and experimental P) by 60 in each one.
During 42 days of fattening period the chickens had been kept in a cage system in trial rooms where the controlled zoohygienic conditions were corresponding to demands of chickens in fattening. Both groups received feed and water *ad libitum*. Within the first three weeks of investigating the starter and the next three weeks the final mixture/blend for chicken fattening had been used.
The raw material structure of fodder blends (mixtures) for control and experimental group differed in choosing of fodders (Table 1) while it is visibly from chemical composition (Table 2) that in quantity and balanced relation of particular nutrients the blends had corresponded to references for this line of chickens. All blends used in investigation were produced in nonpelletized form. As the intention of this investigation was to establish a possibility to substitute fish meal in fodder blends for poultry, an essential difference in choosing of fodders refers to omission of fish meal in starting fodder blend for experimental group (P) of chickens. Instead of it there was used the preparation PROTEIN GOLD (production "Kušić promet" d. o. o. , Sv. Ivan Zelina) in the quantity of 3,00%.
The starter blend (mixture) for the control group (K) was a usual compound with admixed fish meal in quantity of 3,5%. In final fodder blends there was not used fish meal, but in blend for experimental group the preparation PROTEIN GOLD had been subsequently present in the same quantity.
PROTEIN GOLD is an albuminous preparation primarily made up of by-products in food-stuffs industry as well vegetable oils admixtures, minerals and aminoacids. The preparation does not contain proteins of animal origin, so it represents therefore a vegetal alternative to fish meal. The content of nutrients in preparation is shown in Table 3.
Among production parameters the weekly and total weight gain of body mass had been conducted as well total feed conversion rate, mortality and carcass yield (a yield of a slaughter-house; putting to profitable use). The values of conducted production indices received by weekly control of body mass of chickens and daily control in feed expenditure. The carcass yield as well as a mass-share of particular parts of bodyin live mass (live

weight) are destinated for 10 at random selected chickens from each group at the end of fattening period. The carcasses of chickens are treted in accordance with standards of so-called "grill treatment" comprehending a carcass without head, neck, intestines (crop, intestines, liver, heart, milt, gizzard and cloaca) and inferior parts of legs (Živković, 1986).
Both groups of chickens are comprised by common vaccination regime, i. e. on the 21st day they were oculonasally vaccinated against Newcastle disease. Health of chickens had been daily estimated clinically in the course of investigating (tests).
In statistic treatment of averige rates in chicken's weight was applied analysis variance and the data about portions of paricular body parts had been analized by t-test. For statistically important differences had been considered those with $P<0,05$ (Steel and Torrie, 1980).

RESULTS and DISCUSSION

It is visible out of production results (Table 4) that with the regard to body mass (live weight) the chickens of both groups on the first investigation's day were very equalized, (K-41, 38g; P-41,43g).In spite of the fact that the chickens of control group had been fed on fodder blend (mixture) that contained fish meal attained in the course of the first three weeks in fattening period some better results, the differences in values of average body mass (K-671,38 g; P-640,11 g), the gain (K-630 g; P-598,68 g) and conversion (K-1,52 kg/kg; P-1,54 kg/kg) in relation to test-chickens in whose feed the fish meal was substituted for albuminous preparation were not statistically significant ($P>0,05$).
A possibility to substitute fish meal for vegetable fodder in starter mixture for broiler-stuffing had Reddy and Eshwariah (1989) investigated. They succeeded in changing to vegetable albuminous fodders without added lysine and methionine the fish meal to 75% of its share in blend/mixture. There were no statistically significant differences in the second fattening part (stuffing time) (22-42 days) when the chickens in test-group attained better production results (gain 1563,09 g, feed conversion 1,94 kg/kg) in relation to control group (gain 1536,12 g; feed conversion 2,03 kg/kg). The reason for that is the absence of fish meal in compound of finisher feed mixture for the chickens of control group while in feed for test-chickens the albuminous preparation PROTEIN GOLD still remained present in the quantity of 3%. The fish meal is omitted from the final control blend/mixture because of its well-known unfavourable organoleptic effect on the quality of meat.
The albuminous preparation manifested its advantage in relation to this undesirable characteristic of fish meal in a sense of possibility of its illimitable application or use in finisher mixture/blends. The received definite production results from the chickens after the whole fattening period od 42 days demonstrated that the chickens fed with usual fodder blends with a starter containing fish meal as a source of essential aminoacids had acchieved a bigger final body mass (2207,50 g) than the chickens of experimental group (2203,20 g), fed by blends in which the biologic value of proteins had been improved by albuminous preparation. A less total feed expenditure in experimental group
finally resulted in better entire feed conversion on test-chickens (1,83 kg/kg) in relation to the controlled (1,88 kg/kg). The differences in values of final body masses, gains and conversions did not show statistic significance ($P>0,05$).
Such results coincide with the results of investigationconducted by Babidis and associates (2002) in which fish- adn flesh-meal from fodder mixtures for chickens fattening were totally substituted for maize gluten. After 42 days of fattening the substitution of animal fodders for gluten had not any significant effect for controlled production results i. e. for body mass, feed consuming and feed conversion.
Similar observations had published Aziz and associates (2001) on investigations in which 25, 50, 75 and 100% shares of fish meal in mixtures, to stuff the chickens, had been substituted for soy-bean meal. The soy-bean meal was balanced with additive methionine and dicalcium phosphate. The results have shown that a such substitution is able to substitute on the whole fish meal, because there had been in production results no

statistically significant differences. Some of the results of carcass treatment by at random selected chickens from each group are represented (shown) in Table 5. It is clear that the chickens of experimental group attained better values of yield (74,0%) in relation to the controlled (71,9%). At the same time, in an experimental chickens group a greater breast' s share (23,96%) and drumsticks with thighs (21,50%) in live body mass are registered - in relation to control group (22,38% and 21,21%)

Although the differences among the groups are statistically of no importance (P>0,05), it is to mention that the attained results of yield and share of important carcass parts of chicken' s body mase in investigating are better in relation to the values declared for male chickens of the same body mass as well the hybrid line (breast 18,11%, drumsticks with thighs 22,96% and yield 71,22%) (Anonimous, 2002). The attained results with regard to carcass yield (slaughter-house's yield) are congruous with the results of Večerek's and associates investigation (2002) wherein the experts also ascertained a greater rate of carcass yield (slaughter-house's yield) in fattening hybrid' s lines Ross 208 and 308 than those of the declared. In investigating tests in which the fish meal in blenda for chicken's fattening is substituted for gluten (Babidis and associates, 2002) or aminoacids balanced soy-bean meal (Aziz and associates, 2001) a difference in carcass yield was statistically of no importance.

Now, in the end it is necessarily to inform about mortality. As the Table 4 shows in the course of the whole fattening period there had been recorded no carcass. Such a rare phenomenon might be attributed to properly chosen chickens as well to strictly controlled zoohygienic conditionscarried into effect by optimal values in experimental (trial) area. As differences of conducted production-results were statistically of no importance (P>0,05), we might draw a conclusion that an investigated albuminous preparation is able to substitute effectively the fish meal in feed mixtures for chicken's fattening.

The chickens fed with the mixtures in which the albuminous preparation PROTEIN GOLD was intermixed, achieved almost the same weight gain of body mass as the chickens of control group which in starting feed mixture had intermixed fish meal white the application of preparations in mixtures/blends for experimental test-chickens attained better results in values of feed-conversion. At the same time, a better yield and greater shares of desirable and profitable meat-parts of test-chickens contribute to exploitation of PROTEIN GOLD in mixtures for chicken' s fattening.

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SUMMARY

The aim of this study was to investigate the effectiveness of the protein preparation PROTEIN GOLD as an plant (vegetable) alternative to fish meal in broiler feed mixtures. The investigation was conducted on 120 male one-day old chicks (Ross 308) divided in control (K) and experimental (trial) (P) group. During 42 days of fattening period the chickens (corn and soy-bean meal) used in ivestigating were equal on the metabolizale energy and crude protein content. The main difference was fish meal that had been used in starter substituted for protein preparation PROTEIN GOLD. The fish meal has not been used in formulation of finisher mixtures for the last three weeks of fatteing of both groups. The values of recorded production results (body weight gain, feed coversion rate, mortality rate and caracass yield) has not been statistically significant ($P>0.05$) wich is in order to conclude that fish meal can be substituted with plant protein preparation PROTEIN GOLD in starter mixtures in chick's fattening.

Key words: Fish meal, chickens, proteins, Protein Gold

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TABLE 1

COMPOSITION OF FEED MIXTURES

	Starter		Finisher	
Feed-stuffs (%)	K	P	K	P
Corn	55,00	53,20	61,00	63,50
Soy-bean meal	28,00	29,70	22,00	21,50
Sunflower meal	-	-	2,00	5,00
Alfalfa meal	2,00	2,00	5,00	-
Corn gluten meal	4,00	4,50	3,00	-
Fish meal	3,50	-	-	-
PROTEIN GOLD	-	3,00	-	3,00
Oil	2,00	2,60	2,00	2,00
Premix	5,00	5,00	5,00	5,00

TABLE 2

NUTRITIONAL VALUES OF FEED MIXTURES

	Starter		Finisher	
	K	P	K	P
Crude Protein (%)	22,12	22,56	18,38	18,72
Methionine (%)	0,69	0,72	0,61	0,66
Methionine + Cystine (%)	0,99	1,03	0,88	0,94
Lysine (%)	1,45	1,45	1,09	1,11
Arginine (%)	1,56	1,49	1,28	1,19
Threonine (%)	0,87	0,88	0,71	0,72
Tryptophane (%)	0,31	0,30	0,23	0,21
Calcium (%)	1,19	1,09	1,02	1,05
Phosphorus (%)	0,67	0,60	0,57	0,61
Sodium (%)	0,20	0,20	0,14	0,15
Crude fiber (%)	3,74	3,79	4,35	3,96
Crude fat (%)	4,72	5,16	4,82	4,74
ME (kJ/kg)	12,055	12,106	12,516	12,612

TABLE 3

NUTRIENT CONTENT IN PREPARATION *PROTEIN GOLD*

Crude protein. min (%)	58,00
Crude fiber, max. (%)	4,50
Calcium, min. (%)	2,00
Phosphorus (total), min. (%)	0,70
Sodium , min. (%)	0,30
Methionine + Cystine, min. (%)	2,50
Lysine, min. (%)	4,00
Threonine, min. (%)	1,50
ME min. (MJ/kg)	13,60

TABLE 4

PRODUCTION RESULTS

Days	n	Group	Average body weight (g)	Average weight gain (g)	Feed consumption (g)	Feed conversion rate (kg/kg)
1	60	K	41,38	-	-	-
	60	P	41,43	-	-	-
1-21	60	K	671,38	630,00	958,26	1,52
	60	P	640,11	598,68	925,08	1,54
22-42	60	K	2207,50	1536,12	3116,57	2,03
	60	P	2203,20	1563,09	3031,10	1,94
TOTAL	60	K	2207,50	2166,12	4074,83	1,88
	60	P	2203,20	2161,77	3956,18	1,83

TABLE 5

CARCASS YIELD PERFORMANCE (n=10)

	Control group (K)	Experimental group (P)
Live weight (g)	2400	2400
Carcass weight (g)	1725	1776
Dressing (%)	71,9	74,0
Breast in live weight (%)	22,38	23,96
Thigh and drumsticks in live weight (%)	21,21	21,50

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