

THE OPPORTUNITY OF CLASSICAL PROTEIN MATERIAL SUBSTITUTION IN BROILER CHICKENS' FODDER

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Abstract

To reduce the import of soy oil cake, which requires a significant financial effort, it is necessary to research opportunities for its partial replacement in broilers feeding with native protein sources, respectively sunflower oil cake, in the context of using small amounts of synthetic aminoacids or fish meal. The researches were conducted using groups' method. There were organized four groups. The first group - G1 (M) - was considered the control group; in this group it has been used only soy oil cake as protein fodder. On other groups, some soy oil cake was replaced with sunflower oil cake in different proportions or sunflower oil cake and fish meal, and to ensure the biological value of the protein it has been used different proportions of synthetic aminoacids (lysine and methionine).

Key words: broiler, soy oil cake, sunflower oil cake, costs.

INTRODUCTION

In the last years, researchers are concerned with finding new nutritional solutions regard poultry feeding, solutions that allow achieving high production performance with minimized cost and effort.

Although it is considered a strategic fodder raw material, in many countries in Europe and Asia, soybean oil cake is imported, fact which requires finding alternative vegetable protein sources. This phenomenon is also true for our country, which covers about 30% of the needs from indigenous production (Burciu D., 2001). In this context it is necessary to determine the optimal proportion of soy oil cake and sunflower oil cake in the structure of mixed fodder for broilers, and how to improve the biological value of protein by using synthetic amino acids and/or fish meal.

MATERIALS AND METHODS

The biological material was represented by the "Ross 308" broiler hybrid. The experiments were performed on four groups of broilers by 40 head/ group. It was selected one control group and the other groups were considered experimental groups:

- in the control group G1 (M) it was used only oil cake of soy as protein fodder;
- in G2 group, besides soy oil cake there were introduced in fodder sunflower oil cake at a rate of 7% (% by weight of mixed fodder) and synthetic aminoacids (lysine and methionine);

- in G3 group , in addition to soy oil cake there was used in fodder sunflower oil cake at a rate of 12% (% by weight of mixed fodder) and synthetic aminoacids (lysine and methionine);

- in G4 group, besides soy oil cake, there were introduced in fodder sunflower oil cake at a rate of 7%, fish meal 2% and synthetic aminoacids (lysine and methionine).

At the end of the experimental period (42 days) the European Efficiency Factor (EEF) was calculated, based on the age of broilers at sacrifices (days), their average live weight (kg / head), viability (%) and feed conversion index - IC (kg fodder / kg gain):

$$EEF = \frac{[\text{viability (\%)} \times \text{live weight (Kg)}] \times 100}{[\text{age of capitalization (days)} \times \text{specific consumption (Kg)}]}$$

RESULTS AND DISCUSSIONS

To determine from the economic point of view the effectiveness of partial substitution of soy oil cakes from broiler chickens' fodder, with sunflower oil cake, there were calculated the expenditure on fodder. For this, the prices of mixed fodders have been calculated, taking into account raw material prices in the month of September 2009 (lei / kg): maize - 0.63; soy oil cake - 1.61; sunflower oil cake - 2.53 , L-lysine - 5.32; DL - methionine - 13.59; calcium carbonate - 0.10, monocalcium phosphate - 1.84; salt - 0.50 and vitamin-mineral premix - 9.94. The cost recorded for 1 kg of fodder in the three periods of growth, corresponding to the four experimental groups is listed in Table 1.

It can be established that in all three experimental phases, the partial substitution of soy oil cakes from chickens' fodder, with sunflower oil cake led to price falling for a kg of fodder, the difference is even greater as the sunflower cakes have been incorporated into a larger share in the structure of mixed fodder. When next to sunflower oil cakes, fishmeal has been introduced in the structure of fodder (group 4) to improve the biological value of protein, the price of a kg of fodder has not obviously decreased compared to that recorded in group 1 (M), which used only soy oil cakes as protein feed. Thus, compared with group 1 (M) which used only soy oil cakes as feed protein, the average price of a kg of fodder was lower by 3.83% in group 2 where sunflower oil cakes represented 7% of the structure; with 5.56% in group 3 where sunflower oil cakes represented 12% of the structure and 2.00% in group 4 where, next to soy oil cakes, sunflower oil cake by 7% and fishmeal 2% were used.

Table 1

Variation of absolute and relative cost (lei) to 1 kg mixed fodder

Specification	U.M.	G1 (M)	G2	G3	G4
Phase I (1-21 days)	Lei/kg	1,169	1,139	1,110	1,165
	%	100,00	97,43	94,95	99,66
Phase II (22-35 days)	Lei/kg	1,160	1,106	1,095	1,117
	%	100,00	95,34	94,39	96,29
Phase III (36-42 days)	Lei/kg	1,122	1,082	1,055	1,115
	%	100,00	96,43	94,03	99,37
Average	Lei/kg	1,151	1,107	1,087	1,128
	%	100,00	96,17	94,44	98,00

* - prices valid in September 2009

The results regarding the costs of mixed fodder consumed to achieve a kg live weight gain (Table 2), in the first growth period (1-21 days), shows very similar values for chickens in groups 1 (M), 2 and 4 and lower by 3.45% for those in group 3, compared with those in group 1 (M). In the second growth period (22-35 days), compared to broiler chickens from group 1 (M), those of other groups have recorded lower values of the cost of mixed fodder consumed for 1 kg live weight gain, of 2, 07 to 2.96%. In the finishing phase (36-42 days), as in previous phases, the cost of fodder that back to 1 kg weight gain decreased proportionally with the increase of the proportion of sunflower oil cakes in the structure of mixed fodder, but incorporating fishmeal, which is an expensive raw material, has led to increased fodder costs required to obtain a kg live weight gain. This was also registered in the average cost of mixed fodder consumed to achieve a kg live weight gain relative to the entire experimental period (1-42 days).

Fodder reported cost for 1 kg weight gain, averaged over the whole period of growth, was 2.003 lei/kg in chickens from group 1 (M), 1.973 lei/kg for those in group 2, 1.962 lei/kg for those in group 3 and 1.981 lei/kg for those in group 4. Thus, the lower feed costs accruing to 1 kg body weight gain, were recorded for chickens in group 3, which used to feed broilers the largest proportion of sunflower oil cake (12%), followed by chickens in groups 2 (7% sunflower oil cakes) and 3 (sunflower oil cake 7% and fishmeal 2%) with relatively close values, and the highest costs were recorded in broiler chickens of group 1 (M), where it was used only soy oil cake as protein fodder (Figure 1).

Table 2

Fodder costs to obtain 1 kg weight gain

Period	Specification	U.M.	G 1 (M)	G 2	G 3	G 4
Phase I starter (1-21 days)	Specific consumption	Kg/C.F.	1,143	1,495	1,487	1,483
	Price M.F. (lei/Kg)	Lei/ kg	1,169	1,139	1,110	1,165
	Feed expenses (lei/Kg weight gain)	Lei/ kg	1,710	1,703	1,651	1,728
		%	100,00	99,59	96,55	101,05
Phase II growth (22-35 days)	Specific consumption	Kg/C.F.	1,751	1,795	1,817	1,765
	Price M.F. (lei/Kg)	Lei/ kg	1,160	1,106	1,095	1,117
	Feed expenses (lei/Kg weight gain)	Lei/ kg	2,031	1,985	1,989	1,971
		%	100,00	97,73	97,93	97,04
Phase III finishing (36-42 days)	Specific consumption	Kg/C.F.	1,936	1,986	2,027	1,950
	Price M.F. (lei/Kg)	Lei/ kg	1,122	1,082	1,055	1,115
	Feed expenses (lei/Kg weight gain)	Lei/ kg	2,172	2,149	2,138	2,174
		%	100,00	98,94	98,43	100,09
Average for total period (1-42 days)	Specific consumption	Kg/C.F.	1,740	1,782	1,805	1,756
	Price M.F. (lei/Kg)	Lei/ kg	1,151	1,107	1,087	1,128
	Feed expenses (lei/Kg weight gain)	Lei/ kg	2,003	1,973	1,962	1,981
		%	100,00	98,50	97,95	98,90

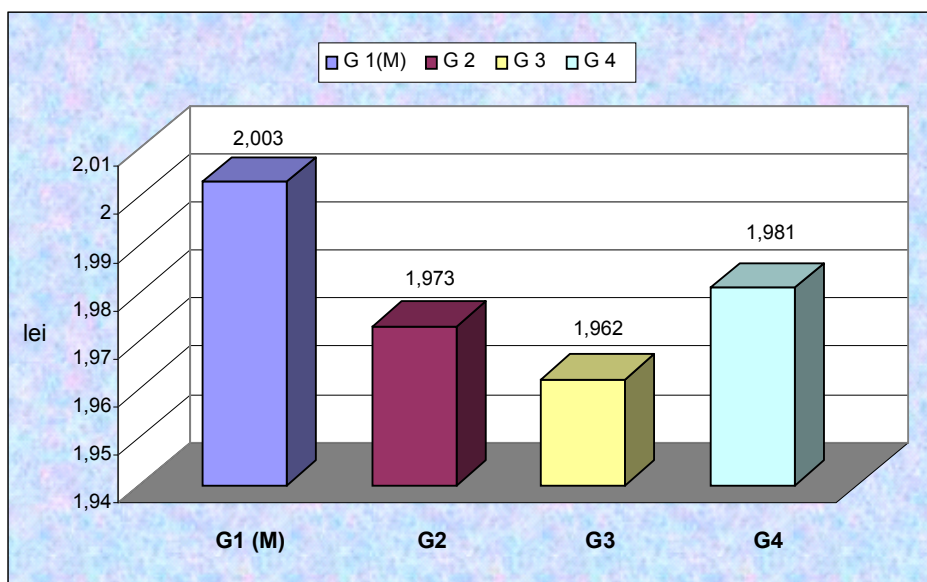


Fig.1.Feed expenses made to obtain 1 kg weight gain (lei/gain kg)

European Efficiency Factor (EEF) allows comparison of performance of some temporally distribution (year, season), spatial distribution (farms) or different biological distributions (series hybrid). Elevated EEF denotes the best-performing technology and nutrition.

By analyzing the calculated values for EEF (Table 3) it can be seen that the highest value was recorded by chickens from group 1 (M) in which only soy oil cakes were used as protein fodder, fact that is mainly due to a

higher live weight at the end of the experiment (2.387 kg/head) but also better recovery rate of feed (1.74 kg M.F./kg gain). Compared with the chickens in group 1 (M), the value of European Efficiency Factor was lower by 6.94% in chickens in group 2, by 13.35% in those in group 3 and, respectively, by 2.44% at those in group 4. It is worth noting that the European Efficiency Factor (EEF) recorded in chickens in group 4 is relatively close to those recorded by the chickens in group 1 (M) (Fig. 2), as a result of the use of fishmeal in the structure of mixed fodder which substantially improved the production performance (final weight and degree of recovery of the food).

Table 3

European Efficiency Factor (EEF)

Group	Age (days)	Average body weight (Kg)	Viability (%)	I.C. (Kg M.F.) Kg weight gain	EEF	
					Absolute	Relative
1 (M)	42	2,387	97,50	1,740	318,46	100,00
2	42	2,275	97,50	1,782	296,37	93,06
3	42	2,202	95,00	1,805	275,94	86,65
4	42	2,350	97,50	1,756	310,68	97,56

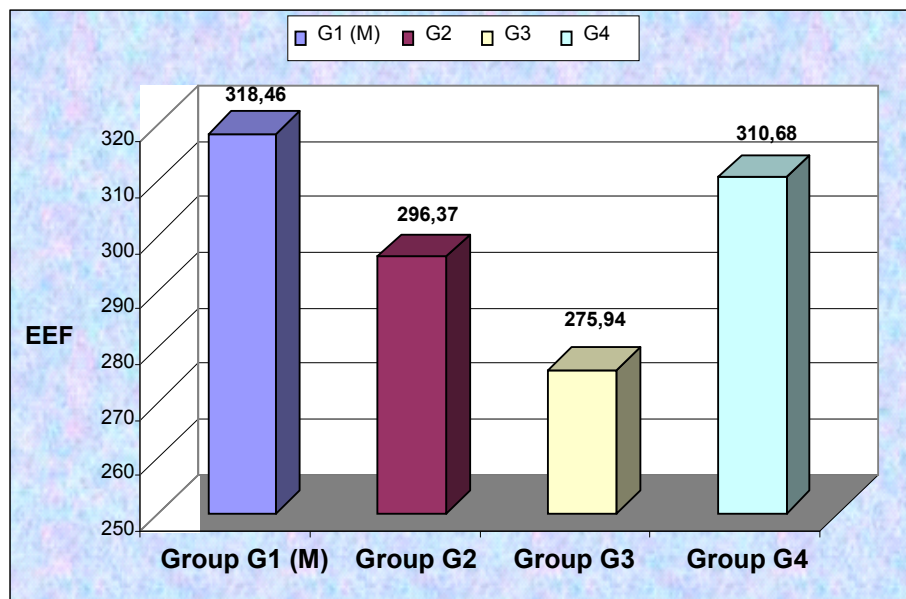


Fig. 2. European Efficiency Factor

CONCLUSIONS

The calculated values for EEF (European Efficiency Factor) are consistent with those cited in the literature. The highest EEF value was registered by chickens fed with only soy oil cakes as protein fodder, usually determined by the higher live weight at the end of the experimental period, but also by very good degree of recovery of the food.

EEF value decreased by 6.94% when sunflower oil cakes were introduced in the structure of mixed fodder, by 7% to 13.35% when sunflower oil cakes represented 12% of fodder structure and only by 2.44% when, in addition to the sunflower cakes, fish meal was used (2%), which improving the biological value of protein fodder, provided bioproductive performance very close to those made by feeding chickens only with soy oil cakes as protein fodder.

Partial substitution of soy oil cakes from broiler chickens' fodder is opportune, ensuring sustainable use of local fodder resources, namely sunflower oil cakes.

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