USING CORN DISTILLER'S GRAIN AND RICE BRAN IN THE NUTRITION OF LAYING HENS AND ITS ECONOMIC IMPACT

UTILIZAREA BORHOTULUI USCAT DE PORUMB SI A TARITEI DE OREZ IN ALIMENTATIA GAINILOR OUATOARE SI IMPACTUL SAU ECONOMIC

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REZUMAT

Furajarea gainilor ouatoare este un factor tehnologic care poate conduce la cresterea eficientei in productia de oua daca este in mod stiintific dirijat. Cresterea preturilor la materiile prime utilizate in producerea de nutreturi combinate impune nutritionistilor sa se preocupe de gasirea unor noi resurse furajere mai ieftine, care sa inlocuiasca ingredientele traditionale, mai scumpe, cum este srotul de soia. Acest studiu a avut ca scop elaborarea unor noi retete de nutret combinat pentru gaini ouatoare. Aceste retete se bazeaza pe inlocuirea srotului de soia cu borhot uscat de porumb si tarita de orez . Noile retete sint izoproteice si izocalorice. Reteta V 1 contine 30 % borhot uscat de porumb, iar V2 contine 20 % tarita de orez. Efectele acestor retete asupra parametrilor tehnologici si eficientei economice in productia de oua au fost urmarite prin utilizarea in micro test a unui esantion de 216 gaini ouatoare apartinind liniei hibride Roso 2000. Principalii parametri luati in considerare au fost urmatorii: productia medie de oua, capacitatea de ouat, greutatea oului, greutatea galbenusului, a albusului, a cojii oului, consumul de furaj, conversia hranei, costul si venitul/gaina, profitul pe gaina si profitul pe ou. Rezultatele obtinute in testarea celor doua loturi hranite diferentiat cu reteta V1 si respectiv V2 au fost comparate cu rezultatele inregistrate de lotul M, care a fost furajat cu nutret combinat clasic , continind 23 % srot de soia. S-a constatat ca gainile hranite cu nutreturi combinate pe baza de borhot uscat de porumb si tarita de orez au inregistrat performante ridicate atit cantitative cit si calitative in productia de oua, conducind la economii la costul de productie si la un profit mai mare pe gaina ouatoare si pe ou.

Cuvinte cheie: noi retete de nutreturi combinate, borhot uscat de porumb, tarita de orez, gaini ouatoare hibridul Roso 2000, eficienta economica

ABSTRACT

Layers feeding are a technological factor that could increase economic efficiency in egg production if it is scientifically managed. The increasing price of raw materials used for producing diet imposes as nutritionists to look for new cheaper feedstuff able to replace the traditional and more expensive ingredients like soybean meal. This study aimed to set up new diet formulae for layers feeding. These new formulae are replacing soybean meal with corn distiller's grain and rice bran. The new formulae assure the same protein and calories content. The V1 formula contents 30 % corn distiller's grain and V2 contains 20 % rice bran. The effects of these formulae on the technological parameters and economic efficiency in egg production have been watched in micro test using a sample of 216 layers belonging to Roso 2000 hybrid line. The main parameters taken into account have been the following ones: average egg production, egg laying capacity, egg weight, yolk weight, white weight, shell weight, feed consumption, food conversion, cost and income/layer, profit/layer and profit/egg. The results obtained in micro test by the two experimental groups differently fed with V1 and respectively V 2 have been compared to the ones recorded by M group, fed with the classical diet based on 23 % soybean meal. We have noticed that the layers fed with rations based on corn distiller's grain and rice bran have registered high quantitative and qualitative performances in egg production, leading to substantial savings related to production costs and to a higher profit per layer and egg.

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DETAILED ABSTRACT

Layers feeding are a technological factor that could increase economic efficiency in egg production if it is scientifically managed. The increasing price of raw materials used for producing diets imposes as nutritionists to look for new cheaper feedstuff able to replace the traditional and more expensive ingredients like soybean meal. At present, corn distiller's grain and rice bran could be successfully used as raw materials for producing diet formulae for layers feeding. Corn distiller's grain contains over than 26 % protein and rice bran around 15-17 % protein, but they also are rich in various vitamins, minerals and energy. This study aimed to set up new diet formulae replacing soybean meal with corn distiller's grain and rice bran, but keeping the same protein and calories level within the content of the ration. The study also aimed to compare the economic efficiency of the two new formulae: V1, including 30 % corn distiller's grain and 6 % soybean meal and V2, including 20 % rice bran and 19.80 % soybean meal and finally to compare the results to the ones obtained in case of the use of VM formula, based on 23 % soybean meal. In this purpose, a sample of 216 layers belonging to Roso 2000 hybrid line was used. The main parameters taken into account were the following ones: average egg production, egg laying capacity, egg weight, yolk weight, white weight, shell weight, feed consumption, food conversion, cost and income/ layer, profit/layer and egg. Producing of diet formulae based on soybean meal substitutes could reduce ration cost by USD 16.35 in case of V1 and by USD 7.43 in case of V2, taking into account VM formula cost of USD 197.69. Using V1 and V2 in micro test, we have obtained similar performances in egg production as in case of the layers fed with diets based on soybean meal. It is about 82 eggs/layer in average at the highest egg laying capacity (91-92 %). Such a production required USD 0.18 / hen expenses in case of V1 and USD 0.09 / hen in case of V2, less than in case of VM. Taking into consideration egg price (USD 0.054), V1 assured USD 8.17 profit/1,000 eggs and V2 led to USD 7.09 profit/1,000 eggs, in comparison with USD 7.08 obtained in case of VM. As a conclusion, the use of V1 and V2 as feeding alternatives in egg production can reduce production cost and increase profit per hen and egg, that is economic efficiency, at the same time maintaining egg performances at the same level as in case of rations based on soy bean cake. As V1 is the most effective alternative, we recommend to the industry to produce mainly diet formula based on corn distiller's grain.

INTRODUCTION

At present, food industry destined for layers feeding utilises soybean meal as a basic protein resource, produced in a limited amount and at a very high price in our country. For this reason, nutritionists are looking for new high nutritive value, protein and energy and less costing feeding resources such as: corn distiller's grain and rice bran (1,2,4). These new feeding alternatives can be successfully used for egg production, due to their high protein content (over than 26 % in corn distiller's grain and 15-17 % in rice bran), vitamins, minerals and energy. As a result, a high egg production at lower costs could be carried out in comparison to the feeding based on diet formulae including soybean meal. This study aimed to compare the economic efficiency of the use of two diet formulae: V 1 – based on corn distiller's grain and V 2 – based on rice bran for egg production in order to offer new less costing feeding solutions to the poultry farmers.

MATERIAL AND METHOD

Two new diet formulae have been designed as follows: V 1 – including 30 % corn distiller's grain and 6 % soybean meal, V 2 – including 20 % rice bran and 19.80 % soybean meal. These formulae have been compared to VM, based on 23 % soybean meal. For setting up the new formulae, it was necessary primarily to determine the nutritive value and energy level of raw materials as well as the layers needs for nutritive substances and metabolisable energy (3). Both V1 and V2 as well as VM alternatives have been optimised so that all of them to be equivalent concerning the nutrients and energy level. A sample of 216 Roso Hybrid layers, divided into three experimental groups of 72 birds each, was used for testing the three formulae. Testing was carried out under the highest laying capacity and lasted 3 months. For each alternative V1, V2 and VM, the following main indicators have been estimated: formula cost, egg performances (egg production/layer, laying capacity, egg weight, yolk, white and shell weight), daily gain, food consumption, food conversion, as well as economic parameters such as: expenses/layer, incomes/layer, profit/layer and egg.

RESULTS AND DISCUSSION

The composition of the experimental diets is presented in table 1, of which one can see that VM includes 23 % soybean (the highest level) meal and 62.66 5 maize, V1 contents 30 % corn distiller's grain, 6 % soybean meal (the lowest level) and 48.91 % maize and V2 is based on 20 % rice bran, 19.80 % soybean meal (average level) and 46.12 maize. In addition, each diet was balanced concerning the content of vitamins, minerals and essential amino acids.

The nutritive value and energy level for each formula are presented in table 2, of which one can notice that all the three diets are equivalent concerning protein and energy level. From this table, we can also notice that there are significant differences concerning available phosphorus. V2, based on rice bran contains more fitic and less available phosphorus (0.11 %); V1, based on corn distiller's grain contains less fitic phosphorus and more available phosphorus (0.49 %) than VM, based on soybean meal (0.30 % available phosphorus).

The diet cost in USD recorded for each alternative was the following: 187.81 for V1, 190.26 for V2 and 197.69 for VM. As one can see, producing diet based on soybean meal substitutes could lead to important savings as follows: USD 16.35 in case of V 1 , based on corn distiller's grain and USD 7.43 in case of V2, based on rice bran.

The main characteristics of egg production during the micro testing period are given in table 3, showing that the use of the new diet formulae has conducted to similar performances as in case of the layers fed with diets based on soybean meal.

The financial results in egg production show that all the three diet formulae are profitable. The profit level, expressed in USD, was: 40.84 in case of V1, 41.80 in case of V2 and 42.83 in case of VM. This is a strong argument that supplementary protein feeding based on soybean meal substitutes could perform almost the same economic effects as in case of using soybean meal diet exclusively.

Table 1.The Composition of the experimental Diets / Compozitia ratiilor experimentale

Diet Item / Elementul ratiei	V1	V2	VM
Corn / Porumb	48.91	46.12	62.66
Soybean Meal / Srot de soia	6.00	19.80	23.00
Corn Distiler's Grain / Borhot uscat de porumb	30.00	-	-
Rice Bran / Tarita de orez	-	20.00	-
Fish Meal / Faina de peste	2.00	2.00	2.00
Monocalcic Phosphorus / Fosfat monocalcic	1.00	1.00	1.00
Limestone / Carbonat de calciu	8.50	8.50	8.50
Salt / Sare	0.35	0.35	0.35
Premix vitaminic mineral / Zoofort A5	1.00	1.00	1.00
Metionine	0.11	0.15	0.18
Lisine	0.21	-	-
Triptophane	0.04	-	0.03
Oil	1.80	1.00	1.20
Coline HCl (70%)	0.08	0.02	0.08
Total	100.00	100.00	100.00

Table 2.Nutritive Value and Energy Level of Diet Formulae / Valoarea nutritiva si nivelul energetic al retetelor de nutreturi combinate

Nutrients / Elemente nutritive	V1	V2	VM
Metabolisable Energy MJ/kg / Energie metabolizabila	11.51	11.48	11.48
Crude Protein / Proteina bruta	16.10	16.04	16.05
Fats / Grasimi	6.62	6.55	3.96
Crude Fibre / Celuloza bruta	4.51	4.77	2.96
Metionine	0.39	0.40	0.38
Cisteine	0.66	0.66	0.66
Lisine	0.75	0.81	0.75
Triptophane	0.17	0.16	0.17
Calcium	3.76	3.76	3.76
Available Phosphorus / Fosfor fitic	0.49	0.11	0.30

The level of the main indicators expressing economic efficiency in egg production recorded during the testing period are presented in table 4, of which one can see that the use of V1 and V2 diet formulae could lead to 82 eggs/layer in average, at the highest egg laying capacity (91-92 %). Such a production required USD 0.18 expenses per hen in case of V1 and USD 0.09 expenses per hen in case of V2, assuring substantial savings per egg comparatively to VM recipe. Taking into account egg market price of USD 0.054, the feeding alternatives V1 – based on corn distiller's grain and V2 – based on rice bran assure USD 8.17 profit/1,000 eggs in case of V1 and USD 7.09 profit/1,000 eggs in case of V2, showing that the use of the new soybean meal substitutes in layers feeding is more effective in egg production than using only diets exclusively consisting of soybean meal.

Table 3. Parameters of Egg Production during the micro test period * / Parametrii productiei de oua in perioada de microtestare

Parameter / Parametrul	M.U.	V1	V2	VM
Average Egg Production Productia medie de oua	Pieces/layer	82	82	84
Laying Capacity / Capacitatea de ouat	%	91.65	91.27	92.97
Total Egg Production / Productia totala de oua	Pieces	5,904	5,904	6,048
Egg Weight / Greutatea oului	g	59.03	60.30	59.03
Yolk Weight / Greutatea galbenusului	g	16.88	17.00	16.88
White Weight / Greutatea albusului	g	35.68	36.25	35.69
Shell Weight / Greutatea cojii	g	5.42	5.59	5.44
Weight Gain / Sporul in greutate	g/layer	117.30	155.08	178.39
Food Consumption / Consumul de hrana	g/head/day	124.71	124.07	124.74
Food Conversion / Conversia hranei	g/egg	2.30	2.25	2.26

?? All the data have been statistically processed. There are no significant differences between the experimental groups, except weight gain.

Table 4. Parameters of Economic Efficiency in Egg Production / Parametrii eficientei economice in productia de oua

Parameter	M.U.	V1	V2	VM
Average Egg production / Productia medie de oua	Pieces/layer	82	82	84
Egg Cost / Costul oului	USD/piece	0.046	0.047	0.047
Testing Costs / Cheltuieli cu testarea	USD/head	3.78	3.87	3.97
Cost/layer/day / Cheltuieli/gaina/zi	USD/head/day	0.042	0.043	0.044
Income/layer / Venit/gaina	USD/head	4.45	4.45	4.56
Profit/layer / Profit/gaina	USD/head	0.67	0.58	0.59
Profit/1,000 eggs / Profit/1.000 oua	USD/1,000 eggs	8.17	7.09	7.08

CONCLUSION

-The use of new diet formulae, based on corn distiller's grain and rice bran in poultry farming for egg production could reach the same performances as in case of using only diets including soybean meal.

-The partial replacement of soybean meal with other protein resources could result to substantial decrease of production cost, ranking between USD 7.43/ton and USD 16.35 /ton in feedstuff industry.

-The use of soybean meal substitutes within diets for layers does not affect egg performances, animal health or environment quality.

-The implementation of feeding based on protein resources cheaper than soybean meal could lead to a higher profit/1,000 eggs due to the decrease of production expenses, assuring a higher efficiency in poultry farms.

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