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Quality Appraisal of Feed Obtained by Production Units and Recommendations on how to use it in Animal Nutrition

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Abstract. Experiments were carried out on broiler chickens separated into three groups. Chickens were fed with combined fodder having a different protein source: animal (meat meal) and vegetable (soybean grit and green peas meal). Based on laboratory data and those obtained in digestibility experiments, the nutritional value was estimated - expressed in kg dry matter in PD (g) = protein digestion, GE (gross Kcal) = gross energy, DE = (kcal digestible) = digestible energy, N.U. = oat nutritive unit. No significant differences were found between the three fodder. It is recommended to extend the research to an industrial production environment.

Keywords: broiler chicken, vegetable and animal protein, digestibility, nutritive value.

INTRODUCTION

In spite of the fact that one speaks a lot about lasting agriculture in Romania, both as quality and economy, yields are not competitive and, moreover, in a ceaseless dramatic decline: by far less produced than consumed. Prices and delivery of food are unrealistic and the alimentary security becomes less and less secure (Dinea, 2004).

Internationally, it is widely spoken about getting out of recession as possible by adopting a national strategy of updating agriculture, independent from political circumstances, acceptable and feasible from the part of all governments, no matter of their succession (Burlacu, 1991).

Such a strategy supposes a lasting development, animal breeding included. According to the philosophy of UE, lasting development presupposes keeping the heritage of future generations unaltered.

Not just leaving aside the economic hardship facing Romania, it is to be taken into consideration that specialists should persevere in research and obtain scientific information concerning the raising and feeding systems of animals - fowls included -and implicitly, that of broilers, too (Drânceanu, 2000).

MATERIALS AND METHODS

The research aimed at determining the nutritional value and yield impact of two kinds of plant protein feeds (soybean grit and green peas meal), obtained by production units; these feeds replaced animal protein in the combined fodder used in feeding young chickens raised for meat production. The experiments were carried out on young broilers in batteries that offered the necessary utilities necessary to determine fodder digestibility. Chicken were separated into three groups of 10 each: control (C), experimental 1 and experimental 2.

For feeding, we used granulated combined fodder made up of assortments of simple fodders in proportions in accordance with the fabrication prescription as follows:

- between ages 1 – 7 and 7 – 21 days, chickens in all groups were fed combined starting fodder, respectively of growing – finishing, having the protein level comprised between 21 – 23% gross protein;

- between ages 21-39 days, feeding was carried out differently per group, by respecting the established experimental protocol:

- the control was fed combined fodder having the structure and nutritive value identical with that shown on the wrapping label of the marketed fodder (Table 1);

Tab. 1:

Quality indices (values on the label) of the combined fodder (CF c) fed to experimental chickens (control)

ITEM	SUBSTANCE	PERCENTAGE IN FODDER
1	Dry matter	88,71 %
2	Gross protein	18,47 %
3	Min. Gross fat	5%
4	Gross cellulose	4%
5	Ashes	5,34%
6	Methionine	0,40 %
7	Min.lysin	1,08%
8	ME (fowls)	12,52% MJ/kg*)
9	Sugar	4,62 %
10	Calcium	0,81 % 0,67%
11	Phosphorus	0,67%0,67%
12	Sodium	0,16 %
13	Vit. A	15000 NE/kg
14	Vit. D3	5000 NE/kg
15	Vit. E	100mg/kg

*)1cal = 4,185 J

- with the experimental 1 and experimental 2, the fodders labeled CF1, CF2 respectively, recipe alterations were administered; these are introduced by Table 2. Therefore, starting on the 4th week of the life of the chickens (weeks 4, 5 and 6), animal protein was replaced by plant protein.

During ages 35-42 days (checking time), fodder digestibility was measured. Consequently, consumed feeds and faeces were measured by collecting mean samples.

Tab. 2:

Structure of combined fodder fed to chickens
in the control – and experimental groups

ITEM	GROUP	FODDER STRUCTURE
1	Control	Fodder combined with 18.47% gross protein (CF c)
2	Experimental 1	Fodder combined with 4 % soybean grits (CF 1)
3	Experimental 2	Fodder combined with 4 % green peas meal (CF 2)

In the laboratory chemical analyses were carried out concerning the mean samples collected from fodders and faeces by using the Weende conventional methodology. In order to obtain the protein nitrogen from the faeces of the chicken under experiment, the uric nitrogen was measured by means of the Stotz method. Then, there followed finding the difference between the total nitrogen of faeces and the uric nitrogen (Dancea, 2005).

From the data obtained in the digestibility experiments the following were estimated:

- apparent digestibility coefficient (ADC) of combined fodders;
- contents in digestible protein;
- total digestible substances/nutrients (TDN)/kg DM;
- fowl-nutrient units/kg DM;
- energy value (gross energy and digestible energy/kg DM).

RESULTS AND DISCUSSIONS

Of the data analysis regarding the gross chemical composition of the combined fodders utilised in feeding the chickens under experimentation (table 3) there results that:

- the gross protein with the control was of 19.39 %, higher than that in the manufacturer's analysis bulletin, i.e., 18.47;
- gross fat contents were much lower than the quality norms prescribed;

Tab. 3:

Chemical composition of combined fodders meant for experimental chickens

Fodder/group	GROSS CHEMICAL SUBSTANCES OF FODDER STRUCTURE (%)						
	DM	Protein	Uric acid	Fats	Cellulose	N.F.E	Ash
CF control	88,80	19,39	-	2.00	4,01	56,60	6,80
	100	21,83	-	2,25	4,52	63.74	7,66
CF experimental 1	88,60	19,18	-	2,12	4,85	55,31	7,14
	100	21,65	-	2,39	5,47	62,43	8,06
CF experimental 2	88,46	19, 03	-	2,04	5,08	55,10	7,25
	100	21,51	-	2,31	5,74	62,19	8,20

- gross ash climbs beyond the value of de 4 %, being of 6.80 % with the fodder meant for the control group. Such thing may be due to the introduction of mineral salts in excessive quantities.

By comparing the values obtained with the analysis of the three fodders we find that following the replacement of meat meal with soybean grits, respectively with green peas meal, differences were recorded in the gross chemical composition as it follows:

- gross cellulose increased to 4.85 % with the fodder destined to experimental 1 group and 5.08 % to experimental 2 group. To be sure, the differences are due to the cellulose present in the structure of plant cells. By taking into account that the fodder meant to chickens has to meet the requirements in the norms i.e., a cellulose value of 4% the most ; thus it would be necessary that the replacements be implemented after an attentive analysis of components and after studies on manufacturing prescription requirements regarding combined fodders;
- gross fat has values close to that in the control group—slightly increased however—i.e., 2.12 and 2.04, respectively. All such values are lower as measured against norms of chicken feeding. However, the aim of the research carried out by our team focused mainly on studying the differences in digestion processing of combined fodders having the structure introduced;
- gross-ash contents was higher in the fodders destined to experimental groups, respectively 7.14 % with group 1 and 7.25 % with group 2, as to the control (6.80 %).

By comparing the results of analyses of gross chemical composition the following conclusions may be drawn:

- the structure of the combined fodder inscribed on the wrapping label is not in line with the laboratory results;

- following the replacement of animal protein (meat meal) with plant protein, with both experimental groups quality values kept the same (mainly the gross-protein content) with the fodder meant for the control. The increase in the gross-cellulose content is a quite natural alteration, a consequence of utilizing plant fodders (Dancea, 2003).

By analyzing the values of apparent digestibility coefficient, resulting from the processing of the data of the experiments carried out on broilers, we have found that:

Tab. 4:

Apparent digestibility coefficient in investigated fodders (%)

Group	SUBSTANCE IN THE FODDER STRUCTURE (nutrition principle)					
	DM	Protein	Fat	Cellulose	N.F.E.	Ash
Control	61.35	77.89	64.45	3.22	71.35	25.89
Experimental 1	59.86	77.09	60.38	3.31	72.18	18.15
Experimental 2	59.58	75.93	61.33	3.18	72.36	19.32

- digestive utilization of dry matter was better with the fodder fed to the control, i.e., 61.35 % as to 59.86 % with experimental 1 and 59.58 %. The difference between the two experimental groups was of only 0.31 %, ADC of DM being higher with the fodder receiving soybean grits;
- digestive utilization of gross protein encountered a similar evolution with differences however, relatively slightly higher. Thus, from a protein ADC of 77.89 % in the control, it was of 77.09 % in the fodder receiving soybean grits fed to experimental 1 and of 75.93 in the fodder receiving green peas meal fed to experimental 2;
- the ADC variation in the fat did not follow a similar trajectory. Thus, from 64.45% in the control, this was consistently (by 4.07%) lower (to 60.38%) in E1 and by 3.12 %, that is to 61.33 %, in E2. With the exception of increase in cellulose content of the fodders, we cannot provide any explanation of the encountered phenomenon. It is possible that the differing structure of the fats has influenced their hydrolysis and absorption in varying degrees in the three fodders (Dancea, 2004).

Data (Table 5) were obtained following the appraisal of the nutritive value via calculation.

Tab. 5:

Nutritive value of fodders investigated expressed in DM kilogram

FODDER/GROUP	PD (G)	G.E. (KCAL GROSS)	D.E. (KCAL DIGESTIBLE)	UN
Control	170,00	3.927	2.869	1,07
Experimental 1	166,90	3.892	2.702	1,04
Experimental 2	163,30	3.880	2.657	1,03

One can see from the above data that the differences in the three fodders are very small and their nutritive value expressed by means of various indexes decreases very slightly (insignificantly), from the control to experimental 1 and experimental 2.

CONCLUSIONS

Following the comparison of the results obtained with the experiments carried out, the following conclusions can be drawn:

- The structure of the combined fodder inscribed on the commercial wrapping label was not proved by lab analyses.
- The digestive processing and absorption of nutrients resulting from the digestion of the combined fodders as source of animal and plant protein recorded relatively low differences (ADC of D.M. displayed very close values).
- ADC-value of protein decreased from that of the fodder including animal protein CF control (CF c), to that of the fodders including plant protein (more in the one with green peas meal) and increased in sugars, the other way around as to the ADC evolution of protein.
- The contents in digestible substances - TDN, the nutritive value expressed in digestible protein, oat nutritive units, gross energy and digestible energy per kilogram dry-matter did not display significant differences fact demonstrating that by replacing the animal protein with plant protein the nutritive value and the balance of protein energy of the combined fodders would not be altered.
- The increase in gross-cellulose content was a quite natural alteration, consequence of utilizing various assortments of plant fodders.
- The chickens in the three groups (control and experimental) have kept their health – and production level within normal parameters, without having recorded any differences whatsoever.
- It is recommendable that research on broilers within production conditions be extended in order to facilitate a more precise assessment of the possibilities of replacing animal protein with plant protein from various sorts of plants that are cultivable in Romania on broader scale.

REFERENCES

1. Burlacu Gh. (1991) – Metode şi tehnici pentru măsurarea valorii nutritive a nutreţurilor. Ed. Ceres Bucureşti.
2. Dancea Zoe, A. Macri, Maria V. Morar, M. Popa, I. Mihalca, L. Buda (2003) – Cercetări asupra utilizării digestive şi efectului de producţie a turtelor de rapiţă la puii de găina broiler, Revista Română de Medicină Veterinară, Vol. 13, 3-4, Rezumatele lucrărilor Congresului Naţional de Medicină Veterinară, Iaşi, Ed. ALFAPRESS IMPRMERI, p.394.
3. Dancea Zoe, M.V. Morar, C. Bele, A. Macri, A.D. Modoran (2004) – "Aproach regarding the nutritive value and the quality of residual products from the processing of oleaginous crops". Bul. USAMV-CN 61/2004, 268.
4. Dancea, Zoe (2005) – Nutriţie animală şi elemente de nutriţie a omului, Ed. Todesco, Cluj.
5. Dinea Mariana, Suciu, I. (2004) – Tehnologia creşterii păsărilor. Ed. Risoprint, Cluj-Napoca
6. Drânceanu, D. (2000) – Biotehnologii în alimentaţia animalelor. Editura Eurobit, Timişoara