

**THE IMPACT OF THE STANDARD DIET,  
SUPPLEMENTED WITH GLUCANS EXTRACTED  
FROM *CLAVICEPS PURPUREA*, ON SOME  
PRODUCTIVE PARAMETERS IN BROILER  
CHICKENS<sup>1</sup>**

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**ABSTRACT** – We have studied the impact of the standard diet, supplemented with glucans extracted from *Claviceps purpurea*, on some productive parameters. The experiment was performed on 30 broiler chickens, beginning at the age of 25 days. Chickens were bred under semi-intensive conditions, being randomly distributed in three equal groups, according to their body weight. They were fed with specific commercial food, balanced in nutrient principles; each day, the glucanic extracts were added at doses of 20 mg/kg body weight for the group E1 and 40 mg/kg body weight for the group E2. The extracts were mixed with food, after being diluted in 10% distilled water. At the end of the experiment, the control group has reached a weight gain of 644 g. The group E1 (with 20 mg glucanic extract/kg) has reached a weight gain of 696 g, which represented a significant difference in comparison with the control group (+ 52 g). The group E 2 (with 40 mg glucanic extract/kg) has reached a weight gain of 728 g, which was also a significant difference as compared to the control group (+ 84 g). The specific fodder consumption was of 2.11 kg fodder/kg body weight at the group E2, slightly higher at the group E1, representing 2.21 kg fodder/kg body weight, the fodder consumption for the control group being of 2.40 kg fodder / kg body weight, significantly higher than that for groups E1 and E2. The haematological, biochemical blood and histological exams of the internal organs have registered parameters within the physiological limits, without significant differences between the control group and the experimental ones.

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**Key words:** glucans, broiler chickens, productive parameters, standard diet

**REZUMAT - Impactul dietei standard, suplimentată cu glucani extrași din *Claviceps purpurea*, asupra unor parametri productivi la puii broiler.** S-a studiat impactul dietei standard, suplimentată cu glucani, asupra unor parametri productivi. Experimentul s-a efectuat pe 30 pui broiler de găină, începând de la vârsta de 25 zile, timp de 28 zile. Puii au fost întreținuți în condiții de creștere semiintensivă, fiind repartizați randomizat în trei loturi uniforme ca greutate corporală. Hrănirea s-a făcut cu hrană comercială specifică, echilibrată în principii nutritive, la care s-au adăugat zilnic extractele glucanice în doze de 20 mg/kg greutate vie la lotul E1 și 40 mg/kg greutate vie la lotul E2, omogenizate în hrană după diluție în apă distilată, 10%. La sfârșitul experimentului, lotul martor a realizat un spor în greutate de 644 g. Lotul E1 (cu 20 mg extract glucanic/kg greutate vie) a realizat un spor în greutate de 696 g, diferența față de martor fiind semnificativă (+ 52g). Lotul E2 (cu 40 mg extract glucanic/kg greutate vie) a realizat un spor în greutate de 728 g, diferența față de martor fiind, de asemenea, semnificativă (+ 84g). Consumul specific de furaj a fost de 2,11 kg furaj / kg spor la lotul E2, ușor mai crescut la lotul E1, respectiv 2,21 kg furaj / kg spor, la lotul martor, de 2,40 kg furaj / kg spor, semnificativ mai crescut decât la loturile E1 și E2. Examenle hematologice și biochimice sanguine și histologice ale organelor interne au înregistrat parametrii în limite fiziologice, fără diferențe semnificative între lotul martor și loturile experimentale.

**Cuvinte cheie:** glucani, pui broiler de găină, parametri productivi, dietă standard

## INTRODUCTION

Glucans are polymers of glucose, being major structural components of the cell wall in fungi, yeasts, bacteria, cereals, etc. Beta-glucans with 1.3- and 1.6-glycosidic bonds have many pharmacological properties, too, involved in immune and unspecific protection of plants and animals (Bell et al., 1999; Yadomae, 2000). We have studied the impact of the standard diet, supplemented with glucans extracted from *Claviceps purpurea*, on some productive parameters in broiler chickens.

## MATERIALS AND METHODS

The 28 day-experiment was performed on 30 broiler chickens, beginning at the age of 25 days. The chickens were bred under semi-intensive conditions (Pavel and Chelaru, 2001; Vacaru Opreș, 2000): natural light and ventilation (identical microclimate conditions), on saw-dust litter, being randomly arranged in three equal groups, according to their body weight. They were fed with specific commercial food, balanced in nutrient principles (Halga, 2000) (the starter recipe, *Table 1*).

The glucanic extracts (furnished by the Biological Research Institute of Iași) were added daily in food, 10% diluted in distilled water, as follows: the group E1 – 20 mg/kg body weight and the group E2 - 40 mg/kg body weight.

The chickens were weighed periodically (every week). Measurements of their total weight, their weight gain and the specific fodder consumption were performed.

## IMPACT OF GLUCANS ON BROILER CHICKENS

At the end of the experiments, the chickens were slaughtered, being performed haematological, biochemical blood and histological exams of the internal organs (liver, kidneys, spleen, Fabricius' bursa, thymus and segments of the digestive tube). The histological exams were performed after fixation in formaldehyde 10%, Bouin liquid, paraffin embedding and after sectioning it at 5  $\mu$ m. The histological structure of the internal organs and the presence of the lymphoid infiltrations were evaluated.

The biochemical exam of the blood serum consisted in determining (with EOS 880 plus spectrophotometer analyzer) the following parameters: ALT – alanine aminotransferase, TP – serum total protein, BUN – blood urea nitrogen, ALB – albumin, CRTN – creatinine, TGL – triglyceride and UA – uric acid.

**Table 1- Composition of fodder administered in chickens**

Total Protein	%	20.30
Fat	%	4.40
Mineral salts	%	6.30
Cellulose	%	4.10
Calcium	%	0.84
Sodium	%	0.16
Vitamin A (retinol – E672)	UI/kg	12.300
Vitamin D3 (calciferol – E671)	UI/Kg	2.910
Vitamin E (alpha-tocopherol)	mg/kg	79.10
Copper (copper II sulphate E4)	Mg/kg	18.00
Metionine	%	0.54
Metionine + Cystine	%	0.92
Humidity	%	11.30
Hydrochloride robenidine (E758)	mg/kg	33.00

## RESULTS AND DISCUSSION

The evolution of the body weight during the experiment is shown in *Table 2*. The results from *Table 2* show that all the experimental groups have reached higher weight gains than the control group. The group E1 (treated with 20 mg glucanic extract/kg body weight) has reached a weight gain of 696 g, this representing a significant difference in comparison with the control group (+ 52 g). The group E 2 (receiving 40 mg glucanic extract/kg body weight) has reached a weight gain of 728 g, which is a significant difference in comparison with the control group (+ 84 g). At the end of the experiment, the control group has reached a weight gain of 768 g.

Table 2 – The evolution of the weight gain and of the specific fodder consumption

Group	Weighing date										
	Initial weight (kg) Average/group (g)	Week 1 Average/group (g)	Weight gain (g)	Week 2 Average/group (g)	Weight gain (g)	Week 3 Average/group (g)	Weight gain (g)	Week 4 Average/group (g)	Total weight gain (g)	Dif. to control	Specific consumption
Group E1	1392	1550	158	1706	156	1850	144	2088	696	+ 52	2.21
Group E2	1452	1660	208	1814	154	2015	201	2180	728	+ 84	2.11
Control Group	1532	1568	36	1735	167	1930	195	2176	644	0	2.40

## IMPACT OF GLUCANS ON BROILER CHICKENS

There were no morbidity or mortality losses throughout the experiment, which proved that the administered extracts had a positive effect on the health of chickens. The haematological and biochemical blood exams have registered parameters within the physiological limits (Aiello and Mays, 1998; Pavel and Chelaru, 2001), without significant differences between the control group and the experimental ones (*Table 3*). The histological structure of internal organs showed no differences between the experimental and the control groups.

The quantity of administered fodder was weighed every day, being the same for all the groups. At the end of the experiment, the mean fodder consumption was of 1540 g for each chicken; therefore, the difference in the specific consumption was felt only at the level of the different weight gain.

The specific fodder consumption was of 2.11 kg fodder / kg body weight gain at the group E2, slightly higher at the group E1, representing 2.21 kg fodder / kg body weight gain; the fodder consumption for the control group was of 2.40 kg fodder / kg body weight gain, significantly higher than that for the groups E1 and E2.

**Table 3 - Results of blood biochemical tests**

Group	ALT	TP	BUN	ALB	CRTN	TGL	UA
M.U.	UI/L	g/dl	mg/dl	g/dl	mg/dl	mg/dl	mg/dl
Control	14.45	3.839	18.63	2.072	0.878	175.9	8.013
E1	12.71	3.985	24.44	2.055	0.659	156.1	7.441
E2	12.12	3.881	22.69	2.161	0.648	152.9	7.981

**Legend:** ALT – alanine aminotransferase      TP – serum total protein  
 BUN – blood urea nitrogen                      ALB – albumin  
 CRTN – creatinine                                      TGL – triglyceride  
 UA – uric acid

## CONCLUSIONS

The glucanic extracts administered to broiler chickens had a favourable effect on the weight gain and on the specific consumption. The group E1 (treated with 20 mg glucanic extract/kg body weight) has reached a weight gain of 696 g, this representing a significant difference as compared to the control group (+ 52 g). The group E 2 (receiving 40 mg glucanic extract/kg body weight) has reached a weight gain of 728 g, which is also a significant difference as compared to the control group (+ 84 g).

The specific fodder consumption was of 2.11 kg fodder / kg body weight gain in the group E2, slightly higher in the group E1, representing 2.21 kg fodder/kg gain, the fodder consumption for the control group being of 2.40 kg fodder / kg gain, significantly higher than that for the groups E1 and E2.

The biochemical blood parameters were situated within the physiological limits at all groups, the differences being insignificant.

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