

# Modifications of some Production Parameters on Heavy Hens as a Result of the Calcium/Phosphor Deficiency in Ration

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## Abstract

One group of 140 hens, 35 weeks old, from a compartment diagnosed with calcium/phosphorus metabolism disorders, examined for 60 days, comparatively with a control group, the followings have been found: decrease of total egg production by 15.2%, reduction of laying percentage by 10.49%, decrease of average body weight by 410 g, reduction the percentage of eggs selected for incubation by 45.10%, increase of the number of eggs with soft or deformed shell by 3.81%. Changes in size, shape and weight of the eggs were also observed in the affected group. Calcium/phosphorus deficiencies have also been revealed through deviations of the chest bone, spontaneous fractures of some bones and difficulty movement.

**Keywords:** calcium, heavy hens, phosphorus, production.

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## 1. Introduction

Calcium and phosphorus are trace elements associated in the organism particularly with the bone formation process [1- 8]. Studies showed that 60-70% of the calcium participating in eggshell formation comes from the diet and just 25-35% is mobilised from bones [1, 4, 7-10].

The exchanges between the exogenous calcium coming from the diet and the endogenous calcium form the balance of eggshell formation. The phosphor-calcium imbalance can occur after 7-10 days of deficiency and can be remedied after 21-30 days. The calcium and phosphorus supply deficiencies in growing poultry diets cause rachitis, which is different histopathologically from the rachitis caused by vitamin D deficiency [11, 12].

Besides the deficit of supply, the calcium and

phosphorus deficiency can also be caused by improper calcium to phosphorus ratio, if there is not enough vitamin D, or when the dietary mineral salts cannot be assimilated [5, 6, 13, 14,]. The phosphorus deficiency can cause right ventricular deficiency and ascites [15].

The purpose of this work was to evaluate the effect of calcium-phosphorus metabolism disorders on the production and reproduction parameters of heavy hens breeds (RRG) during clinical episodes and by laboratory testing.

## 2. Materials and methods

The investigations were conducted on 140 COBB 500 heavy breeds hens (aged 35 weeks) from a poultry house where calcium-phosphorus metabolism disorders were noticed (experimental group). Data on the main production and reproduction parameters of the hens from this group were studied and systematized compared to the control group.

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The control group was represented by healthy birds from the same hybrid, the same age and the same number.

The laboratory work consisted in analyses to determine the dietary calcium and phosphorus and serum biochemical assays: serum calcium, serum phosphorus. The analyses were conducted using the usual techniques [16, 17].

**3. Results and discussion**

Tables 1 and 2 show the results.

The feed analyses were conducted on 6 samples of NC 21/7, revealing a deficit of calcium and, particularly, of phosphorus. Calcium levels were 0.38%-0.67% (below the 2.89% normal limit) [19], while phosphorus levels were 0.25% (below the 0.43% normal limit) [18].

The use of calcium and phosphorus depends on the presence of an adequate level of vitamin D. the deficit of vitamin D contributed to the onset of the calcium and phosphorus deficiency, and to

changing the Ca/P ratio, as also substantiated by biochemical analyses (calcium level  $14.2 \pm 3.1$  mg/dl, and phosphorus level  $6.15 \pm 1.84$  mg/dl compared to the reference values for calcium  $25 \pm 5$  mg/dl and phosphorus  $7 \pm 1$  mg/dl) [19].

The main symptoms observed in the hens from the affected group were deviations of the chest bone, spontaneous tibia and femur fractures, as well as difficult walking. These signs were observed in 14% of the surveyed hens (experimental group). Egg quality on the affected group was a major marker for the diagnosis: thin and frail eggshell, small eggs with abnormal calcium deposits, with cracks and uneven eggshell.

The results shown in Table 1 show a lower number of eggs produced by the deficiency group (1311 less, 15.2%) compared to the control group, which mean 9.3 eggs/hen in the 60 days of the experiment; the laying percentage was 10.9 lower, and the average bodyweight of the deficient hens was 410 g lower than the bodyweight of the control hens.

**Table 1.** Group size, egg production and bodyweight

Group	Period (days)	Average group size	Egg production per period	Egg production per hen	Laying percentage	Bodyweight (g)
Experimental	60	140	7309	52.2	76.01	2825
Control	60	140	8620	61.5	86.5	3235
Differences between the experimental group (Ca-P deficiency) and the control			-1311	-9.3	-10.49	-410

Table 2 data show that the number of eggs selected for incubation was 45.10% lower in the deficient hens compared to the control group, due to the egg weight and size and to eggshell quality. The proportion of eggs with soft or deformed

eggshell was 3.81% higher in the experimental group compared to the control group; adding to this were defections of size, weight, shape, or other changes of the eggshell.

**Table 2.** Production parameters of the hens with disorders of the calcium-phosphorus metabolism

	Period (days)	Average group size	Egg production per period	Egg production per hen	Laying percentage	Bodyweight (g)
Experimental	60	140	7309	52.2	76.01	2825
Control	60	140	8620	61.5	86.5	3235
Differences between the experimental group (Ca-P deficiency) and the control			-1311	-9.3	-10.49	-410

**4. Conclusions**

In a group of 140 hens aged 35 weeks, with calcium-phosphorus metabolism disorders, we

noticed 15.2% decrease of total egg production, 10.49% decrease of the laying percentage, 410 g lower bodyweight, 45.10% lower percentage of the eggs selected for incubation and 3.81% higher

number of eggs with soft or deformed shell. The hens with calcium-phosphorus metabolism disorders showed deviations of the chest bone, spontaneous tibia and femur fractures, as well as difficult walking

### Acknowledgements

The authors would like to acknowledge the assistance of Corina Zburlea, from Mixalim Impex SRL Frumusani, Calarasi.

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