

The Environmental Pollution Level with Excretory Phosphorus at Laying Hens In Romania

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Abstract. Experiments were realized using 6 hybrid Lohmann Brown Classic hens, grown individually in BPC 4 battery cages. Hens were fed with 5 different combined feed (NC) recipes, out of which 2 commercial (NC 1 - 0,62% total phosphorus –tP and NC 2- 0,73% tP), and 3 experimental recipes (NC 3 – 0,36% tP, with no phosphate but with phytase supplement; NC4 – 0,5 % tP with mono-sodium phosphate supplement and NC 5- 0,5% tP with mono-calcium phosphate supplement). The excretion was measured for 3 consecutive days and the tP content was determined, based on which, from the extremes difference, the daily and yearly environmental pollution level with phosphorus was calculated for the total number of Romania's egg laying hens. The unjustified expression of 313,43 P tons per year, equivalent to 68,95 tones of mono-calcium phosphate was concluded.

Keywords: pollution, environment, phosphorus, laying hens, digestibility

Introduction Insufficient quantities of phosphorus in food lead to inadequate mineralization of shell eggs, to decreasing of egg production, to high morbidity and mortality.

At laying hens, the nutritional requirements of available phosphorus gradually decreased to 0.25% (NRC 1994) and current experiments show that the food phosphorus level may decrease up to 0.11% phosphorus Nephites without causing turmoil production if the food is supplemented with phytase. Using phytic enzymes in poultry diets lead to increasing the availability of phosphorus absorption from food, increasing the amount of phosphorus used (retained) and thus reducing the amount of phosphorus removed by sewage. (1),(2),(3).

Aims and objectives. The research aims the evaluation of phosphorus excess from laying hens diet and evaluation of pollution with excess phosphorus from food.

Materials and methods. Experiments were carried out in the Platform for Interdisciplinary Research USAMVB from Timisoara, on six laying hens (GOC) which were fed with five diets (NC 1-NC 5) containing different levels of total phosphorus (tP), Nephites phosphorus (nPP) and available phosphorus (aP), with or without phytase. For adaptation, hens were fed for 10 days with each recipe, then followed by three days of measurements, when there were measured the amounts of given fodder and unconsumed fodder debris to determine the quantity of ingested fodder and faeces production. The fodder samples, the unconsumed remains and fecal samples were collected for 3 days to determine the content of dry matter (D.M.), calcium and phosphorus.

Results and Discussion. Digestibility measurements of D.M. from food and respectively of total phosphorus at the 5 fodder recipes allowed the comparative calculation of total phosphorus removed by sewage. The data analysis results found that the lowest tP excretion compared to D.M. from excretion was recorded at NC 3 where no fodder phosphate has been added but it contained

phytase (300 FTU Phyzime / kg NC), respectively 0.11 g tP per day (Tabel 1). The supplementary of food with monosodium phosphate (NC 4) and monocalcium (NC 5) at 0.25% tP in NC increased the amount of excreted tP / head / day to 0.13 g (NC 4) and 0.14 g (NC 5), respectively an increase in the daily excretion of P by 18.18% at NC 4, respectively to 27.27% at NC 5.

Tab. 1

Comparative average amount of total phosphorus (tP)
excreted daily in relation to the quantity of phosphorus from food

Specification	NC1	NC2	NC3	NC4	NC5
Excretion of D.M. day/g	29,47	30,33	28,00	27,63	29,27
tP excreted/day	0,28	0,22	0,11	0,13	0,14
tP (% din D.M excreted)	0,95	0,72	0,39	0,47	0,48
tP (%) comparative with NC 3	243,59	184,61	100	120,51	123,27

Commercial recipes NC 1 and NC 2 which were designed to avoid a possible deficiency of phosphorus in feed, showed a tP excretion of 0.28 g / day in NC 1, respectively of 0.22 g / day at a tP content in the feed of 0.75 % at NC 1 and 0.76% at NC 2, levels which exceed 3 times the total phosphorus (tP) level recommended by NRC (1994), commercial recipes being supplemented with phytase too. Related to 100g excreted D.M., compared with NC 3, it was recorded an increase of tP excretion by 20, 51% NC 4, 23.27% at NC 5, 143.59% at NC 1 and 84.61% at NC 2. In this regard, at least in the commercial recipes, tP excretion at laying hens increased in an unjustified and alarming way. Estimating environmental pollution was based on experimental data of excreted tP / bird / day and respectively of laying hens flocks provided by Union of Poultry Breeders.

The analysis results show that the use of phytic enzymes in food, while the food is not supplemented with phosphate, drastically reduce the phosphorus amounts removed by sewage. Comparison of the extremes, respectively NC 1 (containing 0.62% calculated tP) with NC 3 (with a level of 0.36% tP) shows a decrease with 313,431 To per year of phosphorus amount removed in the environment. The amount of phosphorus unjustified removed in the environment can be nutritionally quantified in a monocalcium phosphate saving of 68,954 To. Base of calculation: x Kg) tP x 220g/Kg monocalcium phosphate. The equivalent financial losses are of 47,454.14 euros / year, being known that a tone of monocalcium phosphate costs about 555 euros plus VAT.

Conclusion. Commercial recipes exceed the level of TP approximately 3 times compared with standards recommended by NRC (1994). Phytase supplementation of combined fodder recipes (NC) composed based on corn / soybean for laying hens do not require the addition dfe fodder phosphates in food. Excess of phosphorus supplementary excreted over nutritional needs of laying hens at national level is 313,43 tons per year which is equal to 68,95 monovcalcic phosphate unjustified wasted.

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