OPTIMIZATION OF PHOSPHORUS RETENTION FROM THE FEED BY BROILER CHICKENS ORGANISM USING PHYTASE

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ABSTRACT

Efficiency of microbial phytase in phosphorus utilization was investigated in fattening type of broiler chickens Cobb 500 fed soyabean-maize based feed mixtures from day 1 to 42. Broiler chickens were fed the following feed mixtures: control group (4.5 g per kg P), experimental group 1 (2.3 g per kg) and experimental group 2 (2.3 g per kg P + microbial phytase 0.1%). Each feed mixture were fed *ad libitum* to chickes in boxes in commercial poultry farm. To reflect the utilization rate of phytate phosphorus, were excrements of broiler chickens in the end of experiment collected. These samples were subsequently. For comparison of results took into account the phosphorus content in feed mixtures and in excreta. In addition we concluded that phytase addition to the feed mixtures helped to better utilization of phytate phosphorus from feed mixtures.

Key words: microbial phytase, phosphorus, broiler chickens, feed mixtures, excreta

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INTRODUCTION

Broiler diets have been mainly made from plant-based feed ingredients that, in addition to serving as dietary sources of starch (energy), protein, and fat, also contribute substantially to the total dietary phosphore content. However, over 60% of the total phosphore from conventional ingredients such as corn, wheat, and soybean meal **(Plumstead et al., 2008)**. The application of poultry waste with increased P to land can become an environmental concern if P is leached from the soil. This environmental problem is posing a great to intensive poultry fading on a global basis. The low biological availability of phytate P (PP) from most feedstuffs for poultry means that meeting the nutritional requirement of P will depend upon feeding feed phosphatases with higher availability or feeding a combination of a commercial feed phytase plus feed phosphatases (Managi et al., 2009). Environmental pollution due to excretion of certain unutilized mineral compounds like phytate phosphorus (PP) from large-scale poultry farming compelled the nutritionists to redefine the optimum levels of P and Ca for chicken (Rama Rao et al., 2006). There are numerous studies demonstrating the favourable effect of phytase on the phytate-P availability. In other words, phytase releases phosphorus from the phytate, making it available for monogastric animals thereby reducing environmental P-excretion. The use of microbial phytase in the monogastric feed is an attractive option to supply more digestible phosphorus to livestock and to overcome the shortage in mineral phosphates without imposing an additional risk to the environment and the food chain (as an effective and sustainable approach) **(**Huyghebaert et al., 2009).

MATERIAL AND METHODS

We realized an experiment at a commercial farm, where housing conditions were maintained for the fattening of broiler chickens. We used self model experimental technology of feeding and water feed. We used in the experiment the final fattening type of broiler chickens Cobb 500 and feed mixtures starter, grower and finisher with a higher proportion maize. The experiment consisted of three groups: control group and two experimental groups. Feed mixtures of one experimental group were enriched with microbial phytase derived from *Schizosaccharomyces pombe*. Other groups, control and experimental had different content of phosphorus.

Table 1 Scheme of the experiment

	Type of chickens	Phase of fattening	Group	P content in feed mixtures (g per kg)	Phytase
Experiment	*Cobb 500*	Starter	Control	4.5	-
		Grower	Exp. 1	2.3	-
		Finisher	Exp. 2	2.3	0.1%

Exp. 1 – experimental 1, Exp. 2 – experimental 2

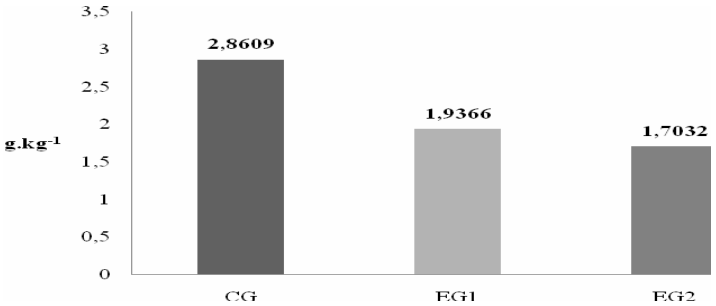
Every group in the experiment was different in composition of the feed mixtures. In control group were used traditional feed mixtures with P content 4.5 g per kg. Feed mixtures used in experimental groups were differed with the content of active substance. Both feed mixtures has P content 2.3 g per kg, but the second experimental group was supplemented with 0.1 % of microbial phytase.

Excreta samples were randomly collected from each followed group in the end of fattening. The excreta collections were pooled and dried for nutrient analysis. Phosphorus was analysed spectrophometrically by method AAS on equipment VARIAN 240 FS. Results were calculated on phosphorus content of the original matter.

RESULTS AND DISCUSION

During the fattening period broiler chickens fed diets with different compostition. Picture 1 shows content of phosphorus of ecxreted broiler chicken manure.

Figure 1 Phosphorus content in broiler chickens excreta (g per kg)



CG – control group, EG1 – experimental group 1, EG2 - experimental group 2

We conclude that the phosphorus content in the excluded exrements is lower in comparison with the phosphorus content in feed mixtures (table 1). However, we noted differences across experimental groups. Enzyme phytase was used in this experiment in order to reduce the rate of excretion of phosphorus by the body of chickens. The phosphorus content of excluded excrements is shown in figure 1. The lowest value (1.7032 g per kg) was reported in the second experimental

group, compared to the first experimental group (1.9366 g per kg). In the control group was recorded the highest content of phosphorus (2.8609 g per kg) in exreta, which may result in higher phosphorus content in feed mixtures compared with experimental groups. In addition we concluded, that phytase addition to the feed mixtures helped to better utilization of phytate phosphorus from feed mixtures. Based on the main effect of phytase with respect to % excreta retention of total phosphorus, it can be concluded that the diets with higher content of phosohorus would cause a decrease in % total phosphorus retention from the excreta compared to the diets with lower content of phosphorus (Managi et al., 2009). Sohail and Roland (1999) found that in broilers aged 4 – 6 weeks, the addition of 300 units of phytase per kg of maize-soyabean meal-based feed, allowed to reduce the non-phytate phosphorus content from 4.25 to 3.25 g per kg, without negative infuence on chicken performance and health. Rao et al. (1999) justifed reduction from 4.5 to 3.0 g nonphytate P per kg in maize-soyabean meal-based diets fed to growing broilers from day 3 to 30, when feeds were supplemented with phytase.

CONCLUSION

Decreasing phosphorus content in feed mixtures reduced phosphorus excretion in brolier chickens excreta. Phytase supplementatian also affected phospohrus retention in body of chickens. Clearly, supplemental phytases improve dietary phytate-phosphorus utilization by food-producing animals, and reduce environmental pollution of phosphorus from animal waste in areas of intensive animal production.

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