



Effect of phytase on phosphorus digestibility, production and bone traits in layer pullets and 3-month laying hens

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Project Timeline: July 2013 – February 2014

Summary

This research project is planned to test a new phytase product in low phosphorus diets in layer pullets and laying hens for monitoring the productivity and skeletal health.

Introduction

Phosphorus pollution is an important limitation to animal production in many regions of the world. Phosphorus has become much more expensive to add in poultry diet. Proper phosphorus nutrition is essential for maintenance of bones and skeletal health of layer pullets and laying hens. Development and optimization of new phytase products is an important part of modern animal agriculture.

Hypotheses:

- 1) Phytase will allow pullets and layers to obtain sufficient available phosphorus from a low phosphorus negative control diet.
- 2) High phytase levels have additional benefits on hen productivity and bone health.

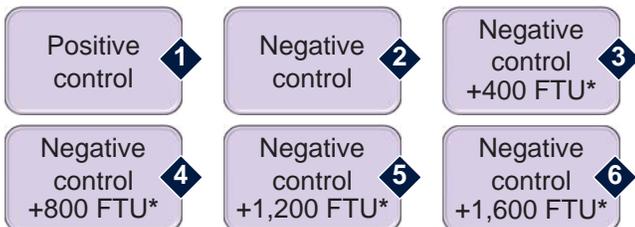
Objective:

To determine the efficacy of a novel phytase on the productivity and bone metabolism of immature layer pullets and mature laying hens in maintaining skeletal health, egg production and egg quality.

Materials and Methods

Experiment 1: The layer pullet trial

- ❖ Total 480 white egg layer pullets (Hy-Line), 1 day old
- ❖ 6 experimental dietary treatments as follows:



Positive control: nutritionally complete pullet diet
Negative control: nutritionally complete pullet diet, but reduced in available phosphorus (by 0.15%), calcium (by 0.16%) and sodium (by 0.035%)

* FTU = phytase units; Quantum Blue phytase

- ❖ The experiment will go to 18 weeks of age

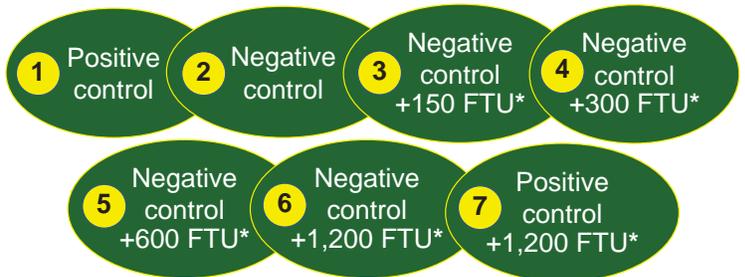
Study parameters:

- ✓ Body weight, feed intake, uniformity and mortality
- ✓ Fecal phosphorus and calcium digestibility
- ✓ Bone mineral density and bone breaking strength
- ✓ Total bone ash, calcium and phosphorus content

Materials and Methods (cont.)

Experiment 2: The 3-month laying hen trial

- ❖ Total 84 white egg layer pullets (H&N Nick Chick), 18 weeks of age
- ❖ 7 experimental dietary treatments as follows:



Positive control: nutritionally complete layer hen diet
Negative control: nutritionally complete layer hen diet, but without supplemental phosphorus
* FTU = phytase units; Quantum Blue phytase

Study parameters:

- ✓ Body weight and feed intake
- ✓ Total egg production, specific gravity of egg, egg shell strength and egg shell thickness
- ✓ Ileal phosphorus and calcium digestibility
- ✓ Bone mineral density and bone breaking strength

Expected Results

We expect that the new phytase product in low phosphorus diets will increase hen productivity and good skeletal health in terms of:

- increased total egg production
- increased egg quality; egg shell strength and thickness
- increased ileal phosphorus and calcium digestibility
- increased bone mineral density and bone breaking strength

Potential Benefits

The trial will increase understanding of bone metabolism in layer pullets and hens and test products intended to reduce phosphorus excretion and increase welfare. More efficient use of phosphorus by laying hens may increase bone health, and will reduce the need for supplemental phosphorus to meet the available phosphorus requirements of the birds.

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