



Project Title:

Effects of different dietary inclusion levels of LinPRO on production performance, egg quality characteristics and fatty acid profile of eggs in laying hens

Research Team:

Ewen McMillan, DVM, M.Sc. Nutreco Canada Agresearch
Andy Humphreys, M.Sc. Verus Animal Nutrition
Colleen Roehrig, B.Sc. Nutreco Canada Agresearch

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Background:

A common strategy for increasing Omega-3 dietary intake of humans is through the consumption of functional foods such as Omega-3 eggs. Since the fatty acid composition of the egg yolk is largely related to the fatty acid composition of the diet, enrichment of eggs can be achieved through the addition of ingredients containing Omega-3 fatty acids.

However, challenges exist with the creation of correct feeding strategies for increasing the rate of Omega-3 incorporation into the egg while reducing the cost of the animal diet. Several unknown factors exist in these diet formulations such as the impact of total fat content of the diet on the incorporation rate of Omega-3 fatty acid into the egg, as well as the optimum inclusion level of LinPRO (co-extruded flax and pulses) into the diet.

Objective:

The objective of this study is to investigate the effects of different dietary inclusion levels of LinPRO on production performance, egg quality characteristics and fatty acid profile of eggs in laying hens.

Study Design:

Twenty-four experimental groups of 500 Bovan hens each (12,000 hens total) were assigned to one of 8 dietary treatments (3 groups per treatment) at 46 weeks of age (26 weeks of egg production). Diets contained either 6 percent total dietary fat or 8 percent total dietary fat and 2.5 percent, 5.0 percent, 10.0 percent or 15.0 percent LinPRO (2 x 4 factorial design). Hens were fed an acclimation diet for 2 weeks and then their assigned experimental diet for 28 days.

Average daily feed intake (ADFI), average daily egg production (ADEP), feed conversion ratio per egg mass (FCR) and feed conversion ratio per dozen eggs (FCRdoz) were measured for the first 2 weeks, last 2 weeks and total 4 week treatment period. Eggs were collected on day 0 of treatment, day 14 and day 28. Egg weight, egg quality characteristics and egg fatty acid profiles were measured at each time point.

Findings:

Results showed that feeding 6 percent or 8 percent dietary fat and feeding LinPRO at a rate of 2.5 percent to 15.0 percent of diet had no relative impact on hen performance (ADFI, ADEP, FCR, FCR doz). Egg weight and egg shell quality were not impacted by dietary treatment.

Feeding higher levels of LinPRO increased the amount of linolenic acid in the egg and the total Omega-3 fatty acid level in the egg. Feeding higher levels of LinPRO reduced the amount of linoleic acid, Omega-6 fatty acid and total poly-unsaturated fatty acid in the egg. Feeding higher levels of LinPRO in the diet reduced the amount of palmitic acid and total saturated fatty acid in the egg. There was an interaction between the level of fat and the level of LinPRO for the amount of linoleic acid in the diet, but this effect reflected formulated differences in the amount of linoleic acid in different dietary treatments. The largest changes in fatty acid composition of eggs occurred from day 0 to day 14 of feeding, with small additional changes from day 14 to day 28.

Implications:

The results summarized from this trial provide valuable insight in the formulation of diets enriched with Omega-3 fatty acids, with the goal of increasing the rate of Omega-3 transfer into the egg in the most economical manner for the producer.

Funding:



For more information please contact O&T Farms Ltd.

P.O. Box 26011
Regina, SK
S4R 8R7

TEL: 306.543.4777
FAX: 306.545.0661
EMAIL: otfarms@otfarms.ca

www.otfarms.ca