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PLANT-BASED DIETS FOR HEAVY HEN TURKEYS

Introduction

There is an increased consumer demand for poultry to be fed diets free of animal by-products. Ingredients such as full-fat canola and full-fat soybeans, as well as canola oil and soybean oil, which have the potential to replace animal-based sources of protein and metabolizable energy, need to be further evaluated. Turkeys have a high protein requirement, therefore, high dietary costs. Research is required to evaluate potential least-cost feed ingredients that not only help meet increasing consumer demands for the removal of animal by-products but also result in potential decreased feed costs for the turkey producer. Research conducted by APRI indicated that roasted full-fat soybeans can partially or totally replace soybean meal in broiler turkey diets. However, fish meal and tallow were included in the diets as concentrated sources of protein and energy (MacIsaac et al. 2005). In addition to being a high quality protein source, oil retained within the whole bean makes soybeans an excellent source of energy. Raw soybean use by poultry is limited by heat-labile trypsin inhibitors, therefore soybeans have to be heat treated before use to destroy the inhibitor. One such method of processing raw soybeans is dry roasting. There are a number of farms with this capacity as well as commercial grain

roasting units which have emerged in the Atlantic region. Extrusion offers an alternative method of processing the raw soybeans where roasting is unavailable. A possible alternative to full-fat soybeans is full-fat canola. However, the use of full-fat canola seeds in poultry diets has not been extensively studied.

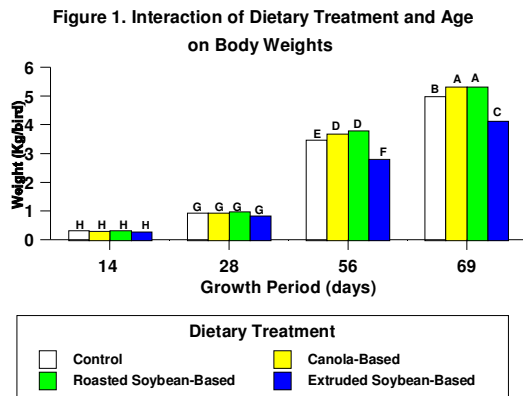
Trial

Turkey poults were fed either one of four dietary treatments varying in the supplemental protein and energy source: poultry by-product meal + poultry grease (control), full-fat canola + canola oil, flame-roasted full-fat soybeans + soy oil, extruded full-fat soybeans + soy oil. Locally grown and roasted (130.5°C) full-fat soybeans were purchased for the trial. Locally grown full-fat soybeans were also purchased and were extruded (120°C) on the NSAC farm.

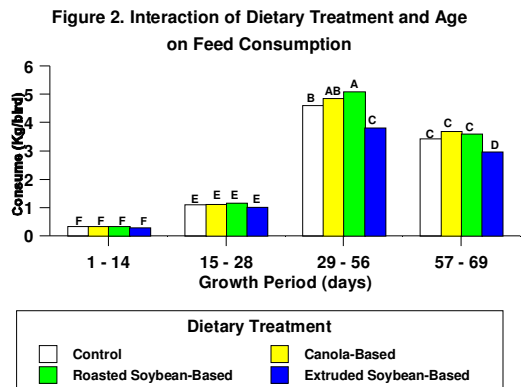
Results

At 56 and 69 days of age, dietary protein and energy sources affected ($P < 0.05$) body weights (Figure 1) of the turkeys. At both 56 and 69 days of age, birds fed the canola-based diet as well as the roasted soybean-based diet were heavier than those fed the other two treatments. In addition, birds fed the control diet were heavier than those fed the extruded soybean-based diet. Birds fed

the extruded soybean-based diets consumed (Figure 2) less feed than those fed the other diets during the 29-56 and 57-69 day periods. Many of the beans appeared to become blackened from the extrusion process which may have resulted in a reduced appetite for the diets containing the extruded soybeans. Dietary treatment did not affect ($P>0.05$) feed conversion (Table 1) indicating that the nutritional value of the extruded soybean-based diets did not affect the consumption rate of these diets. However, as the birds aged, the inclusion level of the extruded soybeans in the diet increased indicating the affect on feed consumption was probably due to the extrusion process. The on-farm extrusion of the soybeans was not easily controlled, however, commercial extrusion units are available in certain regions.



A-H Means with different letters differ significantly ($P>0.05$)



A-F Means with different letters differ significantly ($P>0.05$)

Table 1. Effect of Dietary Treatment on Feed Conversion

Treatment	Feed Conversion (feed/gain/bird)
Control	1.76
Canola-Based	1.81
Roasted Soybean-Based	1.91
Extruded Soybean-Based	1.78
SEM	0.05

Means do not differ significantly ($P>0.05$)

Industry Impact

Common supplemental sources of protein for poultry diets include soybean meal, fish meal and meat meals. Fats and oils are commonly added to poultry diets as concentrated sources of energy. However, there is an increasing demand by consumers to eliminate the use of animal by-products in poultry diets. Replacing meat by-products with either full-fat canola plus canola oil or roasted soybeans plus soy oil resulted in heavier body weights. Current market prices of ingredients will determine least-cost opportunities of plant-based diets for poultry.

Reference

MacIsaac, J.L., Burgoyne, K.L., Anderson, D.M., and Rathgeber, B.R. 2005. Roasted full-fat soybeans in starter, grower, and finisher diets for female broiler turkeys. *J. Appl. Poult. Res.* **14**:116-121.

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For more information on this project or any other project contact APRI@ nsac.ca