Feeding tannin and non-tannin faba bean to broiler chickens

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
$20,000.00	Completed	April 2018 – March 2020	Strategic Research & Development Program; Alberta Broiler Producers	$272,100.00

Project Description

The Canadian western poultry industry in contrast to the swine industry has not adopted feeding locally grown faba bean as alternative feed starch and protein source, but remain mostly feeding imported US soybean meal and corn. Experiments were conducted feeding faba bean to broiler chickens to provide information to poultry producers.

A concern of pulse growers is how the timing of planting and harvesting affect the quality of faba bean. To investigate, in Experiment 1, two cultivars of zero-tannin (Snowbird, Snowdrop) and one cultivar of low vicine/convicine (Fabelle) faba bean were planted and harvested early or late to increase the proportion of damaged beans. Harvested beans and a nitrogen free diet were then fed to broiler chickens. Late vs. early planting/harvesting increased energy, protein and amino acid digestibility.

One question poultry producers have is how rapidly one should introduce and up to what high inclusion level one could feed faba bean cultivars to broiler chickens. Experiment 2 tested feeding three different zero-tannin faba bean cultivars (Snowbird, Snowdrop and Tabasco) at three different introduction patterns by growth phase (Low: 5, 10, and 20%; Medium: 10, 20, and 30%; High: 15, 30, and 40% for the starter, grower and finisher growth phases, respectively). Neither cultivar nor inclusion pattern affected overall growth performance or yield of saleable cuts. Broiler producers can therefore feed any of the three zero-tannin faba bean cultivars evaluated at the most aggressive of the three inclusion patterns tested to maximize faba bean inclusion in broiler diets.

Outcome

Alberta Agriculture has determined before that colour flowered, tannin faba bean cultivars are more tolerant to frost around harvest time than white-flowered, zero-tannin cultivars. Tannins are antinutritional factors that concentrated on the seed hull reducing both starch and protein digestibility. Experiment 3 evaluated feeding two zero-tannin (Snowbird, Snowdrop) or two high-tannin (Fabelle, Malik) faba bean cultivars and dehulling to reduce tannin content. Feeding broilers low vicine/convicine tannin cultivar Fabelle resulted in slightly better growth performance but lower breast yield than feeding zero-tannin cultivars or tannin Malik. Dehulling faba bean did not improve broiler growth performance or carcass dressing to the level- of controls fed soybean meal.

Take-home messages of these experiments are:

• In contrast to what one would think is logical, frost damage at harvest time actually increased the digestibility of energy, protein and amino acid in faba bean cultivars vs. early planting/harvesting. We believe frost arrested the maturation process on the field despite desiccation. The harvested softer, immature, green cotyledon beans were more digestible than if bean maturation was complete.

• Broilers producers can feed any of the zero-tannin (Snowbird, Snowdrop, Tabasco) or tannin cultivars (Fabelle, Malik) tested and introduced them at high inclusion levels (15% in starter, 30% in grower, 45% in finisher) without being concerned of affecting growth performance, carcass traits, or yield of saleable cuts.

• There is no need to de-hull faba bean to reduce the effect of tannins concentrated on the hull as anti-nutrional factors. Broilers performed not differently either fed hulled or dehulled zero-tannin or tannin-faba bean cultivars.

Research Objective

OBJECTIVE 1
To establish energy and amino acid digestibility of tannin, zero tannin, frosted and non-frost damaged faba bean for poultry.

OBJECTIVE 4
To compare feeding of tannin, zero tannin faba bean varieties and dehulling on broiler growth performance, carcass and yield of cuts.

OBJECTIVE 2
To evaluate effects on nutrient digestibility of dehulling to reduce tannin content and hull frost damage.

OBJECTIVE 5
To calculate the reduction in carbon footprint feeding locally-grown faba bean vs. imported soybean meal.

OBJECTIVE 3
Dose-titrate inclusion of faba bean in broiler diets to optimize growth performance.