

Relative Importance of Anti-nutritional Factors on the Nutritional Value of Soybean Meal in Diets of Rainbow Trout (*Oncorhynchus mykiss*) and Methods of Overcoming Their Effects

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Overview

A feeding trial was completed several quarters ago in which diets containing high quantities of soybean meal were subjected to extreme processing conditions during pelleting, using a Buhler Twin-Screw Extruder (DN DL 44). Three processing variables were studied: (1) pre-conditioning or no pre-conditioning; (2) extruder barrel temperature (low or high); and (3) time during which the feed mixture was in the barrel (short or long). Various combinations of processing conditions were employed to produce rainbow trout feeds, which were subsequently used in a 12-week feeding trial to evaluate the effects of processing conditions on the nutritional value of the diets for the trout. These results have been reported, and initial diet analysis has been completed, but an error in feed sample handling in our laboratory made it impossible to conduct analysis for protein dispersibility index (PDI) and trypsin inhibitor activity (TIA).

Activity and accomplishments during the quarter

1. Experimental diets used for the rainbow trout growth study were re-manufactured using the same equipment, ingredients, and processing conditions as were used to produce diets for the rainbow trout feeding trial. Samples of these diets were analyzed again for proximate composition and energy content to ensure that they were essentially identical to earlier diets. Diet samples are currently being analyzed for PDI and TIA, with analysis scheduled for completion early next quarter.

2. Rainbow trout were fed control and high-soybean meal diets (40%) for six months to produce market-sized trout (>500g). These fish were killed, gutted, chilled, and sent by overnight courier to the Dr. Denise Skonberg, University of Maine, for sensory and nutrient analysis. Twenty fish from each dietary treatment group were sent.

Work planned for next quarter

1. Complete PDI and TIA analysis on feed samples and complete report on feeding trial.
2. Begin feeding trial with rainbow trout fed high-soybean meal diets supplemented with various volatile fractions of fish meal production to determine if they affect intake.

Previous work on another project demonstrated that partial hydrolysis of fish meal increased intake of high-soy diets by rainbow trout.

Table 1.

Ingredient			Batch	
	g/100g	g/100,000g	1	2
Fish meal	24.2	24,000		
Soybean meal	52.5	52,500		
Wheat flour	7.40	7,400		
Fish oil, inside	9.15	915		
Top-dress	6.00	----		
Vit premix	.50	50		
Trace mineral premix 3	.05	5		
Stay-C	0.20	20		
TOTAL	100.0			

Table 2. The effect of processing conditions on growth and feed conversion ratio of rainbow trout fed soybean meal based feeds.

<u>Temperature, F</u>	<u>Extrusion Time</u>	<u>Weight Gain, g/f</u>	<u>Feed Conversion Ratio</u>
200	18 seconds	193.3	1.08
200	36 seconds	191.5	1.07
260	18 seconds	201.5	1.05
260	36 seconds	187.2	1.03

Probability of Greater F value

Model	.05	.09
Temperature	.58	.01
Time	.03	.50
Temperature*Time	.09	.65