Production of Brook Trout Fed a Diet Enhanced with Flax Oil

Semmens, K.J., R.A. Kiser, C.R. Merriner and J. Jaczynski

West Virginia aquaculture is characterized by small flowing water systems for the production of trout. Growers using these systems must receive a higher price for their products and therefore cannot compete on a commodity basis. Many producers have turned to the recreational market as their primary outlet, yet it would be useful if growers had a niche market for food fish. The focus of this project is to develop a product that is unique in several ways. A native trout, Brook Trout, with superior flesh is featured. This species is not generally available as a food fish. The flesh would be enhanced with omega 3 fatty acids. It is expected the fish will have a different taste due to a different fatty acid profile.

Methods

The production experiment was conducted at the Reymann Memorial Farm aquaculture facility near Wardensville. Brook trout fingerlings (0.6 g ea) were obtained from WV DNR on 2/6/07 (day 0) and grown to 143 g for use in the experiment. All fingerlings were vaccinated against furunculosis prior to the experiment. On 9/25/07 (day 175) each of six raceway tanks were stocked with 200 kg of fingerlings. Three tanks were fed a control diet (42% Protein 16% fat) and three tanks were fed a diet enhanced with flax oil for 126 days. The experimental diet was made with the same ingredients as the control diet, but was sprayed with flax oil instead of menhaden oil following extrusion and drying. The daily feed ration was delivered with belt feeders, with the amount determined by a schedule designed to provide adequate nutrients for maximum growth. Data regarding growth rate, survival, length frequency, condition factor and feed conversion was collected at six week intervals during the culture period.

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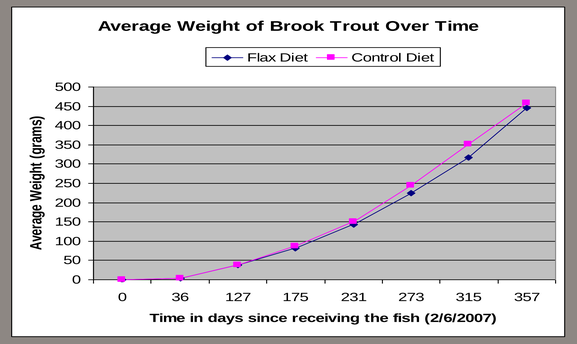
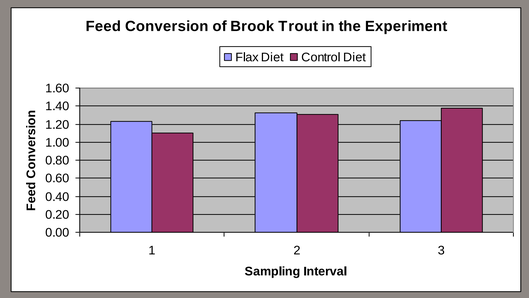
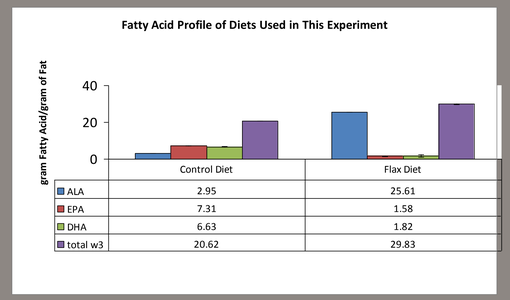
Fillets and feed samples were analyzed for fatty acid profile (FAP), total fat, and moisture content at six week intervals from 9/25/07 to the conclusion of the experiment. Fish from each tank were randomly sampled and filleted. Samples of each diet were taken for analysis. Fillets and the diets were separately homogenized in a laboratory blender. These samples were vacuum packed, labeled and stored at -80ºC until analysis. Lipids were extracted from the fillets, and diets, and used for analysis of fatty acid profile.

Results



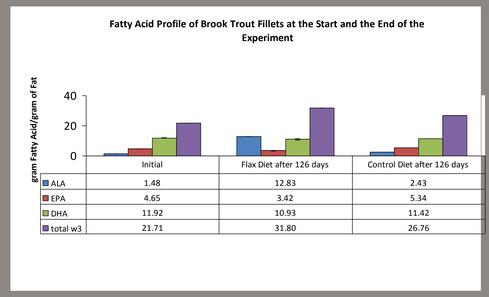
Fish grew and converted feed well in both treatments. Data from the third replicate during the third treatment interval was compromised by a bacterial infection and was not used in the figures. Mortality for the 126 day experiment averaged 4.3% and 2.2% in the flax and control treatments, respectively.





	Control Diet	Flax Diet
ALA	2.95	25.61
EPA	7.31	1.58
DHA	6.63	1.82
total w3	20.62	29.83

The fatty acid profile of the two diets was different. As expected, the profile of the diet enhanced with flax oil was dominated by ALA - linolenic acid (18:3ω3) rather than EPA - eicosapentaenoic acid (20:5ω3), or DHA - docosahexaenoic acid (22:6ω3).



	Initial	Flax Diet after 126 days	Control Diet after 126 days
ALA	1.48	12.83	2.43
EPA	4.65	3.42	5.34
DHA	11.92	10.93	11.42
total w3	21.71	31.80	26.76

The fatty acid profile of fillets for fish fed the two diets was different. Fish fed the diet enhanced with flax oil for 126 days had total omega 3 fatty acids of 31.8 (SD=0.13) gram of fatty acid/gram of fat, whereas fish fed the control diet had total omega 3 fatty acids of 26.76 gram (SD=0.11) of fatty acid/gram of fat. Levels of DHA were not significantly different between treatments, but levels of ALA were significantly higher in fillets of fish fed the flax enhanced diet.

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