

Evaluation of four grain legumes in diets for silver perch (*Bidyanus bidyanus*)

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Grain legumes have potential to replace fishmeal in aquaculture diets. Recent studies with the legumes *Lupinus angustifolius* and *L. albus* showed that removal of complex carbohydrates by dehulling or protein concentration greatly improved digestibility for both species when fed to juvenile silver perch. In the present study, four additional grain legumes were evaluated.

Two experiments were conducted to determine apparent digestibility coefficients (ADC's) for dry matter, energy and nitrogen (1). Chromic oxide (1%) was used as an inert indicator and faeces were collected by settlement. In the first experiment, eight diets were evaluated in a factorial design. Two hull-types (whole or dehulled) and four ingredients (field pea (*Pisum sativum*), faba bean (*Vicia faba*), chick pea (*Cicer arietinum*), and vetch (*Vicia sativa*)) were tested. In the second experiment, carbohydrate reduced (air classification : density separation) field peas and faba beans were tested.

ADC %		Field pea	Faba bean	Chick pea	Vetch
Dry Matter	Whole	62.0 ± 0.4 ^a	55.9 ± 0.3 ^b	48.7 ± 0.8 ^a	41.5 ± 3.2 ^d
	Dehulled	48.9 ± 2.2 ^a	58.2 ± 1.3 ^b	58.4 ± 0.7 ^b	78.3 ± 3.9 ^c
	<i>Concentrate</i>	<i>85.9 ± 4.0</i>	<i>66.3 ± 1.8</i>		
Energy	Whole	67.0 ± 0.2 ^a	62.2 ± 0.4 ^b	53.6 ± 0.8 ^c	55.5 ± 1.0 ^c
	Dehulled	54.5 ± 2.2 ^a	58.8 ± 0.7 ^a	60.2 ± 0.7 ^a	81.8 ± 2.3 ^b
	<i>Concentrate</i>	<i>91.1 ± 2.8</i>	<i>73.4 ± 2.0</i>		
Protein	Whole	83.3 ± 0.3 ^a	91.6 ± 1.3 ^b	84.8 ± 1.0 ^a	74.9 ± 2.6 ^c
	Dehulled	88.1 ± 1.0 ^a	96.6 ± 0.8 ^b	81.2 ± 3.5 ^a	87.7 ± 0.8 ^a
	<i>Concentrate</i>	<i>98.6 ± 2.0</i>	<i>95.0 ± 1.4</i>		

Values are means ± sem for three replicates. Row means with different superscripts are significantly different at P<0.05 (SNK). Significant differences between whole and dehulled ADC's for dry matter, energy and protein for each ingredient are indicated by *. Data in italics (Experiment 2) were not statistically compared with other data.

For the first experiment, both factors and their interaction were significant (P<0.05). From highest to lowest, dry matter ADC's for whole grains were: field peas>faba beans>chick peas>vetch, and for energy: field pea>faba bean>vetch>and chick peas. Dehulling greatly improved digestibility of chick peas and vetch, but reduced dry matter and energy digestibility for field peas and energy digestibility for faba beans. Protein digestibility was highest for dehulled faba beans and lowest for whole vetch. Dry matter and energy ADC's for protein concentrates of field peas and faba beans were much higher than for whole or dehulled grains.

These results indicate that dehulling can improve digestibility of some but not all grain legumes. Protein concentration of field peas and faba beans greatly increased dry matter and energy digestibility of these ingredients for silver perch. In light of previous investigations, reductions in ADC's for dehulled field pea and faba beans were unexpected, and further work is currently underway to re-evaluate the effects of processing on these ingredients.

1. Cho CY, Kaushik SJ. Nutritional energetics in fish: energy and protein utilization in rainbow trout (*Salmo gairdneri*). World Rev Nutr Diet 1990;61:132-172.