The effects of cooking on the digestibility of a practical diet containing starch products fed to juvenile silver perch, (*Bidyanus bidyanus*)

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Plant ingredients are being increasingly used as alternative protein sources to fishmeal in aquaculture diets. One of the consequences is an increasing starch content in least-cost practical diet formulations. Starch could provide a cheap energy source, spare expensive protein and lipid, and enhance the binding characteristics of diet pellets. The aim of this study was to compare the type of starch and cooking on the digestibility of practical diets fed to silver perch.

Diets compared in this study were a reference diet (SP35) (1), or diets containing 70% SP35 plus 30% of wheat or potato or maize starch. Each diet was supplied raw (R) or cooked (C) (autoclaved 121°C for 15 min) (diets 1-8). An extra diet comprising 85% SP35 and 15% pregelatinised (P) maize starch (diet 9) was also included giving a total of 9 diets. Faeces were collected by settlement, and apparent digestibility coefficients (ADC's) were calculated, with chromic oxide (1%) as the inert indicator (2). Dry matter, gross energy and nitrogen digestibility of diets 1-8 were compared using two-factor ANOVA with diet as the first factor and processing (raw or cooked) as the second. One-factor ANOVA was used to compare the ADC's of all diets.

Diet ADC's[1]	SP35		Wheat starch		Potato starch		Maize starch		
	R	C	R	C	R	C	R	C	P
DM (%)	64.8 ^{d}	72.2 ^{e}	57.7 ^{bc}	60.2 ^{c}	50.0 ^{a}	51.5 ^{a}	53.5 ^{ab}	56.4 ^{bc}	65.2 ^{d}
GE (%)	74.4 ^{d}	81.8 ^{e}	65.7 ^{c}	67.7 ^{c}	58.8 ^{a}	61.2 ^{ab}	61.5 ^{ab}	64.1 ^{bc}	73.3 ^{d}
N (%)	89.0 ^{a}	88.8 ^{a}	89.3 ^{a}	89.0 ^{a}	89.7 ^{a}	88.6 ^{a}	88.9 ^{a}	88.7 ^{a}	90.0 ^{a}

[1] Means within rows with the same superscripts were not significantly different (P>0.05; ANOVA; SNK).

Diet and processing influenced dry matter and energy digestibility of diets 1-8 (P<0.05). Digestibility of diets decreased significantly with: SP35 > wheat > maize > potato, for both dry matter, and energy. Cooking significantly increased the dry matter and energy digestibility and there was no interaction. For nitrogen digestibility, there was no significant effect of diet or processing, and there was no interaction. Dry matter and energy digestibility of the diet containing pregelatinised maize starch were significantly higher than diets containing raw or cooked starch products.

The ability of silver perch to digest dietary starch is influenced by the origin and complexity of the starch and processing methods used, such as cooking and extrusion. The significant benefits of cooking on SP35 suggest pelleted diets should be cooked (eg steam conditioned or extruded). Increasing gelatinisation improved dry matter and energy digestibility without decreasing nitrogen digestibility. Further research will be conducted to determine suitable starch inclusion levels, optimise the processing to maximise digestibility and ensure high pellet stability.

1. Allan GL, Rowland SJ. Development of an experimental diet for silver perch (*Bidyanus bidyanus*). Austasia Aquaculture 1992;6(3):39-40.
2. 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.