THE EFFECTS OF VARYING PROTEIN AND ENERGY CONCENTRATIONS ON GROWTH, PROTEIN EFFICIENCY RATIO AND FOOD CONVERSION RATIO FOR SILVER PERCH (*Bidyanus bidyanus* Mitchell)

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Silver perch *(Bidyanus bidyanus)* are a freshwater omnivorous species which form the basis for a new but rapidly growing aquaculture industry in New South Wales and southern Queensland. Determination of protein and energy requirements is crucial for the formulation of cost-effective fish diets. Fifteen diets containing five protein (25, 30, 35, 40 and 45%) and three digestible energy (DE) (10.5, 12.6 and 14.6 MJ/kg) concentrations were prepared using Danish fish-meal as the sole protein source, cod-liver oil to balance omega-3 fatty acid contents, soybean oil to provide omega-6 fatty acids and a mixture of lard and corn starch (at a ratio of 1:3) to provide required DE contents.

Published DE values for other species of fish of 167, 369, 374, 356 and 105 kJ/kg for fish-meal, fish oil, soy-oil, lard and corn starch respectively were used. Cellulose was used as a filler and a vitamin and mineral premix was added. Three extra diets were also provided; a practical diet with 35% protein which has been used previously in large scale rearing trials, and two diets with 35% protein and 12.6 MJ/kg DE but with different ratios of lard and corn starch. Silver perch (mean initial weight 1.2 g, range 1.0-1.4 g) were placed in aerated 70 litre aquaria (four replicates per diet) with continuously-flowing recirculated and freshwater (3:1) at a flow rate of 250 ml/minute. Temperature was 26°±1°C. Fish were acclimatised to experimental conditions for seven days and then fed experimental diets twice daily to satiation for a further 36 days.

Growth increased with protein and energy ($P<0.001$), although there was a significant interaction between these factors ($P<0.05$). For fish fed the lowest and highest DE diets, growth was not significantly increased by increasing protein from 40 to 45%. Conversely, for diets with 12.6 MJ/kg DE, growth was increased with an increase in protein from 40 to 45%. For all protein contents, growth of fish fed diets with 14.6 MJ/kg DE was significantly ($P<0.05$) greater than for fish fed diets with lower DE contents. Protein efficiency ratios (PER) were highest for fish fed diets with DE contents of 14.6 MJ/kg, and tended to decrease with increasing protein content. Food conversion ratios (FCR) (dry weight feed/wet weight gain fish) were lowest (best) for fish fed diets with higher protein and energy contents. Growth, PER and FCR were similar ($P>0.05$) for fish fed a diet with 40% protein and 14.6 MJ/kg, and a diet with 45% protein and 12.6 MJ/kg DE. Optimum requirements for protein and energy were not established, although the faster growth of fish fed lower protein and higher DE diets, compared with fish fed higher protein and lower DE diets, indicates the potential to replace protein in silver perch diets with other sources of energy.

Growth of silver perch on experimental diets (range of mean weights 1.1-3.2 g/fish) was less than on the control diet (4.2 g/fish). Possible reasons for this include differences in digestible energy of test ingredients between published values and actual values for silver perch; differences in the palatability and consumption between test diets and the control diet; and growth inhibiting factors in one or more of the ingredients in the test diets.

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