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“Development on the margin”

Assessing Specific Dynamic Action in *Cyprinus carpio* Fed Diets of Fishmeal, Magmeal and Rapeseed Meal

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Abstract

Feed constitutes more than 50% of operating expenditure in aquaculture. Excess dietary protein not only cost more but also increases energy cost of assimilation by increasing specific dynamic action (SDA). Increase in metabolic rate after feeding has been adjudged an important factor in water quality management in intensive culture systems. In the search for cheaper alternative protein sources in fish diets, preference should be given to ingredients that maximise production of fish while requiring less energy for metabolic activities. This study comparatively evaluated the effect of fishmeal, housefly maggot meal (magmeal), and rapeseed meal diets on the SDA of *Cyprinus carpio*. Three iso-nitrogenous and iso-caloric diets were formulated to yield crude protein of $36.46 \pm 1.28\%$ (mean \pm SD) and gross energy of 22.01 ± 0.79 (MJ/Kg) (mean \pm SD) using test feed stuffs. The experiment was conducted using respirometer. Ten round tanks (250l each) composed the respirometer. A total of 17 fish weighing 1 kg was stocked per tank. Tank 1 to 9 was stocked, while tank 10 (reference) contained no fish. Each feeding group was stocked in triplicates. Experimental fish were acclimatized 14 days. Water temperature was maintained at $14.27 \pm 0.03^\circ\text{C}$. Rate of oxygen consumption by fish (metabolic rate) was measured for 72 hours using O₂ measuring device which is transmitted and recorded online. On the first day, experimental fish were fed 1% of body weight at two feeding periods (0.05% at 8am and 2pm respectively). No food was given on 2nd&3rd day. For each protein source, rates of oxygen consumption (R_{mean}) were partitioned into components, representing resting rates (R_{rest}) and apparent specific dynamic action rates (R_{sda}). Maximal hourly rates (R_{peak}) were also determined. Feeding led to increase in oxygen consumption rates which lasted approximately 13–15 hours, in the three diets. Highest peak was obtained similarly in the three diets after 2 hours of feeding in the morning and 1 hour in the afternoon. No significant difference was recorded in R_{mean}, R_{sda}, R_{peak}, R_{rest}, Energy expended on SDA (kJ kg⁻¹) and SDA coefficient (%). The different protein sources did not alter distribution of energy into maintenance needs and apparent specific dynamic action (SDA) effects.

Keywords: *Cyprinus carpio*, magmeal, metabolic rate, respirometer, specific dynamic action