Effect of plant protein sources on the growth and feed utilization by *Palaemonetes varians* and *Palaemon elegans* (Crustacea: Palaemonidae)

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Objective

To investigate the feasibility of replacing fish protein with plant protein sources, namely, soybean, wheat gluten and corn gluten meals, in practical diets for the growth of *Palaemonetes varians* and *Palaemon elegans*


Palaemonetes varians


Palaemon elegans

Conclusions

P. elegans had better weight gain (WG), feed conversion ratio (FCR feed:gain) and retained nitrogen (RN) than *P. varians*

The total replacement of the protein source resulted in a reduction of the growth rate of *P. elegans*. Body protein and lipid concentration decreased when fed with the all plant diets

P. varians grow at a much slower rate than *P. elegans* and no differences were observed between diets
Results indicate that the reduction of fish meal inclusion in practical diets for these species can be carried on up to 50%, but less than that is not advisable

Material and methods

Initial shrimp weights averaged 0.12±0.02 g for both species

Rearing conditions

Indoor plastic rectangular tanks (10 l) with constant water cycling (10lh^{-1}) and moderate aeration
Same conditions for both species
Fifteen tanks (5x3) were used for each species; 50 shrimps in each tank
Temperature: 19.9°±0.1°C, salinity: 37.6‰ and photoperiod: 12L:12D
Food was supplied twice a day (≈10% shrimp's body weight).
Experiment: 45 days period
Shrimps were counted and individually weighted every 7 days

Diets

Five isoproteic diets (Diets 1 to 5) (39 g/ 100 g digestible protein (DP) and 14 MJ/kg DE) were used:

- Fish meal inclusion was decreased until total replacement by plant sources (soybean and wheat gluten). One diet made only with corn gluten meal as protein source was also produced

- Inclusion of fish oil and soy lecithin varied slightly to maintain similar percentages of lipids in the diets

- CaHPO4, cholesterol, vitamin and mineral premix levels were kept constant. Total proportions were adjusted to 100% by the addition of wheat flour, and lignosol was used as binder

- Diets were steam pelleted using a laboratory pellet mill (California Pellet Mill, San Francisco, CA)

Results

P. varians attain the same final average weight of 0.16±0.03 g irrespectively of the consumed diet. *P. elegans* specimens reach a final average weight of 0.23±0.03 g when fed with Diet 1, 2 and 3 and 0.19±0.03 when fed with Diet 4, 5. Both species evidenced a linear growth

No significant differences were found between the linear regression slopes of the five diets for *P. varians* ($F=2.041$; $p<0.1$). Extremely significant differences were found for *P. elegans* ($F=26.635$; $p<0.0001$)

For *P. elegans* better results were achieved with Diets 1, 2 and 3, whereas for *P. varians* the weight gain was poor and similar for all diets

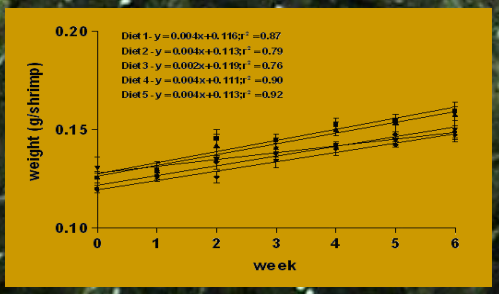

Figure 1 – *P. varians* weight gain obtained in this experiment

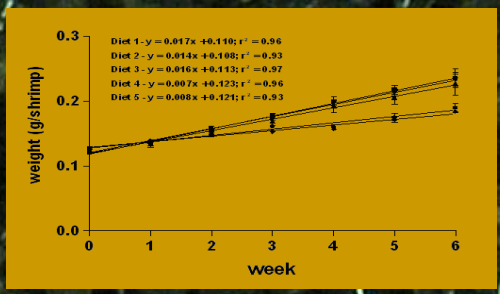

Figure 2 – *P. elegans* weight gain obtained in this the experiment