

BLUE LUPIN FOR WHITE SHRIMP (*Litopenaeus vannamei*)?

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Formulated feeds used for the growing production of carnivorous fish and crustaceans generally have a high protein content still met mostly by fish meal supply. Maintaining the steady and enormous growth of aquaculture production requires practical alternative protein sources. Terrestrial protein sources have been the focus of feed research for more than twenty years. Many studies test legumes like field peas, lupin and faba bean. Several different cultivars of lupin have been tested with different fish species mainly in Australia. The results of these studies are promising for example for salmon and seabass but. Lupin diets with a relevant replacement level for high value crustaceans are tested in the present study.

An experimental diet (Basis) with 30% fish meal as main protein source was formulated. *Lupinus angustifolius* kernel meal was added as 10, 20 and 30 % of the diet, incrementally replacing fishmeal. All diets were balanced to meet the requirements of *L. vannamei* in the grow out phase, concerning energy content, protein and amino acid profile, lipid and fatty acid composition, vitamins and minerals. These diets were compared with a commercial control.

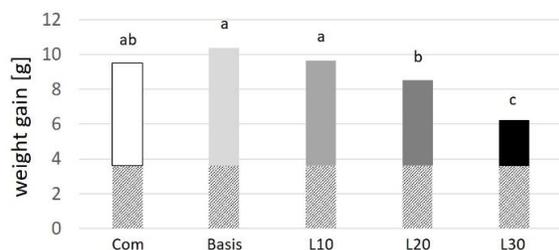


Figure 01: Weight gain of *L. vannamei* within 8 weeks

Feeding experiments were conducted over 8 weeks in a RAS device, with 18 separate 50 l tanks.

Mean survival rate of the shrimps was 65% across all treatments. Mean biomass of animals fed with high lupine levels (L30) was significantly lower than in control diets

(Basis and Commercial control) and L10 after 8 weeks. Metabolic analyses showed malnutrition of animals fed the L30 diet concerning glucose and triglyceride levels, although appropriate protein provision was attained with all experimental feeds.

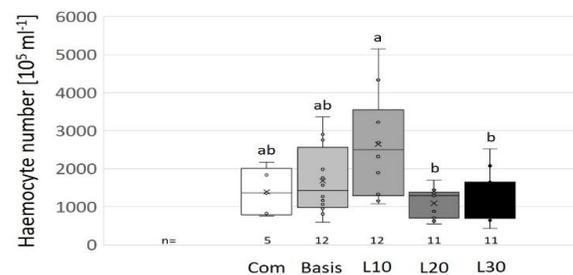


Figure 02: Total haemocyte counts show feed dependent variation

The total haemocyte count showed significantly higher counts in animals fed the L10 diet, which hints at an elevated immune capacity of these animals. This is an intriguing result concerning immunostimulation in cultured animals and needs further investigation. Untreated lupine meal can be used as an alternative protein source at rates of up to 10% (-20%) of the total feed (= **30-40% of animal protein**).