# VALUE ADDED MOLECULES FROM CLAM VISCERA

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**Introduction.** The clam *Megapitaria squalida* is a species commercially captured, distributed in the Gulf of California and along the Pacific coast from Scammon's Lagoon, Baja California Sur to to Mancora, Peru [1]. The viscera of clams (wasted fraction) represents around 20% of the soft tissue [2] which is source of protein and other potential value-added products like palatants and enzymes. The objective of the present work was to investigate the feasibility of recover value added proteins from the *M. scqualida* calm viscera to be used as source of protein for shrimp *Penaeus vannamei* Also we investigate the clam viscera as a potential source of enzymes that could be used in the food industry.

**Methods.** We used pH-shift solubilization process [3] to obtain the spry dried protein concentrate (PC) that was included in feeds at 0, 5, 10, and 15%. The feeds were tested in a bioassay using shrimp (*Penaeus vannamei*). Also the degree of hydrolysis (DH%) of the experimental feeds was evaluated by the pH-stat methotd [4] using the shrimp enzymes. Proximate and aminoacid composition was evaluated for feeds and the protein concentrate. Total proteolitic activity in the the digestive gland of the clams was measured at pH values from 5-11 and temperatures from 5-65 °C.

**Results.** Amino acid content of the PC from clam viscera (not shown), is a suitable source of protein for animal and with potential for human consumption. Amino acid content showed similar or higher values than international recommendations [5]. Te proximate composition showed lower ash content and higher protein and lipid content than raw clam viscera. Fig. 1 shows that 5% clam PC in feeds is enough to enhance the growth of shrimps

**Table1.** Proximate composition of the raw clam viscera and the protein concentrate expressed as dry basis (g/100g) ± estándar deviation.

| | Raw-clam | Clam-Protein concentrate |
|---|---|---|
| Protein | 72.7 ± 0.2 | 71.3 ±0.2 |
| Lipids | 5.7 + 0.1 | 9.5 ± 0.2 |
| Ash | 11.3 ± 0.1 | 9.5 ± 0.2 |
| Fiber | 0.03 ± 0 | 0.01 ± 0 |

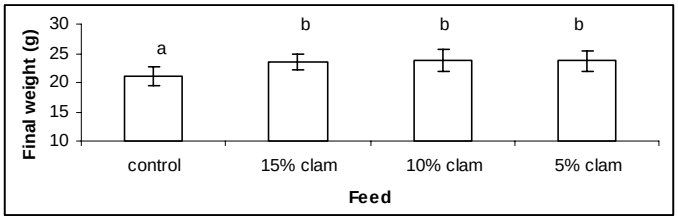


**Fig .1**. Final weight of shrimps fed feeds with different % of protein concentrate from clam viscera *P*< 0.05).

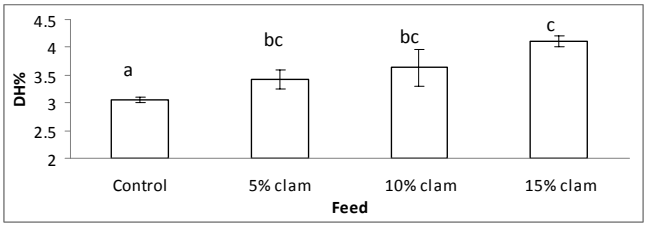


**Fig.2.** Degree of hydrolysis (DH%) of the experimental feeds using digestive enzymes from shrimp (*P*< 0.05).

The degree of hydrolysis (Fig. 2) showed that the control feed had lower DH% than the others, and no significant difference was found among the feeds containing clam PC as demonstrated by the multiple range tests (Tukey HSD).

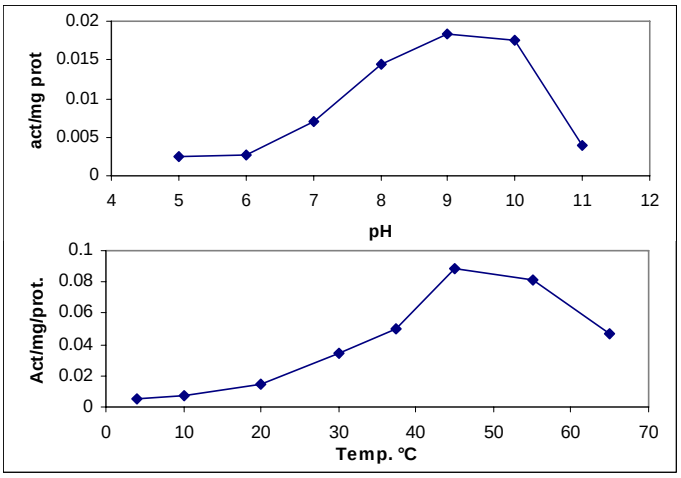


**Fig. 3.** The upper part shows the total proteolytic activity of enzymes from the digestive gland of *M. squalida* at different temperatures (substrate azocasein and 10 min incubation). The lower part shows the total proteolytic activity of the digestive gland *M. squalida* at different pH values (azocasein and hemoglobin as substrate and 10 min incubation).

According to Fig. 3, the proteases from *M. squalida* work fine at alkaline pH and at relative high temperatures.

**Conclusions.** The PC from clam viscera is a good candidate to compliment the protein sources used in commercial feeds as demonstrated. According with present results the proteases from *M. squalida* are good candidates for use in some processes of the food industry.

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**References.**

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