Nutrition and Feeding of the Brazilian Pink Shrimp *Farfantepenaeus paulensis*

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Resumen

Shrimp farming in Brazil is currently dominated by *Litopenaeus vannamei*, a species of undisputed zootechnical merits. In recent years, however, renewed interest in the farming of the pink shrimp *Farfantepenaeus paulensis* in southern Brazil has been stimulated by its market value and higher tolerance to comparatively low temperature levels.

F. paulensis proved relatively easy to rear through the larval stages but juveniles reared in ponds perform poorly on formulated feeds, usually displaying low growth rates. Recent research, however, has demonstrated that these problems may not be as intractable as previously thought. This paper reviews the latest developments on the nutrition and feeding of *F. paulensis*, with special reference to the studies conducted over the last decade by our research group.

Although extensive ecological and biological research has provided a comprehensive understanding of the biology of this commercially important species, relatively little attention has been given to the role of naturally occurring food items on its growth and development. One research line to be described in this presentation includes experiments testing the usefulness of biofilm - a microbial consortium associated with extracellular polymeric substances attached to submersed surfaces - as a food source for shrimp.

In an early study, we found evidence that the biofilm could serve as an important food source. On several trials, we detected no significant effect in terms of survival, but shrimp from treatments with biofilm had consistently higher growth rates than those reared in environments where biofilm was either absent or its availability was reduced. As a positive side effect, biofilm present within culture systems resulted in a reduced exportation of phosphorus and ammonium.

The contribution of biofilm and artificial feeds on the growth of *F. paulensis* was also evaluated using stable isotope (δ13C and δ15N) analysis. As a result of this experiment, we estimated that biofilm alone could account for more than 70% of the nitrogen used by *F. paulensis*.
Other issue that is being addressed includes the evaluation of heterotrophic rearing medias on the growth performance of *F. paulensis*. Early work indicated that the presence of microbial flocs had a significant effect on growth during nursery rearing. Further research, however, focused on the possibility of reducing the protein content of artificial feeds when rearing is carried out in heterotrophic media. In a traditional "clear water" trial, the crude protein requirement of *F. paulensis* was estimated at 45%. When rearing was carried out in a suspended microbial floc system, dietary protein levels as low as 35% were shown to have no significant effect on growth, which indicates that microbial flocs may have a significant role in fulfilling the protein requirements of cultured shrimp. A similar effect may be true for vitamin and minerals, which may render unnecessary the inclusion of these nutrients in commercial diet formulations when rearing is carried out in suspended microbial floc systems.
It is concluded that there are no insuperable problems for the development of *F. paulensis* culture, but further work is required in certain critical areas before economic feasibility can be demonstrated.
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