

SPRAY-DRIED PLASMA PROTEIN

Spray-dried Plasma powder is a high quality protein, which contains a high level of immunoglobulins (IgG).

IgG's play a central role in the immune system. They can bind bacteria and viruses. In trials with several animal species longer intestinal villi are seen and also less inflammation in the gut wall were observed.

It is expected that positive effects may also be seen in young fish. Therefore, plasma was tested as an ingredient in shrimp feeds. SDP might have a positive effect on the immune system and digestibility of nutrients in shrimp.

Shrimp farming worldwide is suffering more from opportunistic bacteria like *Vibrio*, which results in high usage of antibiotics. Various products have been tested to decrease the presence of *Vibrio* in the intestine and hepatopancreas of shrimp. Increasing the disease resistance is another strategy, which can be used simultaneously.

IgG is a heat sensitive molecule. To determine the effect of heat on the functionality of the immunoglobulins in SD-Plasma, feeds were tested with SDP added during production and undergoing the heat treatment (90-95°C of the pelleting process) and SDP added after pelleting at low temperature (20°C) through coating.

EXPERIMENT (MATERIAL AND METHODS)

A growth trial was done during 6 weeks. 5 treatments:

- **Control:** rich feed, high in fishmeal (no plasma)
- **Plasma 2P (Pressed):** 2% Fishmeal is replaced by 2% Plasma 70P
- **Plasma 2P/Control (Pressed):** after 3 weeks back to Control
- **Plasma 2C (Coated):** 2% Plasma 70P is vacuum coated afterwards at low temperature
- **Plasma 2C/Control (Coated):** after 3 weeks back to Control

RESULTS

After 6 weeks there is a significant positive effect of inclusion of 2% plasma in the feed.

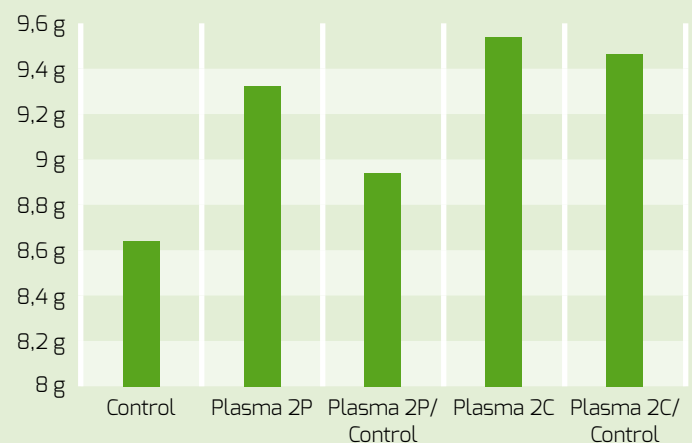


Fig 1: Final average weight of shrimp (after 6 weeks) receiving the control diet and plasma during 3 and 6 weeks.

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SURVIVAL

After 3 weeks, the shrimp receiving plasma pressed into in the feeds have higher survival rates than the shrimp without plasma or shrimp with coated plasma. After 6 weeks, the shrimp with plasma in the pellet still have higher survival rates. The increase of survival persisted till the end of the experiments, even when plasma application was stopped after 3 weeks.

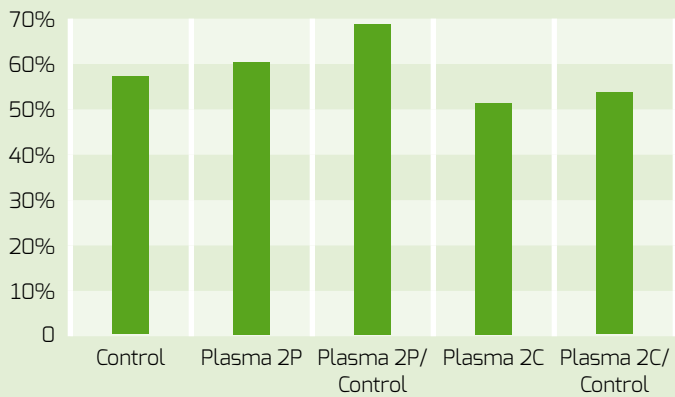


Fig 2. Final survival of shrimp (after 6 weeks) receiving the control diet and plasma during 3 and 6 weeks.

HISTOLOGY

After the growth trial, 10 shrimp from each treatment were collected and prepared for histology. They were send to Imaqua for histology section of intestinal epithelium height. Shrimp fed with plasma had higher epithelium height than the shrimp in the control group.

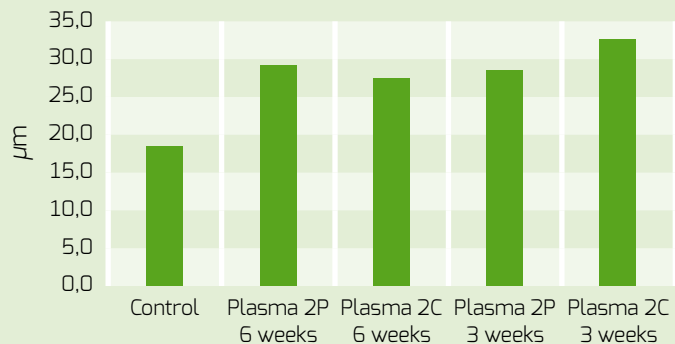


Fig 3. Midgut epithelium height (after 6 weeks) receiving the control diet and plasma during 3 and 6 weeks.

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CONCLUSION

The shrimp receiving Plasma showed better growth for both the pelleted feed and the coated feed.

In this trial the group of shrimp that received feed with the plasma coated showed no positive effect on survival, in comparison to the control and in contrast to the plasma that was mixed in the feed before pressing. The inclusion of Plasma in the diet for 3 or 6 weeks increased epithelium height.

This trial shows positive effect of spray-dried plasma on the growth performance, survival and gut wall morphology. From the performance there is not a clear line to conclude that pressing or coating is better. There was a potential risk that pressing might damage the immunoglobulins by the heat during preconditioning and pressing. The data do not support such a conclusion. The data show a positive effect that warrants further investigation on the right period for the inclusion of plasma in the formulation.

Based on this trial it can be advised to include Plasma in the diet of *Litopenaeus vannamei*. The usage of plasma can help to reduce the need for antibiotics in shrimp farming, shown by a better growth, a higher survival rate, which in this trial was supported by the observation that the epithelium height was positively influenced.

In this way Plasma is a very sustainable choice.



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