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# Effects of a phytonutrient on aquatic species raised under commercial conditions

By Josselin le Cour Grandmaison, Product Manager – XTRACT® range, Pancosma SA, Switzerland

Tilapia and shrimp farming are currently booming: Food and Agriculture Organization predicts that 12 million tons of tilapia feed will be produced by 2020. Shrimp farming is following the same dynamic from 2001 to 2014 shrimp aquaculture production has been multiplied by 13.

These sharp rises are not without consequences and numerous challenges have to be overcome by industry and farmers. Enhancement of growth performance and improvement of the animal health status are currently the two main issues for these aquatic species.

As a matter of fact, intestinal health, integrity and functioning are key elements in animal production and aquaculture. Physiological research has demonstrated that digestive tract is not only a place where digestion is occurring, but other systems as important as immune defenses are also taking a crucial place.

Some products are able to increase digestive secretions, protect gut epithelium and possess immune

modulating properties. However their effects are often tested *in vitro* or in research-like conditions precluding their real assessment at farm level.

The Swiss based company Pancosma, a global leader in feed additives, has developed concrete solutions for aquaculture farming. XTRACT® 6930 is a product composed of standardized protected particles containing carefully selected combination of bioactive substances found naturally in aromatic plants and spices. Focusing on a few, well known ingredients, a set of physiological reactions are triggered inside aquatic species digestive tracts: boosting feed utilization and modulating natural defense of aquatic species.

For instance, XTRACT® allows to better utilize feed via an enhancement of digestive enzyme secretions, the improvement of nutrients absorption and a reduction of maintenance requirements via its immune modulation action. It also permits to better endure external challenges without any need for antibiotics.

New trial results demonstrating XTRACT®

positive action on tilapia and shrimp have been set up in commercial-like conditions. We present the results in this article.

## Evaluation of XTRACT® on tilapia growth performance

Juvenile tilapia fish with a body weight of 2.56 g were transferred to 24 tanks: 200 fish were allocated per tank. Water in tanks was mimicking commercial situation.

Tilapia were fed with 3 different diets: negative control, 200 g/ton and 300 g/ton of XTRACT®. Each treatment was replicated eight times. The negative control consisted of a basal diet made of soy bean meal, fishmeal, wheat flour, rice, blood meal and a premix. The XTRACT® 200 g/ton and XTRACT® 300 g/ton diets consisted in the basal diet supplemented with of XTRACT® at 200 g/ton and 300 g/ton respectively. XTRACT® was previously mixed with fish oil and top coated at 2% onto the pellets in order to reach additive desired concentration.



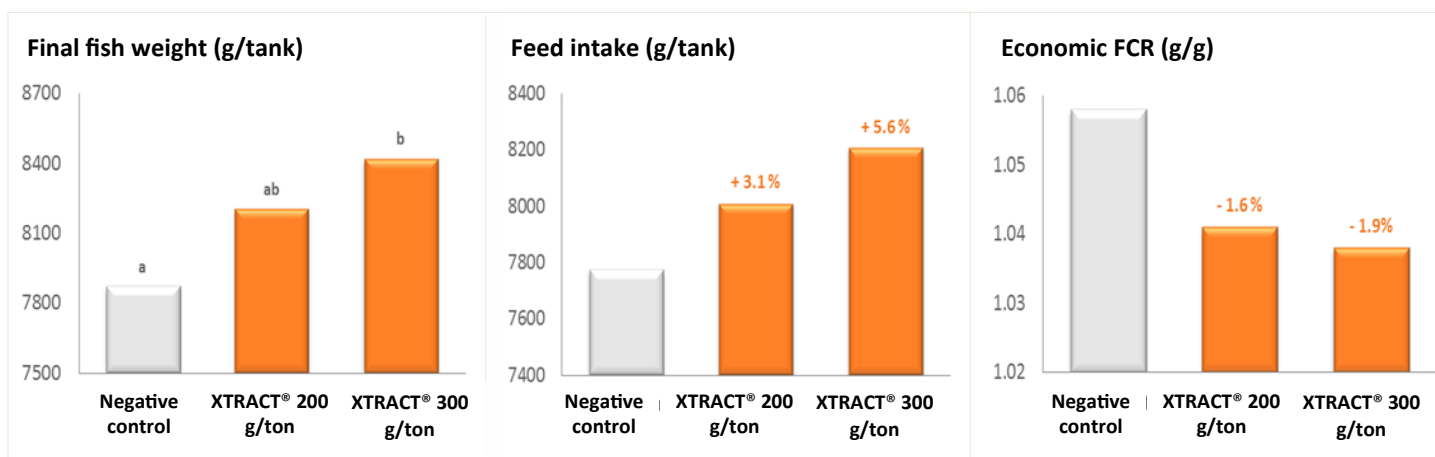
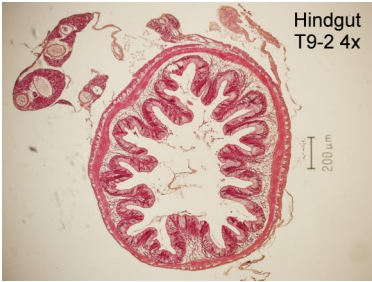

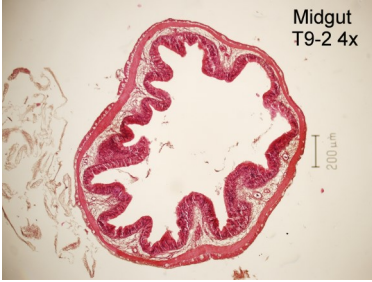



Figure 1, 2 and 3: Final fish weight, fish feed intake and Economic Feed Conversion Ratio (FCR) in function of treatment groups (a, b,  $P < 0.05$ ).  
 Economic FCR = Feed Intake / (Biomass Final – Initial Biomass)

Table 1: Histological evaluation of tilapia hindgut and midgut in function of two dietary treatments.

	Negative control	Tilapia fed with XTRACT® at 200 g/ton
Hindgut		
Midgut		
Comments	Disrupted and heterogeneous groups of villi	Intense and numerous well shaped villi

Compared to fish administered with negative control, tilapia fed with XTRACT® at two levels displayed better growth performance: higher final body weight ( $p < 0.05$ ), higher feed intake and improved economical feed conversion ratio (Figures 1, 2 and 3).

A dose response was noticed on tilapia growth performance: when XTRACT® dose was increased from 200 g/ton to 300 g/ton tilapia performance was also improved in a linear manner.

These results corroborate previous research performed on young tilapia in Thailand in 2015. Histological observation suggested that XTRACT® supplemented at 200 g/ton had a positive effect on absorption surface and intestinal integrity of tilapia (see Table 1). Intense and numerous well shaped villi were observed in comparison to control group.

Improvement of tilapia survival rate was also noticed when XTRACT® was supplemented at 200 g/ton and 300 g/ton of feed (Figure 4). This lower mortality could be explained by the ability of XTRACT® to modulate immune system and help aquatic animals to endure external challenges.

By courtesy of Dr Thomas Wilson

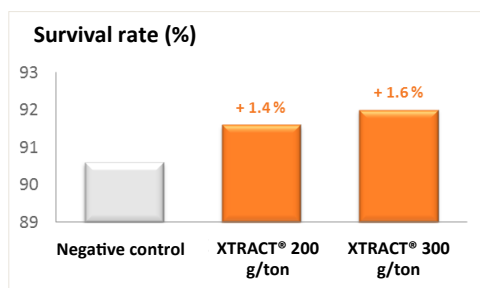


Figure 4: Tilapia survival rate in function of treatment groups

### Evaluation of XTRACT® on shrimp growth performance

Pacific white shrimps (*L. vannamei*) with a body weight of 3.06 g were allocated into 36 cages and raised during 63 days: 225 shrimps were allocated per cage. Cages were allocated in commercial shrimp pond.

Shrimp were fed with 3 different diets: negative control, XTRACT® 100 g/ton and XTRACT® 150 g/ton. Each treatment was replicated twelve times. The negative control consisted of a basal commercial shrimp diet with 35% of Crude Protein. The XTRACT® 100 g/ton and XTRACT® 150 g/ton diets consisted in the basal diet supplemented with of XTRACT® at 100 g/ton and 150 g/ton respectively. XTRACT® was added directly in to feed

via the premix.

Cages containing shrimps fed with diets supplemented with XTRACT® displayed higher final biomass and higher feed intake. When XTRACT® was supplemented at 150 g/ton of feed, large improvement of shrimp Feed Conversion Ratio was observed (-4.8%).

More importantly, shrimp fed with XTRACT® had a strongly higher survival rate in comparison with shrimp fed negative control diet. Again this better shrimp survival rate can be explained by

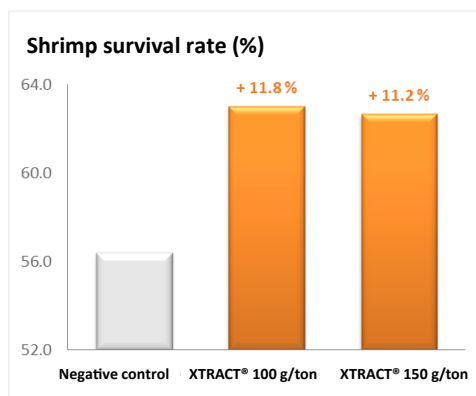


Figure 8: Shrimp survival rate in function of treatment groups

the ability of XTRACT® to help aquatic species to support external challenges and stresses.

### Discussion and Conclusion

Dietary supplementation of this phytogetic feed additive successfully improves performance of juvenile tilapia and pacific white shrimps. For these two aquatic species final body weight, feed intake, economic feed conversion ratio and survival rate were improved. Using comparative physiology it is possible to get insights of the product's true mode of action (Bravo. 2015).

Higher bile acid secretion and enhance lipase activity leading to a higher fat digestibility are effects mainly coming from capsaicin, a component of XTRACT® (Bravo et al., 2014; Ganesh Bhat et al., 1984; Jamroz et al., 2005). In addition anti-oxidant and immunomodulation properties exert a protective effect on gut membrane improving intestinal integrity and gut absorption surface (Awaad et al., 2014; Karadas, Pirgozliev et al, 2014).

Thus phytonutrient XTRACT® answers one of the main demands of industrials and farmers regarding tilapia and shrimp farming: better feed utilization and resistance to external challenges and stresses. This solution has the potential to generate greater financial profit to

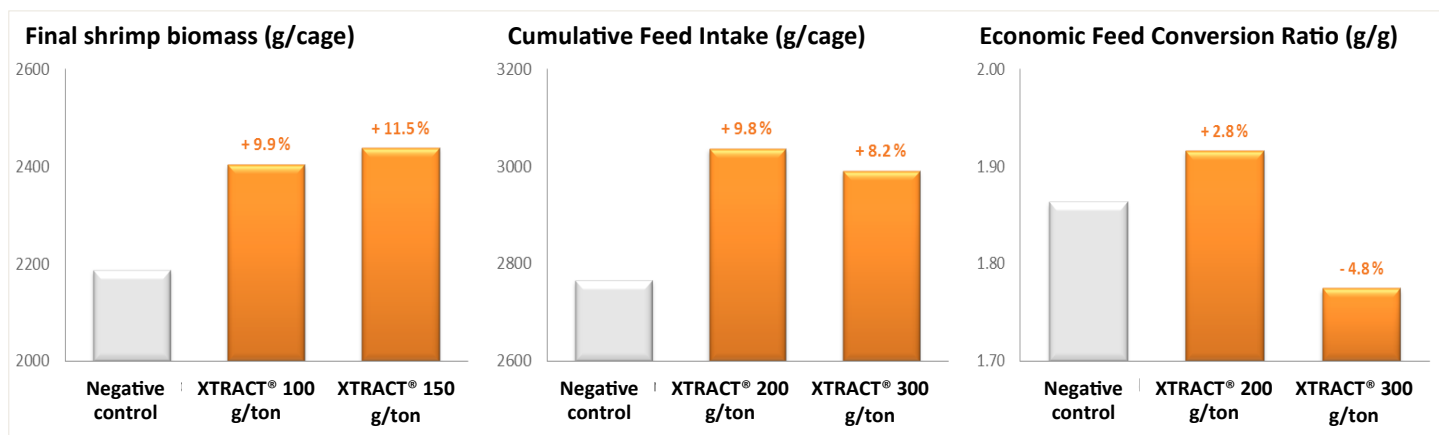


Figure 5, 6 & 7: Final shrimp biomass, Cumulative Feed Intake and Economic Feed Conversion Ratio (FCR) in function of treatment groups.  
 $Economic\ FCR = \frac{Cumulative\ Feed\ Intake}{(Biomass\ Final - Initial\ Biomass)}$



Trials at experimental farm in Vietnam

aquaculture stakeholders.

In addition to phytonutrients, Pancosma has designed additional feed additives based on their expertise. This portfolio for aquatic species includes organic trace minerals and health enhancers.

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*Thus the phytonutrient answers one of the main demands of industrials and farmers regarding tilapia and shrimp farming: better feed utilization and resistance to external challenges and stresses. This solution has the potential to generate greater financial profit to aquaculture stakeholders.*

## More information

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