Research Feature: AquaVac* Ergosan* Enhances Growth and Survival in Juvenile Chinook salmon (*Onchorynchus tschawytscha*).

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Introduction

The major objective in aquaculture is to improve productivity by increasing survival and improving feed efficiency. Successful improvements in these parameters ultimately lead to better economic performance. In addition to improving overall performance, it is critical that the majority of the population achieve minimum standards. For example, salmon smolts need to achieve minimum size for transfer to sea, whilst shrimp prices are determined according to size category. Such criteria will determine the viability of an operation; controlling parameters that influence these is critical for successful farming operations. Improved health status and feed performance go hand-in-hand to achieve the improvements required.

The use of immunomodulators/feed additives as an integral part of aquaculture management strategies has received increased attention in recent years from researchers and fish farmers alike. As a result, a number of commercially available products are now used by the aquaculture industry worldwide.

This article reports on some work carried out in New Zealand to assess the impact of AquaVac Ergosan use on the performance of juvenile Chinook salmon.

What is AquaVac Ergosan and what does it do?

AquaVac Ergosan is a complementary feedstuff comprised of dried seaweed and plant extracts from *Laminaria digitata* and *Ascophylum nodossum*. The principle components are registered food additives: Algines and alginic acids.

Research has demonstrated that AquaVac Ergosan can 'switch on' key immune genes such as Tumour Necrosis Factor alpha (TNF-α) and Interleukin-1 beta (IL-1β) when injected into rainbow trout (Peddie *et al*., 2002), whilst in-feed application is effective in reducing the incidence of Rainbow Trout Fry Syndrome (RTFS) and subsequent mortality rates (Anon, undated). Moreover, work recently published from Italy has shown that enhanced levels of lysozyme, complement and heat-shock-protein can be detected in sea bass fed with AquaVac Ergosan (Bagni *et al* 2004).

Trial design and logistics

The trial was set up in the commercial production facility using six raceways containing between 110,000 and 148,000 fry in each. The raceways were randomly assigned as experimental or control groups. AquaVac Ergosan was incorporated into a commercial fry diet at an inclusion rate of 0.5% (5kgs per tonne of feed) and fed at 2.1% per day. The

AquaVac Ergosan containing diet was fed for two 10-day periods in pulses, the first being from June 10th to 19th and the second being from August 3rd to August 12th 2004. This reflects the expectation that the effects of feeding AquaVac Ergosan last between 25 and 30 days. (Bagni *et al.* 2004, Dr C Gould pers com).

Mortality and growth rates were recorded on a daily and weekly basis respectively, whilst routine fish health checks were carried out periodically. The grade of the fish was an important production parameter that was assessed at the end of the study.

The trial was divided into two phases:

Pre-split: This covered the time from first feeding the fry in the raceways with AquaVac Ergosan to the time when they had outgrown the capacity of the original raceways and were split in order to reduce the stocking densities (June to July 2004).

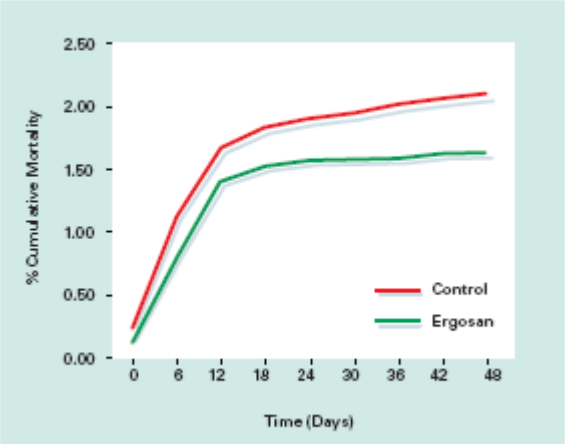
Post-split: From after this time point until the final hatchery grade (July to September 2004). Grading took place on 13th September.

Results

Results Pre-split

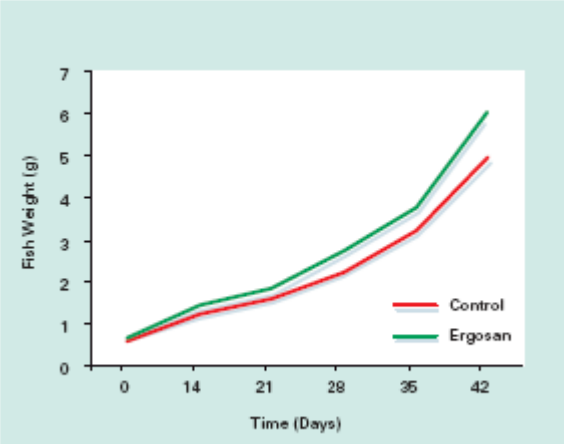
- There was a significant effect of diet ($p<0.05$) and time ($p<0.001$) on cumulative mortality rate (by two-way ANOVA) (see Figure 1).

Figure 1. Cumulative Mortality Pre-split (error bars not shown).



- There was a significant effect of treatment over time ($p<0.001$) and diet ($p<0.05$) on average fish weight (by two-way ANOVA) (see Figure 2).

Figure 2: Average Fish Weight Over Time for the Pre-split Period (error bars not shown).



- Although both SGR and FCR were more favourable in the Ergosan treated groups, the difference was not statistically significant. (see Table 1).

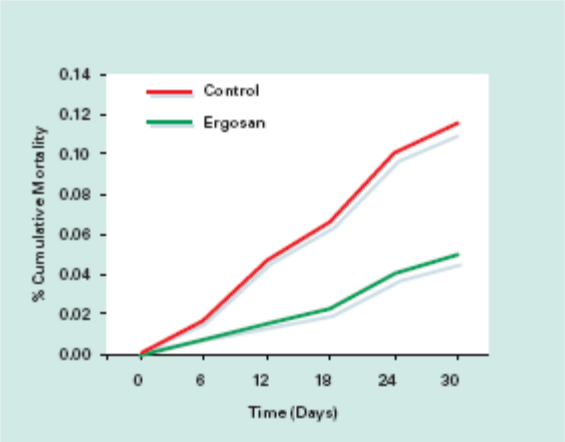
Table 1. The effect of AquaVac Ergosan on SGR and FCR Pre- and Post-Split (error bars not shown) (do you need this refence to error bars for a table?

Diet	**SGR (Mean)**		**FCR (Mean)**	
	Pre-Split	*Post-Split*	*Pre-Split*	*Post-Split*
Ergosan	4.7	3.0	0.79	0.89
Control	4.5	3.1	0.90	0.98

Results Post-split

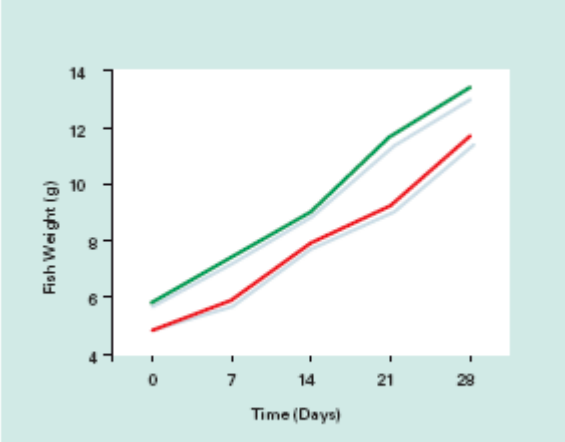
- There was a significant effect of diet ($p<0.05$) and time ($p<0.001$) on cumulative mortality rate (by two-way ANOVA) (see Figure 3).

Figure 3: Cumulative Mortality Post-split (error bars not shown)



- There was a significant effect of treatment over time ($p<0.001$) and treatment ($p<0.001$) on average fish weight (see Figure 4).

Figure 4: Average Fish Weight Over Time for the Post-split Period (error bars not shown).

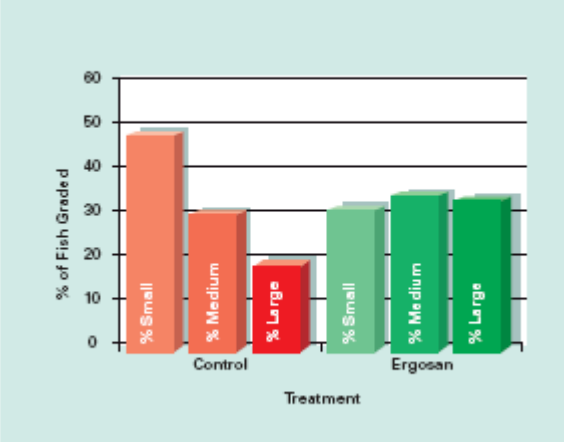


- FCR was more favourable in the Ergosan treated group, although this difference was not statistically significant. SGR was almost identical between groups (see Table 1).

Grading Results

At the end of the trial when the fish were graded the AquaVac Ergosan fed group yielded a higher proportion of 'large' grade fish than the control group. Indeed, 69% were in the 'medium' to 'large' grade with only 32% in the 'small' grade (which were culled). In the control group, 49% of the fish were classed as 'small' and were therefore culled (see Figure 5).

Figure 5. The Effect of AquaVac Ergosan on Grade-Mix at the End of the Trial



In Conclusion

1. The results of this preliminary trial show that fish fed with AquaVac Ergosan had lower overall mortality rates than those fed on a normal production diet.
2. No specific disease was recorded during the trial.
3. The FCR and SGR were improved in the fish fed AquaVac Ergosan. Although these differences were not statistically significant, the fish fed on the AquaVac Ergosan diet were significantly larger than the controls.
4. The grade of fish produced on the AquaVac Ergosan diet was substantially improved compared to the controls**,** with 69% of the fry reaching the critical size compared to only 51% in the control group**.**
5. AquaVac Ergosan can play an important role in improving production efficiency in farmed Chinook salmon.

*Trademark.

References and Further Reading

Anon (undated). Clinical Study: reduction of mortality caused by Rainbow Trout Fry Syndrome (RTFS).
http://www.thefishsite.com/FeaturedArticle/FATopic.asp?AREA=HealthAndWelfare&Display=1

Bagni, M., Romano, N., Finoia, M.G., Abelli, L., Scapigliati, G., Tiscar, P.G., Sarti, M. & Marino, G. (2005). Short- and long-term effects of dietary yeast β-glucan (Macrogard) and Aliginic acid (Ergosan) preparation on immune response in sea bass (*Dicentrarchus labrax*). *Fish & Shellfish Immunology* **18**, 311-325.

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