MINISTRY OF DEVELOPMENT - GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY

H.C.M.R.
HELLENIC CENTRE FOR MARINE RESEARCH

FINAL REPORT

Project title

«"Effect of using different levels of organic acids in sea bream fish feeds in regard to growth, feed efficiency and mortalities". »

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1. Introduction

Acid preservation of fish and fish viscera to produce fish silage has been a common practice and its final product has been widely used in fish feeds with reported beneficial effects (Asgard & Austreng, 1981). These beneficial effects of acid preserved products caught the attention of the scientific community to investigate the dietary effects of using these short chain acids on fish directly (Luckstadt, 2006)

In a recent trial the inclusion of an organic acid blend, mainly consisting of formate and sorbate, in rainbow trout diets resulted in improved weight gain and feed conversion ratio in trout fed the highest inclusion level of organic acid blend compared to the control group (de Wet, 2005). Similar results are reported for the inclusion of lactate in Arctic charr diets, while the addition of proprionate in Arctic charr feed had a growth depressing effect compared to the control group (Ringo, 1991).

Taking into consideration the above studies, the use of organic acid blends appears to be a promising way to improve growth performance and feed efficiency of fish culture.

1.1 Aim

The aim of this study was to determine the effects of two levels of two different organic acid blends in sea bream fish feeds on growth performance, mortalities and feed utilization, in juvenile sea bream (*Sparus aurata* L.).

2. Materials and methods

2.1. Diets

Five commercial type diets were prepared in a laboratory scale containing fishmeal, soy bean meal and wheat meal as main ingredients. A control diet was used where no organic acids were included (Control), two diets were supplemented with two different inclusion levels of DP 485 10kg/ton of feed (DP48510) and 15kg/ton of feed (DP48515) in the diet and two diets were supplemented with two different inclusion levels of DP 442 10kg/ton of feed (DP44210) and 15kg/ton of feed (DP48515). DP 485 consists of purified sodium lignosulphonate blended with Formic acid, while DP 442 consists of purified sodium lignosulphonate blended with Formic acid and Propionic acid. The components of the diet were mixed in a Hobart mixer where water and oil was

added to obtain a soft paste. The paste was cold pressed and dried at 35^{o}C in a forced air circulator. Pellets were crumbled to an appropriate size, screened and fed to the fish. All diets contained approximately 45% protein and 18% fat. Their formulation and composition is given in Table 1.

2.2. Rearing and sampling

Gilthead sea bream (*Sparus aurata*) of an initial average weight 1.9g was supplied from a local farm. Fish were left to be acclimatized for 10 days and then were distributed in groups of 40 fish per tank to 15 cylindrical fiberglass tanks of 120 l each, three tanks per treatment. Each tank was supplied with filtered sea water (salinity 38%). Water was continuously aerated, so oxygen was kept close to saturation. The water temperature during the whole duration of the experiment ranged from 22 $\pm$ 2^{0}C.

Fish were fed *ad libitum* by hand three times per day, 7 days a week, except 1 day before weighing. Every 30 days fish were weighted in groups of five fish after anaesthetization with diluted phenoxyethanol.

Table 1: Formulation and proximate composition of the experimental diets %

	Control	DP48510	DP48515	DP44210	DP44215
Fish Meal	40	40	40	40	40
Soya been	15	15	15	15	15
Wheat Meal	16	16	16	16	16
Fish oil	14	14	14	14	14
Corn Glutein	13	13	13	13	13
Vit+Min	0,3	0,3	0,3	0,3	0,3
Cellulose	1,7	1.7	1.2	1.7	1.2
Organic acids		1	1.5	1	1.5
Moisture	7,63	7,92	7,38	7,18	7,90
Protein	43,21	44,60	44,97	44,26	44,58
Fat	18,18	17,97	18,52	18,27	18,55
Ash	6,38	6,43	6,59	6,85	5,14

2.3. Measurements and Analyses

Growth - feed utilization

The growth performance of the fish and feed utilization was measured according to Castell and Tiews, 1980 by the following formulae:
Specific growth rate (SGR)= (ln final weight - ln initial weight)*100/days
Feed conversion ratio FCR = feed consumed g / weight increase g
% feed consumption = feed (g)/fish*100/ (final weight/2-initial weight/2)/days

3. Results

3.1. Growth and feed utilization

Mortality incidents where scarce and random in all treatments due to parasites and not diet related. There was no statistically significant difference in all growth parameters. Feed utilization showed statistically higher values for the groups fed the organic acid blends. Table 2 and figures 1-3, show the growth performance of the fish as well as feed utilization.

Table 2: Growth performance factors and feed utilization of the fish fed the two levels of the different organic acid blends. *

	Control	DP48510	DP48515	DP44210	DP44215
Initial weight g	1.85±0.11	1.89±0.02	1.89±0.09	1.89±0.13	1.76±0.25
Final weight g	15.98±0.84	16.74±0.83	16.75±0.97	16.92±0.46	15.91±0.03
SGR	3.41±0.14	3.46 ±0.07	3.46± 0.02	3.48 ±0.09	3.40 ±0.17
FCR	1.25±0.14^{b}	1.10±0.06^{ab}	1.18±0.08^{ab}	1.07 ±0.03^{a}	1.15 ±0.04^{ab}
%feed consumption	4.25±0.32	3.82±0.17	4.08±0.26	3.73±0.08	3.90±0.32

*Values are means of three replicates expressed with the standard deviation between tanks

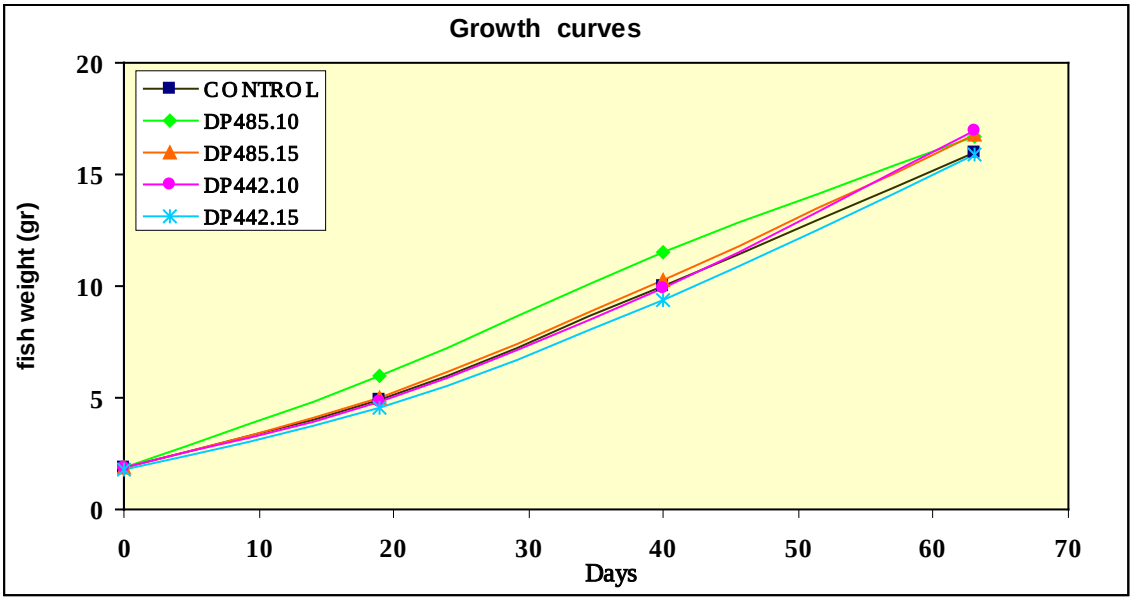

Figure 1: Growth curves of fish fed two levels of different organic acid blends.

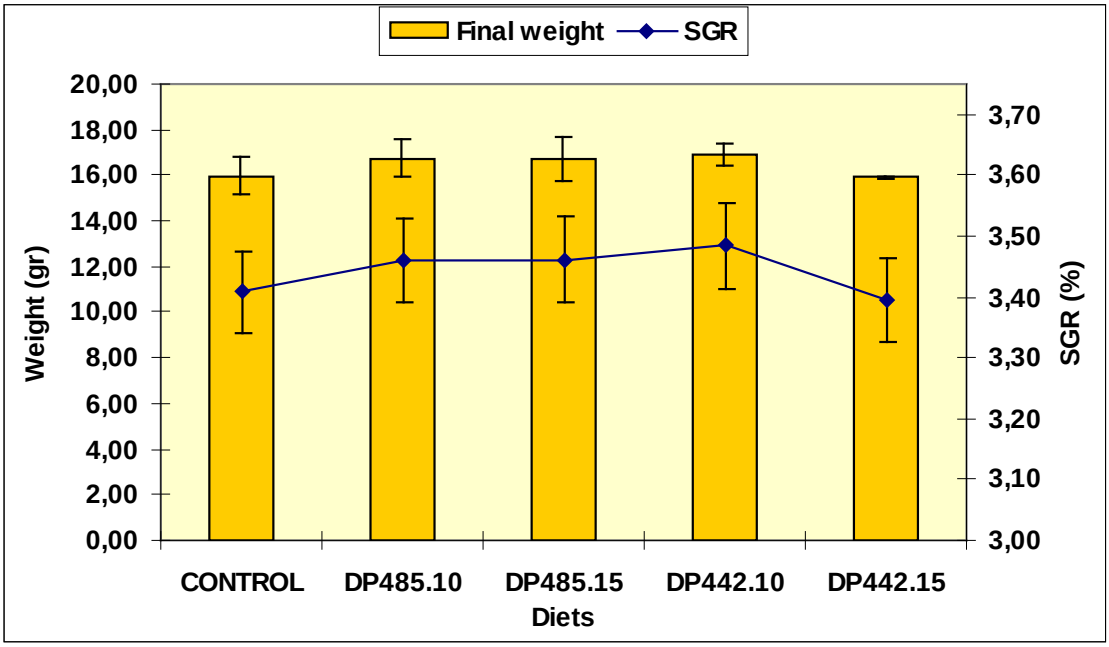

Figure 2: Final weight and specific growth rate of fish fed two levels of different organic acid blends.

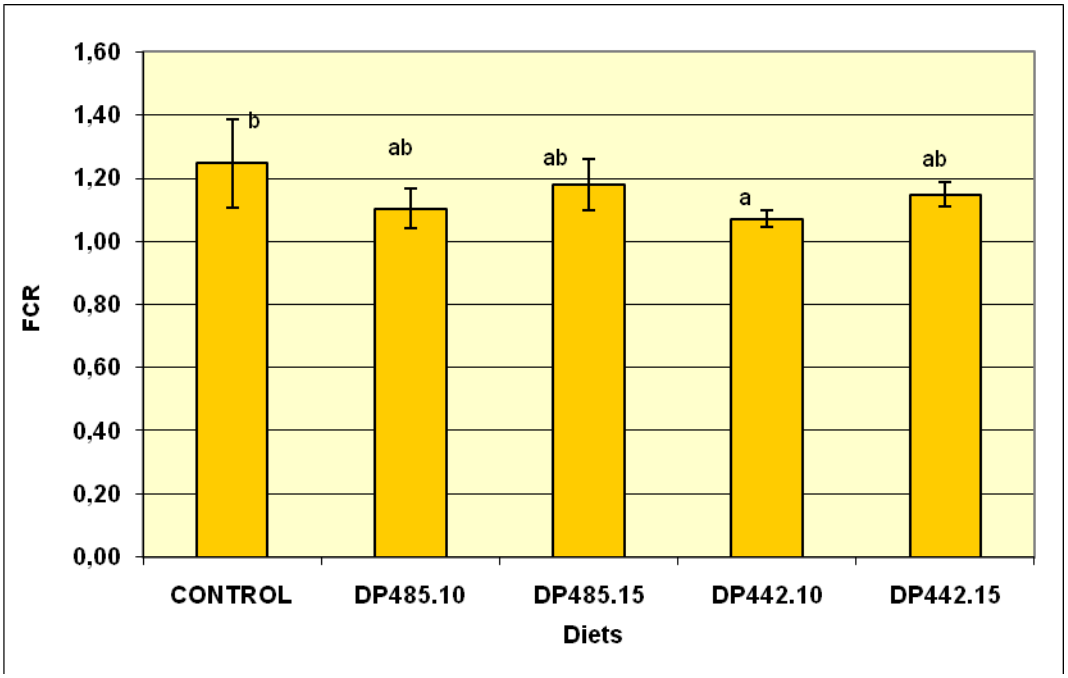

Figure 3: Feed conversion ratio of fish fed two levels of different organic acid blends.

4. Conclusions

- No significant differences (P>0.05) were found in growth performance of fish fed the different levels of the two organic acid blends.
- Feed conversion showed significant differences between the control and organic acid supplemented diets.

5. References

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- Ringo, E. (1991). Effects of dietary lactate and propionate on growth, and digesta in Arctic charr; Salvelinus alpinus (L.). Aquaculture, 96, 321-333.