

Phosphorus and Ammonia Reduction in Trout Pond Effluent © 2009

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ECOPROBIOTICS®, of the Bacta-Pur® System, are beneficial communities of natural bacteria, which have been on earth for millions of years and have been selected for their synergistic ability to biodegrade pollutants and to improve water quality. *ECOPROBIOTICS®* increase biodiversity. Just as people take probiotic yogurt for its' ability to assure the presence of the optimal community for digestion and immunity, *ECOPROBIOTICS®* improve ecosystem health. EVERY PRODUCTION of Bacta-Pur® products is analyzed and cleared for shipment ONLY after passing all performance tests and being CERTIFIED PATHOGEN FREE using techniques from the food industry. *ECOPROBIOTICS®* are purely natural and beneficial; they NEVER contain added chemicals such as surfactants, emulsifiers or enzymes..., nor do they contain genetically modified (GMO) or deliberately mutated organisms. *ECOPROBIOTICS®* are safe and beneficial. Disease causing organisms are never used, as others do or permit. All bacterial cultures in the Bacta-Pur® product are listed on the Canadian DSL.

Background

Aquaculturists face a growing problem of decreasing water quality. Increases in pollution not only can result in government intervention, but pollution also causes negative feedback on the production itself.

Ammonia and phosphorus are two of the most common problems. Even before lethal levels are reached excessive ammonia stresses animals. This, in turn, reduces feed conversion efficiency and increases susceptibility to diseases and reduced oxygen.

Increased loading of phosphorus is of concern because it accelerates the growth of algae and higher plants. This can be problem both within and after the aquaculture production facility.

Treatment Program

Two demonstration projects were conducted to define the benefits of bacterial augmentation on trout production. The trials took place in earthen raceways in Denmark. Both applications were based upon the use of 0.5 ppm (1 ml / 2 m³) of Bacta-Pur® N-2000+* continuously added to the influent. The first trial was of short term about 20 days; Bacta-Pur® was added only for the first six days.

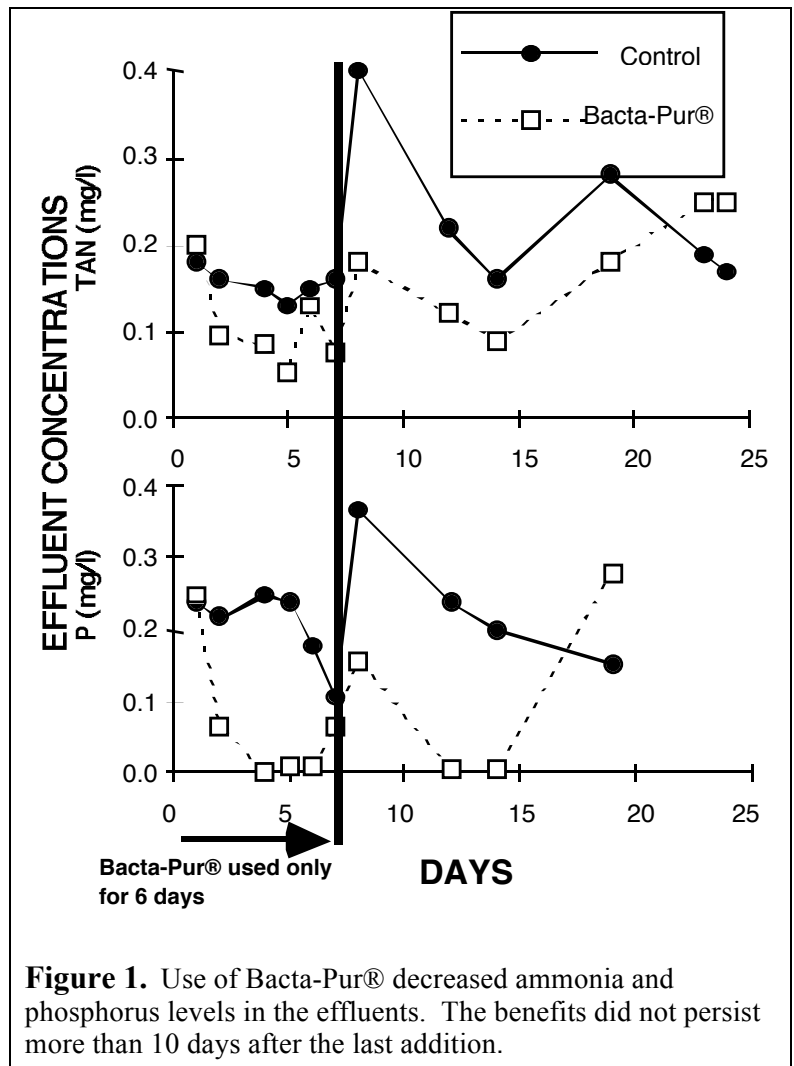


Figure 1. Use of Bacta-Pur® decreased ammonia and phosphorus levels in the effluents. The benefits did not persist more than 10 days after the last addition.



Total ammonia nitrogen (TAN) and phosphorus were monitored, in the pond effluents. The second trial lasted almost two months and also assessed the effects upon fish production. Three raceways were compared the influent of one received 0.5 ppm (1 ml / 2 m³) of Bacta-Pur® N-2000+ based on flow.

Results

Trial 1 — Both ammonia and phosphorus, in the effluent, decreased rapidly with the addition of Bacta-Pur® N-2000+ (Fig. 1). The benefits of the bacterial augmentation did not persist more than 10 days after the last addition by which time ammonia and phosphorus levels returned to those of the control.

Trial 2 — The bacterial augmentation decreased ammonia and phosphorus production with respect to both tonnes of fish produced and tonnes of food used. The amount of phosphorus, in the effluent, based on tonnes of fish produced, was 10 to 20 times lower with the use of Bacta-Pur® as compared to the controls. Simultaneous increase of conversion of food into fish flesh (Table 1) was also reported. These results could be explained, at least in part, by the uptake and conversion of phosphorus and ammonia into bacterial biomass, which is preyed upon by small invertebrates, which are in turn fed upon by the fish. The Bacta-Pur® converted the pollution into natural food.

Table 1. Effect of bacterial augmentation on trout production

<u>PARAMETER</u>	<u>Bacta-Pur®</u>	<u>CONTROL 1</u>	<u>CONTROL 2</u>
Species	Rainbow trout	Rainbow trout	Rainbow trout
Pond Volume	110 m ³	110 m ³	110 m ³
Flow Rate	10 L/sec	10 L/sec	10 L/sec
°C	9	10	10
Test Duration (days)	56	52	52
Stocking Size (g)	11.8	286	19.5
Final Size (g)	35.0	417	45.8
Fish Produced (kg)	998	137	401
Bacta-Pur® N-2000+ added (ml/day)	432 (0.5 ppm)	0	0
Effluent Concentrations			
Total Ammonia-N (kg/ton product.)	9.9	23.1	13.2
Total Ammonia-N (kg/ton food)	11.6	16.6	14.3
Total Phosphorous (kg/ton product.)	0.6	6.5	13.3
Total Phosphorous (kg/ton food)	0.6	3.2	9.5
Food Conversion	0.85	1.39	0.92

* Bacta-Pur® N-2000+ has been replaced by Bacta-Pur® N3000, which is more than 1000 times more concentrated.

