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## PRELIMINARY RESULTS ON BIOMASS OF *Artemia franciscana* KELLOGG PRODUCED USING DRY *Spirulina* AND TWO KINDS OF FERTILIZERS

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### NOTA CIENTIFICA

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### ABSTRACT

Two experiments were carried out in order to calculate the biomass of *Artemia franciscana* produced in 15 and 13 days, respectively. Experiment 1) 3 sets of 3 aquaria with 20 l of brackish water (20‰) each and 6 nauplius/ml were, respectively, treated with *Spirulina*, and two fertilizers: poultry excrement and "fosforin" with *Tetraselmis* as food item. pH varied 7.3-8.0, T °C varied 25.5-33.0, and O<sub>2</sub> mg/l varied 4.5-6.0. Biomass was between 13.0 g and 36.2 g in 20 l. Experiment 2) 3 sets of 3 concrete tanks with 120 l of brackish water (20‰) each and 1 nauplius/ml were treated as the aquaria above. *Chlorella* sp and *Pseudomonas* sp were dominant. pH varied 7.5-9.0, T °C varied 25.5-35.0, O<sub>2</sub> mg/l varied 0.5-3.4. Biomass was between 41.9 g and 86.5 g in 120 l.

### RESUMEN

Se llevaron a cabo dos experimentos con el propósito de calcular la producción de biomasa de *Artemia franciscana* en 15 y 13 días, respectivamente. Experimento 1) 3 módulos de 3 acuarios con 20 l de agua salobre (20 ‰) y una densidad de 6 nauplio/ml, se les proporcionó *Spirulina* y dos fertilizantes: gallinaza y "fosforin", con *Tetraselmis* como alimento. El pH varió 7.3-8.0, T °C varió 25.5-33.0 y el O<sub>2</sub> mg/l varió 4.5-6.0. La biomasa fue entre 13.0 y 36.2 g en 20 l. Experimento 2) 3 módulos de 3 tanques de concreto con 120 l de agua salobre (20 ‰) y una densidad de 1 nauplio/ml se alimentaron como el experimento anterior. En este experimento dominaron *Chlorella* sp y *Pseudomonas* sp. El pH varió 7.5-9.0, T °C varió 25.5-35.0, O<sub>2</sub> mg/l varió 0.5-3.4. La biomasa fue entre 41.9 g y 86.5 g en 120 l.

### INTRODUCTION

*Artemia* used as a food item fulfills most of the nutritional requirements for several organisms. Kinne (1977) quoted that more than 85 % of marine species had been cultured with *Artemia* nauplius used in their diet.

In order to obtain massive quantities of *Artemia*, this paper compares the biomass production using two different fertilizers supplied with *Tetraselmis* and other fed on dry *Spirulina*.

### MATERIALS AND METHODS

Two experiments at 20 ‰ of salinity were carried out in 15 days under laboratory (1) and natural (2) conditions. The first one (1): three sets (A, B, and C) of three 20 l aquaria each with density of 6 nauplius/ml were fed on dry *Spirulina* (A), and inorganic fertilizers (B), and organic fertilizer (C) supplied with *Tetraselmis*. The second one (2): three cement tanks (A, B, and C) of 120 l each with a density of 1 nauplius/ml were fed on dry *Spirulina* (A), inorganic fertilizer (B) and organic fertilizer (C). Temperature °C, pH, oxygen mg/l and *Artemia* biomass were registered.

### RESULTS

Both environmental and biological parameters from the experiment are shown in figure 1 (aquaria): pH varied between 7.3-8.0. Temperature varied from 25.5 to 33 °C. Oxygen varied from 4.5 to 6 mg/l. Biomass reached was 13 g (B) up to 36.2 g/20 l (A) in 15 days.

In figure 2 (cement tanks): pH varied from 7.5 to 9.0. Temperature varied from 25.5 to 35 °C. Biomass reached was of 41.9 and 47.8 g/120 l (C), and 53.4 to 86.5 g/120 l (A) in 13 days.

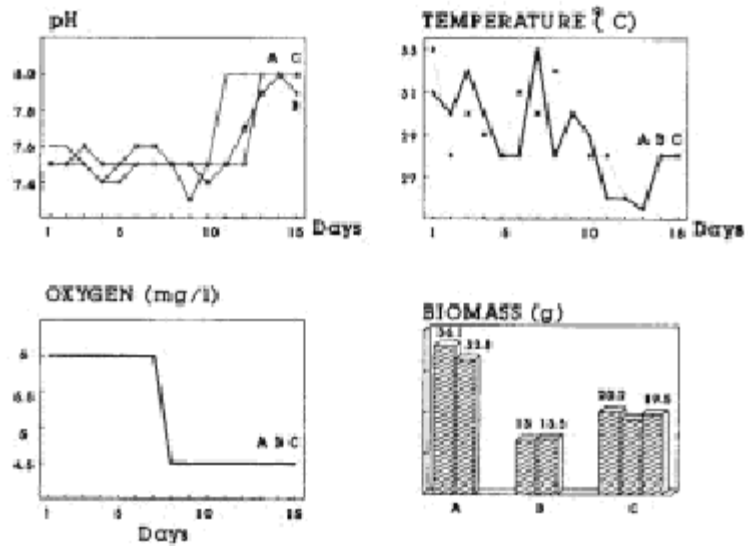


Figure 1. Experiment 1, shows pH, T °C, O<sub>2</sub> mg/l and total biomass variation in 3 set of aquaria A: *Spirulina*, B: inorganic fertilizer and C: organic fertilizer daily for 15 days.

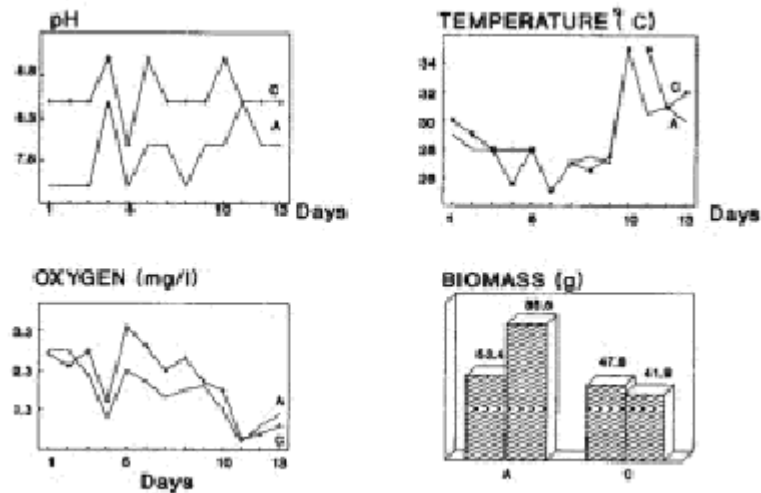


Figure 2. Experiment 2, shows pH, T °C, O<sub>2</sub> mg/l and total biomass variation in the 3 cement tanks A: *Spirulina*, B: inorganic fertilizer and C: organic fertilizer daily for 13 days.

In figure 3 (cement tanks: A, B. and C): variation of pH, temperature °C and oxygen mg/l were shown in 24 furs.

#### DISCUSSION

Buck (1988) used organic and inorganic fertilizers through different aquacultural systems to produce animal protein. In the present study *Artemia* was produced using organic and inorganic fertilizers. Kerns and Roelofs (1977) mentioned that bacteria and protozoas developed from fertilizers have a high nutritional value. Sorgeloos (1982) obtained more than ten thousands adults of *Artemia* per litre and more than 10 g/cm<sup>3</sup> daily using poultry excrement and inorganic fertilizers.

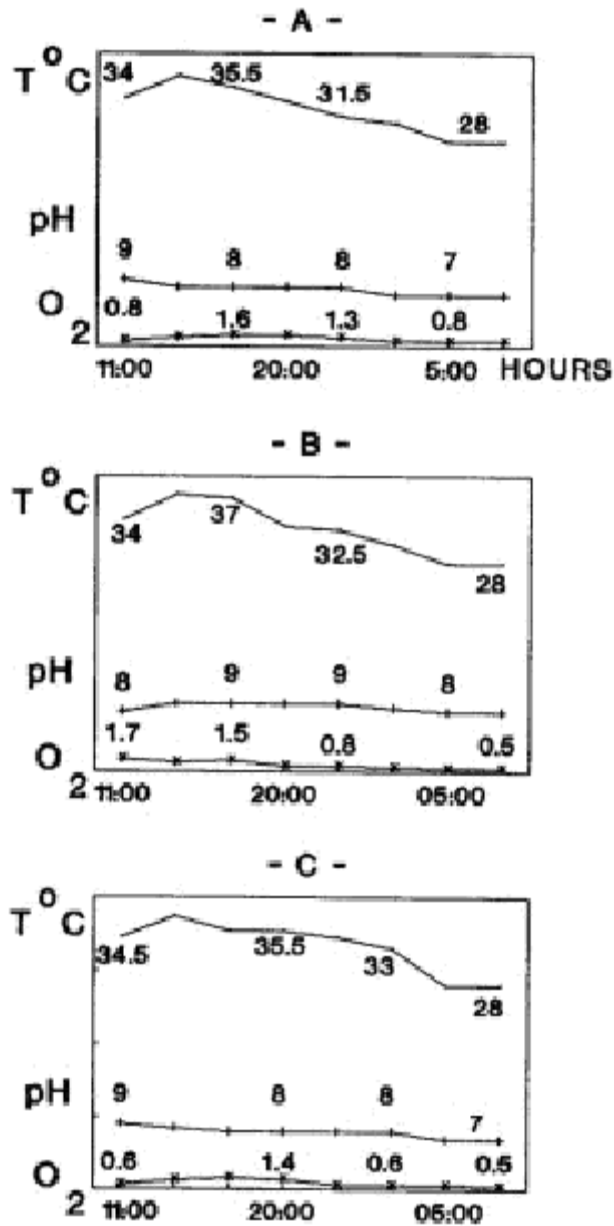


Figure 3. Shows 24 hrs measurements on pH, T °C, and O<sub>2</sub> mg/l from the three sets of cement tanks A (*Spirulina*), B (inorganic fertilizer), and C (organic fertilizer).

Ortega-Salas and Martínez (1987) reported for *A. franciscana* in the area of Yavaros an oxygen variation of 0.1 to 4.0 ml/l, and temperature between 22 to 42 °C. Similar results of the present study (figures 1 and 2) are in the same range.

#### CONCLUSIONS

The highest *A. franciscana* biomass fed on *Spirulina* reached in aquaria was 36.2 g/120 l (1.8 kg/m<sup>3</sup>) in 15 days and for cement tanks 86.5 g/120 l (0.72 kg/m<sup>3</sup>) in 13 days using 1 nauplius/ml, but if 6 nauplius/ml are used this

could be between 2 kg and 4 kg/m<sup>3</sup>. Fertilizing with organic treatment results were 20 g/20 l (1 kg/m<sup>3</sup>) in 15 days and for cement tanks 47.8 g/120 l (0.39 kg/m<sup>3</sup>), if 6 nauplius/ml are used this could produce around 2 kg/m<sup>3</sup>. Organic fertilizer is cheaper and easier to get.

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