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Common Carp in Floating Net Cage Culture

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Abstract

Lakes of about 1.8 million hectares are scattered all over the Indonesian archipelago. The average natural production is still low, only about 40/kg/ha/year (Sarnita, 1978). Common carp is the most popular fish especially to people who live in the big cities. The experiment on common carp culture in floating net cages looked into culture methods that would give indications of all optimal stocking rate or density.

A raft of 10 x 10 m made of steel bars with drums as floaters was divided into nine plots. A cage of polyethylene 3 x 3 x 2 m, 1 inch mesh size was hung in every plot. About three fourths of the cage was under water. Three stages of stocking rate of common carp of about 130 g individual weight were used: 2 kg/m², 4 kg/m² and 6 kg/m². The experimental Latin Square design was used. Artificial fish food (pellet) containing about 32 percent crude protein was given five times a day. Fish were fed to satiation. Morphometrical and limnological data were measured every 14 days. Individual growth and actual rations were calculated daily.

As a result of this experiment, common carp culture in floating net cages with a stocking rate of 6 kg/m² is recommended.

INTRODUCTION

This experiment was carried out in an upland man-made lake in West Java, with an altitude of about 500 m above sea level. The main objective was to find out an optimal density or stocking rate for the optimal total production and growth rate of common carp.

MATERIALS AND METHODS

A raft of 10 x 10 m made of steel bars was divided into nine plots separated by 30 cm spaces. Each plot was 3 x 3 m. Sixteen 200-liter steel drums were tied at every three meters around and inside the raft as floaters. The raft was located about 20 m from the nearest beach and in current. A concrete anchor of 25 kg was on every corner.

Nine cages of 3 x 3 x 2 m made of polyethylene 330 D/15, 1-inch mesh size were hung in the nine plots. About three-fourths (1.5 m) of the cage depth was under water. Every cage was tied to the vertical bars at the corner of the plot at its ring-ropes.

Common carp 130 g "punten" originating from fish farms in Bandung (West Java) were used. Fish were stocked at densities of 2 kg/m², 4 kg/m² and 6 kg/m². The average number of fish for each density were 133,270 and 417, respectively.

The experimental Latin Square design was used with three replications. The individual body weight and standard length of samples were measured every 14 days. The number of samples of every stage of density was 50, 75 and 100 fish, respectively.

Dissolved oxygen, CO₂, pH, NH₃, alkalinity, water and air temperature were measured before sampling. Water and air temperature were measured at every feeding time. Maximum-minimum air temperature was measured daily.

The experiment was carried out in an upland man-made lake, Lido in West Java, at about 500 m above the sea level, from August 11 to December 19, 1978.

RESULTS AND DISCUSSION

In Figure 1, the histograms illustrate the individual growth rates or increments. The average daily individual growth in percentage of body weight at densities 2 kg/m^2 , 4 kg/m^2 and 6 kg/m^2 were 1.27 percent, 1.30 percent and 1.51 percent, respectively. The growth rates were not reduced by the space or density.

Dissolved oxygen level was 6.17-7.2 ppm, CO_2 level was 3.97-5.96 ppm, pH was 7.5-8.0, alkalinity was 1.2-1.5 ppm, NH_3 level was 2.5-3.75 ppm, water temperature (daylight) was $24\text{-}27^\circ\text{C}$ and daily minimum-maximum air temperature was $16.7\text{-}38.9^\circ\text{C}$. This is considered a normal limnological situation for Lake Lido.

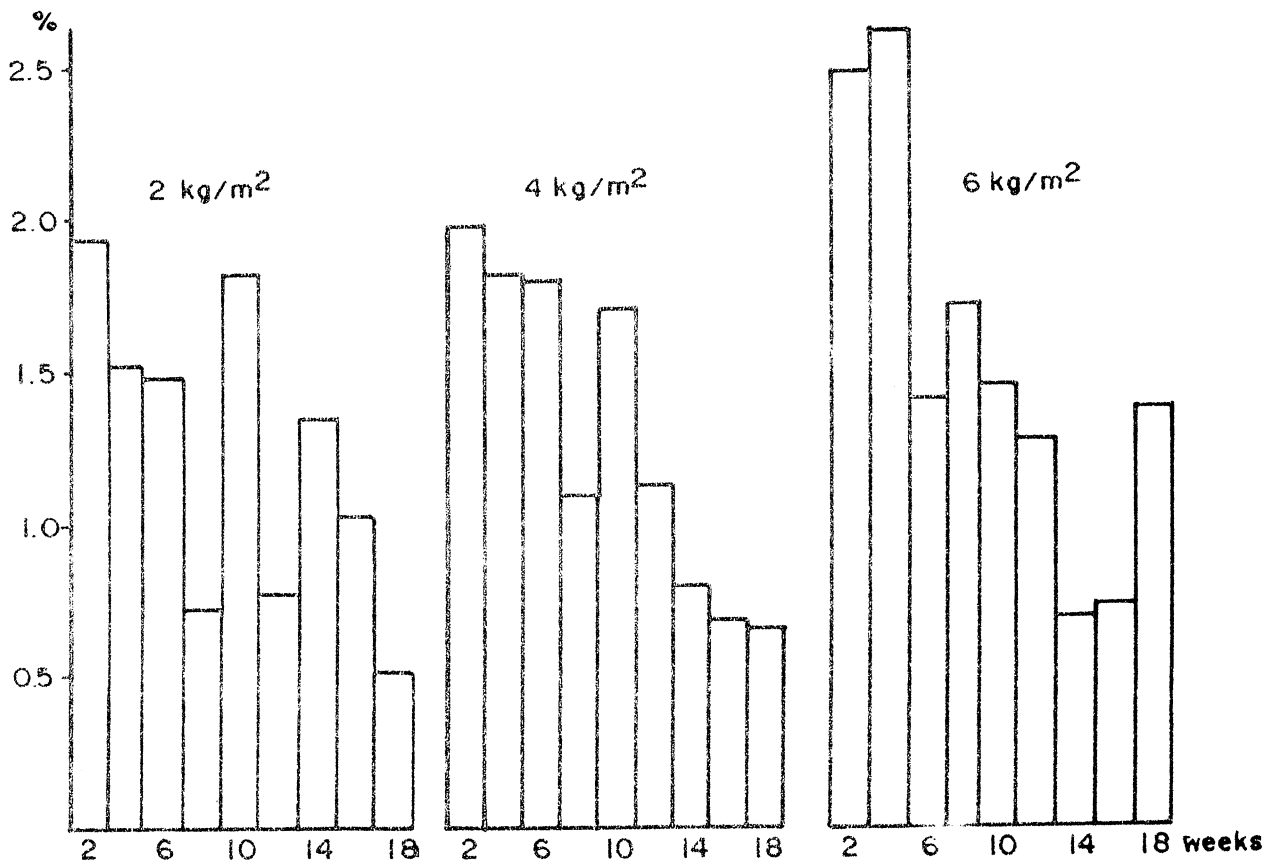


Figure 1. Average daily individual increment rates (percent of body weight) at different densities with 3 replications.

Daily increments of population in grams per square meter are illustrated in Figure 2. The densest population produced the largest increments.

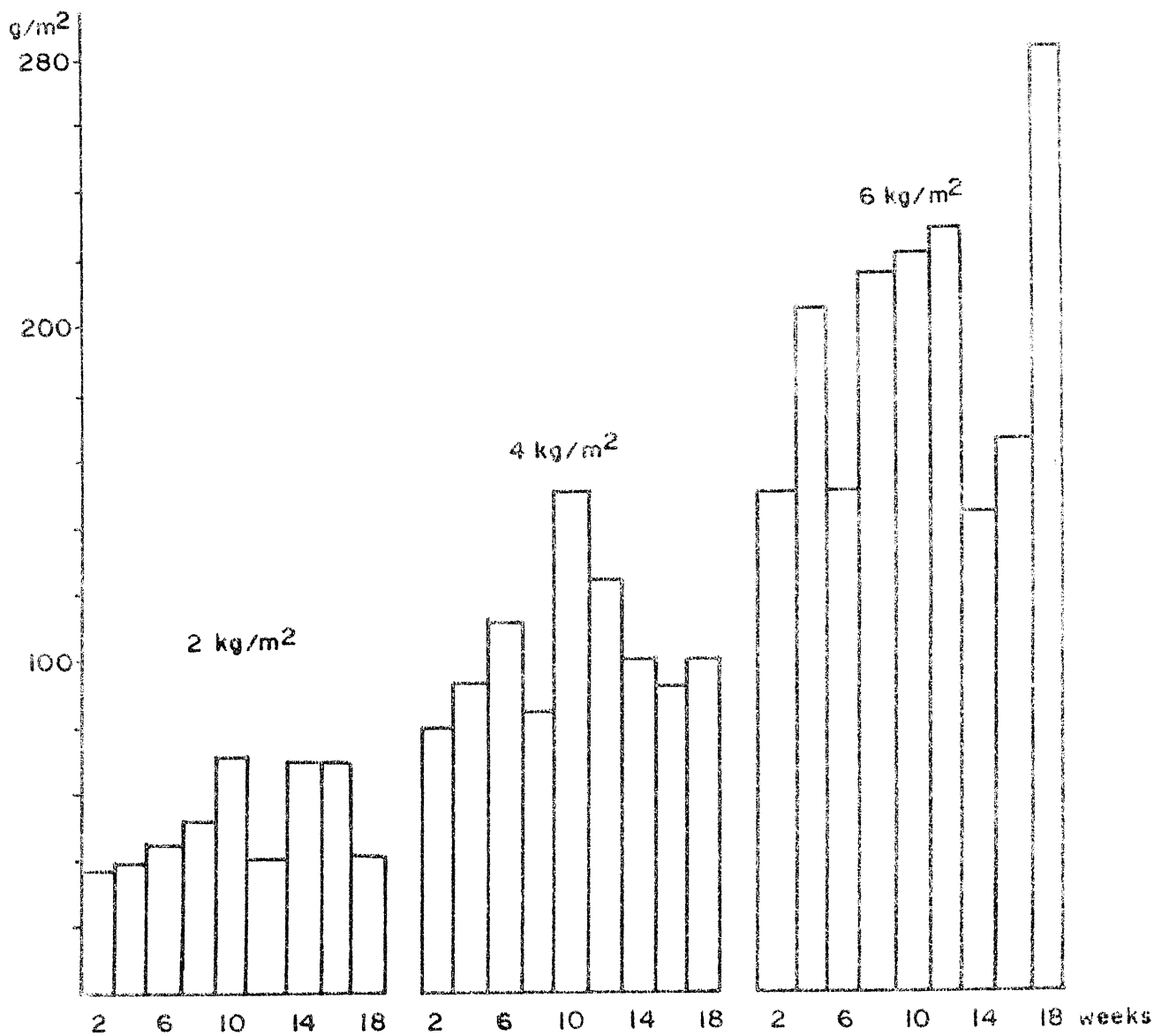


Figure 2. Average daily increments (g/m^2) at different densities with 3 replications.

Actual daily rations at the different densities are shown in Figure 3. Daily rations are usually affected by environmental conditions and these conditions are affected by the density of fish population. Higher daily rations means more desirable condi-

tions. From Figure 3, however, the daily rations at three different densities were statistically the same, so the conditions were not affected by the different densities in this case.

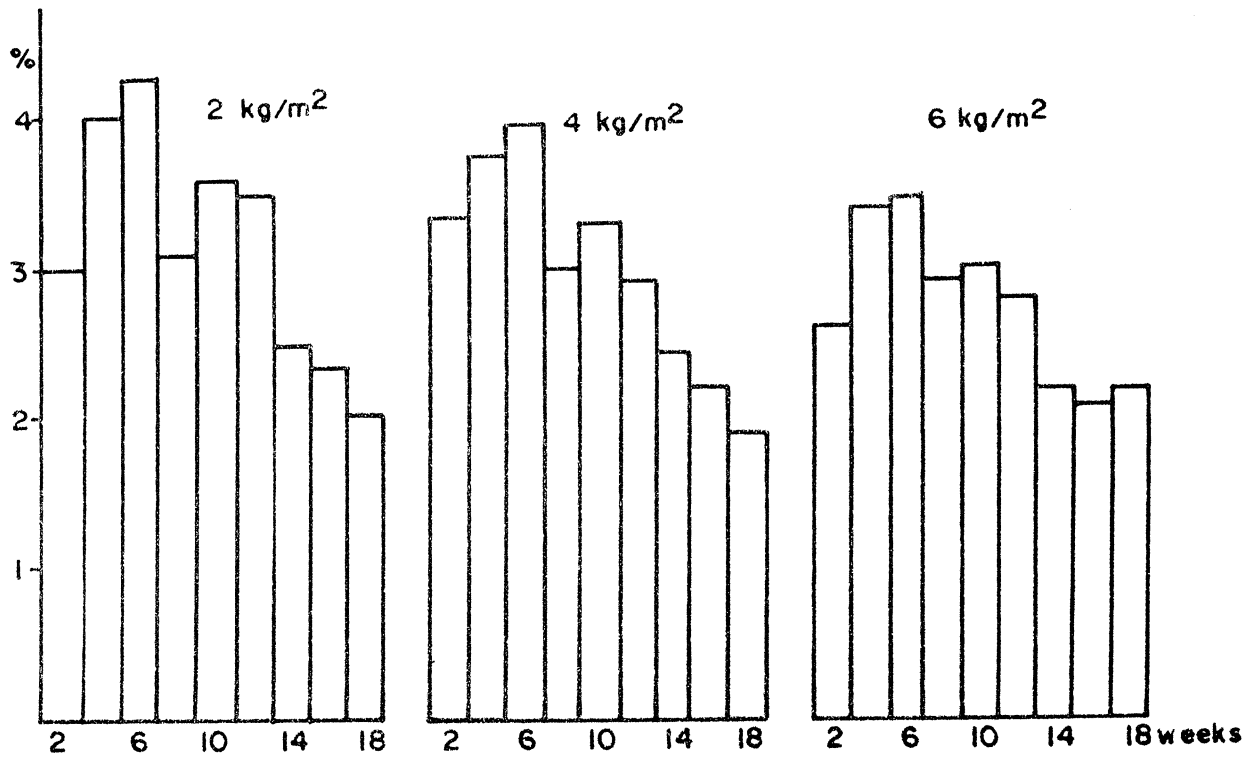


Figure 3. Average of actual daily rations (percent of body weight) at different densities with 3 replications.

In Figure 4, food conversions are shown. High food conversion means poor conditions. The average food conversions at 2 kg/m², 4 kg/m² and 6 kg/m²

were 3.02, 2.71 and 2.36, respectively. Based on these data the environmental conditions were not disturbed by the density.

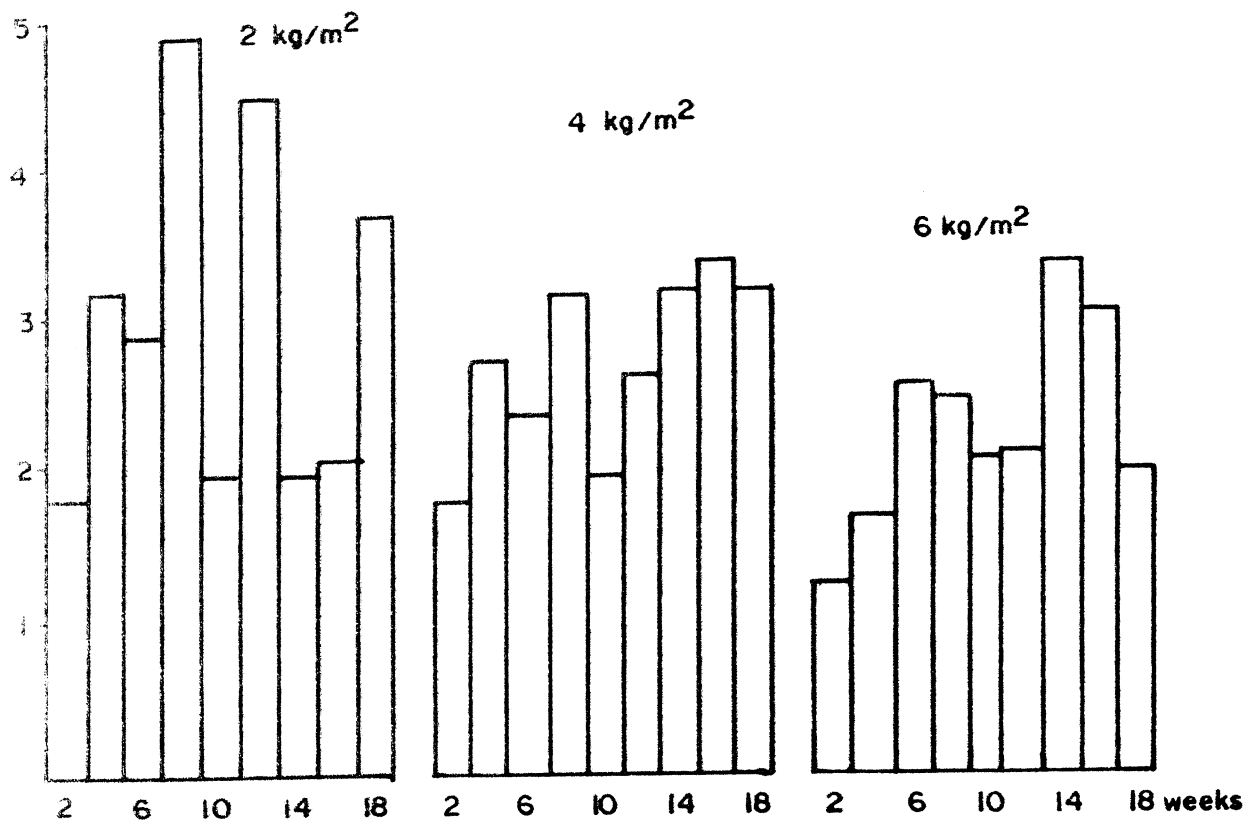


Figure 4. Average food conversions at different densities with 3 replications.

As a result of this experiment, common carp culture in floating net cages with a stocking rate of 6 kg/m² is recommended, given the limnological conditions found in Lake Lido, West Java. Further research should be done at higher stocking rates and at lower feeding frequencies.

An economic comparison of the three stocking rates is presented in Table 1. The highest profit is at 6 kg/m² stocking rate. The total production of this stocking rate was 28.5 kg/m²/4.5 months.

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Table 1. Economical account of common carp culture in floating net cages at different densities per raft per 4.5 months (in Rupiahs*).

Items	2 kg/m ²	4 kg/m ²	6 kg/m ²
Fixed costs	(690,000)	(690,000)	(690,000)
Raft 9 x 9 m ²	550,000	550,000	550,000
Cage 9 x 9 x 2 m	140,000	140,000	140,000
Operating costs	(473,988)	(840,980)	(1,230,037)
Fish seeds (Rp 850/kg)	137,799	275,400	413,100
Fish food (Rp 162/kg)	207,414	420,903	655,506
Labor (Rp 25,000/mm/3 rafts)	37,500	37,500	37,500
Depreciation	41,250	41,250	41,250
Interest (12 percent/year)	50,124	65,927	82,581
Gross Income			
Fish (Rp 1100/kg)	637,758	1,426,887	2,539,089
Tax (7 percent)	44,643	99,882	177,736
Net profit	119,127	486,025	1,131,3163

* Rp 625 – US \$1