Experimental Fish Ponds in the Highlands

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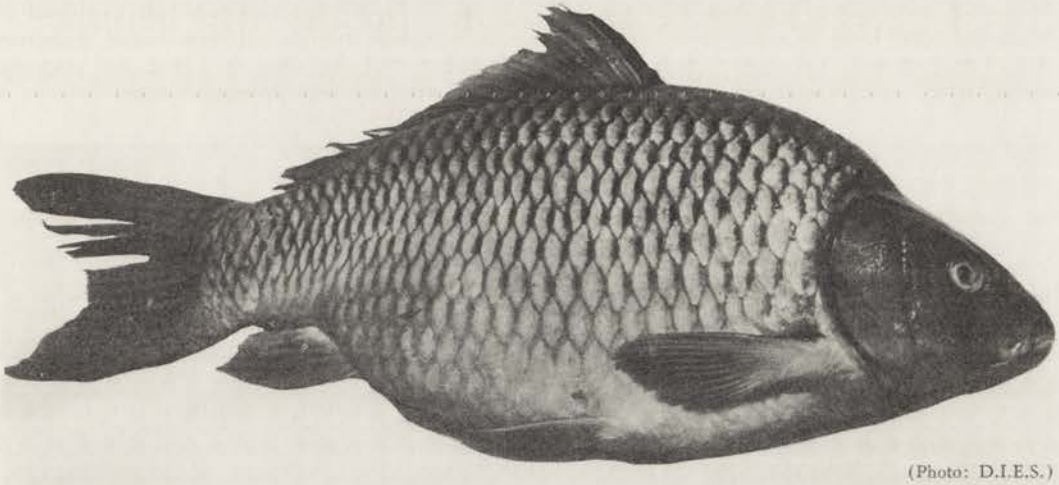
Because there is a clear need for more protein in the diet of the highlands people of Papua New Guinea, the Department of Agriculture, Stock and Fisheries is introducing aquaculture (fish farming) to these areas. There are experimental breeding ponds on the Highlands Agricultural Experiment Station, Aiyura, near Kainantu and at Dobel, near Mount Hagen. From both these places, fingerlings (young fish approximately the size of a finger) are distributed to highlands people for aquaculture in the same manner as seeds or seedlings are distributed by other divisions of DASF for agriculture. This article describes the work at Aiyura.

There are two varieties of Common or European Carp, *Cyprinus carpio,* now being bred. One is called "Golden Carp". This fish is bright orange or golden in colour. When mature it is about 24 in. long and normally weighs 8 to 12 lb, but specimens up to 80 lb have been reported. The other is the "Cantonese Carp" which is coloured with a typical fish pattern, i.e., green-black on the back fading to silver or white on the belly. It is generally smaller than the Golden Carp.

The layout and size of the various ponds at Aiyura may be seen in the *Figure.* Ponds 2, 3 and 4 are used to produce Cantonese and Golden Carp fingerlings. Each of these ponds is approximately 300 x 100 ft. In each pond approximately 150 sexually mature fish of one or the other variety are held. The water-supply is a mountain stream, which flows through a cow pasture before being diverted to the ponds. The sluice boxes are used to control the depth of the ponds, which is maintained usually at 3 ft. Excess water leaves the ponds through the sluice boxes and drains back into the stream.

(Photo: D.I.E.S.)

Plate I.—Golden Carp.



(Photo: D.I.E.S.)

Plate II.—Cantonese carp.

The fish receive a daily ration of as much rice-bran and cooked sweet potato as they can consume in 20 minutes. Since there are comparatively few fish for ponds of this size, they are also able to derive a significant part of their nourishment from algae and waterweed growing in the ponds.

Every four months these ponds are drained and approximately 2,000 fingerlings are transferred to the nursery ponds, where they are held pending distribution. The "breeders" (sexually mature fish) are placed in the holding ponds until the main ponds are refilled.

Supplying Fish to the Farmer

When fingerlings are requested, they are easily netted from the small nursery ponds. They are dispatched in water-filled polyethylene bags inside cardboard boxes.

Before fingerlings are distributed, Fisheries Extension Officers teach people how to build and manage fish ponds. It is important that people who receive fish understand the dangers of overcrowding and underfeeding. A pond a tenth of an acre or larger is preferred. This is an area of 484 sq yds. Examples of ponds with this area are 22 yds x 22 yds or 48 yds x 10 yds.

The Fisheries Officer will advise on the stocking rate which may vary from one fish per sq. yd of pond surface area to one fish per nine sq. yds of pond surface area, depending on the nature of the pond and the ability of the aquaculturist (fish farmer) to feed them adequately. It is best that the pond be designed so that it can be drained and filled when this is needed. Every precaution must be taken to prevent flooding, which can cause the loss of many fish.

For rapid growth, the fish must be fed a balanced diet (protein and carbohydrate) at a rate of between one tenth to two tenths of the fish's body weight daily. The average weight of the fish in the pond is determined weekly by removing, weighing and returning a representative sample (about 5 per cent) of the pond's population. Obviously the amount of food must increase as the fish grow. With intensive feeding of a proper diet, fingerlings may reach 4 lb in only 8 months.

New Investigations

Since the exact relationship of food ration and ration composition to growth rate is not yet fully understood, a joint experiment with the Department of Animal Husbandry, University of Queensland, is soon to begin. Various pelletized rations, with a controlled ratio of protein and carbohydrates will be manufactured in their laboratories and fed at measured rates to a measured weight of fish in pond 3. It is hoped that the ideal ration may be deduced from results of this experiment.

Trials are now underway with a new type of fish in pond 1, the Javanese Carp, *Puntius gonionotus*. This fish is strictly herbivorous (plant-eating). It prefers the very small green plants called algae. A dense growth of algae must be produced in ponds by fertilizing with a superphosphate fertilizer at the rate of approximately 360 lb per acre per year.

The advantage of the Javanese Carp is therefore that it does not need food supplied (rice

bran and sweet potato) as the other carp do. With the right kind of algae in the pond and the correct amount of superphosphate at the correct time, enough food will be grown in the pond to supply the fish with all the food it needs. When the trials are completed, Fisheries Officers will be able to advise on stocking rates and fertilizer application rates.

(Photo: D.I.E.S.)

Plate III.—For distribution from Aiyura, the fish fingerlings are put in water in a plastic bag. The bag is then placed inside a cardboard box.

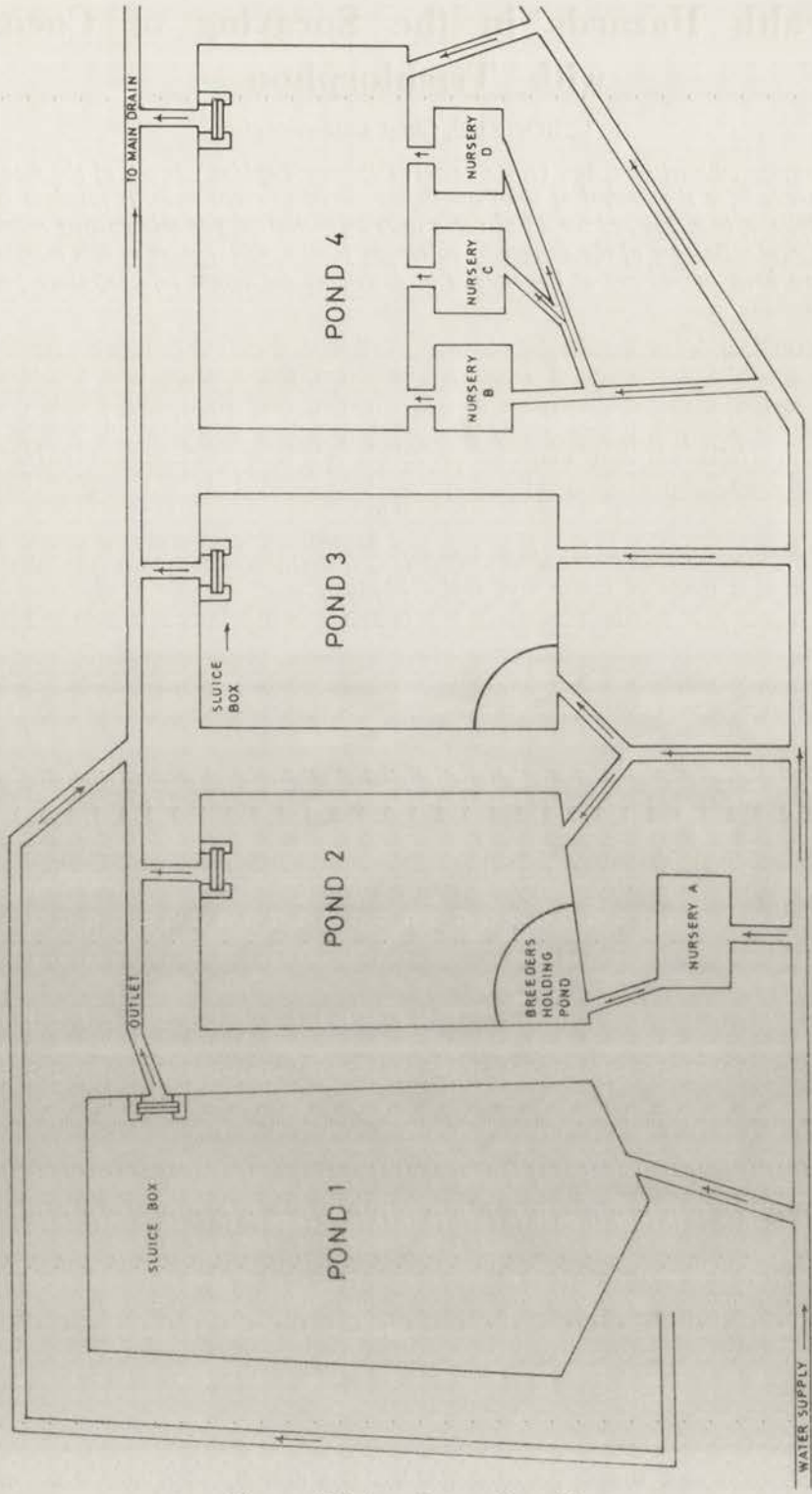


Figure.—Fish breeding ponds at Aiyura.