Automatic Feeding System Using Live Artemia

An automatic feeding system was developed to supply *Artemia* to larvae of the spot prawn *Pandalus platyceros*. The system was worked out at the Aquacultural Experiment Station at Manchester, Washington, the National Marine Fisheries Service, NOAA (National Oceanic and Atmospheric Administration).

Artemia were hatched in conical vats containing 320 liters of seawater at a temperature of 20° C and salinity of 32 PPT. After separation from the hatching water they were placed in a holding tank containing sea water at 9–12° C. The density of the *Artemia* in the holding tank was varied according to feeding needs. A pump controlled by a timer distributed the *Artemia* to an upper and a lower bank of rearing troughs (fig.). Between feedings the system was continuously flushed with sea water.

The feeding system (fig.) consisted of an insulated tank 60 x 75 x 60 cm deep (243 liters of water were used in the tank) for holding *Artemia*. An overflow system area provided for accidental overfilling or check valve failure. Air supplied to the tank provided oxygen and assured uniform mixing. An electric pump (Teel $^1/_{35}$ hp model 1P677 magnetic drive[1]) was attached to a drain at the bottom of the tank. An electronic liquid level controller (model 7186 Cole-Parmer Dynasense) attached to the pump prevented the tank from being pumped dry. The sensing rods of the controller were placed within 2 cm of the bottom outlet of the tank. The pump was activated by a timer (Neilson Metal Industries Inc., Salem, Oregon, model 50303) working through the liquid level controller. The operational period for the pump was 48 seconds every hour; the range of operating intervals

[1]Reference to trade names does not imply Government endorsement of commercial products.

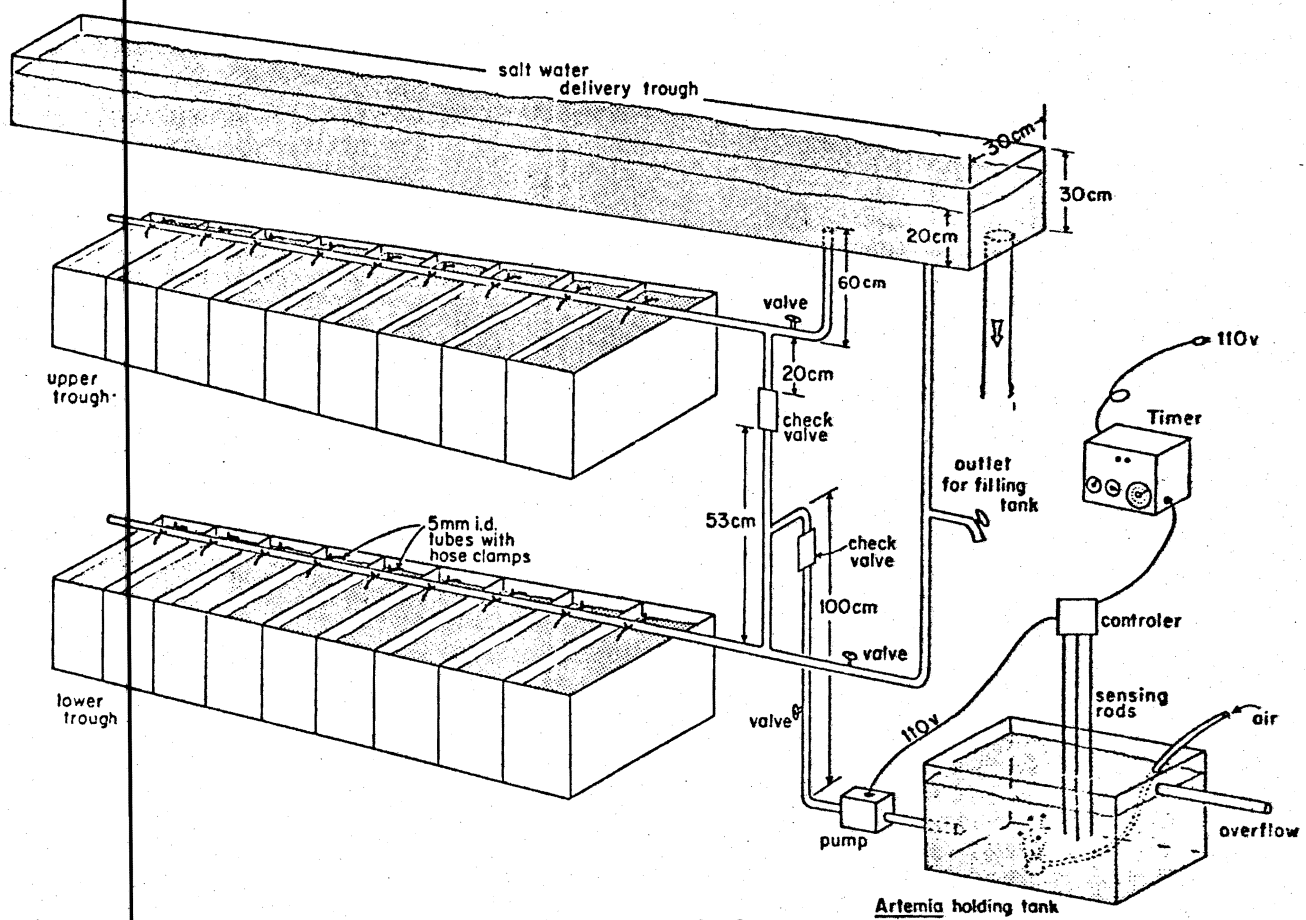

Diagram of automatic feeding system.

that could be employed ranged from 1 second to several hours.

Once the pump was activated, water and *Artemia* were pumped through an all PVC distribution system of 14 mm (i.d.) PVC schedule 40 pipe. A valve was located on the discharge side of the pump to regulate its flow into the distribution system. A check valve above a flow regulation valve prevented water from returning to the *Artemia* holding tank from an overhead saltwater supply trough during back-flushing. The trough supplied water to the laboratory and was located 233 cm above the food pump (fig.). Two valves controlled the rate of back flushing. A check valve prevented back-flushed water from the upper rearing trough system from entering into the lower system. The main pipes to deliver food to the upper and lower rearing troughs were connected at the ends to provide uniform pressure during pumping. Thirty-six Tygon food-distribution tubes (5 mm i.d.) were connected to the main pipes with threaded nylon tube connectors. The outflow from each tube was controlled with a screw clamp. Depending upon the clamp setting, each tube delivered from 100 to 1,500 ml of water and *Artemia* to the rearing containers, during each 48 second cycle.

Fourteen liters of suspended food were delivered to the rearing system during each cycle. It was necessary to refill the *Artemia* reservoir twice daily. Upon completion of a feeding cycle, head pressure in the overhead saltwater trough closed the check valves, flushing the food distribution system with saltwater. The flushing system could also be used to deliver water to the rearing troughs if desired.

The cost of materials in the system was about $360 including the timer which was the most expensive item. With this system we were able to supply *Artemia* nauplii to 36,000 spot prawn larvae. In summary the essential features of the system are as follows:

a. One timer operates as many feeders as necessary, precisely regulating measured amounts of live *Artemia* to each container or tank.

b. Safeguards prevent losses in case of system failure.

c. Automatic flushing of delivery lines removes *Artemia* between feedings to prevent high metabolite concentrations from entering rearing troughs and to insure the quality of the food.

d. The flushing system can be used as a water delivery system to rearing troughs.

e. The feeding system is adaptable to small scale laboratory testing or mass culture.

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