Feeding Behavior of Cultured Mullet (*Mugil so-iuy*) Fry

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In fry rearing, how to enhance survival rate and reduce mortality is an essential problem. To solve this, studies on environmental conditions, particularly on water quality and temperature, are conducted to determine the optimum condition for each stage in fry development. The influence of food at each developmental stage is also studied. This involves feeding habits and time, amount of food and knowledge of the fry's mouth diameter. These two factors—environmental conditions and food—are related to and are restrained by each other. Failure to consider them results in the following: (1) the fry survive for some time but gradually become weak and die; (2) growth differentiation is sped up, and competition between the fry is intensified and (3) occurrence of deformities increases.

Results of Experiments

Experiments conducted on the feeding habit of *Mugil so-iuy* fry under rearing conditions resulted in the following:

1. Based on mouth size and the development of the digestive organ, the fry's larval phase (i.e., from mouth opening to the completion of metamorphosis at 35 days) may be divided into four stages: (a) 3-5 days after hatch, the fry open their mouth; hence, from endotrophic, they become epitrophic; (b) 6-18 days, the fry feed on oyster (or mussel) larvae; (c) 6-23 days, the fry feed on rotifers and (d) 13-35 days, the fry feed on nauplii and adults of *Artemia salina* (or copepods).

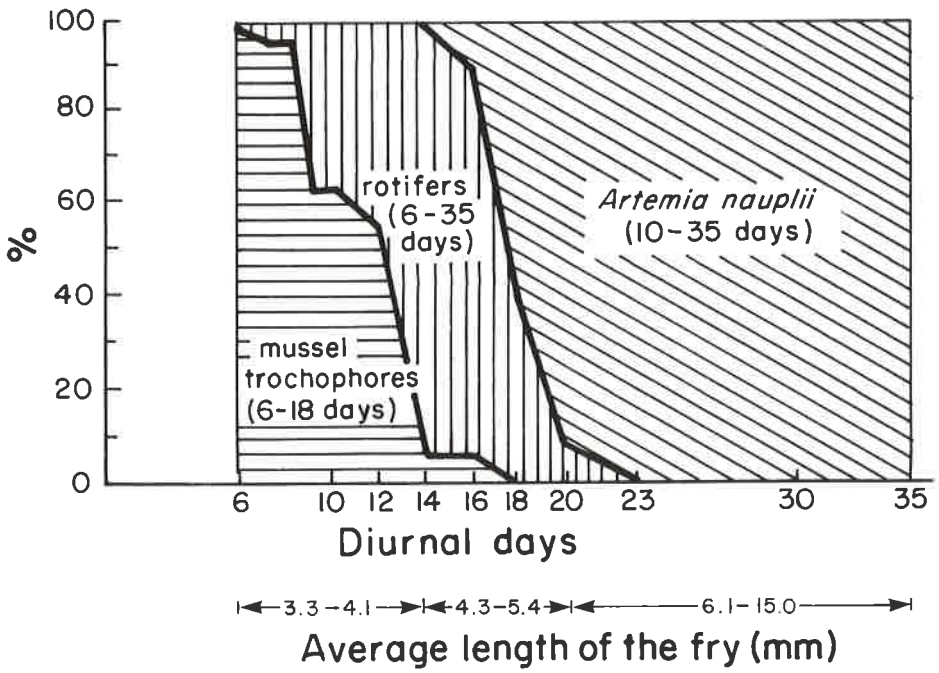
However, the food composition in one stage is not distinctly different from that in another. There is a gradual replacing process. For example, food taken by 8-day old fry contains 94.9% mussel trochophores and only 4.7% rotifers; for a juvenile of 14-16 days, rotifers account for 80% of the food and for a juvenile of 20 days, nauplii of *Artemia salina* account for 94% and rotifer, 5.5%. Based on the analyses of data in the experiments, food sizes fed to mullet fry are about 50-75% of the fry's mouth diameter. Thus, it is seen that mouth size and development stage affect feeding the fry's feeding behavior.

2. The time required to reach satiation of food by mullet fry decreases with the growth of the fry. With adequate food, experimental water temperature of 18-24°C and salinity of 30 ppt, the time required to reach food satiation for fry hatched from 7-25 days (with average total length of 3.58-8.09 mm) is 110-130 min.; for those hatched from 33-40 days (11.6-19.5 mm), 40 min. and for 56 days old (23.2 mm), 10 min.

3. The daily food ration given to the fry changes with its growth and varies with the kind of food. For 11-13 day-old fry (with average total length of 3.2 to 4.4 mm), the volume of rotifers taken by an individual daily is 96-400% of the volume of the individual. For 16-55 day-old fry (6.6-28.8 mm), the total volume of nauplii of *Artemia salina* taken by each fry per day is equivalent to 93 to 270% of the fry's total volume in experiments, about 662-3,629 individuals. Both increase in a positive correlationship, but the ratio of volume of nauplii of *Artemia salina* consumed per day against the fry's volume decreases with the increase of the fry's length. According to a rough estimate of the ratio of quantity of the food taken by the fry per day against the excreted pellet quantity, the utilization of the nauplii may reach 90% or so.

4. Starvation exerts an obvious influence on the growth and development of fry. Results of a preliminary experiment indicate that newly hatched fry begin to die after six days when starved at 19-26°C and 30 ppt. About half of the fry died when fed insufficiently for three days. But when given adequate food, survival rate became stable. It is important to feed newly hatched fry on a suitable schedule and with suitable food quantity.

5. Feeding activity could last up to midnight when a certain amount of illuminance is provided to the mullet fry at night. •



Proportion of different foods eaten by *Mugil so-iuy* fry of different ages. Mussel trochophores are gradually replaced by rotifers and then by nauplii as the fry grow.