

Feed Particle Size Requirements for Crucian Carp Fry

Results of ASA/China 1999 Feeding Trial 35-99-61

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ABSTRACT

Feed particle size requirements for crucian carp of 2-cm to 7-cm total length were determined in a joint study by ASA and the Zhejiang Freshwater Fisheries Research Institute in Huzhou, China. Results were used to formulate feed size recommendations for fish farmers producing crucian carp using feed-based production technologies. Crumble feeds of size 0.5-mm and 1.0-mm are recommended for fry of 2-cm and 3-cm total length, respectively. Crucian carp fry can be weaned to a 1.5-mm extruded pellet at 5-cm total length.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with the Zhejiang Freshwater Fisheries Research Institute (ZFFRI), conducted a study in 1999 to identify the feed particle size requirements for post swim-up stage crucian carp fry. The study had three objectives: 1) determine the feed particle size requirements of crucian carp fry ≥ 2.0 cm in total length; 2) determine at what size crucian carp are capable of ingesting a 1.5-mm extruded feed pellet; and 3) formulate feed size recommendations for fish farmers who are producing crucian carp fingerlings using feed-based production technologies. Results of the study are presented in this paper.

MATERIALS AND METHODS

Fish for the study were produced by ZFFRI in April 1999 at the ZFFRI research station in Huzhou. At swim-up stage the fish were stocked in 2-m³ concrete tanks and intensively fed a 46% protein fish starter diet produced by Shanghai Fwuso aquafeed mill. Feed was dispensed into the fry tanks at 2-hour intervals, 24 hours per day, from Sweeny automatic feeders. Fish were fed in the tanks for two weeks, after which they were stocked in ponds. Feeding continued in ponds with a 41% protein fry diet formulated by ASA and produced by Shanghai Fwuso aquafeed mill.

Fish were sampled every 7 days starting from the time fish reached the swim-up stage until fish were >7 cm in total length. Fifty fish were randomly collected at each sampling and individually measured for total length, weight and open mouth size. Feed particle size requirements were determined for fish at 1-cm intervals for total lengths of 2 cm to 7 cm. Ingestible feed particle size was calculated as 50% of the average fish open mouth size at the 2-cm to 7-cm total length intervals.

RESULTS

Crucian carp total length, weight, open mouth size and ingestible feed particle size data are shown in Table 1. Fish weight to total length correlations were 0.1 g at 2 cm, 0.4 g at 3 cm, 1.0 g at 4 cm, 3.0 g at 5 cm, 4.0 g at 6 cm, and 5.5 g at 7 cm. Average open mouth size to total length correlations were 1.0 mm at 2 cm, 2.7 mm at 3 cm, 3.0 mm at 4 cm, 3.9 mm at 5 cm, 4.2 mm at 6 cm, and 4.5 mm at 7 cm.

Crucian carp fry were determined to be capable of ingesting 0.5-mm feed particles at size 2 cm total length, 1.3 mm feed particles at 3 cm total length, 1.5 mm feed particles at 4 cm total length, and 1.9 mm at 5 cm total length (Table 1). Ingestible feed particle size for fish ≥ 6 cm was larger than 2 mm.

Table 1. Total length, weight, open mouth size and ingestible feed particle size for crucian carp of total length 2 cm to 7 cm, as determined in a study conducted in 1999 at the Zhejiang Fisheries Research Institute, Huzhou, China.

| Fish length (cm) | Fish weight (g) | Mouth opening (mm) | Ingestible feed size (mm) |
|---------------------|--------------------|-----------------------|------------------------------|
| 2 | 0.1 | 1.0 | 0.5 |
| 3 | 0.4 | 2.7 | 1.3 |
| 4 | 1.0 | 3.0 | 1.5 |
| 5 | 3.0 | 3.9 | 1.9 |
| 6 | 4.0 | 4.2 | 2.1 |
| 7 | 5.5 | 4.5 | 2.2 |

FEED RECOMMENDATIONS

Results of the study were used to formulate feed size recommendations for fish farmers producing crucian carp fingerlings using feed-based production technologies. Feed size recommendations are shown in Table 2. Two crumble feed sizes are recommended for feeding

crucian carp fry prior to weaning to extruded, floating pellets. Fry of 2-cm total length can be fed a 0.5-mm crumble feed. Crumble feed particle size can be increased to 1.0 mm when fish reach approximately 3 cm in total length. At 5-cm total length, fish can be weaned from crumbles to 1.5-mm extruded pellets. The 5-cm total length size was selected as the weaning stage, even though fish of size 4-cm total length were found capable of ingesting a 1.5-mm pellet, because actual size of extruded feed pellets specified as 1.5-mm ranges up to 2.0 mm.

Table 2. Feed recommendations for crucian carp fry and fingerlings being cultured using feed-based production technologies.

| Fish size | Recommended feed |
|--------------|------------------------|
| ≥ 2 cm/0.1 g | 0.5 mm crumble |
| ≥ 3 cm/0.4 g | 1.0 mm crumble |
| ≥ 5 cm/3.0 g | 1.5 mm extruded pellet |

ACKNOWLEDGEMENTS

ASA gratefully acknowledges the Director and staff of the Zhejiang Freshwater Fisheries Research Institute for conducting this study in collaboration with ASA.