AQUACULTURE INFORMATION SERIES: NO. 3

PRODUCTION SCHEDULING

The last step in production planning is to develop a production schedule based upon the Product Definition, which was based upon the marketing potential data (cf. Aquaculture Information Series No. 1). The elements of a Product Definition for scheduling purposes should include:

1. Species (strain) of fish to be produced.
2. Average size (length or round weight) of fish at harvest.
3. Number of fish to be harvested.
4. Total biomass to be harvested.
5. Date (s) of harvest.

An example of an acceptable Product Definition would be:

> Rainbow trout (Kamloops) at 320–380 g/fish (round weight), (250 – 300 g dressed weight) are to be harvested at the rate of 2,500 fish per week throughout the year.

This process is written in metric units because of its simplicity. The fish are measured in mm and weight samples are taken in kilograms. If one wishes to convert the metric units to English units; i.e., inches and pounds, then one must be prepared to lose some measuring sensitivity in the conversion process.

Beginning with the harvest data, which consist of the number and size of fish to be harvested during a specified time period, the next step is to calculate the time required to produce the fish. That is, the water temperature-dependent growth rate must be established by either 14–day growth periods. Longer periods; i.e., 28 days, have been used; however, the longer the period, the greater the error because of having to use a mean water temperature and a constant condition factor for an extended period. In this process, it is suggested to use a Julian date calendar in conjunction with the usual calendar dating.

An ideal format for generating a production forecast contains 8 categories: (1) date; (2) mean daily water temperature (°C); (3) number of fish; (4) mean body length (mm); (5) mean no. of fish per kg; (6) biomass (kg); (7) weight gain (kg); (8) feed required (kg) (Figure 1). Note that metric units have been used. Before converting to English units, try completing the first reading or two using the metric units. The first task is to complete the dating sequences and mean daily water temperatures in 14–day intervals (the suggested feeding periods between pond inventories), beginning with the release/harvest date and working backward in time for several; e.g., 26, growth periods. The second task is to complete the number of fish column beginning with the release/harvest number and increasing this number by the anticipated mortality during each 14–day period. The usual daily mortality is calculated at 0.02%. It is not advisable to estimate the mortality expected to occur because of disease episodes.

Figure 1: An example of a production planning format

Lot No.________________ Species (strain)_____________________

Date	°C	Length	Number	No./wt Unit	Biomass	Gain	Feed Req'd	Ponds Req'd

Estimated starting date ___________________
Estimated no. eggs/fingerlings req'd ___________________________
Estimated total amount of feed req'd ___________________________

The water temperature-based biweekly length increases are established by working backwards from the mean harvest length. Using the length and weight compensated condition factor chart (Klontz, 1991), the biweekly mean number of fish per kg can be calculated as follows:

Weight (grams per fish) = condition factor times length (mm^3)

No. per kg = 1000 / mean weight per fish

The biweekly biomass (kg) is calculated by dividing the head count by the mean no. of fish per kg.

The biweekly weight gain (kg) is calculated by subtracting the beginning biomass (kg) from the ending biomass (kg).

The feed requirements on a growth period basis can be calculated by multiplying the expected weight gain (kg) by the Feed Conversion Ratio (FCR) (the kg feed required to generate 1.0 kg weight gain). Most high quality feeds are formulated to provide an FCR of 1.1–1.3:1.

This sequence is continued backwards in time until the fish are of a size to be well on feed – usually 2,200 fish/kg. For the time required to begin the production from either green or eyed eggs, a thermal (temperature) unit chart should be consulted (Piper et al 1982).

The establishment of the oxygen and density carrying capacities in the planning process makes it possible to estimate the space (number of ponds) required during the course of producing a specified lot of fish (cf. Aquaculture Information Series No. 2). This is accomplished as follows:

1. List, by growth period, the number of fish on hand.

2. Beginning with the end of the production cycle, just before the fish are market-sized, subtract on a pond-by-pond basis the respective number of permissible fish based upon either the DCAP or the OCAP values. Each subtraction will represent one specific pond to be

used.

3. Continue this process backwards in time to the time of initially ponding the fish.

The production scheduling process as presented may seem a little complex and confusing at first. It is not an easy process for the beginner – even for the not-so-beginner, for that matter. Nonetheless, in this day and age of increasing production costs and rather stable – even variable – market prices, it behooves one to utilize many economizing "tools". Planning the process is the first step. Here one can visualize where the fish will (should/could) be at a specified point in time.

References

Klontz, G. W. 1991. A manual for rainbow trout production on the family-owned farm. Nelson and Sons, Inc., Murray, Utah 71pp

Piper, R. G. et al (Eds.). 1982. Fish Hatchery Management. U. S. Fish and Wildlife Service, Washington, D.C.

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