

(This example will use some of the principles regarding math and fractions covered in the previous example. Refer to [www.fws.gov/midwest/JordanRiver/pdf\\_files/fish\\_math1.pdf](http://www.fws.gov/midwest/JordanRiver/pdf_files/fish_math1.pdf).)

### How do we determine how much feed to give a tank of fish?

First, we have to know the following: fish size, population inventory, targeted growth rate, and estimated feed conversion.

End of month sample count data for Tank 12 (FPP is “fish per pound”)

Sample Wt. (g)	Fish Count	FPP
587.1	261	201.8
620.4	276	202.0
1207.5	537	201.9

Let’s say we just finished doing an inventory on Tank 12. Its population is 49,463 fish. How much does the population weigh?

$$49,463 \text{ fish} \times \frac{\text{pound}}{201.9 \text{ fish}} = 245 \text{ pounds}$$

We can calculate fish length by using a Condition Factor (C), which relates weight to length. What is the average fish length, using an English units condition factor of .0002726 lbs/in<sup>3</sup>?

$$C = \frac{W}{L^3} \Leftrightarrow L^3 = \frac{W}{C} \Leftrightarrow L = \sqrt[3]{\frac{W}{C}}$$

Note that W is individual fish weight (pounds). If we know how many fish there are in one pound, individual fish weight (pounds per fish) is just the inverse of the fish per pound number.

$$L = \sqrt[3]{\left(\frac{1}{201.9}\right) \text{ lbs} / 0.0002726 \text{ lbs} / \text{in}^3}$$

$$L = 2.629 \text{ inches}$$

We want to grow them at an average rate of 0.4 inches per month, assuming a conversion of 1.20 pounds of feed per pounds of gain. How much feed will we give them tomorrow?

Use the Hatchery Constant:

$$HC = 3 \times 100 \times \Delta L \times \text{Conversion}$$

Note that  $\Delta L$  is the *daily* length increase. Since we are given a *monthly* length increase, we divide that by 30 to get daily growth.

$$HC = 300 \times \left( \frac{0.4 \text{ inches}}{30 \text{ days}} \right) \times \left( \frac{1.20 \text{ pounds}}{\text{pounds}} \right)$$

$$HC = 4.8$$

The Hatchery Constant divided by the current length gives the feed weight, in terms of percent body weight per day:

$$\frac{HC}{L} = \%BW / \text{day}$$

$$\frac{4.8}{2.629} = 1.83\% BW / d$$

1.83% of the current inventory weight of 245 pounds is approximately 4.5 pounds of feed for tomorrow.