

## Technical Bulletin #07:

# Feed Conversion Ratio (FCR):

## How to calculate it and how it is used

### What is the Feed Conversion Ratio (FCR)?

The FCR is simply the amount of feed it takes to grow a kilogram of fish. For example, if it requires two kilograms of feed to grow one kilogram of fish, the FCR would be two.

$$FCR = \frac{2 \text{ kg Feed}}{1 \text{ kg Fish}} = 2$$

This means that when a feed has a low FCR, it takes less feed to produce one kilogram of fish than it would if the FCR were higher. A low FCR is a good indication of a high quality feed.

### Why is FCR important?

FCR is a valuable and powerful tool for the fish farmer. It allows for an estimate of the feed that will be required in the growing cycle. Knowing how much feed will be needed then allows a farmer to determine the profitability of an aquaculture enterprise. This means that FCR allows the farmer to make wise choices in selecting and using feed to maximize profitability.

### How are protein and FCR related?

As the amount of protein in the diet increases, the FCR gets smaller. This means that it takes less feed to produce a kilogram of fish. This can be important, because while feed with higher levels of protein might be more expensive per kilogram, because it is possible to use less feed, it may actually be the cheapest way to feed fish.

### How can FCR be used to budget?

Let us assume that a feed mill produces a 36 percent protein fish diet for *Pangasius catfish* that has an FCR of 1.3. This means that for every one kilogram of fish at harvest they will need to 1.3 kg of feed. If the goal is to produce 1,000 kg of fish, then the enterprise will require 1,300 kg of feed. If the feed costs KMR 2,000 per kilogram, the total cost of feed for the growing cycle will be KMR 2,600,000.

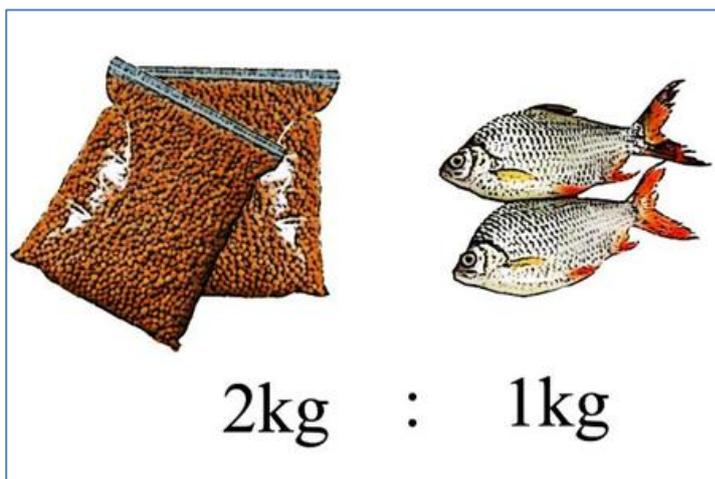
The nice thing about FCR is that it provides a tool to compare two diets. Let us further assume that a competitor to the first feed mill produces a 28 percent protein fish diet for the same fish that is only KMR 1,800. However, the FCR for this diet is 3.2. This means that to grow the same 1,000 kg of fish will require 3,200 kg of 28 percent feed. The total cost to feed the lower priced fish food would be KMR 5,760,000. That means that it will cost KMR 3,160,000 more to feed a lower quality food.

### Is FCR always the same for everyone?

Unfortunately, it is not. Your USAID-HARVEST technician can give you an approximate FCR for any feed/fish combination. However, many things will influence the FCR.

For example, FCR can change as a fish gets older. FCR for small fish is generally lower than the same species of fish that is larger. For example, growing a fish on formulated feed from 1 gram to 50 grams may result in an FCR of less than one, but the same species of fish and same feed is likely to have FCR between one and two when producing a larger size of fish.

Every farm has many other unique things about it that change the way fish respond to feed. FCR can be influenced by things like water quality, pond management, temperature, how and when feed is presented to the fish, and the health of the fish, all of which can alter the FCR of a feed. This is why it is important to keep good written records of your





farm activities. With good information collection you will eventually be able to calculate an accurate FCR for your specific pond/feed/fish combination.

**Can the FCR be less than one?**

How can 1 kg of feed produce MORE than 1 kg of fish? It is possible, because the fish contains water in its flesh while the feed does not contain much water. When the fish converts dry food into moist flesh using a highly efficient diet, it can produce more moist flesh than the weight of dry feed that was used. If we dried the fish to the same degree that the feed is dried before weighing it, FCR less than one would not be possible.

It is also possible to get an FCR of less than one if there is a lot of natural food in the pond. The fish will eat both the manufactured feed and the natural feed and grow better than when they eat the manufactured feed alone.

**Are there any other advantages to a low FCR?**

Yes! In general, very good feeds that have a low FCR allow for more fish to be grown in a pond because there is less waste polluting the water. With better water quality the carrying capacity of the pond is increased.

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