IFFO POSITION STATEMENT JANUARY 2017

FORAGE FISH DEPENDENCY RATIO (FFDR)

IFFO's Position

FFDR could be regarded as part of an overall package of information relating to fed aquaculture sustainability, but caution needs to be exercised in how the information is interpreted, and the figures produced for FFDR should not be examined in isolation. This position paper provides some background.

Fishmeal and fish oil produced from forage fish populations provides a substantial contribution to global food production and is essential in meeting the nutritional requirements of billions of people around the world. The use of the term FFDR confuses the issue by incorrectly assuming that the species used in marine ingredient production would have higher value to society in other areas such as direct consumption markets, or by environmental benefits through conservation. As long as fishmeal and fish oil are produced from well managed fisheries, or from byproduct from fish from well managed fisheries, then their use in aquafeeds is valid.

The ASC consultation which includes FFDR is open and accessible here[1]. IFFO members who have particular concerns about the FFDR approach should register these directly with the ASC, through the email address: standards@asc-aqua.org .

Background

The Forage Fish Dependency Ratio (FFDR) is a conceptual mechanism for describing the quantity of wild fish used in feeds in relation to the quantity of farmed fish produced, in fed aquaculture systems. FFDR was derived originally as a way of quantifying the environmental impact of feed use in aquaculture systems and there has been a particular attention on FFDR in salmon aquaculture. FFDR is expressed as a ratio that takes into account the amount of fishmeal and fish oil in the feed that originates from wild stock, and is calculated on a site specific basis taking into account the (economic) Food Conversion Ratio (FCR). In essence it was proposed to provide an overview of the impact of fed aquaculture on the marine environment through an evaluation of the raw material that comes from the utilisation of forage fish stocks. Its true value in supporting a sustainability assessment of fed aquaculture is debatable and IFFO, through Dr Andy Jackson's earlier work, has already objected to some of the FFDR approach limitations. It is notable for having been included in the Aquaculture Stewardship Council's (ASC) farmed salmon standard, with a current proposal to reduce the FFDR ratio values even further out to consultation[2]. FFDR is referred to in the scientific literature (e.g. Ytrestøyl, Aas, & Åsgård, 2015), and is a term commonly presented in the arguments of those whose position is critical of the farming of carnivorous fish species.

[1] http://www.asc-aqua.org/index.cfm?act=update.detail&uid=348&lng=1
[2] http://www.asc-aqua.org/index.cfm?act=update.detail&uid=348&lng=1

How is FFDR calculated?

The formula for calculating FFDR differs for fishmeal and fish oil as a consequence of the different yields that are achieved for these materials from the reduction of whole fish species. Fishmeal has a higher yield value than oil, and may be represented by a figure of 24% of the total raw material. Fish oil has a lower yield, variable according to the fish species, but for species such as the Peruvian anchovy that possess comparatively high EPA and DHA levels that are required in salmon feed, the yield value may be estimated as 5% of total raw material quantity.

The values for yield, together with values for fishmeal and fish oil levels in the feed and the on-site Feed Conversion Ratio (FCR) value, may then be used in a calculation that estimates the total quantity of forage fish that has been used as the source of the fishmeal and fish oil. The formula used by the Aquaculture Stewardship Council (ASC) Salmon Standard for calculating the FFDR for fishmeal ($FFDR_M$) and fish oil ($FFDR_O$) is described as follows.

$$FFDR_M = \frac{(\%\ \text{fishmeal in feed from forage fisheries}) \times (\text{eFCR})}{24}$$

$$FFDR_O = \frac{(\%\ \text{fish oil in feed from forage fisheries}) \times (\text{eFCR})}{5.0 \text{ or } 7.0^{3}}$$

As an option to the use of $FFDR_O$, the ASC standard also permits for a calculation that accounts for marine-derived EPA and DHA, in the feed set at a limit of 30g kg^{-1}feed, and presented:

$$\text{EPA\&DHA in feed (g)} = \frac{(\text{fish oil in feed (g)}) \times (\%\ \text{EPA \& DHA in fish oil})}{100}$$

The permitted level for the $FFDR_M$ in the ASC standards $\leq$1.35 and for $FFDR_O$ is 2.95. With current levels of marine ingredient inclusion in aquafeeds and eFCRs seen in the salmon farming industry, these figures readily achievable.

[3] depending on the source of the fish

Why is the application of the term FFDR "debatable"?

- The criterion behind the FFDR approach in the ASC standard centres on the use of wild fish for feed within a broader principle of the use of resources in an environmentally efficient and responsible manner. In fact, the inclusion of fishmeal and fish oil in aquafeeds has little bearing on the raw material source, being driven predominantly by the species-specific formulations adopted by the feed industry.

- Overall the raw material source for marine ingredients used in the aquafeed industry does not impact human nutrition because there is limited market for the product.

- Forage fish stocks are often well managed fisheries typically being formed of fast-growing, early-maturing, pelagic species. The wide adoption of the IFFO RS standard across the sector indicates that the industry is already well ahead of other feed ingredient sectors in dealing with sustainability issues when viewed on a per unit of production basis. So, assumptions about the environmental impact of forage fish exploitation are often not valid.

- FFDR values are also dependent on the performance of the aquaculture facility, and could be affected by, for example, disease outbreaks that have no bearing on marine ingredient raw material supply or how the system has been managed.

Please contact nauchterlonie@iffo.net if you need any further assistance.

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