

Impact of rising feed ingredient prices on aquafeeds and aquaculture production



Cover photograph:

Harvest of Nile tilapia (*Oreochromis niloticus*) from a freshwater pond, Jamalpur, Bangladesh, 2008 (courtesy of FAO/Jayanta Saha).

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Preparation of this document

This document was prepared as part of the FAO Aquaculture Management and Conservation Service's (FIMA) ongoing programme "Monitoring, Management and Conservation of Resources for Aquaculture Development". The activities under the study entitled "Impact of rising feed ingredient prices on aquafeeds and aquaculture production" were undertaken in response to the soaring increase in food (particularly cereal grain) prices all over the world during 2007–2008 and was partially funded by Norway Programme Cooperation Agreement 2008.

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Abstract

It is now widely recognized that the rising demand for aquatic products will have to be met by aquaculture. The future of aquaculture will depend on how well it meets this challenge. The contribution of aquaculture to total fishery products (excluding plants), globally, has steadily increased from 4 percent in 1970 to 36 percent in 2006 and is continuing to increase. The growing importance of aquaculture in overcoming production limits of capture fisheries can be judged from the fact that China's 2004 aquaculture production was about 70 percent of its total fisheries production. By 2020, global aquaculture is expected to contribute about 120–130 million tonnes of fish to meet projected demands. The types of species/species groups dominating fed aquaculture production and the recent focus to increase and intensify production of crustaceans, marine finfish, and diadromous fishes, reflects a tendency to increasing reliance on aquafeeds, for their production, and particularly commercial diets. It is, therefore, crucial that aquaculture is sustainable and that the resources required for promoting aquaculture are secured. Key resources required to meet this challenge are aquafeeds and the ingredients used in their production. These resources, together with high transportation costs as a result of costly energy, form the central part of this study.

Fed aquaculture relies on a basket of common input ingredients such as soybean, corn, fishmeal, fish oil, rice and wheat, for which it competes in the marketplace with the animal husbandry sector as well as with use for direct human consumption. Many of these key ingredients traditionally used in recipes for commercial or on-farm aquaculture feeds are internationally traded commodities. Therefore, aquafeed production is also subjected to any common global market shocks and volatility. Since 2005, the basket commodity price index (CPI) rose by about 50 percent and the prices of soybean meal, fishmeal, corn and wheat rose by 67, 55, 284, 225 and 180 percent, respectively. Similarly, the cost of major oils used in the aquafeed industry has increased by up to 250 percent. The aquaculture industry is, therefore, not immune to this global phenomenon and the major concern is how it will impact aquaculture. Specifically, smallholders and rural farmers may particularly be susceptible to these global changes and the fallout may further contribute to their poverty and vulnerability. Considering such developments, this technical review evaluates the underlying reasons for the recent dramatic rise in prices of these commodities used in aquafeed production and its consequences for the aquafeed industry and, in particular, on demand and expectations from aquaculture in securing current and future fish supplies.

This technical paper also discusses issues related to availability of and access to land and water resources, and the impact of other sectors using these resources on the direction of aquaculture both in terms of species produced and the production systems. In the light of probable increase in competition for land and water in many aquaculture producing countries in Asia, there will inevitably be increasing pressure to intensify aquaculture productivity through the use of more commercial feeds than farm-made feeds. Urbanization has influenced both the level and distribution of income and dietary habits which are driving upwards the demand for high-value fish species with significant implications for feed supplies. Due to the increasing prices of ingredients, aquafeed prices, especially the prices of compound aquafeeds, may increase further and a shortfall in the local supplies will compel importation of aquafeeds. Of the ingredients, fishmeal and fish oil are highly favoured for aquafeeds and aquafeed production is under increasing pressure due to limited supplies and increasing price of fishmeal and fish oil. This review also outlines initiatives that are searching for substitutes for fishmeal and fish oil so as to position the industry to meet the challenge of securing aquafeed for sustaining aquaculture.

To regulate the rising commodity prices would require governmental interventions. A brief overview of coping strategies to strengthen national capacity to address the issue of aquafeed supply and to mitigate rising prices of aquafeed ingredient is given. These strategies include policies, research and private sector and farmers' initiatives.

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Introduction

BACKGROUND

During 2007–2008, there was a soaring increase in food prices (particularly cereal grain) all over the world. This was especially severe in the world's poorest countries and was predicted to contribute to about a 56 percent rise in cereal import bills of those countries in 2007–2008. This sharp increase in food prices was due to a number of factors, including the reduced production of cereal crops worldwide and continued increases in oil prices resulting in higher freight cost. There was also the added concern that the use of certain grains in biofuel production would further aggravate this problem.

In aquaculture, feed accounts for over 50 percent of the production cost. Although considerable variation exists, cereal grains are the usual sources of carbohydrates in most of the aquafeeds and these cannot be economically supplemented with other sources. Fishmeal is the single most important source of protein in fish feed. The increased cost of energy (due primarily to soaring petroleum prices), El Niño effects, and increasing demand have resulted in a global increase in fishmeal price. The world price for fishmeal ranged between US\$500 and US\$700 per tonne during the period 2000–2005. In May 2008, the price of fishmeal was US\$1 210 per tonne.

The average price of other feed ingredients commonly used in aquafeed rose by 20–92 percent during the period between June 2007 and June 2008. The increasing price of feed ingredients (fishmeal, fish oil and cereal) and increasing manufacturing and transportation costs were, therefore, likely to have had a compound effect on global production and the price of aquafeeds. It was reported that during late 2008, feed prices had increased by over 30 percent on average in many of the countries in Asia, while farmgate prices of aquaculture products had remained static, literally impinging on the economic viability of several thousands of small-scale producers that form the backbone of the aquaculture sector, particularly in Asia, the epicentre of aquaculture production. The aquaculture industry will not be immune to this global phenomenon, and specifically smallholders and rural farmers may be particularly susceptible to this global change and the fallout may further contribute to their poverty and vulnerability. This global phenomenon could eventually induce small-scale producers to change businesses and/or may result in loss of livelihood.

The impact of an increase in feed prices is bound to vary not only between countries and regions but also within different farming systems and for different fish species. For example, while an increase in fishmeal and fish oil may have a profound impact on the farming of salmonids in Europe, a price increase will not have a profound effect on tilapia, catfish and carp farming in most of the Asian and sub-Saharan African countries as the proportion of fishmeal and fish oil in diets is relatively low, typically 2–7 percent for fishmeal and 1 percent for fish oil, while soaring prices of other ingredients (e.g. cereal and cereal by-products) may likely have a major impact. A study (Rola and Hasan, 2007) carried out in Viet Nam and Thailand in 2006 showed that proportion of the break-even price with the actual price on catfish farms are 85 percent and 69 percent, respectively, while the respective feed costs are about 86 and 81 percent of total production costs. The higher the break-even price, in comparison to the market price, the more vulnerable is the producer implying that farmers in Viet Nam and Thailand cannot afford to absorb a decrease of the proportion exceeding 15 and 31 percent, respectively. This indicates that most of the catfish and tilapia farmers in these countries will not be able to absorb any further feed price increase. Under these circumstances, the immediate need is to assess the extent and magnitude of the impact of this global phenomenon on aquaculture to

understand the situation, to study the medium- and long-term impact on aquaculture production, including food security and the overall biosecurity of the system, and to develop coping strategies to address the changing situation.

Activities

The study was carried out with special reference to the continents of Asia and Europe, considering that Asia contributes over 90 percent of global aquaculture production, while the aquafeed industry is the most well-developed in Europe. The activities under the study included both specific and overall impact analyses which were carried out through the collection, review and analysis of available published literature and information, as well as data collected in selected market studies.

The review had two major focuses: (a) a collection of data on the status in the costs and trends of and availability of feed ingredients and aquafeed; and (b) an analysis to examine how this change was reflected in aquaculture production, the prices of final aquaculture products and their consumption pattern in relation to the biosecurity and safety of aquaculture products for human consumption. The study includes the following specific topics to measure the overall impact of increased price of feed ingredients:

- assessment of status and trends of aquaculture feed: volume of production, prices of ingredients, and product quality with special reference to countries of south and southeast Asia and western Europe;
- assessment of aquaculture products/production: volume, quality, price, shift/change in production patterns (species diversification); and consumption in two regions, Asia and Europe;
- impact on biosecurity of aquaculture products resulting from a change in feeding patterns and unavailability of standard nutritional options; and
- comparison of the impacts in Asia and Europe, and development of management measures for adaptation to strengthen national capacity for emergency preparedness and recovery.

Abbreviations and acronyms

AFSD-BAI	Animal Standard Division, Bureau of Animal Industry (Philippines)
ARWR	Actual Renewable Water Resources
CF	Crude fibre
CL	Crude lipid
CP	Crude protein
CP Group	Charoen Pokphand Group Thailand
CPI	Commodity Price Index
CPSP	Fish protein soluble concentrates
DDGS	Corn Distillers Dried Grains with Solubles
DKK	Danish krone
DNA	Deoxyribonucleic acid
EAA	Essential amino acids
EE	Ether extracts
EU	European Union
€	Euro (€, European Union)
FAO	Food and Agriculture Organization of the United Nations
FM	Fishmeal
FIN	Fishmeal Information Network
Fed aquaculture	Aquaculture production that utilizes or has the potential to utilize aquafeeds of any type in contrast with the farming of filter-feeding invertebrates and aquatic plants that relies exclusively on natural productivity. Also defined as “farming of aquatic organisms utilizing aquafeeds in contrast to that deriving nutrition directly from nature”
HFM	Hydrolysed feather meal
IMF	International Monetary Fund
IMPACT model	International Model for Policy Analysis of Agricultural Commodities and Trade
INRA	Institut National de la Recherche Agronomique (French National Institute for Agricultural Research)
IFPRI	International Food Policy Research Institute
IRWR	Internal Renewable Water Resources
NE	North Europe
NFE	Nitrogen free extractives
NSPs	Non-starch polysaccharides
PBM	Poultry by-product meal
PDV	Productschap Dievoeder (Product Board Animal Feed, the Netherlands)
PEPPA	Perspectives of Plant Protein Use in Aquaculture
PHP	Philippine peso
ppb	Parts per billion
ppm	Parts per million
RAFOA	Research on Alternatives to Fish Oil in Aquaculture
RE	Rest of Europe

RMB	Currency of the People's Republic of China. The official ISO 4217 abbreviation is CNY (Yuan, ¥), although commonly abbreviated as RMB
RNA	Ribonucleic acid
SBM	Soybean meal
SPC	Soybean protein concentrate
SPI	Soy protein isolate
SSA	sub-Saharan Africa
UK	United Kingdom of Great Britain and Northern Ireland
UN	United Nations
USDA	United States Department of Agriculture
US\$	US dollar (United States of America)
VAC	Integrated garden (V), fishpond (A) and livestock (C) system (VAC in Vietnamese is <i>vuon, ao, chuong</i> , which means garden, pond and livestock)
VASEP	Viet Nam Association of Seafood Exporters and Processors
VND	Dong (₫, Viet Nam)
WHO	World Health Organization