

WORKING PAPER: I

ENHANCING TRANSBOUNDARY PRODUCTION, TRADE AND DISTRIBUTION OF AQUATIC ANIMAL FEEDS IN AQUACULTURE SYSTEMS IN AFRICA

Executive Summary

Feeds are among the primary inputs into production of aquatic animals. On average, feeds constitute over sixty percent of operational costs in aquatic animal production. Access to feeds of the right quality and in the correct amounts to meet the nutritional needs of aquatic species at their different life stages is therefore critical for efficient aquatic animal production. Equally important is the appropriate utilization of these feeds by producers throughout the entire production cycle.

A recent review revealed that 1.6 Million Metric tons of aqua feed was produced in Africa in 2016, however, almost all the countries in Africa produce less feed than are demanded by the particular country. The insufficient aquafeed production in Africa, together with the poor quality and inconsistent supply of locally produced feeds have enforced aquaculture sector to rely on imported feeds. However, the high demand and lack of local competition very often lead to feed over-pricing. In most African countries, there is no oversight of the industry by either government

agencies or any form of animal feed manufacturing association. Despite that imported aquafeed is very expensive, many farmers still prefer it due to its reliable quality. However, many other farmers cannot afford this feed and are forced to rely on their farm-made feeds or locally produced commercial feeds which are generally of low quality consequently, reducing aquaculture production. Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa (PFRS) recognises the need for Member States to encourage the development, expansion or introduction of new and proven production techniques such as aquatic animal feed production. In support to PFRS, AU IBAR through FishGov project facilitated consultation work to develop a working paper on appropriate regional guidelines for the transboundary production, distribution and trade of aquatic animal feed to support aquaculture development in Africa. The paper also provides an overview of aquatic animal feed in Africa emphasizing on weakness and opportunities in the aquafeed value chain.



Introduction and Background

Of the global Aquaculture output worldwide, Africa is a significantly low producer of fish compared to dominant regions like Asia and Europe. In 2016, total African aquaculture production amounted to 2,121,210 tons representing only 1.9% of global aquaculture production (110,208,218 tons) (FAO, 2018). However, despite the low contribution to the global production, the region has experienced a relatively high growth compared to other regions. The increase began in 1995 and has since shown a constant growth. This is due a realization of the importance and potential of Aquaculture by African governments in terms of food security and poverty alleviation. As aquaculture production in Africa is increasing, the demand for feed increasing which presents new opportunities for the feed mill business.

The 2017 Alltech Global Feed survey estimated the global feed animal production at over 1 billion tons in 2016, of which 39.5 million tonnes were from Africa representing 3.8%. Africa was reported as the fastest growing region; with a growth of over 13% in 2016. In terms of Commercial aquaculture feed, the global production is estimated at 39.9 Million tonnes and Africa contributed only 4% to the global production. However, In comparison to aquaculture production in Africa; feed production sector is growing at a faster rate and has doubled between 2014 and 2016 (Figure 1).

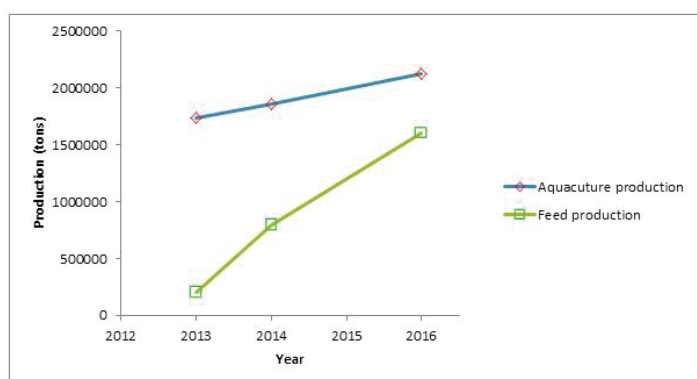


Figure 1: Aquaculture and Feed production trends in Africa (Source: computed from Alltech Global Feed survey data for several years)

Status of Aquafeed production in selected African countries

The extensive form of aquaculture production is the most dominant in Africa, practiced by more than 80 percent of the small scale farmers. As for the matter of feeding the stock on these ventures, feeds are generally produced on-farm using locally sourced ingredients from their farms such as maize and soybean, and complemented with kitchen waste and animal manure. The feed produced is often badly formulated, poorly made and misguidedly used due to a lack of technical expertise and inadequate manufacturing equipment. However, at the other extreme, there are rising numbers of intensive farms, both pond based and cages, in countries such as Egypt, Zambia, Nigeria, Ghana, Uganda and Zimbabwe. These farms have high outputs and as a result require large compound feed inputs, which involve either the purchase of commercial pelleted feed, or the establishment of local feed mills. The private sector in feed manufacturing has played a big role in countries such as Egypt, Ghana and Uganda.

The number of specialized aqua feed mills is small but growing in Africa. Nigeria for example now has 4 specialized feed mills, which only produce extruded, floating fish feeds and each of these companies sell across the country. The Ghana based manufacturer 'Ranaan Fish Feed West Africa' is the leading producer of aqua feed in Ghana. However, the company does not meet the demand for aqua feed on the market which is very high. Sigma feeds in Kenya, although already having an extruder on line has recently invested in a larger extruder with greater output. In Uganda, Ugachick Poultry Breeders are the largest aqua feed manufacturer. The production capacity of this line is 12,000 MT/year, and most of its feed is also exported to neighboring Kenya. In Zambia, the first dedicated fish feed plant has been constructed by Skretting Africa to assist the country's fast-growing aquaculture industry reach its full potential. . In Egypt, there are 25 fish feed mills producing more than 300,000 tons of fish feed each year (El-Sayed, 2014). Despite breakthroughs recorded in these areas, the demand of aquafeed by most farmers in Africa is very high than the supply (Figure 2). Hence some commercial farms still rely

heavily on imported feed ingredients and fish feeds from European countries, which makes fish farming expensive as fish feed account for at least 60% of the total cost of production.

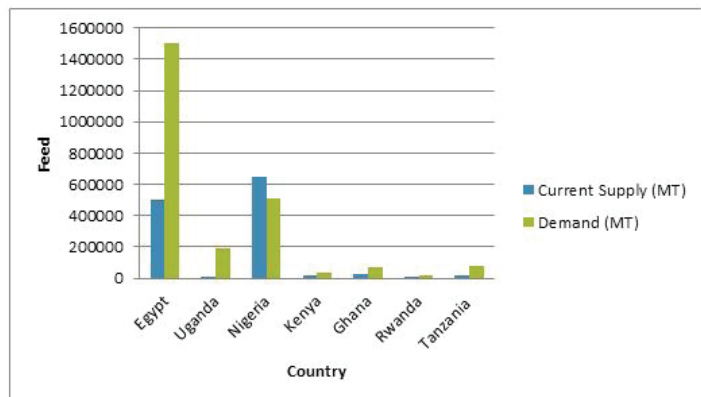


Figure 2 : Current supply, demand for feed* for selected African country (Source: Shaheen (2013), Rothuis et al. (2014) and Udo and Dickson (2017) - estimates based on 2015 aquaculture production)

Furthermore, some countries such as Malawi currently do not have any company producing extruded feed which studies have proved that it is high performing and are importing feed from the neighboring countries. This has raised the cost of feed, making it unaffordable to most small scale farmers. For example, feed transportation from Lusaka (Zambia) to Mchinji Boarder (Malawi) which about 500km costs around 115\$ per ton; which is over 20% of total feed price (M. Matsimbe, Personal comm. 2018).

Aquafeed value chain

The value chain of the aquafeed sectors in Africa is relatively simple and short. Two types of value chain have been identified;

Small-scale, on-farm aquafeed value chain

The vast majority of fish farms in Africa rely on farm-made feeds, fed in moist or sun-dried form. These feeds are produced by fish farmers themselves, involving home based operations with simple and mostly primitive facilities (Alagoa et al., 2011). This is mainly because small-scale commercial farmers cannot afford manufactured pelleted feeds. The farmers also have minimal access to quality feed ingredients, finance, storage facilities, etc. They also lack the basic knowledge on on-farm feed management. Farm-made feed formulations range from single feed ingredients such

as maize bran, wheat bran, rice bran or ground corn, to formulated mixes, moist feed cakes and processed, dry pellets. Ingredients are sourced from within the farm or bought from local suppliers, agents, and other cheaper sources.

Commercial aquafeed value chain

Figure 3 is showing the commercial value chain. The commercial feed producers usually sell through their wholesale and retail depots, as well as some other designated retail outlets throughout the countries. The distinction of a feeds seem to lie on whether the feed is sinking or floating pellets. Extruded, floating feeds offer the advantage of watching the feeding response as opposed to a sinking, steam-pelleted feed. Extruded feeds cost more to manufacture than steam-pelleted feeds due to the extra energy required and nutrients lost during the extrusion process.

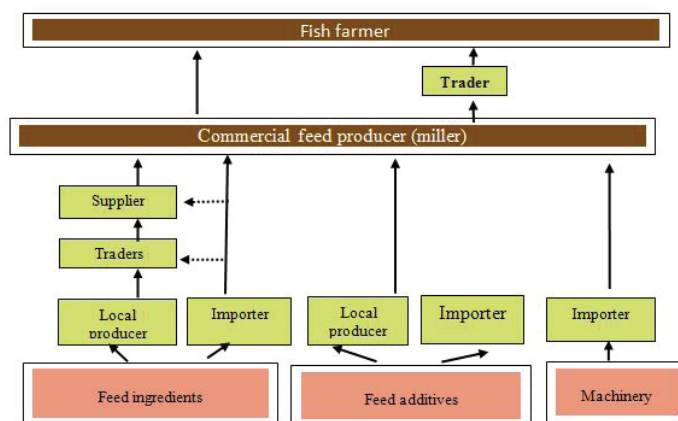


Figure 3: Value chain of commercial aquafeed in Africa adapted from El-Sayed, 2017)

Problem in Relation to Transboundary Production, Trade and Distribution of Aquatic Animal Feed

Whilst many constraints are holding back fish culture development, fish feed production and quality is one of the concerns as it is the majority of running costs of producing fish with 60-80% of expenditure. Developing the aquaculture sector in Africa will entail developing several sectors within the industry, such as the feed industry. The main factors affecting supply and accessibility to aqua feeds in sufficient quantities and of the right quality are threefold. Firstly, there are issues within the feed production; secondly issues associated with trade and distribution; and thirdly issues associated with the utilization of feeds.

Feed production

On farm small-scale feed producers lack technical assistance to manufacture cost effective quality aquafeed. Mostly, local manufacturers' use inappropriate feed formulations as they lack scientific background and knowledge on nutritional requirements of the farmed species. High price and poor quality ingredients lead to poor quality of finished feeds (high content of fines, low nutrient contents, wrong pellet size, high FCR, etc.). In addition, they have poor storage facilities leading to feed quality deterioration/spoilage.

Where aquafeed is commercially produced the core bottlenecks in feed production are obtaining the right quality of agronomic and other ingredients in the right quantities, quality and time and feed manufacturing technology. Extrusion technology is favored by today's aqua feed industry as it is capable of producing low density floating feeds and farmers find its higher quality results in lower FCRs and ultimately healthier profit margins. For cage farming, the need for extruded feed is inevitable. However, countries like Malawi currently does not have any company producing extruded feed which studies have proved that it is high performing. The demand for high quality feed has resulted in some countries importing fish feed. This has raised the cost of feed, making it unaffordable to most small scale farmers. Feed testing and analysis facilities and capacities are often limited, inaccessible and costly. This compromises the ability of smallholder producers and farmers and even many medium and large scale commercial producers to produce the correct quality even where formulations are correct. Consequently feed quality is uneven, costs of production and feed safety issues are promulgated due to these inconsistencies.

There are also challenges associated to access and appropriate use of correct feed additives, particularly so for aquatic animals. Feed additives are intended to improve the nutritional content, improve feed digestibility, and enhance pellet quality and shelf life. Medications, such as antibiotics and substances to flesh or egg quality can also be dispensed through the feed. Furthermore, animal feeds are often poorly labeled. The environmental impacts of arising from the use of feeds of poor quality also need to be taken into

account.

Trade and distribution issues

Poor feed handling, transport and storage infrastructure and bad feed supply chains are the key factors hampering aquafeed sector development and trade in Africa. Feed and feed ingredients are often transported to remote areas where aquaculture is practiced. Transporting feed ingredients and processed aquafeed from country to country in Africa or even within the same country can be difficult, due to: African road networks are physically limited and fragmented and roads are not usable in many remote, rural areas especially during the rainy seasons (FFI, 2011). Feeds may be transported in open trucks, motorbikes and bicycles, leading to pellets damage. Bureaucracy, inconsistencies, corruption and bribes at checkpoints within countries and at bordering customs systems make freight costs in Africa one of the highest in the world (DFID, 2011). Transport costs feeds can add up to 25% to the original unit cost (El-Sayed, 2017). For example, feed transportation from Lusaka (Zambia) to Mchinji Boarder (Malawi) which about 500km costs around 115\$ per ton; which is over 20% of total feed price (M. Matsimbe, 2018. personal comm.).

Most of African ports, especially in SSA are poorly equipped and inefficiently directed, leading to impeding transportation and trade in the continent. Therefore, equipment supplies, especially those shipped in from foreign countries can also be adversely affected by transport situation across Africa. It has been reported that for overland transit to landlocked countries in SSA, more than 50% of total transport time from port to hinterland cities is spent in ports (Arvis et al, 2010). The quality of fish feed may also be subjected to sharp deterioration during storage and distribution through the supply chain. Most African fish farmers are generally unaware of the effects of appropriate feed handling, storage and transport techniques on farm performance and profitability.

Utilization

The major issues at farmer level in terms of utilization include; (1) Capacity to purchase quality feed and in sufficient volumes, (2) Capacity to use feeds optimally

(3) Ability to assess the quality of the feeds that they purchase and to demand quality standards (4) Ability to maintain the quality of feed; farmers often have little knowledge on how best to store and handle their feed ingredients. Farmers are generally aware of the advantages of using industrially manufactured pellet feeds over farm-made aquafeed, but inadequate capital or lack of access to capital and a lack of technical knowledge prevent them from buying the better-quality feed and improving their feed management strategies.

Guidelines for Enhancing Transboundary Production, Trade and Distribution of Aquatic Animal Feeds in Aquaculture Systems in Africa

This section discuss strategies to be implemented in order to promote increased production of feed to enable trans-boundary trade and also procedures to follow to ensure that proper protocols for enhancing transboundary production, trade and distribution of aquatic animal feeds in aquaculture systems in Africa.

Table 1: *Transboundary production, distribution and trade of aquatic animal feed*

LEVEL	MAJOR ISSUES AND CONSTRAINTS	STRATEGIES/GUIDELINES FOR IMPROVEMENT
TRANSBOUNDARY PRODUCTION OF AQUATIC ANIMAL FEED	<ul style="list-style-type: none"> • Low production 	<ul style="list-style-type: none"> • Encourage large-scale farmers to produce aquafeed. • Use of appropriate equipment and technical expertise in feed manufacturing. • Encourage poultry and livestock feed producers to produce aqua feeds. • Enhance the capacity of aquafeed producers and traders.
	<ul style="list-style-type: none"> • High price 	<ul style="list-style-type: none"> • Public/private sector investment in research to identify appropriate, high-quality and readily available feed. • Support and facilitate research and pilot testing in production of aqua feeds from locally available resources.
	<ul style="list-style-type: none"> • Poor quality 	<ul style="list-style-type: none"> • Government should provide sound and accessible information and advice to stakeholders on diets formulations, manufacturing practices, methodologies and logistics of on-farm feed. • Help source quality materials, feed formulation, feed processing, • Simple, small-scale on-farm feed processing technologies and feed formulations should be developed and promoted. • Public/private sector investment in research to identify appropriate, high-quality and readily available feed. • Support and facilitate research and pilot testing in production of aqua feeds from locally available resources.
	<ul style="list-style-type: none"> • Dependence on feed import 	<ul style="list-style-type: none"> • Support and facilitate research and pilot testing in production of aqua feeds from locally available resources.

LEVEL	MAJOR ISSUES AND CONSTRAINTS	STRATEGIES/GUIDELINES FOR IMPROVEMENT
		<ul style="list-style-type: none"> Promoting commercial aquafeed industry through financial support and other incentives. Increase allocation of national budget to aquaculture
	<ul style="list-style-type: none"> Poor supporting logistics 	<ul style="list-style-type: none"> Put in place efficient fish feed trade information systems. Enhance and support the roles of Aquaculture associations, feed cooperatives and other NGOs in providing capacity building and technical and logistic services to on-farm feed producers and distributor.
		<ul style="list-style-type: none"> Develop public-private partnerships with farmer groups and associations to share resources and improve access to improved manufacturing capacity
TRANSBOUNDARY DISTRIBUTION AND TRADE OF AQUATIC ANIMAL FEED	<ul style="list-style-type: none"> Inefficient import and export agreements. 	<ul style="list-style-type: none"> Improve and align trade systems between Member States in the same Regional Economic Community (REC). Encourage and promote opportunities for regional and/or sub-regional subsidiaries of multinational aqua feeds companies. Reduce/drop customs duties and value added taxes (VAT) on farm inputs and imported feeds. Harmonize policies, institutional, legal and regulatory regimes to function beyond national jurisdictions.
	<ul style="list-style-type: none"> Poor transport and storage facilities. High Transport costs. Poor/inefficient ports and roads. 	<ul style="list-style-type: none"> Improve the capacity and infrastructure of ports, roads and railroads networks. Reforming and modernize customs administrations. Elaborate enabling mechanism to support and harmonize regional aquafeed trading activities.
	<ul style="list-style-type: none"> Bureaucracy and corruption. Poor traceability mechanism 	<ul style="list-style-type: none"> Improve the capacity of countries to implement traceability mechanisms. Fighting Bureaucracy and corruption in all import/export links. Improve quality and safety of products to better access regional markets. Put in place efficient (and preferably unified) quality control/inspection regulations and standards).

LEVEL	MAJOR ISSUES AND CONSTRAINTS	STRATEGIES/GUIDELINES FOR IMPROVEMENT
AQUAFEED GOVERNANCE/ SERVICES	<ul style="list-style-type: none"> Poor quality control inspection 	<ul style="list-style-type: none"> Implementing adequate hygiene and sanitation programmes Providing appropriate education and training to all stakeholder Implementing well developed, continuous monitoring programs for inspecting feedstuffs, finished feeds and production and storage facilities Quality control of feed ingredients and processed feeds
	<ul style="list-style-type: none"> Limited access to financial and insurance services 	<ul style="list-style-type: none"> Encourage private and state-own banks to finance aquafeed production and trade;
	<ul style="list-style-type: none"> Poor capacity building and extension services Insignificant roles of producers' organizations 	<ul style="list-style-type: none"> Encourage public and private partnership (PPP), Set up appropriate insurance regimes, Provide appropriate moratorium time on loan repayment, Subsidize small-scale (on-farm) producers and traders. Encourage the formation of producers associations and unions. Establish a good link between governments and producers associations.

Conclusion

The present working paper provides guidelines that relate to aquafeed production, distribution and trade. Implementation of these guidelines and strategies will consequently increase the supply and use of cost effective high quality aquatic animal feed thereby increasing the production of fish from aquaculture in Africa.

References

- 2017 Alltech Global Feed Survey (2017), www.alltech.com.
- Abdel-Fattah M. El-Sayed, Malcolm W. Dickson, Gamal O. El-Naggar (2014). Value chain analysis of the aquaculture feed sector in Egypt. WorldFish, Abbassa, AbouHammad, Sharkia 44662, Egypt.
- Alagoa, Y., Elo, O., Andrew, U., Ojukulli, A. 2011. A Report on Aquaculture Value Chain Analysis in the Niger Delta. Partnership Initiatives in the Niger Delta, 57 pp.
- Arvis, J.F., Raballand, G. and Marteau, J.F., (2010). The Cost of Being Landlocked: Logistics Costs and Supply Chain Reliability. Washington, D.C., World Bank, 2010.
- Cocker, LM. 2014. Partnership for African Fisheries (PAF) Aquaculture Working Group: Strategic Review on African Aquaculture Feeds, 85 pp.
- El-Sayed, A.F.M. 2017. Aquaculture in Sub-Saharan Africa. International Aqua feeds, 6:22-23.
- El-Sayed, A.F.M. 2017. Regional Guidelines for the Production, Transboundary Distribution and Trade of Aquafeeds, Feed Ingredients and Feed Additives.
- FAO (Food and Agriculture Organization of the United Nations). 2017. Global Aquaculture Production 1950-2016. <http://www.fao.org/fishery/statistics/global-aquaculture-production/query/en>.
- FFI (Fish Farming International), 2011. Lifting the Veil on Africa. Aquaculture's Next Frontier. Dey, R., 06/2011. www.intrafish.com
- Rothuis, A., M. Turenhout, A. van Duijn, A. Roem, E.

Rurangwa, E. Katunzi, A. Shoko and J. B. Kabagambe, 2014. Aquaculture in East Africa; A regional approach. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report IMARES C153/14 | LEI 14-120. 54 pp.; 16 fig.; 8 tab.; 37 ref.

11. Shaheen A., Seisay M, Nouala S (2013) an industry assessment of Tilapia farming in Egypt. African Union, International Bureau for Animal Resources (AU-IBAR).
12. Udo I. U and Dickson B. F (2017) The Nigeria Aqua Feed industry: potentials for commercial feed production, Nigeria Journal of Fisheries and Aquaculture 5(2): 86-96 September 2017.

Prepared by:

Professor Emmanuel Kaunda

Lilongwe University of Agriculture and Natural Resources (LUANAR)

P.O. Box 219, Lilongwe, Malawi

Email: ekaunda@bunda.luanar.mw

Note: This Working Paper is a synthesis of series of reports based on activities implemented by AU-IBAR under the project 'Strengthening Institutional Capacity to enhance governance of the fisheries sector in Africa', Project number: DCI-FOOD 2013/331 -056' funded by the EU.

Citation: AU-IBAR, 2018. Working Paper : Enhancing transboundary production, trade and distribution of aquatic animal feeds in aquaculture systems in Africa



African Union – Interafrican Bureau for Animal Resources (AU-IBAR)
Kenindia Business Park, Museum Hill, Westlands Road
PO Box 30786-00100 Nairobi, Kenya.
Tel: +254 (20) 3674 000
Fax: +254 (20) 3674 341 / 3674 342
Email: ibar.office@au-ibar.org
Website: www.au-ibar.org