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Ethiopian feed industry: current status, challenges and opportunities

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Introduction

Ethiopia is a country with largest livestock population in Africa and with a huge livestock genetic diversity. In the second Growth and Transformation Plan (GTP), Ethiopian government has identified livestock sector as a new source of economic growth. The rationale in using livestock sector as a growth driver emanates from the unexploited potential of the sector and a wide range of agro-industries to be created along the path of market led economy and commercialization.

In general, the feed sub-sector is central for all livestock commodities and is a key pillar of livestock growth and transformation from various perspectives. From production point of view, animal production is essentially a conversion of feed into animal product dictating the level of production and product quality and safety. From economic point of view, about 70 percent of the cost of animal production is feed and suggesting economic feasibility of animal agriculture is mainly a function of quantity or quality of nutrients and the science of feeding. Thus feed is a point of convergence and a critical commodity for which all livestock species compete and it is a major pillar towards ensuring economic, social and environmental goals of livestock production (Makkar, 2016).

As is the case for other growing economies, the demand for livestock commodities in Ethiopia is rapidly growing. Compared to the production base year of 2014/15 with estimated 167million litres of milk, 1.3 million tonnes of red meat and 419 million eggs, the projected demand is expected to be 1490 million litres of milk, 1.9 million tonnes of red meat and 3.9 billion eggs by 2020 (LMP, 2015). Also, at global and regional levels the demand for livestock products is projected to increase by 60-70 percent by 2050 from the current level (Makkar, 2016). Thus, commercial feed sector in Ethiopia should take advantage of the global and the country's economic growth and the increased future animal source food consumption. Historically, the development of feed processing plants in Ethiopia dates back to the beginning of modern livestock husbandry in the early 1950's followed by establishment of feed processing enterprises during the socialist regime. As a follow up of the new economic policy since 1991, the feed processing enterprises operated by government were privatized and a number of feed processing plants of various capacities came into operation. Overall assessment of the Ethiopian feed processing plants was carried out in 2012 by the Ethiopian Animal Feed Industry Association (EAFIA, 2012). However, in the market led economy where production signals are derived from market it is rational to expect basic changes and dynamism in overall status, challenges and opportunities. The objective of this paper is to provide an overview of the current status, key challenges, and the way forward for the Ethiopian feed industry.

2. Current Status

2.1. Industry structure of commercial feed sub-sector in Ethiopia

Currently a total of 81 enterprises under 5 major categories are operating in Ethiopian commercial feed sub-sector (Table 1). The dominant enterprises are feed processing plants owned by private companies and farmers' unions engaged in production of compound feed followed by importers or manufactures of supplements (premixes, feed additives, etc.) and of feed processing machineries/ equipment, and suppliers of forage seeds.

A total of 32 privately owned feed processing plants are currently operational. In terms of geographic distribution, most of the enterprises are found in Oromiya and Addis Ababa regions with respective contribution of 37 and 31 percent. The Amhara and Southern Nation, Nationalities and People Regional (SNNPR) states, each accounts for 13 percent while Tigrai region accounts for 6 percent of the total feed processing plants. Nationwide, there are a total of 28 farmers' unions engaged in commercial feed sector and they are evenly distributed across the four regional states mentioned above. In terms of presence of enterprises dedicated to the commercial feed production and service delivery, about 42 percent of the administrative zones (20 zones) in the major regional states i.e. Amhara, Oromiya, SNNPR and Tigrai are not yet covered. Additionally, no feed enterprise (feed processing plant, farmers unions, importers of feed supplement, suppliers of feed equipment, etc.) exist in the regional states of Afar, Somali, Gambella, Benishangul-Gemuz, Harari and Diredewa. Apparently, most of these regional states are dominated by the pastoral and agro-pastoral production systems where livestock production forms the basis of livelihood of the community and feed intervention is central to their development agenda.

There are a total of 12 enterprises engaged in importation of supplements (premixes, additives and vitamins) while 3 enterprises are engaged in manufacturing of supplements, making a total of 15

Table 1: Industry structure and regional distribution of enterprises engaged in feed industry

	Number of enterprises in each category					
Region	Feed processing plants	Farmers unions	Supplement importers / man-ufacturers	Feed processing machineries / equipment	Forage seeds	**Total enterprises**
Addis Ababa	10	1	10	4	1	26
Oromiya	12	6	4	1	0	23
Amhara	4	7	0	0	0	11
SNNPRS	4	6	1	0	0	11
Tigrai	2	8	0	0	0	10
Total	**32**	**28**	**15**	**5**	**1**	**81**

enterprises engaged in the supply of feed supplements. In terms of geographical distribution of enterprises engaged in importation or manufacturing of supplements, most of them are in Addis Ababa (10 enterprises) followed by Oromiya (4 enterprises) and SNNPR (1 enterprise) states. Domestic production of feed supplements is currently limited to mineral supplements and effective microbes and delivery of premixes depends on import. Major categories of premixes include premixes for egg production (rearing premix, starter premix and layer premix), broiler premix (broiler starter, broiler grower and finisher) and ruminant premix which contains vitamins, trace element, minerals and other additives.

Currently there are a total of 5 enterprises engaged in importation or manufacturing feed processing machineries or equipment and they are all located in Addis Ababa. Commercial forage seed production is currently limited to one enterprise located in Addis Ababa.

2.2. Facilities and capacities of feed processing plants

In terms of facilities, all the privately owned feed processing plants have feed mill, mixer and storage places for ingredients and for processed feeds. Only few plants mill limestone and make multi-nutrient blocks. Pellet maker is limited to two feed processing plants, liquid mixer exists only in one feed processing plant and no feed processing plant has a laboratory for analysis of ingredients and feeds. The average installed capacity of the private feed processing plants is 5.4 tonnes per hour while the operational capacity is 3.0 tonnes per hour, suggesting most of the plants are operating at an average of 54 percent of their installed capacity. Most feed processing plants are currently operating below their installed capacity mainly due to low demand for the product, shortage of ingredients and inconsistent supply of electricity. Average operational capacity of feed processing plants at farmers' unions level is 2.0 tonnes per hour. In terms of operational capacity as percentage of installed capacity for the feed mixer, farmers' unions are currently operating at an average processing capacity of 66 percent.

2.3. Price trends of feed ingredients and formula feeds

Price trends of feed ingredients taking base year of 2010/11 and average price of 2016 suggest an average increase of 52 percent across five years and at an annual increase of 11 percent (Table 2).

Table 2: Price trends of major feed ingredients (Birr per tonne)

Ingredient	2010/2011 price	2015/2016 price	Percentage change
Maize	4000	5100	28
Wheat bran	2800	4170	49
Wheat middling	3000	4200	40
Noug cake	3000	4800	60
Rapeseed cake	1300	2900	123
Soybean meal	7500	12000	60
Cottonseed cake	4550	5000	10
Percentage change on the overall period			**52**
Percentage change per annum			**11**

Table 3: Price trends of major compound feeds (Birr per tonne)

Ingredient	2010/2011 price	2015/2016 price	Percentage change
Layers ration	5030	8350	66
Growers ration	5520	10270	86
Chick starter ration	6550	10680	63
Dairy ration	3340	6110	83
Calves ration	4280	8560	100
Heifer ration	2800	6440	130
Beef cattle ration	3520	6090	73
Sheep ration	3540	6440	82
Average			**82**
Percentage change per annum			**16.4**

Likewise, average percentage change in price of compound feeds suggests average increase of 85 percent with estimated annual rate of increase of 17 percent per year (Table 3).

2.4. Production of major compound feeds

Annual compound feed production by both private and farmers' unions feed processing plants in 2015/16 has been estimated at 61416 tonnes (excluding home-made mixed feed) (Table 4).

Table 4: Major compound feeds produced by private and farmers' unions feed processing plants during September 2015 to August 2016 in tonne/year

Feed type	Private processing plants	Farmers unions processing plants	Total	Percentage share of compound feed
Dairy feed	11920	4156	16076	26.2
Beef cattle	3439	5372	8811	14.3
Poultry feed	34362	143	34505	56.2
Other feeds	1929	95	2024	3.3
Total	**51650**	**9767**	**61416**	**100.0**
Percentage share	**84.1**	**15.9**	**100.0**	

In terms of enterprise category, privately owned feed processing plants account for 84 percent while those of farmers' unions accounted for the rest 16 percent of the total annual production. Regarding feed type, poultry feed accounted for 56 percent of annual compound feed production while dairy feed, beef

cattle feed and other feeds respectively accounted for 26, 15 and 3 percent.

2.5. Feed supplements/additives and feed processing machineries

Assessments on imports of supplements or feed additives suggest a total of 677 tonnes of feed supplements have been imported by 5 companies in 2015/16. An appraisal of supply of feed processing machineries indicated a total of 119 pieces of equipment (16 mixers, 102 choppers and 1 forage harvester) have been imported and made available to commercial livestock producers, university farms, private feed companies during the last four years. Likewise, a total of 122 different machines (20 mixers, 22 choppers, 15 mills and 65 compound mills and mixers) have been locally manufactured during the last four years and made available to users.

2.6. Trends in price of feed supplements/additives

Increase in price of supplements varied with the type of supplement. During the last five years, prices of vitamin premixes and methionine remained relatively stable as compared to the trends in prices of mineral, lysine and salt. The average increase in price of supplements during the last five years has been about 41 percent.

3. Key challenges in Ethiopian Feed Industry

Commercial feed sector in Ethiopia, like any other emerging sector along the path of market led economy, is currently facing a number of challenges. Major challenges are presented below.

3.1. High price of feed ingredients and compound feeds

Seasonality, shortage and very high prices of feed ingredients are key challenges for sustainable and affordable delivery of compound feeds. During the last five years, prices of feed ingredients and compound feeds have increased by an average of 52 and 82 percent respectively, leading to low demand of compound feeds. This situation has even led to closing of some commercial farms (dairy and beef), essentially due to low return on the investment.

3.2. Un-fair taxation policy on feed ingredients and compound feeds

Commercial feed sub-sector and livestock production in general have long been suffering from un-fair taxation. On ruminant feeds, 15 percent value added tax (VAT) is charged on feed ingredients and compound feeds leading to double taxation for feed ingredients and formula/compound feeds. On poultry feeds, since most of the feed supplements especially the premixes are imported from abroad, the government has taken positive measure recently in removing VAT on poultry feed ingredients and formula feeds.

3.3. Feed safety and quality

Ensuring feed safety and quality is recently one of the key challenges in the commercial feed sector. It is also of high importance for the livestock producers and consumers of animal source foods. Among feed safety issues, the recent detection of high aflatoxin levels in oilseed cakes and compound feeds has raised serious concerns in ensuring the desired quality and safety of feed along the food value chain. Additionally, the need for maintaining the desired level of nutritional and quality standards of feed ingredients and compound feeds is also a challenge for commercial feed producers, the regulatory body and livestock producers. Lack of confidence of livestock owners on the quality of compound feed is also one of the reasons for not using such feeds. There is also a need to update feed quality and safety standards.

3.4. Demand of compound feed

Compound feed production and intensification of animal agriculture are key processes which ought to go hand-in-hand towards transforming animal agriculture. Although market led economy and commercialization of animal agriculture have opened new avenues to achieve this goal, increase in demand of compound feeds has not yet reached to the desired level. Thus, most of the feed processing plants are operating below capacity.

3.5. Imports of premixes, minerals and vitamins

Among various inputs, premixes, minerals and vitamins are critical in supporting the desired level of animal productivity. However, they are currently imported from abroad using hard currency and their prices are very high.

3.6. Research and extension support for commercial feed sector

Technical services (research and extension) in promoting the commercial feed sector (use of alternative feeds for compound feeds; use of innovative approaches in import substitution via local production of feed supplements; research, extension and infrastructure development support in forage seed and feed processing machineries; on-farm testing and promotion of compound feeds, and technical support for feed safety and quality regulation) are very weak or non-existent.

3.7. Feed quality and safety analytical service

Most private and farmers' unions feed processing plants are currently facing serious challenges in analytical services mainly because of high cost and inadequate service delivery. There are no well equipped and accredited labs to the satisfaction of the commercial feed sector. To date only one commercial lab that undertakes modest number of analysis is available. Labs in public institution have limitations in capacity and mode of service delivery to support the commercial feed sector. In terms of scope, the existing labs are very much limited to the conventional analysis and there are no labs to support analyses required for ensuring feed quality and safety.

3.8. Organizational capacity of Ethiopian Animal Feed Industry Association (EAFIA)

EAFIA was established in 2008 by feed factory owners, private dairy farmers and farmers' unions. As a young institution it has not yet reached to the desired level of operation. It is currently facing several challenges, among them technical, financial, and organizational deserve attention. Technically, members of EAFIA have not yet developed the required capacity for internal or self regulation for ensuring the desired quality and safety of their products. In terms of finance, the major source of finance so far has been project based and such a source is not sustainable. From organizational point of view, all feed factory owners are not yet members of EAFIA and a lot more remains to be done to make EAFIA an influential association.

4. Opportunities for the Ethiopian Feed Industry

Among the aforementioned challenges the key concern in commercial feed sector is resourcing of the quality ingredients throughout the year at affordable price. For this to happen the following issues deserve special attention.

4.1. Feed Ingredients (maize and soya bean)

Adequate opportunities currently exist to produce maize and soya bean for feed production in Ethiopia. Last five decades of research and technological advances have led to the availability of varietal choices and production packages. Additionally, huge land is available for commercial production of these commodities. These offer opportunities to enhance their production in Ethiopia.

4.2. Compound feed (ruminant, poultry and aquaculture)

Production of compound feed in Ethiopia has almost doubled during the last five years. However, the quantity being produced currently does not match the huge livestock population the country has. Additionally, region-wide distribution of feed processing plants is uneven and is limited to only some regions and zones. Additional new business opportunities, for example, compound feed production for aquaculture are emerging.

4.3. Feed Supplements or inoculants

In terms of feed supplements (premixes, minerals and vitamins) Ethiopia is very much dependent on their import. Imported products are usually generic and not tailored for local purpose. Additionally, from economic point of view, hard currency is required to procure them from abroad. Therefore, alternatives have to be sought and developed from technical and economic perspectives for sustainable supply. Domestic production of feed supplements is emerging with wider business opportunities as a result of intensification of livestock production. Thus, there are opportunities for foreign direct investment or involvement of local investors in domestic production of feed supplements. The production of effective microbes as feed inoculants is currently a take off point with huge business opportunity in commercial feed sector.

4.4. Improved forage and natural pasture

Research and development efforts in improved forage production during the last five decades has led to varietal development and production practices. However, adoption of the technology and commercialization have lagged behind because of a number of factors pertaining to technical (technology and approach), socio-economic, policy and institutional (actors convergence) issues (Gberemedhin et al., 2003, Shelton et al., 2005). As has been noted in various tropical countries, failure of the technology in meeting farmers' expectations, lack of participatory approach in technology development and absence of farmer-centred research and extension programs were the major factors contributing to low adoption. Limitations in partnership between relevant stakeholders (government, private and farmers) and lack of long term commitment by key players have also been noted to contribute to low adoption. From socio-economic and policy perspectives (availability of land, land tenure system, degree of market orientation, income of farmers) were also among the key factors influencing the adoption of improved forage production technologies. The market led economic policy and commercialization is an opportunity for increased adoption of such technologies to cater to the needs of domestic, regional or global markets. High biomass of improved forages can be produced, processed and made available for use. The commercial forage seed production also offers business opportunities for foreign direct investment or through local investment.

While there is feed deficit in certain part of the country, there are areas e.g. Gambella, Benishangul-Gemuz regions where abundant feed such as natural pasture is produced (FAO, 2018) and is not effectively utilized. Specifically in the savannah grassland of these regions, natural pasture is underutilized. Thus, in such environment natural pasture can be harvested at the right time, baled and transported to feed deficit areas or areas where there is effective demand.

4.5. By-products of agro-industry

By-products of sugar industry (molasses, bagasse, sugarcane tops), breweries and food processing industries are not yet effectively utilized for animal feed production. The increasing number of upcoming sugar industry projects, breweries and agro- and food -industries would provide opportunities for improving feed supply through utilization of alternative feeds. Additionally, abattoir by-products such as bone, blood and meat can be converted to animal feed and incorporated into non-ruminant feeds.

4.6. Total mixed ration/alternative feeds in ruminant and non-ruminant rations

Incorporation of crop residues or hay into total mixed ration is among the technological alternatives to enhance utilization of low quality roughages, increase feed conversion efficiency and economic returns from the livestock production. Production of total mixed ration can be commercialized, offering investment and job creation opportunities. Search for other alternative feed ingredients (in addition to those mentioned above) such as locally adapted lesser-known and lesser-utilized resources and their inclusion in ruminant and non-ruminant rations also provides opportunities for investment.

4.7. Feed processing machineries, equipment and tools

Feed processing machineries, equipment and tools are currently supplied by few companies. Taking into account the need for modernization of the feed industry dictated by commercialization of livestock production, there will be high demand for feed processing machineries. A revolution is needed in this field for making the feed industry vibrant.

4.8. Laboratory service delivery in feed quality and safety

Commercial feed sub-sector is currently encountering lack of laboratory service delivery system for feed quality and safety assessment. Labs rendering such services are very limited in number and scope, and mode of service delivery needs to be efficient and reliable. Taking into account the future growth of the feed industry, establishment of laboratory service delivery system by commercial labs is an opportunity for investment.

4.9. Enhancing capacity and impact of EAFIA

Quite a range of opportunities exists for improving overall organizational capacity of EAFIA. Financially, securing funds from alternative sources can be designed and implemented. In addition, EAFIA can link with key actors (research, academia, development organizations, international institutions) engaged in feed value chain to improve its efficiency and impact. It may develop a status of non-profit organization so that it can participate in the activities of development and international organizations. EAFIA can also make the best use of its technical advisory board to develop an action plan for the next 5 to 6 years.

5. Conclusions

Based on the above analysis the following conclusion can be drawn:

Estimated at 61416 tonnes, the annual compound feed production is far below the demand.

Domestic production of supplements and feed additives is in infancy and the country's requirement heavily depends on import, demanding technical and policy interventions.

The prices of feed ingredients and compound feeds have increased at an alarming rate demanding technical and policy support. While moving towards conducting comprehensive and systematic studies in a coordinated manner, technical solutions in using alternative feed ingredients available in various geographic locations can be harnessed and used. Additionally, policy interventions such as removal of the VAT on key feed ingredients and compound feeds targeted for ruminant livestock is critical for reducing the price of feeds and thus contributing to the sustainable development of the feed industry. Feed companies should diversify their product i.e. produce total mixed ration in mash, block or pellet form, multi -nutrient blocks, feed supplements/additives, among others.

Feed companies should go beyond customary activity of only feed production, and complement their engagement in promoting their products, for example through their own extension and outreach activities.

In the light of the ongoing development of Integrated Agro-industrial Parks, supply of feed ingredients can be enhanced by integrating the feed processing plants to these initiatives. The Integrated Agro-industrial Parks, among various activities, are involved in processing of crops and other agro- and food-products, and they generate a huge volume of by-products for use as feed ingredients for feed processing plants. The integration would be a win-win situation both in terms of creating effective demand and supply towards enhancing the feed value chain, creating jobs and mitigating disposal problems of by-products.

Access to quality feed should be enhanced by providing special support e.g. making available finance, improving overall infrastructure, providing market information to feed micro-businesses (private dealers, marketers and organized youth) at the grass root level. Franchised model business arrangement would help in improving access to inputs required to manufacture feeds.

Although animal feed by and large is a private good, extensive technical and policy support such as research, regulatory framework and conducive policy environment are required from the public domain.

As a young institution, strengthening the organizational capacity of the Ethiopian Animal Feed Industry Association deserves attention to spear head the development of feed industry.

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