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Milking challenges while drinking foreign milk: the case of Ghana's dairy sector

Mavis Boimah, Daniela Weible, Sascha Weber

Thünen Institute of Market Analysis, Bundesallee 63, 38116 Braunschweig, Germany,
mavis.boimah@thuenen.de, Daniela.weible@thuenen.de, sascha.weber@thuenen.de

ABSTRACT

While the domestic milk production sector of Ghana remains stagnant over the years, dairy processing on the other hand is continually witnessing growth relying largely on milk powder and other dairy products imports mainly from EU member countries. The EU is blamed for the underdevelopment of the domestic dairy sector of many African nations. However, evidence that either prove or refute these growing criticisms are missing. This study was thus initiated to examine Ghana's dairy sector with an emphasis on those parts of the value chain where imported milk powder is used. The study shows that the dairy processing industry is continually expanding relying largely on milk powder imports mainly from EU member countries. Also, processors expect an increase in consumer preferences for more diversified dairy products in the near future. This implies further growth of the processing industry which already relies largely on imported input. The study identified myriads of challenges facing the Ghanaian dairy sector which altogether contribute to its inability to contribute to the processing industry's needs. Notwithstanding, any attempt to address the challenges of the sector should focus not only on economic and political aspects such as self-sufficiency, sovereignty, and trade dependency but also climate conditions, the use of natural resources and their subsequent environmental impacts should be considered.

Keywords: dairy sector, imported milk powder, local fresh milk, processing, Ghana

1 Introduction

The dairy processing industry of Ghana has witnessed tremendous growth over the years, largely attributed to growth in population, demand for more healthy diets, and an increase in the imports of milk and its products. Nevertheless, fresh milk production in Ghana has not experienced any meaningful growth over the years. The self-sufficiency-rate for example is lower than 20 % since 2005 (FAO-STAT, 2020; UN Comtrade, 2020).

European dairy companies on the other hand continue to expand their operations in Africa, with a significant presence in the West African region (Corniaux, 2017; Orasmaa et al., 2016). These companies have been criticized by some international organisations and Civil Society activists for flooding African nations with their cheap imports (CTA, 2014). Thus allegedly resulting in the underdevelopment of the domestic dairy sector and having negative consequences for producers (Vielajus, 2006). Furthermore, the abolition of milk quotas within the EU has also been linked to this criticism (Orasmaa et al., 2016). These examples of criticism show the emotionally driven discussions. However, evidence that either prove or refute these growing criticisms are missing. In response, this research is conducted to assess the impact of milk products exports on developing countries with a focus on Ghana based on the substantial volumes of dairy products imported.

This paper is part of a broad study assessing the impact of EU milk products exports on African countries[1]. In this paper, a focus is put on those parts of the value chain in Ghana where imported milk powder is used and addresses the following research questions:

- How is the value chain of imported milk powder organized and structured?
- Which products are produced from milk powder? What marketing channels exist for the processed products?
- What differences exist in the use of milk powder and local fresh milk?
- What barriers and challenges confront Ghana's dairy sector?
- How do dairy processors and retailers perceive and assess the competition between local fresh milk and imported milk powder?

The paper is structured as follows: Following the introduction, a detailed description of Ghana's dairy market is given in Section 2. This description contains a brief summary of past and current livestock policies, an overview of the different cattle rearing systems in Ghana also covering the spatial distribution of cattle, the illustration of total dairy supply emphasising the importance of imports and an overview of dairy processing and retail in Ghana with a focus on the value chain of imported milk powder. Against this background, Section 3 presents the applied methodology and database while results of the interviews are shown in Section 4. Conclusions drawn from the study are presented in Section 5.

1.1 Description of the Ghanaian dairy sector

1.1.1 Livestock Policies

Ghana's livestock and milk production sectors have not received much attention in terms of policies as well as interventions from the local government and other development agencies. Although various policies have been approved, the development of the dairy sector especially is poorly addressed by both past and current policies.

Livestock policies date back to the early 70s. Objectives have been, for example, to increase productivity of livestock (e.g., the Five-Year Development Plan, 1975/76-1979/80); to reduce the incidences of animal disease (e.g., the Ghana-German Agricultural Development Project, initiated in 1974, lasting close to 20 years; and the Pan-African Rinderpest Control project, 1986-1999); to improve breeding stocks and animal husbandry practices (e.g., the Growth and Poverty Reduction Strategy II, 2006-2009). Among the host of policies implemented over the years, only those on diseases and pests' control has been successful, nevertheless, they have not led to any substantial growth and development of the dairy sector. Thus, the sector remained stagnant. Some reasons can be cited: most livestock policies did not clearly outline plans for dairy development - that is overall, little emphasis was placed on activities that would lead to growth and development of the dairy sector. Additionally, some policies were not implemented due to the lack of commitment on the part of the government (e.g., GOG, 2014).

[1] For further information see: https://www.thuenen.de/en/cross-institutional-projects/impact-of-meat-and-dairy-exports-on-developing-countries/

The national development objective as stated in the current Coordinated Programme of Economic and Social Development Policies (2017-2024) is to attain food security through adequate supply of quality meat, animal and dairy products. In this policy document, reference was made to the inability of past policies including that on breeding and production to make significant contributions to the development of the livestock and dairy sector. In addition, the sector was described as relatively stagnant, with an average growth rate of 5 % over the last decade (GOG, 2017). Yet, no plans or strategies are outlined in this document to spur growth of the dairy sector.

1.2 Cattle rearing and milk production in Ghana

1.2.1 Systems of cattle rearing

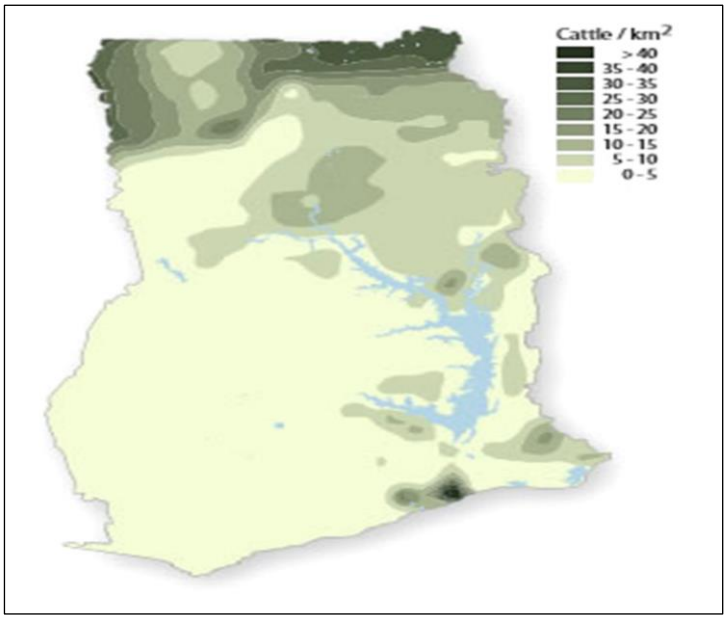
In Ghana, livestock production is an avenue for employment especially for the majority of rural dwellers, as a source of additional income to crop farming, and as a safety net either to crop failure in the event of droughts or during periods of low agricultural prices due to bumper harvest (K. Oppong-Apane, 2016).

Although milk can be produced from livestock such as goats and sheep, cattle is the unique source of milk produced in Ghana. However, to date, most farmers continue to raise indigenous breeds of cattle, while open fields serve as the main source of feed for animals. The extensive system of cattle rearing therefore dominates the other systems in Ghana. It is a pastoral and agro-pastoral approach where herdsmen mostly "Fulani" move freely from one place to the other grazing their herds on natural grass lands with no supplementary form of feeding such as hay or silage. In this system of raising cattle, very few farmers are oriented towards commercial milk production because meat (beef) instead is the priority focus in raising cattle. Regardless of this, the extensive system produces more than 90% of the total fresh milk in Ghana (Guri, Ameleke, & Karbo, 2018; Oppong-Apane, 2016). In most cases, farmers sell milk as a surplus after consumption by their households and their calves. Milking is done manually with the hands into unclean cans and gallons because of the lack of automated milking machines, and in dirty environments rendering the milk unhygienic (Oppong-Apane, 2016). Even though milk produced is fresh, there are no cooling units to store the milk before selling out.

Apart from the extensive system, two other systems of cattle rearing are practiced: the intensive and the semi-intensive systems, however, these are not widely used. In the semi-intensive system of cattle production, the animals are partially kept in a confinement otherwise known as a kraal and is popularly practiced in urban areas and cities. The cattle are taken to open fields for grazing and returned to their place of abode. Just like the extensive system, milk production in this system is not a priority, however, quantities produced on average are higher than that produced in the extensive system. The intensive system in contrast to the former systems described above keeps cattle in confined structures and are fed with fodder and concentrates. This system of cattle production is very rare in Ghana and are found only on Research Stations and University Farms where breeding programmes take place. In this system, milk production is an all-year activity and usually destined for the market.

1.2.2 Spatial distribution of cattle rearing

Cattle rearing is dominant in the Guinea and Sudan Savannah vegetation zones located in Northern Ghana (see **Fehler! Verweisquelle konnte nicht gefunden werden.**), which together account for about 75 % of the cattle population in Ghana (DFID, 2014; ADF, 2001). The two agro-ecological zones in Northern Ghana are climatically favourable for rearing livestock in addition to large fields for grazing animals compared to the other ecological zones in the country.



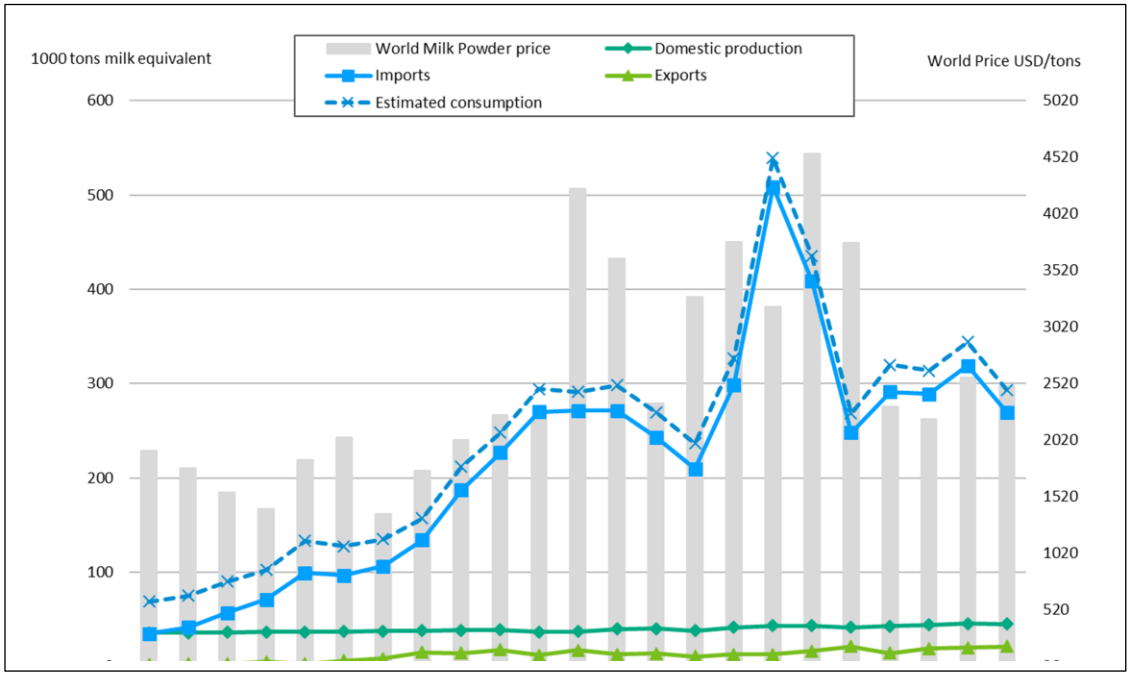
Source: HarvestChoice/IFPRI, 2010

Figure 1. Map of Ghana showing cattle density

The relatively dry coastal savannah in the south accounts for about 15 % of the country's cattle population while the remaining regions together account for the least population of cattle (10 %) due to the prevalence of tsetse fly that transmits the deadly disease, trypanosomiasis (ADF, 2001).

1.3 Dairy supply

Taking dairy demands into consideration, the quantity of fresh milk produced in Ghana is far inadequate. The low production of milk is attributed to large proportions of milk produced in the extensive system of cattle rearing compared to that produced in both the intensive and semi-intensive systems. Due to this, processors rely mainly on imported milk powder for the various dairy products processed and supplied on the Ghanaian market. Imports of dairy products to Ghana as a result has witnessed a steady increase in the last two decades as shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**. The upward trend in imports is related to an increasing population, per-capita incomes and domestic demand for dairy products in West Africa generally, and specifically in Ghana. According to the data, the self-sufficiency rate of dairy in Ghana fell steadily from 44 % on average (1996-1999) to 14 % on average (2014-2018). Estimated consumption as illustrated in figure 2 also increased alongside imports. While local milk production barely increased during this period, the data (Figure 2) shows some exports of milk mainly to neighboring countries but in insignificant volumes.



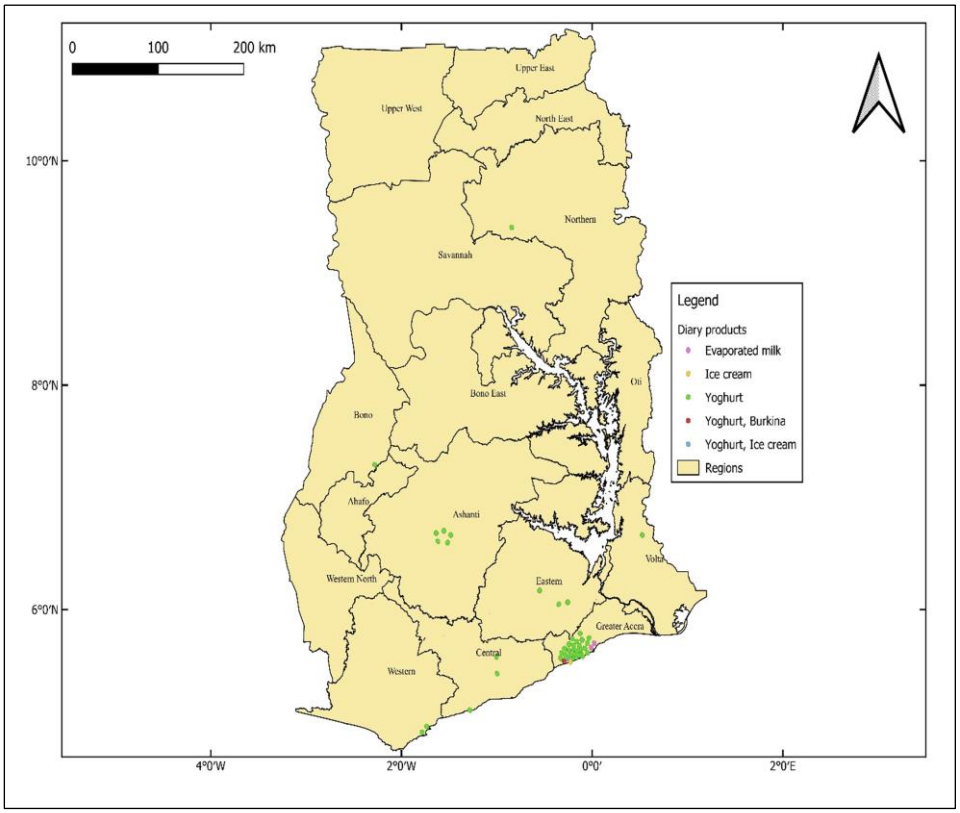
Note: The domestic consumption is estimated based on imports + production - exports. Storage was not considered. Source: Zamani et al., 2021.

Figure 2. Development of the Dairy Sector in Ghana from 1996 to 2018 (in 1000 tons, milk equivalent)

Imports shown in **Fehler! Verweisquelle konnte nicht gefunden werden.** mainly consist of various forms of milk powder including skimmed, semi-skimmed and full-fat powder. Thus, milk powder makes up the biggest part in domestic supply and consumption. The peak in imports in 2012/13 may probably be due to the very low world market prices during this period, however, other factors such as an increase in demand can as well drive growth in imports.

1.4 Dairy processing and marketing

Although cattle rearing and milk production predominantly takes place in the northern zone of the country, dairy processors (large, medium, and small) are concentrated in the southern part (about 800 km away), especially in the capital city, Accra (Figure 4) constituting more than 80% of dairy processors in the entire country. These group of processors rely almost entirely on imported milk powder.



Source: Own compilation

Figure 2. Map of Ghana showing the location of main dairy processors

Dairy processing in Ghana can generally be classified into two distinct groups based on the type of milk (i.e., the main input): (i) those dependent on local fresh milk and (ii) processors of imported milk powder. Processors combining both local fresh milk and imported milk powder for their products are rare. The value chain of fresh local milk begins with farmers (herdsmen) who sell collected fresh milk directly to processors or to itinerants (middle men) who re-sell to processors. For local fresh milk, its processing is largely artisanal and usually done by the herdsmen's wives, and mini processors who process the milk into "Wagashi" (cottage cheese), yoghurt and "Burkina" (yoghurt mixed with millet). These end products are normally sold by women hawking on streets, in communities, at specific locations along the streets and in open markets. Local dairy products to a large extent are not certified, are poorly packed with no traceable information.

Processing that depends on milk powder is usually done by large, medium and small firms, but also by mini firms. The chain begins with the importation of milk either by the processors themselves (usually large and medium-sized dairy companies) or by the processors buying imported milk from other importers or wholesalers on the domestic markets. The value chain of imported milk powder is however the focus of this paper as shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**.

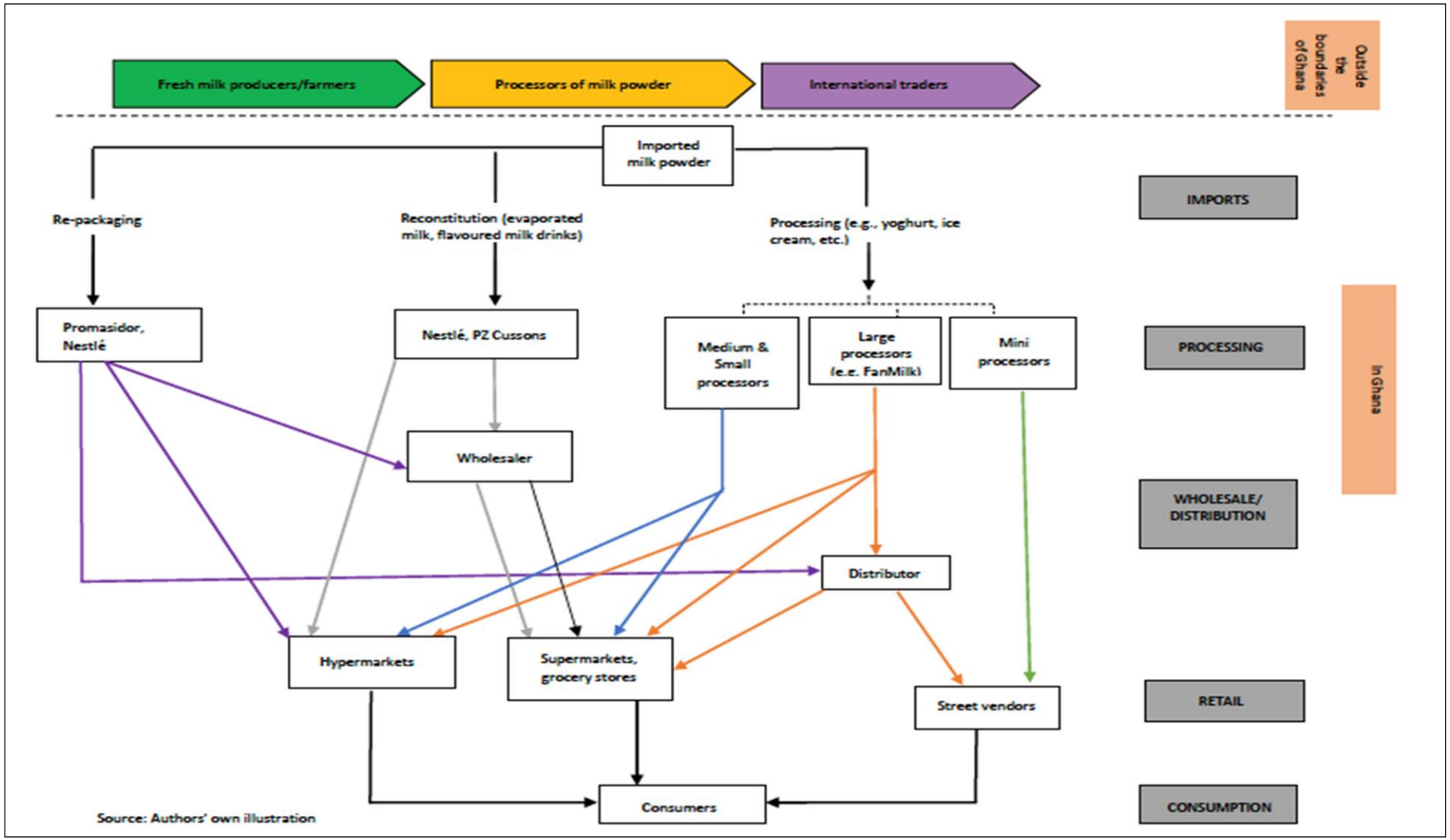


Fig 4. Value chain of imported milk powder

Two types of processors are identified in the value chain of imported milk powder; those involved in the reconstitution of liquid milk from imported powder (evaporated milk and drinks) by large companies such as Nestlé Ghana Ltd. and PZ Cussons Ltd., and those that process imported powder into yoghurts and ice creams (e.g., FanMilk Ghana Ltd., Frosty Bite Ghana Ltd., Emigoh Ghana Ltd., Zeeghurt, etc.). Products of large, medium and small processors are well packaged with labels that provide much traceable information on the product such as the production and expiry dates. These products are certified by both the Standards and the Food and Drugs Authorities. Mini processors, similar to processors of local fresh milk operate without formal certification by the Food and Drugs and the Standards Authorities. Their products as well do not have labels providing traceable information and are sold at venues similar to those for retailing local dairy products.

In marketing and retailing, two main channels are identified for products of dairy processors; out-door (street vendors with bicycles and head carriers) and in-door (hypermarkets, supermarkets, and grocery shops). There are also intermediary distributors/agents, especially for products of FanMilk Ghana located in cities and urban centres across the entire country, who wholesale to street vendors and small grocery shops.

Consumers in the end buy and consume either (1) dairy products processed from local fresh milk, (2) domestic dairy products processed from imported milk powder, or (3) imported re-packaged dairy products.

To summarize, major actors in the value chain of imported milk powder are importers, re-constitutors, processors, distributors, wholesalers, retailers, and consumers. For the fresh milk value chain, its actors are input dealers, veterinary services providers, herdsmen/producers, itinerant buyers, middlemen, processors, retailers, and consumers.

2 Methodology and data

The study dwelt on both primary data and desk literature reviews. For the primary data, both face-to-face and telephone interview approaches were used. The first stage of the primary data collection process involved a purposive sampling of five dairy processors (one large, three medium, two small, and one mini) and two hypermarkets. In the second stage, contacts were established with key personnel (staff) of these firms and marketers to present the objectives of the project and to seek approval to conduct the interviews. A date was then fixed with each firm and marketer for the interview either in physical presence or by telephone in the third stage. The last stage involved a one-on-one interview session with the production managers of the processing firms, and the Sales Managers of the hypermarkets. The interviews were conducted based on a semi-structured guide prepared for each of the actors. The discussions with the processors entailed questions on production data, comparison between local fresh milk and imported milk powder, market development (current and future potential), and on barriers and challenges of dairy processing (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). For the hypermarkets, questions were addressed on dairy products on offer to consumers, origin, price, preferred products by consumers, etc. (see **Fehler! Verweisquelle konnte nicht gefunden werden.**).

3 Results

3.1 Company and production data

Dairy processors interviewed focus on the production of end products for consumers, with no semi-processed or by-products for other industries. Yoghurts and ice creams are the main products of the processing industry. Regarding yoghurt, different varieties exist such as plain, flavoured, with added cereals or fruits, labneh or Greek yoghurt. According to the processors the specialization in yoghurts is backed by an increasing health consciousness of Ghanaians and demand for healthy foods.

Based on the data collected, large firms produce about 300 tonnes of dairy products per day for the market, while medium firms produce on average 120 tonnes per day. Small and mini processors as well produce on average 15 and 7 tonnes of products respectively per day.

Fehler! Verweisquelle konnte nicht gefunden werden. shows the five largest dairy companies in Ghana according to production volumes. FanMilk Ghana Ltd. established in 1960, is the leading company in yoghurt and ice cream production in Ghana, offering a wide range of products to its customers across the 16 regions, as well as exporting its products to neighbouring countries (Togo, Benin, Burkina Faso, and Ivory Coast). With regard to yoghurt, products of Dolait and Emigoh Ghana Ltd., respectively in this order are gaining grounds in the Ghanaian market and can be found in the 16 administrative regions. Emigoh Ghana was second to FanMilk Ghana Ltd. but was taken over by Dolait (produced in the republic of Benin) based on the latter's competitive

advantage - in packaging (more attractive tetra packs, bowls and small buckets), and in prices (cheaper products). Nestle Ghana Ltd. and PZ Cussons Ghana Ltd. are also among the largest dairy companies in Ghana, but they do not produce yoghurt as the others do. Instead, these firms mainly produce evaporated milk and flavoured milk drinks (reconstituted from milk powder).

Table 1.
Top 5 Dairy firms in Ghana

Dairy companies	Products/brands
FanMilk Ghana Ltd.	FanYogo, FanIce, FanMaxx, SuperYogo, FanChoco
Nestle Ghana Ltd.	Ideal milk, Carnation milk,
PZ Cussons Ghana Ltd.	Nunu milk
Dolait Ghana	Dolait yoghurt
Emigoh Ghana Ltd.	Yomi Yoghurt

Source: Authors' own compilation

Not listed among the Top 5 dairy firms but also widely known for their products are Promasidor and Arla Foods. Promasidor is a re-packaging firm of a variety of dairy products with the brand name "Cowbell" "Dano milk" is owned and produced by Arla Foods, a farmer-owned company based in Denmark.

Dairy processors interviewed stated that full-cream and skimmed milk powder are the main inputs of the industry. Processors either import mainly from European countries such as Ireland, Netherlands, Germany, Belgium, and Denmark, and from Thailand or buy milk powder from traders in the local markets. Different types of milk powder (skimmed milk powder, fat-filled powder, and whey powder) are used for different yoghurt products. For some products, processors add palm oil to skimmed milk powder. Depending on the country of origin and the quality of the powder, a 25 kg bag of milk powder costs between Gh₵ 400-700.

Dairy processors interviewed use imported milk powder because of the numerous challenges associated with the access to fresh milk produced in Ghana. Only one of the interviewed processors tried using local fresh milk collected from an Agricultural officer who uses semi-automated machines for milking in making one of its products "*Burkina*" (fermented milk mixed with millet). However, due to the low quantities and unreliable supply of milk, this processor switched to the use of imported powder. Price of local milk is another reason cited by the processors as a major deterrent to its use. A litre of fresh milk costs about Gh₵ 8, which is comparatively higher than the price of powdered milk, which is about twice the price of fresh local milk.

3.2 Comparing local with imported dairy products

The retailers of dairy products generally distinguished between the three types of dairy products: (1) local dairy products processed from fresh milk, (2) domestic dairy products processed from imported milk powder, and (3) imported final dairy products.

The **domestic products processed from imported milk powder** on sale by retailers are yoghurts (popular brands such as Yomi, Vivou, Zeeghurt, Emadom, Chilly, etc.), and Burkina. These products are processed from either full-cream, skimmed or fat-filled milk powder. There is also re-constituted evaporated milk produced in Ghana (e.g., ideal, nunu, and carnation) and powdered milk re-packaged in Ghana (e.g., Cowbell, Nunu, Nido, etc.).

The **imported final dairy products** sold on the other hand are more diverse compared to local and domestically processed ones and include UHT milk (skimmed, semi-skimmed, and full-cream under different brand names), ice cream, evaporated milk (e.g., Peak, Dano, etc.), powdered milk (e.g., Peak, Dano, Frischli, etc.), cheese, butter, and yoghurts. Dairy products sold by retailers are based on what is available in the market and also based on consumer preferences for healthy and diverse products.

Local dairy products processed from fresh milk retailed by hypermarkets and supermarkets are fresh milk and yoghurt products of Emadom (a medium-scale dairy processor). Products from fresh milk are mostly sold in open markets, on streets and in communities by vendors, however, they are scarce to find.

3.3 Competition between local fresh milk and imported milk powder

As illustrated so far, a big gap exists between what is produced (in terms of fresh milk) and what is demanded. In responding to the high demands, processors rely on imported milk powder. From the view point of processors, the use of imported milk powder does not have any negative consequences for Ghana's dairy sector because no competition exists between local milk and imported powder. The milk production sector of

Ghana lacks the capacity to supply the quantity and quality of milk required by the processing industry. However, no complaints have been channelled to the Ministry of Food and Agriculture (MoFA) by processors on account of the difficulties encountered in accessing fresh milk because imported milk powder is readily available and is cheaper. To illustrate this, respondents stated:

"The use of imported milk powder is filling the wide gap in local fresh milk supply. It is impacting positively by helping meet demands"
(Processor 2)

"There is no competition between imported milk powder and local fresh milk"
(Processor 3).

3.4 Barriers and challenges confronting Ghana's local dairy sector

Increasing population, income growth and urbanisation are triggering a rise in the demand for dairy products in Ghana (Blay Adjei, 2018), nevertheless, the local production sector is unable to meet these demands. Basically, Ghana's dairy production sector is faced with myriads of challenges that altogether contribute to its underdevelopment. Problems of the sector relate to resources, infrastructure, climate change, and also to research, extension, and policies. The key challenges are presented below.

In the context of **resources**, land, feed and drinking water are the main barriers to milk production. The extensive system of cattle rearing is one that requires large tracts of fields for grazing animals, nevertheless, there are no forms of lands reserved either by the government or owned by cattle farmers in Ghana. Lands that ought to be conserved for farming and grazing are being converted to human settlements by estate developers as the country's population increases and demand for homes is continually rising. This is therefore putting increasing pressure on natural resources for grazing animals, creating tensions and conflicts between herdsmen and communities. Herdsmen trek several kilometers with their herd in search for pasture which becomes even more difficult during the dry season when almost everything dries up and when bushfires are rampant as many people go in search for bush meat. The problems with feeding are compounded by the lack of a market for silage and hay. Also, farmers do not prepare silage by themselves, so the animals depend solely on grass in the fields (K. Oppong-Apane, 2016).

Adding up to the difficulty in access to feed is the lack of portable drinking water for the animals. There are no wells or dug outs meant for watering animals since the lands are not designated or owned by the farmers themselves. In some cattle rearing communities, water is a scarce resource with animals having to compete with humans (Kwame Oppong-Apane, 2016). Feed and water are not only essential for the health of the animals but also affect both the quality and quantity of milk produced. These setbacks in addition to the lack of improved genetic breeds of cows contribute to low milk yields in Ghana.

In the extensive production system low milk yields go along with wide seasonal variations. In the dry season, when everything dries up, feeding becomes a challenge, and milking goes down. Thus, overall quantities of milk produced significantly falls and fresh milk is scarce.

Regarding **infrastructure**, housing is a major infrastructural challenge to cattle rearing in Ghana with animals being kept in open kraals with no form of shelter and bear the vagaries of the weather (heat, cold, storm, etc.) thus affecting the health and milk production capacity of cows. Milking is done manually because there are no automated machines for this purpose in unclean environments, usually at the same place where animals are kept (in the presence of cow dungs and flies) exposing the milk to bacteria and other forms of pathogens. Donkor, Aning, & Quaye (2007) and Omore et al. (2009) re-iterated the need for improved hygienic handling of milk in Ghana as they found from their study the contamination of raw milk sold in Ghana with several bacteria including Yersinia spp., Klebsiella spp., Bacillus spp., Enterobacter spp., Escherichia coli, and staphylococcus spp. Also lacking are adequate storage and cooling units. Milk collected is stored in unclean plastic gallons, with no refrigeration or cooling units to stabilize the temperatures before transporting it to processors. Furthermore, high logistical requirement in the supply of fresh milk remains a major challenge to fresh milk producers. Most milk producers are located in rural areas far from urban centers, with bad roads and poor transport channels. Access to markets is therefore a challenge considering the perishable nature of milk. Even in cases where itinerant buyers go to the production areas to collect milk, transportation is normally without cooling units and mostly is by means of public vehicles, bicycles or by foot, reducing the quality of the milk before it is processed. Also lacking is technology and infrastructure for processing fresh milk in Ghana. Processing is largely artisanal and done by the locals.

It is therefore difficult if not impossible for processors to access fresh milk considering the distance of more than 800 km between cattle farmers located mainly in the north of the country and dairy processors who are down south.

Climate change and its variability are having significant impacts on livestock and milk production in Ghana. Long periods of drought affect grazing fields, leaving the cattle with little to feed on resulting in underfeeding and malnourishment. Extreme heat conditions are also known factors for low milk yields and outbreak of diseases such as Anthrax (Augère-Granier, 2018).

In addition to the challenges outlined are problems with research, veterinary services and extension. Ghana lacks improved breeds with high milk yielding traits, while funds for research are low (MoFA, 2004). Also, farmers bear the full costs of veterinary services (GOG, 2014), and this hinders them from frequent access.

The challenges of Ghana's dairy sector as discussed above on one hand and the year-on-year expansion of the dairy market spurred by continual growth in consumer demands (Blay Adjei, 2018) on the other hand clearly present an opportunity for all the actors in the local milk value chain (i.e., from input supply through production to processing and marketing). In this regard, processors are hopeful that developing the milk production sector will impact positively on the economy of Ghana. From the standpoint of processors, growth of the dairy sector would require investments from both the government and the private sector in improved genetic breeds of cows, and in infrastructure for milking, storage and processing.

4 Conclusions

The study shows that dairy processors in Ghana rely almost entirely on imported milk powder for the range of products offered to consumers due to the low volumes of milk produced locally which are far inadequate compared to what is required for processing. In addition to what is processed and re-packaged domestically from milk powder, final dairy products are also imported and popular on the Ghanaian market. The problem of a steady local input flow to an extent can be traced back to the goal of livestock production in Ghana – for household food security and as a safety net to crop farming in case of weather failure. Also, the focus of the widespread extensive system of cattle rearing is on beef production rather than on milk production. The quantities of milk produced in this system is far inadequate with the needs of processors. Furthermore, the large distance between the main cattle rearing and milk production areas and processing plants have to be mentioned as a huge barrier, coupled with inadequate logistics such as the lack of vehicles with cooling units and bad roads. Adding on to the aforementioned challenges is the issue of price difference between local fresh milk and imported milk powder. For dairy processors it would be far more expensive if not impossible to rely on fresh local milk. The question remains as to whether the processing industry should continue to depend exclusively on imported powder or whether it would make sense to expand local milk production. In any case, if the local milk production sector is to be developed, then interventions should focus not only on economic and political aspects (e.g., self-sufficiency, sovereignty, trade dependency, etc.) but also on climate conditions. For instance, the use of natural resources and their subsequent environmental impacts should be considered.

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