Ghana's evolving protein economy

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Abstract

This paper provides an initial analysis of Ghana's protein economy in the light on current debates about nutritional transition and livestock revolution. Ghana's strong economic growth and reducing levels of poverty make it a particularly interesting case. Protein-rich foods, including fish and livestock products, supply 20-40 percent of protein consumed. Overall fish is becoming less important and poultry more important; but there also are large difference in household expenditure on protein-rich foods across wealth categories, regions and areas. Specifically, the protein element of the nutritional transition and the consumption side of the livestock revolution would appear to be unfolding at different speeds and in different ways, along an axis that is urban–south–non-poor at one end, and rural–north–poor at the other. We explore the policy and political economy dimensions of these changes.

Key words: self-sufficiently; food security; imports; GLSS

Introduction

The nutrition transition as described by Popkin (1993, 1998) refers to the shift to diets high in sugars, fat and animal-source food that is widely observed to accompany rising incomes. The nutrition transition runs in parallel to demographic (lower fertility and mortality) and epidemiological (from malnutrition and infectious to chronic and degenerative disease) transitions, and changes to more sedentary lifestyles. Closely related to the nutrition transition is the idea of a "livestock revolution", which Delgado et al. (1999) used to refer to high levels of observed and projected growth in demand for livestock products in the developing world, and the accompanying shifts in the systems and locations of livestock production needed to meet this accelerated demand. However, in contrast to transition, the notion of revolution highlights the expectation that change will be both rapid and disruptive.

In this paper we argue that livestock revolutions should be seen and analysed in relation to the broader protein economy. The notion of a protein economy appears fleetingly in the literature (Hardin 1979; Brown 2001) but it has not been well developed. Here we use the term to refer to the production, trade and consumption of protein-rich foods, but just as importantly, to the factors that drive changing patterns of demand for, and supply of these foods. Amongst protein-rich foods we include pulses, fish, meat, milk and eggs. The drivers of change in the protein economy are expected to include rising incomes, increasing urbanisation, changing lifestyles and various areas of national policy (including but not limited to macro-economic policy, trade policy, agricultural sector policy and health policy); and the changing structure of the global food economy, international trade regimes, technology and so on. Some of these drivers have unique national and sub-national dimensions and dynamics, while others reflect processes observed more broadly. In focusing on the protein economy some salient questions are: who consumes what protein-rich foods and in what quantities; where these foods come from; and the policies and politics that support or seek to alter these consumption patterns?

Protein is essential for human nutrition and protein-rich foods are generally nutrient dense, especially in vitamins and minerals. However, limited protein intake *per se* is not generally considered to be a major aspect of undernutrition (McLaren 1974; McLaren 2000). Thus we focus on protein-rich foods not because of their protein content, but because of the central part they play in the nutrition transition. Changes in the consumption of protein-rich foods, and in the protein economy more generally, provide a useful dietary lens through which to view the social and spatial disparities associated with economic growth.

We present an initial analysis of the protein economy of Ghana. Ghana is an interesting case because over the last two decades it has experienced rapid economic growth and significant levels of poverty reduction (McKay et al. 2015), conditions which should be associated with nutrition transition and increased consumption of protein-rich foods. But the fact that fish is a very important protein-rich food in Ghana may complicate the links between a rapid nutrition transition and a livestock revolution. Finally, addressing the country's dependence on imported meat has been a policy objective since before independence, so any livestock revolution will play out against deeply embedded commercial relationships and policy discourses. The protein-rich foods consumed in Ghana are part of larger national, regional and in some cases global protein economies. For most of these products domestic producers compete to a greater or lesser degree with regional and/or international producers and processors. Some years ago Heinbuch (1994) used official statistics and questionnaire surveys in two sites to provide a sketch some aspects of Ghana's protein economy, with a particular emphasis on fish. In most years over the period 1961 to 1988 protein supply was well above the recommended level of 40 g/day, about one third of which came from fish or animal sources. The proportion of total protein supplied by fish and seafood ranged from 13.8 percent in 1964-1966 to 23.8 percent in 1976-1978. In April 1994 beef protein was estimated to cost 3 to 4.3 times more than protein from smoked fish. More recently, Osei-Asare and Eghan (2014) used the 5th round of the Ghana Living Standards Survey (GLSS) to estimate budget shares, expenditure and price elasticities of demand for a variety of meat products. Their econometric analysis, which notably excluded fish, suggested that beef was the most frequently purchased meat product and the mean quantity of beef consumed was higher than any other meat. There was also high demand for poultry. Based on the high expenditure elasticities of demand for beef, poultry and game they concluded that demand for these meat product is set to increase as income rise. These findings are in line with expectations associated with the nutrition transition. However, as we will see, the authors' recommendations that investment in domestic production of beef and game should be prioritised does not reflect the reality of the national and international policy context. Otherwise, the research literature relevant to Ghana's protein economy is limited.

The paper proceeds as follows. The next section introduces an analytical framework and the sources of data that inform our analysis. Following this, the main elements of the protein economy are presented including the availability of protein, expenditure on and consumption of protein-rich foods, agricultural and nutrition policy, and the political economy of protein. The final section discusses these findings and concludes.

Framework and data sources

A simple framework is shown in Figure 1. At the centre of the framework is an analysis of: (1) the physical quantities and flows associated with domestic production, importation and consumption of protein-rich foods; (2) the distribution of these quantities and flows over geographical space and different social-economic groups; and (3) the various forces and factors that drive (or are likely to drive) change in these quantities, flows and dynamics. Policy is one of these, but it is not assumed that it is (or will necessarily be) the most important driver. The second aspect of the framework highlights the policy processes and political economy around the national protein economy, with specific reference to three sides

of the outer triangle: actors and networks; discourses and narratives; and interests and politics (Keeley and Scoones 1999, 2003; KNOTS Team 2006). The goal here is to develop an understanding of relevant political and power relations, how they affect the structure and dynamics of the protein economy, and the resulting winners and losers.

[Figure 1 near here]

There are widely recognised concerns about the reliability and quality of official agricultural statistics in Africa (Jerven 2013; Mosley 1992), and historically this has been a particular problem in relation to livestock. In many countries changes in government priorities and ministry staffing following structural adjustment disrupted established routines for the collection of agricultural statistics, including, for example, periodic national livestock counts, veterinary and border inspections. The system for collecting agricultural statistics in Ghana was negatively affected by these changes, and except for the case of cocoa and other export crops, the available statistics cannot be considered reliable. Statistics relating to livestock populations, their spatial distribution (i.e. by region or district), production, offtake, importation and slaughter either don't exist or are likely to have a very wide margin of error and must therefore be used with considerable caution.

National statistics relating to livestock and fisheries in Ghana are available from a number of sources (Table 1), but those provided through FAOStat[i] are the most widely cited. FAO does no data collection, but report figures provided by the government of Ghana. In practice, however, much of the FAOStat livestock data for Ghana is flagged as having been "adjusted" and "estimated" by FAO, or informed by other sources. The rationale and methods for these adjustments are not transparent.

[Table 1 near here]

The Ministry of Food and Agriculture's (MOFA) Statistics Research and Information Directorate (SRID) collects and publishes agricultural statistics.[ii] In theory SRID is the source of much of the information provided to FAOStat. National data is also available through the website CountryStat[iii], but it is also based on SRID data. The USDA Foreign Agricultural Service's Production, Supply and Distribution (PSD) Online database publishes estimates of Ghana's production and importation of some livestock species and meat products.[iv] USDA is not involved in primary data collection in Ghana, and the methodology used to develop these estimates is not specified. A number of countries, including Burkina Faso, Brazil and the EU publish trade figures of direct relevance to Ghana's protein economy.

There is generally close correlation between the livestock-related information available through FAOStat and that which is available from the other sources. However, as noted above, these are not independent sources, and this correlation should not be seen to validate the information available from FAOStat. In addition, there are some important anomalies in these data. For example, FAOStat provides estimates of the number of live cattle, sheep and goats imported into Ghana. It is generally assumed that the majority of these come from (or through) Burkina Faso. The Burkina Faso government also publishes estimates of the number of live cattle, sheep and goats exported specifically to Ghana. If indeed the assumption that Burkina Faso is the main supplier of live animals is correct, one would expect that the total number imported into Ghana would be largely accounted for by the number exported from Burkina Faso. Figures 2 and 3 compare the import and export statistics for live sheep and goats, and cattle, over the period 2000-2011. For both of these livestock groups, import and export estimates for the period 2000 to 2004 are exactly the same. While the import numbers are reported (i.e. flagged) by FAOStat as "unofficial figures", these same numbers appear as exports to Ghana in the statistical yearbooks of the Burkina Faso *Ministère des Ressources Animales* (*Statistiques du secteur de l'élevage*). For the years after 2004, the Ghana import data are reported as either "provisional official data"

or “FAO estimate”, and there is a clear and growing divergence between the import and export figures. This illustrates some of the difficulties and limitations associated with these data.

[Figures 2 and 3 near here]

While there are problems with some of the available data, there is reason to suspect that for specific items the national data may be more reliable. For example, data on the importation of frozen meat, which in principle must enter Ghana by passing through one of only a small number of ports, are likely to be more reliable than estimates of the importation of live animals, which will go unrecorded if they cross from neighbouring countries without passing a formal border or veterinary post. Unfortunately it is impossible to verify this hypothesis.

The Ghana Living Standards Survey (GLSS) is implemented by the Ghana Statistical Service and gathers information on, amongst many other things, household expenditure on different kinds of food. Since 1987 there have been six GLSS rounds, with each round comprising a nationally representative sample of households. We provide new analysis of data from Round 5 (Sept 2005 to Sept 2006) and Round 6 (Oct 2012 to Oct 2013), which surveyed 8,687 and 16,772 households respectively (Ghana Statistical Service 2008, 2014). GLSS data allow for analysis of spatial and demographic mapping of patterns of expenditure on protein-rich-foods. GLSS also provides insight into household livestock holdings and income from and expenditure on livestock, but we do not exploit these data here. The GLSS data also has some important limitations. For example, a few food expenditure categories are very broad and others are very narrow, and there is no consistent price series that can be used to translate expenditure into quantity. Nevertheless, the GLSS provides a wealth of information relevant to the protein economy, and to date this has been analysed only superficially (Osei-Asare and Eghan 2014).

The Ghana Demographic and Health Survey (DHS) is a periodic exercise that gathers food consumption, nutrition and anthropomorphic data from a nationally representative sample, with a particular focus on children and women. Here we draw on DHS 2004 (Ghana Statistical Service et al. 2004) and DHS 2014 (Ghana Statistical Service et al. 2015), which interviewed 6,252 and 11,835 households respectively. Changing categories and priorities limit to some degree the comparability across different DHS rounds. Covering some of the same ground, but using a methodology developed by the World Food Programme[v], a national Comprehensive Food Security and Vulnerability Analysis (CFSVA) was undertaken in 2009 (Biederlack and Rivers 2009), which was followed in 2012 by a further analysis of food security and vulnerability in northern Ghana (Hjelm and Dasori 2012).

As will become evident, in practice it is quite difficult to integrate the GLSS and DHS data. Thus as with the official production and trade statistics there are important disconnects with the expenditure, consumption and outcomes data. Nevertheless, in what follows, we use these sources to develop an initial mapping of the protein economy. Even with the caveats about quality and reliability we start with the statistics available through FAOStat. This is not because we believe they provide an accurate picture of the different aspects of the protein economy, but rather because if policy makers or others want information about the protein economy, they have few options other than to go to FAOStat (as is evidenced by most Government of Ghana policy documents). Thus, even if these official statistics are fundamentally flawed, they are important in that they are easily accessible and are therefore likely to inform policy analysis. Our approach is in the first instance to take the information provided by these sources at face value, but with the aim of identifying limitations, gaps, contradictions and hypotheses.

Analysis

Availability of protein

Because of the nature of the available statistical information, in what follows we refer to broad categories of protein-rich foods such as cattle meat and poultry meat. Unfortunately categories like these cover everything from undifferentiated meat and bone, and skin, to boneless fillet steak; and from chicken back to boneless breast meat. These different products will likely be priced differently, be consumed by different social groups, and to have different nutritional qualities.

Using FAOStat data we estimate that during the period 2009-2011, vegetable sources, including cereals and starchy roots and tubers, accounted for around 65 percent of national protein intake (Table 2). Fish accounted for the bulk of the 35 percent of protein derived from fish and livestock products together. This contrasts with FAO's own estimate that on average during the period 2009-2011 protein of animal origin accounted for 21 percent of protein supply.[vi] To put this into perspective, using detailed consumption surveys, Swaminathan et al. (2012) estimated that in India 16 percent of protein intake by rural adults was from fish and animal sources (20 percent for urban adults); while US adults were estimated to obtain 65 percent of their protein intake from animal and dairy products (Pasiakos et al. 2015; Smit et al. 1999).

[Table 2 near here]

Table 2 also provides some initial insights into the recent evolution of the protein economy. First, between 2000-2002 and 2009-2011, domestic production of protein in protein-rich foods declined by about 10 percent, with increased production of poultry, mutton and goat meat being offset by a 20 percent fall in fish production. Second, over this period the contribution of protein-rich foods to protein availability appears to have decreased marginally. Third, the contribution of protein from fish to the total protein available from all protein-rich food declined from 82 percent to 71 percent, while that from poultry increased from 2 percent to 11 percent. And finally, the level of national self-sufficiency in protein from protein-rich foods declined significantly, from 74 percent to 50 percent, with the largest falls being in fish, poultry and cattle meat.

The geographical origins of imports of the three most important protein-rich foods demonstrate the changing global dimensions of the protein economy (Figure 4). On average over the years 2009-2011, nearly 80 percent of the fish imports (by value) were sourced from Africa, with Morocco being the single biggest provider (Table 3). For frozen chicken, Brazil went from supplying 3 percent (2000-2001) to 35 percent (2009-2011), with the USA and European countries supplying most of the remainder (Table 4). While the total quantity of frozen chicken supplied by the USA increased by 360 percent over this period, its share of imports declined by nearly half. Change in the supply of cattle meat has been just as dramatic. On average between 2000-2002, Burkina Faso supplied nearly three quarters of imported cattle meat (as live animals) (Table 5). By 2009-2011 the total quantity of cattle meat imported had increased 25 times: while Burkina Faso remained the largest single provider (35 percent), approximately half came from Europe. Excluding imports from Burkina Faso, approximately 93 percent of cattle meat imports were classified as "Offals, edible, cattle", which would include feet, tongue, lips and snouts.

[Figure 4 near here]
[Table 3 near here]
[Table 4 near here]
[Table 5 near here]

Household expenditure on and consumption of protein-rich foods

The GLSS classifies households in several ways: Poor or Non-poor; Urban or Rural; North or South; and by locality (Accra[vii], Other Urban, Rural Coastal, Rural Forest, Rural Savannah). These categories overlap to a significant degree: the expectation, for example, would be that the majority of poor people are more likely to be in Rural areas and in the North, and in areas classified as Rural Savannah.

GLSS 6 (October 2012 to October 2013) indicates large differences across household groupings in average weekly household expenditure on protein-rich foods (Table 6). For example, Non-poor households spent 2.6 times more than Poor; Urban spent 2.5 times more than Rural; households in the South spent 2.3 times more than those in the North; and households in Accra spent 3.1 times more than those in Rural Savannah. Across all household groupings at least half of expenditure on protein-rich foods is for fish, with households classified as Poor, Rural, in the South or in Rural Forest and Rural Coastal areas spending a greater proportion on fish than others. Fish accounted for 72 percent of Poor households' expenditure on these foods. After fish, the largest expenditures are on poultry and beef, with each accounting for 10 percent of expenditure on protein-rich foods. Households in the North and in Other urban areas show some preference for beef, while Non-poor households show preferences for poultry, milk and eggs.

Nationally the pattern of expenditure across the different protein-rich foods is generally aligned with the relative availability of protein from these foods as estimated from FAOStat data (Table 7). If the discrepancies that are seen for fish, beef, milk and eggs are real, they would indicate that fish is a relatively inexpensive source of protein, while beef, milk and eggs are relatively expensive sources.

Comparing between GLSS 6 and GLSS 5 (September 2005 to September 2006) shows that the disparity in expenditure on protein-rich foods between Poor and Non-poor households increased between the two rounds (from 1.9 times more to 2.6 times). Over the entire national sample, the share of expenditure on fish remained constant while that for poultry doubled from 5 percent to 10 percent (Table 8). Poor households reported spending relatively more on fish and less on beef in GLSS 6, while Non-poor households doubled their relative expenditure on poultry while marginally reducing their relative expenditure on fish and beef.

[Table 6 near here]
[Table 7 near here]
[Table 8 near here]

DHS 2003 and 2014 (Ghana Statistical Service et al. 2015; Ghana Statistical Service et al. 2004), the survey rounds that most closely align with the analysis of protein availability and GLSS protein expenditure data given in the previous sections, add marginally to the picture. Children were divided between those who were breastfeeding and those who were not breastfeeding at the time of the survey. In both rounds the majority of both groups was reported to have consumed foods of animal or fish origin (in addition to any milk or milk products) the day or night preceding the interview. In 2003 non-breastfeeding children aged 20-23 months were reported to have eaten these foods on average 4.9 times in the seven days preceding the survey (there is no comparative data reported for 2014).

Biederlack and Rivers (2009) suggested that the 2009 Comprehensive Food Security and Vulnerability Analyses (CFSVA) exercise was "the first nationwide household food consumption survey in Ghana since 1977" (p.80). Relative to the consumption of protein-rich foods, it highlighted the fact that over the whole sample, there was nearly daily consumption of some fish or seafood (although probably often as a condiment as opposed to being the

heart of the meal). On the other hand, “meat consumption, including animal products such as eggs and dairy, is very low with less than 2 days a week: red meat is only eaten about 1.2 days and poultry just about 0.8 days” (p.80). Within this national picture substantial variation in the consumption of fish and meat was observed: consumption of fish, meat, eggs and milk was more frequent in the south than the north, and rich households ate meat approximately 3.2 days per week compared to 1.4 days for poor households. The 2012 study of northern Ghana again observed that “households in the wealthier quintiles have a more diverse diet, consuming more meat, fish, sugar and dairy products than those in the poorer wealth quintiles” (Hjelm and Dasori 2012).

Agriculture and nutrition policy

The Food and Agriculture Sector Development Policy (FASDEP II) (Ministry of Food and Agriculture 2007) is the most recent formal articulation of the Ghana government’s long-term policy objectives and strategy for agriculture and livestock. Malnutrition is recognised as “a serious problem among children, adolescents and pregnant women due to insufficient levels of food intake and or diets not providing an adequate nutritional intake” (p.10), particularly in rural areas and urban slums. One objective is therefore to “enhance nutrition through coordination of programmes and institutions for food security, dissemination of nutrition and health information, and advocacy for food fortification” (p.26). In relation to the protein-rich foods the goal is to increase supply from domestic production from 30 to 80 percent of aggregate demand, which, it is suggested, should reduce poverty among farmers. The commercial poultry industry is identified as the key to increasing meat supply in the short term, while in the longer term smallholder poultry producers are to be transformed into “profitable enterprises” (p.37) able to meet growing demand. The FASDEP II document makes no reference to any GLSS data, and only one reference to the 2003 DHS.

The Medium Term Agriculture Sector Investment Plan (METASIP) (Ministry of Food and Agriculture 2010) was developed through a consultative process, in conformity with guidance from the Comprehensive African Agricultural Development Programme (CAADP), as a financing plan for FASDEP II. Rhetorically at least it places nutrition at centre stage, stating that: “The ultimate goal of food production and consumption is adequate nutrition of the human body for higher productivity and reproduction. Thus, emphasis on production that ensures adequate nutrition of farm and non-farm household members is necessary” (p.23). Production and consumption of horticultural crops (fruits and vegetables) are linked explicitly to improved food and nutrition security. The specific “Improved Nutrition” component accounts only 0.72 percent of total planed expenditure (p.xiii) and 1.27 percent of what are identified as priority investments (p.xv). This document makes several references to GLSS 5 (although not to the food expenditure data), but no reference to any of the DHS surveys.

In relation to the protein-rich foods METASIP identifies a need for “pragmatic efforts” to bridge the gap between actual meat consumption and the level of consumption recommended by FAO. It is however short on details. Production of poultry and small ruminants is to be increased through the use of improved technology. The rationale is that these livestock categories were identified in FASDEP II as a means of increasing producer incomes. In contrast, consumption of meat and fish is to be promoted in order to increase intake of micronutrients, rather than protein (p.30), while the use of High Quality Protein Maize is to be promoted to address the problem of stunting.

Current fisheries policy (Republic of Ghana n.d.) recognises that there is limited potential to increase domestic production of capture fisheries, and therefore imports will be an increasingly important component of fish supply. There is however considered to be significant potential to increase domestic fish production through aquaculture.

Protein-rich foods do not figure prominently in the national nutrition strategy: meat and fish are both mentioned only once, and of the two references to protein, one is generic while the other is to Quality Protein Maize (Government of Ghana 2013). The policy does however make a number of clear links between nutrition and agricultural development. For example, it suggests that actions within the agricultural sector could "facilitate access to adequate, diverse, safe, and affordable food in an equitable manner; ensure that nutrition is enhanced across all stages of the food system; promote the production and utilization of locally grown and raised, indigenous, and nutrient-rich food; and scale up national and local systems for food processing, preservation, and storage" (p.28). Others areas identified to improve nutrition include the use of sustainable modern agricultural technologies; encouragement of public-private partnerships; ensuring food safety; and reducing women's workloads and increasing their income generation. A mainstreaming approach is articulated, with nutrition being expected to enter into all of the Ministry of Food and Agriculture's "departments, policies, plans, programmes, and projects, as well as its M&E systems" (p.34).

The political economy of protein

We are not yet in a position to provide a detailed analysis of the political dimensions of the protein economy. However, some of the competing actors, coalitions and interests can be identified. These include a number of government ministries (i.e. Food and Agriculture, Health, Fisheries and Aquaculture Development, Finance and Economic Planning); small and large livestock and fish producers and their organisations; veterinarians, feed producers, input and equipment suppliers; livestock dealers, transporters and butchers; and importers and distributors of live animals and frozen fish, meat and poultry; consumers; and an array of investors and development partners.

These actors mobilise a variety of narratives and discourses to promote their preferred courses of action. For example, the discourse of those who seek more support or protection for commercial broiler producers highlights notions of self-sufficiency, unfair competition and dumping (Sumberg et al. 2015). The discourse of others, including many within government, stresses the need to modernise in order to be internationally competitive, the importance of better agro-industry linkages, and the development of agro-processing capacity and value chains. A third strand of discourse is also evident, particularly in the media. It links public health and food safety issues to imported poultry products, and promotes the narrative that the meat exported to Ghana is nothing more than the waste of the European meat economy, and too low in quality to be consumed in Europe.

Despite government's rhetorical commitment to decreasing dependency on imported meat and poultry, its initiatives to support domestic producers achieve this have generally been opportunistic, poorly specified and poorly targeted (for the case of poultry see: Sumberg et al. 2015). This may reflect the fact that despite their dietary importance, the livestock and fisheries sectors continue to sit at the periphery of the national policy system. As a result, and the occasional bursts of policy attention notwithstanding, the politics of the protein economy are dominated by the government's long-term commitment to economic liberalisation, low tariffs and competition.

Discussion and Conclusions

Nationally, protein-rich foods including fish and livestock products probably supply between 20 and 40 percent of protein consumed, with the vast majority of this protein being supplied through fish. However, among the protein-rich foods, fish may be becoming less important and poultry more important. There are large differences across household categories in average weekly expenditure on protein-rich foods: non-poor households, urban households and households in the south spent 2-3 times more on protein-rich foods than others. Across all households at least half of expenditure on protein-rich foods is for fish; the next most

important are poultry and beef, with each accounting for 10 percent of expenditure. There is little here that is new or startling: poverty in Ghana is more prevalent in rural areas and particularly those in the north; it is associated with lower expenditure on protein-rich foods and, using the CFSVA methodology, lower food consumption scores.

What is perhaps more striking is the picture that emerges of the on-going evolution of the protein economy. The protein element of the nutritional transition and the consumption side of the livestock revolution would appear to be unfolding at different speeds and in different ways, along an axis that is urban–south–non-poor at one end, and rural–north–poor at the other. Between 2000 and 2011, the quantity of protein supplied through domestically produced protein-rich foods was more or less stable. However, during this period imports increased rapidly, and as a result, self-sufficiency in protein from protein-rich foods declined to around 50 percent. This level of imports ties Ghanaian consumers tightly into regional and international commercial circuits, although the nature and strength of these ties are different for rich and poor, rural and urban consumers. If non-poor, urban Ghanaians are indeed participating in an emergent livestock revolution, it should be recognised as an imported revolution, supplied largely by producers in Brazil, Europe, the USA and Burkina Faso.

The information at hand sheds little light on the nutritional implications – e.g. in terms of micro-nutrient or fat consumption – of these on-going changes to the protein economy. If overall consumption levels and the shift from fish to poultry and other livestock products continues apace, new health and nutrition challenges associated with protein heavy diets may emerge. At present the periodic data collection exercises do not provide a strong basis for tracking developments along these lines.

Integral to the evolving protein economy is the tension between discourses and political rhetoric highlighting self-sufficiency and the importance of protecting domestic production, and the Ghana government's deeply entrenched commitment to liberalisation. The persistence of this tension indicates the scope for further analysis of the politics of the protein economy, including the winners and losers associated with the rapid growth of imports of protein-rich foods. Is this a case of short-term, ideologically-driven decision making that is undermining the resilience of Ghana's food system; or is allowing Ghanaians to eat off the global protein plate an efficient and responsible means of meeting the growing demand for protein-rich foods?

Evolution of the protein economy, and Ghana's particular import-facilitated livestock revolution, provide an opportunity – and a need – for a radical re-think of national livestock development policy. This would benefit from critical examination of a number of now almost sacred narratives, for example, about why people keep livestock and perhaps particularly cattle; the constraints to increased productivity; and the desirability of different livestock development pathways.

Finally, analysis of the evolution and dynamics of the protein economy and the livestock revolution is severely hindered by the quality of official statistics, a number of data disconnects, and a thin research base. Improvement of systems for collecting official statistics will require long-term commitment and innovative approaches. One particularly important challenge is to convince commercial operators that the availability of reliable sector-wide information would be to their advantage. Beyond this there are important opportunities for further in-depth analysis of existing data sets such as the GLSS, which could provide valuable, policy-relevant insights into the evolving protein economy.

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Endnotes

[i] http://faostat3.fao.org/home/E
[ii] http://mofa.gov.gh/site/?page_id=79
[iii] http://www.countrystat.org/
[iv] http://apps.fas.usda.gov/psdonline/psdQuery.aspx
[v] https://www.wfp.org/food-security/assessments/comprehensive-food-security-vulnerability-analysis
[vi] FAOStat, under Food Security and Suite of Food Security Indicators
[vii] Accra = Accra Greater Accra Metropolitan Area or Accra (GAMA)

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Table 1. Data sources

Aspect	Data source	Coverage	Comments / Limitations
Domestic production and imports	SRID, MOFA, Govt. of Ghana		Origin / reliability of data is not obvious
Domestic production and imports	CountrySTAT		Repeat of SRID data
Domestic production and imports	Dept. of Fisheries, MOFA, Govt. of Ghana		
Domestic production and international trade Supply, and food balance by commodity	FAO [FAOStat]	National estimates of production and trade of livestock species and products, 1961 – 2012 (for trade) or 2013 (for production)	In principle based on data supplied by government of Ghana; often estimated / adjusted by FAO Poor quality of data
Domestic production, imports	USDA	National estimates for bovine, poultry and pig meat; 2000- 2015	Origin – see * below
Exports to and imports from Ghana	Govt. of Burkina Faso	Live animals, 2000-2011	Method of collection is not clear Quality ?
Exports to Ghana	Various governments and trade organisations	Specific commodities	
Household expenditure on different protein-rich foods	Ghana Living Standards Survey (GLSS)	National sample of households GLSS 5: Sept 2005 to Sept 2006; 8,687 households GLSS 6: Oct 2012 to Oct 2013; 16,772 households	Absence of reliable prices data to convert expenditure to quantities
Complimentary feeding;	Demographic and Health Survey (DHS)	National sample of households DHS 2003; late 2003; 6,252 households DHS 2014; Sept-Dec 2014; 11,835 households	Changes in questions and categories make some comparison difficult; men are largely invisible
Food consumption; food security	Comprehensive Food Security & Vulnerability Analysis	CFSVA 2009: national focus; 3,851 households CFSVA 2012; focus on northern Ghana; 8,399 households	

* The sources of the information, according to the website, are stated as follows: 'The international portion of the data is updated with input from agricultural attachés stationed at U.S. embassies around the world, FAS [Foreign Agricultural Service] commodity analysts, and country and commodity analysts with ERS [Economic Research Service]. The U.S. domestic component is updated with input

from analysts in FAS, ERS, the National Agricultural Statistical Service, and FSA [Farm Service Agency]. Interagency work on the database is carried out under the aegis of the WAOB [World Agricultural Outlook Board].'

Table 2. Availability of protein from different sources (protein MT)

	Production (MT)		Import-Export (MT)		Total Available (MT)		Total Available (%)		Self-sufficiency (%)	
Source	**2000-2002**	**2009-2011**	**2000-2002**	**2009-2011**	**2000-2002**	**2009-2011**	**2000-2002**	**2009-2011**	**2000-2002**	**2009-2011**
Fish	85,833	69,533	25,531	59,449	111,364	128,981	30.6%	24.9%	77%	54%
Poultry meat	382	1,119	2,916	18,705	3,298	19,824	0.9%	3.8%	12%	6%
Cattle meat	4,792	4,024	2,536	5,677	7,328	9,701	2.0%	1.9%	65%	41%
Mutton & goat meat	4,032	7,245	717	1,707	4,748	8,952	1.3%	1.7%	85%	81%
Milk	1,077	1,211	3,602	4,774	4,679	5,985	1.3%	1.2%	23%	20%
Pig meat	2,120	3,639	477	1,398	2,596	5,037	0.7%	1.0%	82%	72%
Eggs	2,244	3,772	12	3	2,255	3,774	0.6%	0.7%	99%	100%
Sub-total	**100,478**	**90,542**	**35,790**	**91,713**	**136,269**	**182,256**	**37%**	**35%**	**74%**	**50%**
Cereals					117,660	197,820	32%	38%		
Starchy roots / tubers					109,965	137,904	30%	27%		
Sub-total					**227,625**	**335,724**	**63%**	**65%**		
Total					**363,894**	**517,980**				

Source: FAOStat, but modified to reflect Govt. of Burkina Faso data on export of live cattle and sheep and goats to Ghana (Ministere des Ressources Animales 2014, n.d.-a, n.d.-b)

Table 3. Fish imports

`	2009-2011		
Country of origin	**Value (US$)**	**%**	**Cum %**
Morocco	67,847,910	41	41
Mauritania	34,928,661	21	62
Namibia	17,222,680	10	72
Senegal	8,356,301	5	78
Spain	4,972,827	3	81
Netherlands	3,710,892	2	83
Ireland	3,034,433	2	85
Total			**100**

Source: Comtrade

Table 4. Poultry imports

	2000-2002				2009-2011		
Country of origin	**Quantity (MT)**	**%**	**Cum %**	**Country of origin**	**Quantity (MT)**	**%**	**Cum %**
USA	8,027	47	47	Brazil	31,294	27	27
Netherlands	3,332	20	67	USA	29,556	25	52
Belgium	2,021	12	79	Belgium	22,857	20	72
UK	618	4	82	Netherlands	11,140	10	82
Brazil	517	3	85				
Total	**17,005**		**100**		**116,218**		**100**

Source: FAOStat

Table 5. Origin of imported cattle meat and offals (including meat derived from live animals imported from Burkina Faso)

	2000-2002				2009-2011		
Country of origin	**Quantity (MT)**	**%**	**Cum %**	**Country of origin**	**Quantity (MT)**	**%**	**Cum %**
Burkina Faso	1,581	73	73	Burkina Faso	19,630	35	35
India	128	6	79	Belgium	12,237	22	57
USA	127	6	84	Ireland	5,179	9	67
				India	3,527	6	73
				Italy	3,244	6	79
				Netherlands	3,215	6	84
Total	**2,175**		**100**		**55,676**		**100**

Source: FAOStat and Ministere des Ressources Animales (2014, n.d.-a, n.d.-b)

Table 6. Average weekly household expenditure on protein-rich foods, GLSS 6 (Gh cedi)

Protein-rich food	National	Poor	Non-poor	Rural	Urban	North	South	Accra	Other Urban	Rural Forest	Rural Coastal	Rural Savannah
Fish	48.4	25.8	55.5	42.5	55.8	20.2	58.9	67.6	52.4	61.4	57.6	21.4
Poultry	7.9	2.6	9.5	6.5	9.6	3.1	9.6	12.7	8.7	8.8	8.2	4.0
Beef	7.8	3.0	9.3	5.3	11.0	6.2	8.4	8.9	11.6	6.2	5.6	4.3
Milk	5.9	1.5	7.2	3.4	8.9	4.6	6.3	12.2	8.0	3.0	5.7	3.1
Eggs	3.3	0.6	4.1	1.9	5.0	1.3	4.0	6.8	4.5	2.3	4.1	0.9
Goat	2.6	1.1	3.1	1.7	3.8	2.8	2.5	6.6	3.0	1.2	1.3	2.1
Mutton	1.5	0.2	1.0	0.8	0.8	0.4	0.9	3.5	1.9	1.2	0.2	0.7
Pork	0.8	0.8	0.8	1.0	0.6	1.6	0.5	1.1	0.5	0.4	0.5	1.7
Bush meat	0.8	0.3	1.8	0.8	2.3	0.9	1.7	0.6	0.8	1.0	0.3	0.8
Other meat	0.3	0.1	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.1	0.3
Total	**79.2**	**36.0**	**92.8**	**64.1**	**98.1**	**41.3**	**93.3**	**120.3**	**91.5**	**85.9**	**83.5**	**39.3**

Source: Authors' calculations

Table 7. Comparison of availability of and expenditure on protein-rich foods.

Protein-rich food	Calculated availability (%)	National expenditure (%)
Fish	71	61
Poultry	11	10
Beef	5	10
Mutton & goat	5	5
Milk	3	7
Pork	3	1
Eggs	2	4
Other	--	1
Total	100	100

Source: Availability derived from Table 2; Expenditure taken from Table 8.

Table 8. Expenditure on protein-rich foods, GLSS 5 and GLSS 6 (%)

	National		Poor		Non-poor	
Protein-rich food	**GLSS 5**	**GLSS 6**	**GLSS 5**	**GLSS 6**	**GLSS 5**	**GLSS 6**
Fish	62	61	59	72	63	60
Poultry	5	10	5	7	5	10
Beef	13	10	15	8	12	10
Milk	8	7	8	4	8	8
Eggs	4	4	3	2	4	4
Goat	3	3	4	3	3	3
Mutton	2	2	2	1	2	1
Pork	1	1	2	2	1	1
Bush meat	2	1	1	1	2	2
Other meat	0	0	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**

Source: Authors' calculation using GLSS6 data

Figures

Figure 1. Ghana's national protein economy: a framework for analysis

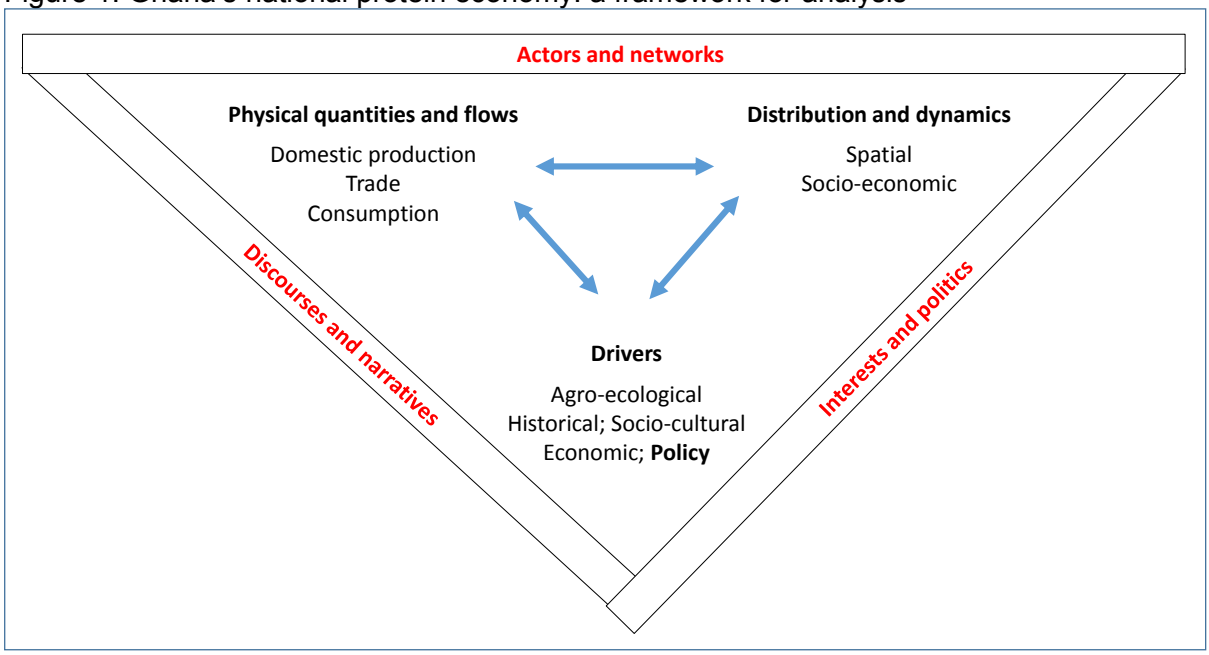


Figure 2. Divergent views of sheep and goat imports

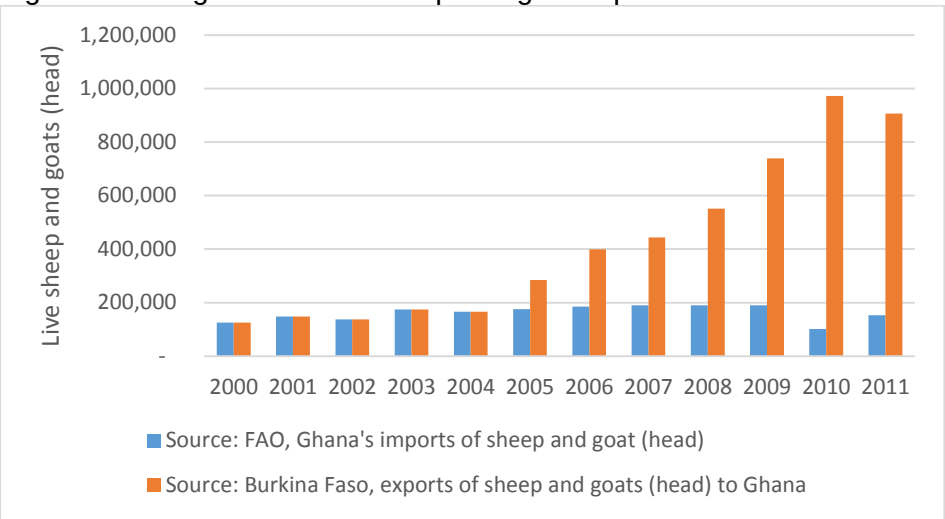


Figure 3. Divergent views of cattle imports

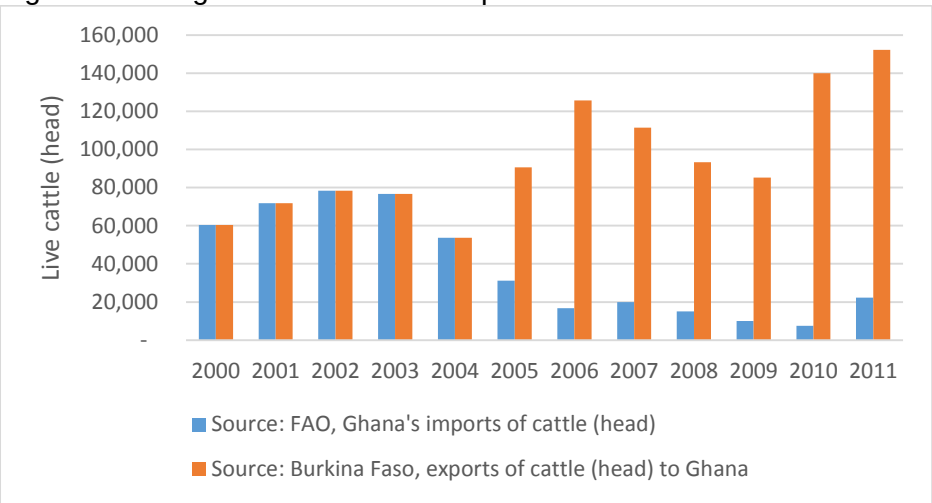
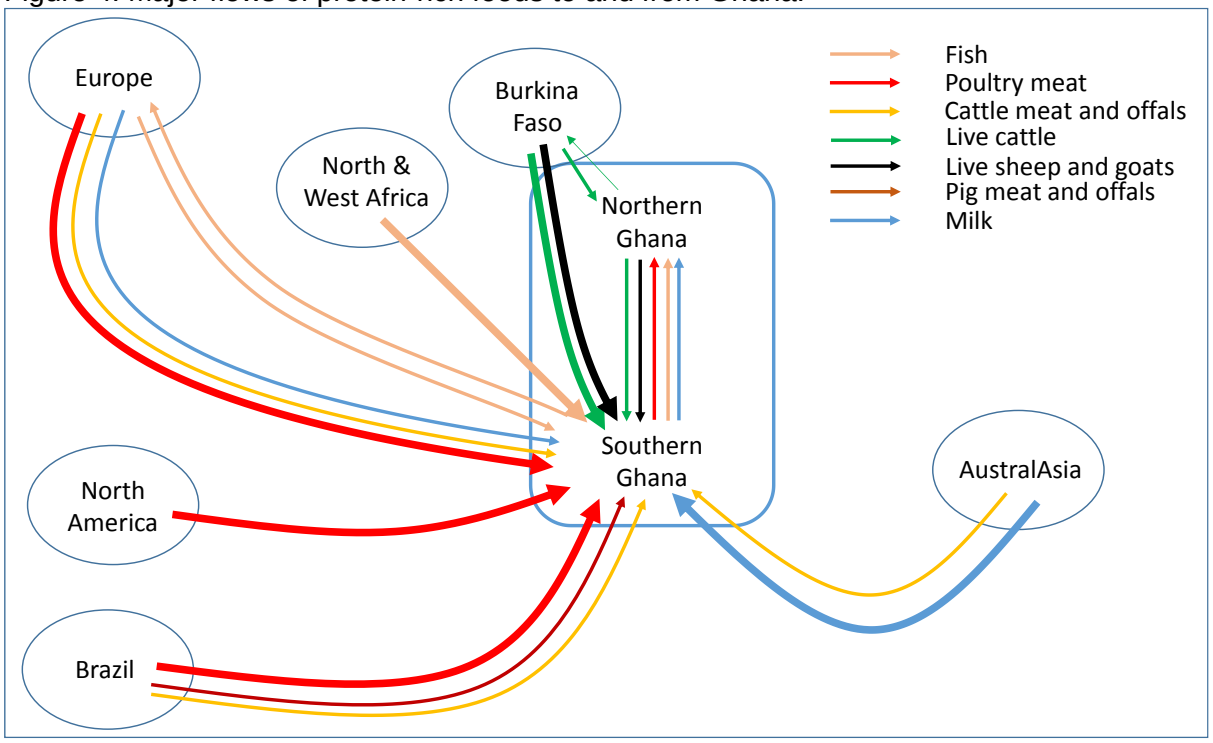


Figure 4. Major flows of protein-rich foods to and from Ghana.



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