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Looking beyond productivity: barriers to animal source food consumption in Ethiopia

Katie McNamara and Sarah McKune

University of Florida



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Sustainably intensifying smallholder livestock systems to improve human nutrition, health, and incomes

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Background

Animal source foods (ASF; see Box 1) contain a high density of crucial micronutrients that are more bioavailable than the same nutrients found in plants (Darapheak et al. 2013; Demment et al. 2003; Murphy and Allen 2003). In this way, even small quantities of ASF can greatly improve nutritional status (Jin and Iannotti 2014). Globally, in several contexts the connection between livestock production and improved nutritional outcomes has been thoroughly supported by scientific evidence (Leroy and Frongillo 2007; Thumbi et al., 2015; Workicho et al. 2016). Livestock-owning households experience improved nutrition through two key avenues: consumption and livelihoods (Jin and Iannotti 2014; Leroy and Frongillo 2007).

While plant-based diets and ovo-lacto vegetarian diets can be nutritious under ideal conditions, these diets depend on a high consumption of diverse plant source foods to account for the comparatively low energy content and lower or absent quantities of some vitamins and minerals (see Table 1) (Murphy and Allen 2003). In the case of Ethiopia, diets are limited by resource poor conditions in many regions of the country, restricting the diet of many rural households to maize and legumes (Workicho et al. 2016). Consumption of ASF in this context could contribute significantly to the overall quality of diet by adding crucial nutrients that are unavailable in other components of the Ethiopian diet.

Despite housing the largest population of livestock animals in Africa, the productivity of livestock in Ethiopia is far below that of its neighbors and contributes comparatively less to the country's economy (Asresie and Zemedu 2015; Benin 2000; ICPALD 2009). Production constraints to improving ASF consumption include poor animal health and lack of proper husbandry and management strategies stemming from vast policy and governance challenges (Asresie and Zemedu 2015; Benin 2000; Jilo et al. 2016; Regassa et al. 2018; Thumbi et al. 2015). Despite these challenges, Ethiopia has a wealth of traditional knowledge in livestock production. Much of this knowledge is increasingly overlooked, as national and international development initiatives largely bypass or marginalize the pastoral population (Atanga et al. 2013; Davies and Bennett 2007). This is problematic as pastoralists own approximately 69% of Ethiopia's cattle, 53% of sheep, 67% of goats, 25% of camels, and 22% of poultry (CSA 2017). Despite being a minority population, evidence suggests that pastoralists are the most productive livestock producers per unit area, providing the majority of Ethiopia's meat and milk supply (Neely et al. 2010). These estimates, however, are fragmentary as much of pastoralist contributions to the livestock sector are unaccounted for due to exclusion of cross-border trade in national accounts (International Institute for Environment and Development n.d.). Although productivity barriers to improved ASF consumption are the primary concern for many development organizations and the national government, such barriers are largely driven by long-standing agricultural policies and new governance strategies that do not support the basic needs of the majority of livestock owners in Ethiopia, but

Box 1: Definitions

Animal source foods include any food item yielded from animal production including milk, eggs, meat and fish.

Subsistence production refers to rearing livestock for the purpose for own final use. Most often, livestock is dual-purpose, meaning households will utilize livestock products for both home consumption and income generation (Workicho et al. 2016).

Bioavailability refers to the amount of nutrient stored in food that is available for absorption and use by the body. ASF often contain greater amounts of *available* iron and zinc and are the only source of bioavailable vitamin B-12 (Murphy and Allen, 2003).

Pastoralism is a form of livestock production common in Nigeria, Niger, Kenya, Tanzania and Ethiopia. Pastoralism depends strongly on mobility to provide pastureland, manage grazing pressure, and divert common risks to livestock production, including drought, disease and desertification (Regassa et al. 2018; Davies and Bennett 2005).

rather facilitate extraction of natural resources (land and primary livestock products) from the country's peripheral and predominantly agro-pastoralist and pastoralist territories (Regassa et al. 2018; Shikui 2016).

Table 1: Nutritional content of ASFs as compared to plant source foods in the Ethiopian diet

Food Type	Energy (kcal)	Protein	Vitamin A (μg RAE)	Vitamin B-12 (μg)	Available iron (mg)	Available zinc (mg)
Eggs	78	6.00	75	1.60	0.60	0.50
Meat	269	24.90	0	1.87	0.32	2.05
Milk	51	3.30	55	0.39	0.01	0.18
Maize	119	2.70	0	0	0.12	0.12
Legumes	127	8.70	0	0	0.15	0.11
Recommended intake	1600	17.30	400	1.20	1.86	1.44

Data source: Murphy and Allen 2003

The most commonly consumed ASFs in Ethiopia include eggs, meat, and milk. In general, fish consumption is low and appears to be highly regional. Cereal grains and legumes are the most commonly consumed plant source foods; kidney beans were used here to demonstrate nutritional data for legumes, beef was used to demonstrate nutritional data for meat (see Workicho et al. 2016). The data above reveals higher overall protein, vitamin, and mineral content in ASF as compared to plant-source foods. This difference is most apparent in vitamin B-12 and vitamin A.

Objectives

This report analyzes the existing production barriers to improved nutrition through the ASF consumption and livelihood pathways against the historical narrative of Ethiopia's livestock sector and ongoing policy challenges. The ASF consumption pathway refers to the link between household livestock production and the consumption of ASF, while the livelihoods pathway refers to earnings generated from livestock production that can be used for purchase of nutritious foods (ASF or non-ASF). The common outcome of both pathways is improved nutrition. These pathways can be constrained by food production, disempowerment, and household income by influencing availability, quality, safety, caring capacity, workload, and decision-making power about household food purchases and other decisions that impact household nutrition, among other critical factors (SPRING 2014). The focus on production-related barriers to ASF consumption is based on an initial analysis from an on-going working paper on the primary pathways to improved ASF consumption for nutritional improvement across three countries (Ethiopia, Nepal, and Niger; McKune et al., forthcoming) to support the Feed the Future Innovation Lab for Livestock Systems Nutrition Cross-Cutting Theme. The purpose of this report is two-fold: 1) to contribute to a better understanding of the sources of constraints on ASF consumption in Ethiopia and 2) to provide stakeholders with information that can be used to propose nutrition-sensitive solutions that are responsive to the socio-political landscape that shapes Ethiopia's livestock system.

Production barriers

Based on the current literature, many immediate barriers to livestock productivity, including animal health and nutrition and livestock management practices, are driven by a policy and market environment that, particularly in the lowlands, favors investments for commercial livestock systems. The majority of resources and regulations provided by the state (regarding land use and titles, technologies, services and financial incentives) are designed with the commercial and semi-commercial livestock unit in mind, overlooking the majority of livestock holders in the country and the primary targets of nutrition initiatives: smallholder agro-pastoralists¹ and pastoralists² (Benin, 2000; Thumbi 2015; Asresie, 2015; Jilo, 2016; Regassa, 2018) The following sections characterize the immediate constraints on livestock production, including livestock health and management practices, followed by the underlying production barriers, including the policy and market environment.

Immediate barriers

Poor animal health reduces the efficiency of livestock growth-rate (important for meat animals) and/or production rate (important for egg or milk-producing animals), subsequently impacting improved nutrition through both the ASF consumption and livelihood pathways (Aleme Asresie et al. 2014; Ministry of Agriculture and ILRI 2015; Prempeh et al. 2001; Umata et al. 2011; Yune and Abdela 2017). Animal health is primarily affected by nutrition and disease (see Box 2) and the capacity of the farmer to prevent, manage and respond to health risks. Animal diseases influence human nutrition through inconsistency in production capacity of the animal (Pieracci et al. 2016) and through zoonoses that directly impact human health and nutrition (for example, TB and diarrheal disease) (McDaniel et al. 2014; Ministry of Agriculture and ILRI 2015). In terms of nutritional outcomes, unhealthy animals reduce the household consumption of ASF (Carletto et al. 2015; Hetherington et al. 2017; Jin and Iannotti 2014; Tadesse et al. 2014; Workicho et al. 2016) and reduce the potential for income

Box 2: Priority livestock diseases

The following diseases are identified as diseases of high priority according to the Ethiopian Ministry of Agriculture (2015) due to the potential to affect production capacity via decreased immune function, and increase morbidity and mortality rates.

- Food and Mouth Disease (FMD)
- *Mycobacterium bovis* (the bacterium that causes Bovine Tuberculosis [bTB])
- Sheep and Goat Pox (SGP)
- Contagious Bovine Pleuropneumonia (CBPP)
- Peste des petits ruminants (PPR)
- External

¹ Livestock holders who use a mixed crop-livestock production and may be involved in seasonal herd migration

² Livestock holders who do not participate in food-crop production and are involved in long-distance seasonal herd migration in search of pasture and water

generation from livestock activities (Ayele and Peacock 2003; Jin and Iannotti 2014; Randell and Gray 2016; Randolph et al. 2007; Tadesse et al. 2014; Udo et al. 2011; Umeta et al. 2011).

Poor livestock health is exacerbated by livestock malnutrition, which in Ethiopia largely results from poor quality and insufficient quantity of feed and fodder (Birhan and Adugna 2014). The management strategies needed to produce and maintain adequate livestock feed varies by livestock production system. Grassland production, and intensive, semi-intensive, commercial, and semi-commercial production are the main livestock systems in Ethiopia. Grassland-based systems, which include pastoral and agro-pastoral production, meet most of their livestock feed needs from natural grazing (90%) and a smaller proportion from crops (10%) (Birhan and Adugna 2014). Such systems must routinely rotate (move between owned or shared pastures) or migrate herds long distances to fresh grazeland, utilize pasture conservation methods to preserve forage quality, and manage stocking rates below the environmental carrying capacity to ensure maintenance of grazelands. Intensive systems, which rely heavily on purchased concentrates and roughages, are often located in or near urban areas and involve little natural grazing. Feed in the intensive system is supplied from off-farm sources, in this case, separating farmers from the production of feed (Atanga 2013). Finally, veterinary care can promote animal health by preventing disease in healthy animals and minimizing the impact of disease among sick animals. However, veterinary services are limited in Ethiopia and farmers are generally unsatisfied with those that exist due to cost, quality, and range of available services (Dessie, 2013).

Underlying barriers

As mentioned previously, the immediate constraints in the pathways connecting ASF consumption and nutritional improvement are heavily influenced by the policy environment of Ethiopia. Beginning in the 1930s, several political regimes introduced policies based on large-scale agricultural development in the agrarian highlands and pastoral lowlands (Regassa et al. 2018). The Haile Selassie regime (1930-1974) began the ongoing process of *villigization*, displacement of pastoral and remote agro-pastoralists into communities, in the 1960s through the Awash Valley Agricultural Projects and the Godey Agricultural Development Project (Belete et al. 1991; Regassa et al. 2018). The subsequent military regime of the *derg* (1974-1991) further intensified agricultural development under the auspices of the state. The *derg* introduced widespread nationalization of rural lands and transformed the rural landscape through collectivization programs and establishment of large, commercial state farms. Following the *derg* regime, the current Ethiopian Peoples' Revolutionary Democratic Front (EPRDF) increased efforts to "settle" Ethiopia's "last frontier," the pastoral lowlands, through the resettlement of people from densely populated centers to the lowlands, revival of sedentarization practices to consolidate pastoralists into villages, sale of pastoral lands for agribusiness (particularly food crop agriculture and sugar cane), investment in large-scale infrastructure changes (dams, irrigation channels), and leasing "underutilized lands" to foreign and domestic investors (COMESA 2009; Regassa et al. 2018).

Overall, policy trends for the past 50 years have been marked by mounting pressure on pastoralist and agro-pastoralist livestock production in favor of large-scale agribusiness (see Table 2) (Pye-Smith 2012). More specifically, the described policies have led to reduced mobility for pastoralists through villigization and resettlement programs and through state-mediated leasing of pastoral lands for agricultural production (Crewett and Korf 2008). Restricted mobility has prevented pastoralists from

responding to recurrent droughts (1997-2011) (Atanga et al. 2013; Regassa et al. 2018). Bihran and Adugna (2014) argue that the prevention of free movement of pastoral herds has caused high stocking rates of livestock that tip beyond the carrying capacity of pastures. Such challenges further exacerbate soil quality, feed availability, and tensions between pastoralists and the national government (Birhan and Adugna 2014; Regassa et al. 2018).

Table 2: Review of critical policies for agricultural development and their effect on the livestock and agriculture sectors

Policy title	Year Introduced	Policy description	Outcomes for farmers	Outcomes for livestock
Land reform of 1975	1975	<ul style="list-style-type: none"> • Rural lands become public property • Ensured access to land • Organization of farming households into peasant associations (PAs), which cultivated land • Creation of state farms, which were cultivated communally 	<ul style="list-style-type: none"> • Underinvestment in peasant sector (accounted for 95% of producers) • Focus on large state farms • Land held under household head(men), excluding women from PAs (Coles and Mitchell, 2011) 	<ul style="list-style-type: none"> • Underinvestment in livestock (85% of producers)
Long-term development plan (1984-1994)	1981	<ul style="list-style-type: none"> • Introduction of “agricultural socialism” • Agricultural inputs distribution controlled by state • Livestock to receive 7.8% of total agricultural budget • Largest investment in irrigation and settlement subsectors (61%) • Villagization 	<ul style="list-style-type: none"> • Favoring farmers in state farm cooperatives • High price of agricultural inputs and extension services cause farmers to focus on subsistence farming 	<ul style="list-style-type: none"> • Agriculture favored over livestock • Pastoralists marginalized • Increased stocking rates of livestock • State-led sedentarization
Agricultural Development -Led Industrialization (ALDI) (Lavers 2012)	1993	<ul style="list-style-type: none"> • Government control over agricultural production decisions • Goal of strengthening and creating settled 	<ul style="list-style-type: none"> • New constraints on agricultural production, what is produced, and how it is produced 	<ul style="list-style-type: none"> • Increased population in pastoral lowlands • Limitations on livestock migration • Land shortages

		agricultural communities	<ul style="list-style-type: none"> • Labor intensive smallholder production • Increased sedentary settlements among pastoral groups 	
Revised Family Code (Lavers 2017)	2000	<ul style="list-style-type: none"> • Land rights granted to women • Customary law includes joint and individual ownership of land by women • Equal inheritance rights 	<ul style="list-style-type: none"> • Increased financial security for women in rural areas 	<ul style="list-style-type: none"> • Little impact on pastoral communities (gendered division of labor largely centers on men and boys for livestock management) • Reform not enforced until mid 2000s
<i>Mender Masebaseb</i> (“Collecting People to Villages”) (Lavers 2017)	2003-2004	<ul style="list-style-type: none"> • Renewal of villagization to pastoral lowlands 	<ul style="list-style-type: none"> • Agricultural inputs focused on agribusiness • Smallholders face difficulty in receiving extension services due to cost and “bundling” of extension service packages 	<ul style="list-style-type: none"> • Pastoralists moved to villages • Increased environmental degradation by livestock due to higher stocking rates • Transform pastoralism to sedentary agriculture • Appropriation of pastoral lands for agribusiness investment
Federal Land Proclamation (Lavers 2017)	2005	<ul style="list-style-type: none"> • Increased federal control over land tenure 	<ul style="list-style-type: none"> • Redistribution of land use • Private smallholders considered tenants of the state • Land sales by small holders prohibited 	<ul style="list-style-type: none"> • Pastoralists and agro-pastoralists develop informal grazing contracts to protect grazing rights
2007/2008 agricultural reform		<ul style="list-style-type: none"> • Lowlands targeted for agricultural intensification/large-scale agribusiness • Increased focus on foreign investment of lowlands 	<ul style="list-style-type: none"> • Enhanced emphasis on large-scale agriculture privatization and foreign investment 	<ul style="list-style-type: none"> • Displacement of pastoralists

Growth Transformati on Plan (GTP) (Regassa et al. 2018)	2010	<ul style="list-style-type: none"> • Large-scale investment in lowlands • Construction of intensive water systems for hydropower and agriculture (dams, irrigation) 	<ul style="list-style-type: none"> • Enhanced emphasis on cash crops (sugar cane) 	<ul style="list-style-type: none"> • Displacement of pastoralists
Livestock Master Plan (LMP)* (Shapiro et al. 2015)	2015	<ul style="list-style-type: none"> • Investment in veterinary services in lowland pastoral areas. • Diversification of livelihoods to enable “transition out of pastoralism” (Nash et al., 2016, p.1) 	<ul style="list-style-type: none"> • Increase in crop agriculture and decline in “pure” pastoralism in agro-ecological zones were agriculture is feasible 	<ul style="list-style-type: none"> • Policies support sedentarization and growth of small and medium settlements (example: veterinary services are non-mobile) • Demand-driven outlets for animal products prodect pastoral and agro-pastoral livelihoods

Note: the source for this table is Belete, 1991 unless otherwise stated.

* Due to recency of LMP, the full scope of impact to farmers and the livestock sector as a whole is not fully apparent. However, according to Little et al. (Future scenarios for pastoral development in Ethiopia, 2010-2025) proposes the current trajectory above. For a more details on potential scenarios see Little et al. 2016.

In general, national level nutritional indicators have improved considerably for Ethiopia. However, it is imperative to analyze the nutritional status of the country according to regional disparities. Much of the improvement has occurred in centrally located urban and periurban areas. As these regions have increased access to intensive and semi-intensive livestock production and agriculture, improved infrastructure, and larger capital investment in food production as a whole, these areas have benefited from national policies stemming from agribusiness investment. Despite these investments, geographically disaggregated data indicates that chronic hunger has increased in the pastoral lowlands since the early 2000s, despite rapid declines in other areas (COMESA 2009). More specifically, chronic malnutrition and wasting is above the national average in Afar, Tigray, South Nation and National People, and Amhara—all with largely rural, agro-pastoral and pastoral populations (Ahmed et al. 2014).

Of critical note to nutrition are the gender differences in access to assets resulting from Ethiopia’s use of the unitary household model in land use registration. Under this model, households are treated as a single unit and are registered under the name of the household head, typically the male head-of-household. Such land tenure practices led to the systemic exclusion of women from land ownership. Although the 2005 federal land proclamation requires lands to be jointly registered to husbands and

wives, there is little incentive to reissue certificates for households currently registered under one household head (Lavers 2017). However, women's asset ownership can improve women's decision-making power and influence over intrahousehold allocation of resources, including food resources (van den Bold et al. 2013). Both asset ownership and decision-making are considered domains of empowerment, a concept with well-established connections to improved household nutrition (Malapit and Quisumbing 2015; Quisumbing and Meinzen-Dick 2001).

In addition to policy and gender-related barriers, income and cultural beliefs and practices also present barriers to ASF consumption. Feeding practices vary across religion and culture in Ethiopia. Fasting is a common cultural practice among orthodox religion and Muslim followers, which temporarily prohibits consumption of milk and meat in the former and consumption of any food in the later. This can be particularly harmful among pregnant women and young children but limits ASF consumption among all participants (Biza Zepro 2015). Income has been shown to positively influence ASF consumption. However, this association is stronger in urban areas as compared to rural areas (Betru and Kawashima 2009). Finally, the agro-ecological conditions of Ethiopia present natural barriers to increased ASF consumption. Tailoring livestock production strategies to the specific ecological challenges presented by each region may alleviate these constraints. For example, intensive and semi-intensive livestock production has been found to be extremely effective in urban and peri-urban contexts while pastoralism proves more useful in arid lowlands (Atanga et al. 2013; Davies and Bennett 2007). Overcoming these barriers may be approached simultaneously from health (for example, through health education messages relating to dietary diversity and child feeding practices or through behavior change campaigns) and agricultural perspectives (linking extensionists with nutrition-sensitive techniques). Government initiatives to control inflation of food prices can also be supportive in this effort (Darapheak et al. 2013).

Conclusions and recommendations

To return to the central purpose of this paper, the primary barriers to ASF consumption for nutritional improvement in Ethiopia stem from production-related policy decisions that influence quantity and quality of livestock feed and perpetuate risks associated with livestock disease and access to adequate veterinary services. The natural landscape also contributes barriers to livestock production that inhibit improvements in nutrition, specifically in regard to the difficult livestock raising conditions of the arid lowlands.

Traditional livestock production methods, including pastoralism, have historically been crucial indigenous techniques for allowing pastoralists to respond to environmental variability and disease pressure. Under the dynamic ecological conditions of Ethiopia's arid lowlands, mobility of herds is central to the following:

- **Managing droughts:** In the dry season, pastoralists pursue the highest quality forage available by moving from pasture to pasture to limit herd weight loss. Sedentary livestock systems must endure limited food availability due to the dry season and instead supplement livestock diets with purchased concentrates (Profitós et al. 2013).
- **Grassland health:** Pastoralists mitigate the pressure of livestock on the environment through regular migrations. In this way, the risks of overgrazing are minimized (Mcgahey 2011).

- Disease management: Reducing animal weightloss and maximizing diet quality during the dry season can reduce animal stress and weakened immune systems that increase susceptibility to disease. However, these benefits should be weighed against the lack of access to veterinary care due to poor veterinary care infrastructure in pastoral areas (Blench 2001).

Policy changes since the mid-1900s have gradually contributed to the marginalization of pastoralists and disruption of needed migration routes. In place of nomadic herds, the Ethiopian government has led a multi-generational push towards domestic and foreign investment in agribusiness on historically pastoral and agro-pastoral lands in both the highland and lowland regions of the country. Villagization programs that encourage the sedentarization of pastoralists are among such programs. Current agricultural policies do not reflect the interests of the majority of the livestock-owning population in Ethiopia: rural smallholders, including agro-pastoralists and pastoralists. This is because both agro-pastoralists and pastoralists require mobility to respond to natural and economic shocks. For example, livestock owners involved in riverland agriculture move to higher or lower ground in accordance with floods and drought, respectively, and the later migrating seasonally to reduce grazing and disease pressure on herds. As the potential to generate income from pastoralist systems declines, the pathway connecting ASF consumption and nutritional improvement becomes constrained through: 1) reduced purchasing power for diverse and nutritious diets and 2) low ASF yields unable to support home consumption.

Better management of the immediate constraints to improved nutrition can be facilitated through integration of local knowledge and participation in the development, implementation, monitoring and evaluation of resource management and conservation strategies. Such efforts can produce policies and practices that are more responsive to the local needs of Ethiopia's most food insecure communities. A better understanding of pasture management methods that are sensitive to local traditions is necessary; the communal governance strategy used by many rural populations may serve as an effective framework for rural governance due to the use of collective decision-making and communal management of grazeland, which is a strategy that may serve useful for ameliorating grazing pressure from restricted herd mobility. Research into this area is needed in order to identify policies that support Ethiopia's pluralistic livestock sector.

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University of Florida
Institute of Food and Agricultural Sciences
P.O. Box 110910
Gainesville, Florida
32611-0910

Livestock-lab@ufl.edu

<http://livestocklab.ifas.ufl.edu>