

## REPORT - RAPPORT

# THE DEVIL IS IN THE DETAIL: DISCLOSING THE IMPACT OF RELIGION ON THE MILK SYSTEM IN ETHIOPIA<sup>1</sup>

Eline D'Haene

Department of Agricultural Economics, Ghent University, Belgium

The influence of religion within food systems in developing economies has been understated in scholarly studies. With its different Christian, Islamic, and traditional faiths, Ethiopia offers a promising field for investigating the impact of religion on the milk system, the most important animal protein source in Ethiopian diets. In a first chapter, we investigate how the presence of a religious fasting period influences household milk intake in the country. The second and third chapter explore how milk producers have adapted to the demand seasonality caused by religious fasting practices in two different major milk production areas. In the two final chapters we investigate if and how religious ties facilitate milk transactions. This dissertation concludes that religious fasting practices have a clear impact on milk consumption and production in the country, thereby creating considerable market inefficiencies. Furthermore, we find evidence of market coordination problems along

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## Background

Food systems are rapidly transforming in developing countries due to changing diets and rapid urbanization. Diets get more diversified with a higher inclusion of non-staples – especially processed and animal-sourced foods (ASFs) – and households become increasingly dependent on purchased produce rather than home-produced food (IFAD, 2016). Still, the contribution of ASFs to total protein intake remains limited in low-income countries, their contribution is only 20% (OECD/FAO, 2019). Annual growth rates of per capita milk, meat, and egg consumption in sub-Saharan Africa (SSA) have been stagnant to slightly negative over the past decades (Gerosa & Scoet, 2013: 11-40) and per capita calorie availability of ASFs is projected to decrease in the region by nearly 5% in the coming decade (OECD/FAO, 2019).

These trends have very often been attributed to a supply chain that could not keep pace with an increasing demand for ASFs. This has influenced local policy programmes that are

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increasingly advocating a transformation of the livestock sector. Primary focus of these livestock interventions is often productivity-based, which is seen as a major bottleneck of the SSA livestock system. Less understood is how religion influences the livestock sector development, making it difficult to design effective policies to mitigate the potential effects of religion on ASF consumption and production. In this dissertation, we argue that factors influencing demand for ASFs could still suppress the intake of animal protein, even when ASFs are available and affordable. We specifically focus on the influence of religion given the explicit association between religious beliefs and practices, and ASFs. Food instructions laid out by various religious groups often constrain or even completely prohibit consumption of (specific) ASFs. Because religion changes food choices and food intake, it is expected to alter the food system at large (Global Panel, 2016). The role of religion in affecting food choices and food supply is, however, underemphasized in economic literature (Heiman et al., 2019: 363-369), while it is believed that the impact of religion on food systems will remain important given the growing share of religious people worldwide, and especially in SSA. There is thus a need for case-by-case studies that investigate how food systems have evolved within particular religious settings.

### **Research focus and research questions**

In this dissertation, we explore how the milk system in Ethiopia has evolved within a diverse and long-standing religious context. We select Ethiopia as a case study because of its religious diversity – the country is amongst one of the most religiously diverse countries in the world (Assen, 2016: 415-436) – and its large group of Orthodox Christians. Ethiopia is home to 36 million Orthodox Christians, the largest group of Orthodox Christians outside Europe (Pew Research Center, 2017). Orthodox Christians are the dominant religious group in Ethiopia – representing 44% of the total population (CSA, 2010) – but surprisingly, this religious group has been neglected within scholarly studies while attention has been given to religious minorities such as Mormons (16.3 million adherents worldwide (Restored Church of Jesus Christ, 2019)), Jews (14.6 million (DellaPergola, 2019: 361-449)), and the Amish (330,000 members (Amish Studies, 2020)).

Ethiopian Orthodox Christians abstain from ASFs during multiple fasting periods that cover roughly half of the year (Abegaz et al., 2018; Bacheve et al., 2017; Francesconi et al., 2010: 60-68). Fasting practices cause significant seasonality in the demand of ASFs in the country, which in turn influences ASF production, processing, and marketing practices. It seems that the practice of fasting affects ASF consumption in two ways. First, consumption is directly affected by fasting as Orthodox members are not allowed to consume ASFs during fasting periods. Second, fasting might impact the availability and pricing of ASFs due to lower investments in the sector and broader value chain effects. The widely occurring fasting practices in the country thus possibly contribute – among others – to the underdevelopment of the country's dairy sector compared to other countries in the region (such as for example Uganda or Kenya) (Tegegne et al., 2013; Van der Lee et al., 2018: 4324). Few authors, however, have looked at these issues.

We study the impact of religion on the cow milk system, as milk is the most important animal protein source in Ethiopian diets. Despite the large stock of cattle in the country,

milk is not regularly consumed because it is a luxury product. When it is consumed, it is mainly intended for children or other vulnerable population groups (such as elderly and pregnant or lactating women) (Negassa, 2009; van Dorp, 2014). Yearly milk intake in the country reaches only 20.6 kg per adult equivalent (Abegaz et al., 2018), which is only half of the average in SSA (OECD/FAO, 2017) and less than one-fifth of the required intake for healthy diets (FAO). Problems of structural supply, poorly developed local markets, low purchasing power, and lack of consumer awareness regarding the nutritional benefits of ASFs have been advanced to explain low consumption levels (ADP-LMDP, 2013; Tefera et al., 2010; Tegegne et al., 2013; Warren & Frongillo, 2017: 66-73). Less explored is how religion could possibly curtail the demand and supply of milk in the country.

To explore how the milk system in Ethiopia has evolved within a diverse and long-standing religious context, we focus on three different research questions, that each address an element of the milk system, and we study how religion influences milk consumption, milk production, and milk transactions. We provide answers to these research questions in five chapters.

We operationalize religion's impact on the milk system in this dissertation in two ways: (1) we detail the impact of a religious practice, i.e. Orthodox fasting, on milk consumption, production, and output use, and (2) we investigate whether the religious affiliation of potential trading partners affects trading preferences of both milk producers and milk consumers.

### **Contributions to literature**

This dissertation contributes to the literature in various ways. We cast light on the role of religion in food system development, a markedly under-researched area. We study this in Ethiopia, a low-income country, and focus on a large yet neglected group, Orthodox Christians. This contrasts with previous studies that focused merely on high-income countries and Islamic beliefs and practices (notably Ramadan). This dissertation takes a comprehensive approach, and focuses on three elements of the milk system that are intertwined and can therefore not be studied separately: consumption, production, and transactions. The focus on a non-conventional product (milk) is also in contrast to earlier investigations that have targeted meat and substances. Furthermore, we detail the wider societal impact of the Orthodox religion, by focusing also on non-Orthodox households. Moreover, we are the first to quantify the effects of religious fasting rituals on consumption and production in detail in the context of Ethiopia. We do so at several levels: (1) at the national level, (2) within the most developed dairy hub of Ethiopia (the Great Addis milk shed) hosting an Orthodox majority, and (3) for an almost exclusive Orthodox and urban setting (Mekelle city). Including this urban perspective is new and as such a valuable addition to the literature.

Finally, we investigate the ways in which religion, as a part of one's identity, interferes with milk transaction preferences of both producers and consumers. We study this using choice experiments applied to individuals rather than the more commonly used method of assessing preferences among products, services, or programmes – an innovative approach. The prevalence of market exchange preferences based on shared mem-

bership within a social group and potential market segmentation that might result from such preferences, has received little scholarly attention so far, which is another gap we address.

### **How does religion influence *milk consumption*?**

To investigate how religion influences milk consumption, we detailed the impact of the presence of a religious fasting period on household milk intake. Using nationally representative data from the second wave (2013-2014) of the Living Standard Measurement Survey programme and linear probability models, we find that fasting impacts milk intake and sourcing strategies of consumed milk in the country, and that these effects are not limited to the Orthodox community. The presence of a long fasting period – which in this dataset corresponds to Easter fast – reduces average probability of a household consuming milk, irrespective of which religious group a household adheres to, but it is especially so among Orthodox and Muslim households. The impact of fasting is also larger in dominantly Orthodox settings. Furthermore, we observe that for those households consuming milk, Orthodox fasting negatively affects milk purchase intention among all households in dominantly Orthodox localities. This suggests that, due to repeating fasting spells, local dairy market development in dominantly Orthodox settings has been hampered. It seems that the practice of fasting thus affects milk consumption in two ways. First, consumption is directly affected by fasting as Orthodox consumers are not allowed to drink milk or eat milk products during fasting periods. Second, fasting impacts the availability of dairy produce, especially in dominantly Orthodox areas, where less milk can be acquired from the markets during fasting which reduces milk intake among non-Orthodox households.

### **How does religion influence *milk production and output use*?**

Because Orthodox fasting periods are spread throughout the year, with long fasting spells in February-March (55 days), July (10-40 days), August (16 days), and December-January (40 days), fasting causes significant dairy demand seasonality, which adversely affects milk production systems, an effect we detailed for two dominantly Orthodox localities. Using secondary data collected within the project ‘Improving the evidence and policies for better performing livestock systems in Ethiopia’ led by IFPRI who interviewed 870 milk producing households in the commercially-oriented Great Addis milk shed, we study the impact of the presence of a long fasting season on milk production, marketing, and consumption. We find that producers adopt different strategies to cope with long Orthodox fasting seasons, and that these strategies vary with farmer’s market access, which we proxy by remoteness to the capital Addis Ababa. We find that remote farmers mainly rely on reducing the production of milk by their dairy herd during long fasting periods. The milk that is still produced by these households is processed or channelled to their young children. As a result, these households sell and consume significantly smaller quantities of liquid milk during fasting periods. The intake of milk by their youngest children is not affected by the presence of a long fasting period. Liquid milk sale opportunities of non-remote farmers on the other hand are significantly less affected

by long fasting periods. But we observe considerable heterogeneity among these farmers in their ability to maintain milk sales during fasting seasons. Some of these farmers seemingly benefit from being better connected to buyers that continue purchasing milk during fasting periods. As a result, non-remote farmers, on average, do not reduce the total production of milk at their farms significantly. Yet, to compensate for (some) forgone market opportunities during fasting, these farmers process a significantly larger share of the produced milk during fasting and they feed significantly more milk to their young children. In comparison to remote farmers, consumption volumes of liquid and processed milk in non-remote households are not affected by long fasting seasons.

Intrigued by these findings, we wondered how milk production systems have evolved in settings where almost exclusively Orthodox Christians reside (over 95%), for example in the Mekelle milk shed, an area that has barely been studied. To this end, we interviewed 304 milk producing households within the city of Mekelle, where the milk market is mostly developed. Aligning milk production with fasting periods is not widespread in the city, and if practiced, only at best partially solves the demand-supply mismatch. All the dairy farmers we interviewed, were Orthodox Christians and less than 5% of the milk they produce is consumed within the households (by children and elderly mostly) both within and outside fasting periods. These households thus mainly rely on milk processing and continued milk sales to overcome fasting events, yet significant variability exists in the importance of these adaptation strategies among farms. We therefore clustered farms in five groups adopting a cluster analysis approach, that categorized farms along three important dimensions: input efficiency, market integration and resilience towards demand seasonality. Here we summarize the main findings to illustrate how farms have adjusted to periods of reduced milk demand.

Farmers in only three of the five milk producing clusters we found, manage to sell about half of their milk output during Orthodox fasting, with one group selling up to 70% of the produced milk. This latter group, which we named *established, output-efficient farms*, shows to be best integrated in the market with stable and remunerative milk prices regardless of fasting periods. Members from another cluster, *processing farms*, completely rely on milk processing to overcome fasting events, with on average 96% of the produced milk being processed. Yet another group of farmers, the *young male entrepreneurs*, hardly consume, sell or process milk during fasting. Produced milk is thus largely spoiled in these farms during fasting events. Among all groups, we see that farmers barely process milk during non-fasting periods. Traditional milk processing carried out at household level is labour-intensive and time-consuming. Furthermore, the conversion of milk is inefficient. This limits the opportunity of value addition opportunity for processing significantly. One could thus argue that traditional processing in Ethiopia is so widespread because of Orthodox fasting rituals that are practiced by a majority of the population<sup>2</sup>. Only during Orthodox fasting, when milk demand drops, is it interesting for urban farmers to process of milk into butter and other processed milk products as it increases the shelf life of milk and thus allows

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2 Of course, in more remote areas, processing is widely practiced to mitigate for poorly functioning or absent milk markets (Keding et al., 2013: 825-846)

bridging the fasting period. Furthermore, in Mekelle city, we observed that the processed milk products are rarely sold, but mostly consumed by the households themselves. Only farmers of two clusters sell excess butter. This all suggests that processing seems to be mainly consumption stabilizing rather than a sales stabilizing strategy.

### **Does religion interfere with *milk transactions*?**

Having shown that religious fasting rituals undeniably impact both milk consumption and production in the country, we wondered if religion – which is part of one's social identity –influenced with whom people preferentially trade milk. Evidence of ethnic market segmentation has been reported in Africa (Aker et al., 2014: 1-16; Robinson, 2016: 371-384), but insufficient attention has been paid to the occurrence of religious market segmentation.

In the last two chapters of this dissertation, we take both a buyer and seller perspective and detail whether religion affects consumer purchase behaviour and producer selling behaviour. More specifically, we address the following two questions: (1) do consumers/producers consider the religious affiliation of a seller/buyer when making a choice to purchase from this seller/to sell to this buyer and (2) if a consumer/producer does consider the religious affiliation of a seller/buyer, does s/he prefers sellers/buyers from the same religious group? An affirmative answer to both questions, points to (un)conscious self-selection to co-religious sellers/buyers, contributing to religious market segmentation. We focus on the specific case of Ethiopia and milk. Several reasons that enforce each other, make us hypothesize that religion might be an important factor in a consumer's/producer's (initial) selection of milk suppliers/buyers: (1) the milk market that operates predominantly informally, (2) the religious symbolism of ASFs, (3) the widespread occurrence of co-religious networks due to low levels of trust in other religious groups and the geographical dispersion of religious groups, (4) and the occurrence of informational asymmetries that require trust from consumers/buyers in milk sellers/buyers.

To this end we interviewed 221 consumers and 222 producers in Mekelle city who were asked to participate in a discrete choice experiment. In the choice tasks for milk consumers, milk seller profiles were constructed using five relevant attributes: milk price, distance to the selling point, type of seller (milk producer or milk shop), gender and religious affiliation of the seller. In the choice experiment for milk producers, potential milk buyer candidates were characterized using the following five attributes: milk price, payment terms (at the time of transaction or delayed), type of buyer (individual consumer, milk shop, or trader), religious affiliation and gender of the buyer.

When evaluating trading preferences among milk consumers, we observe clear preferences for milk prices, proximity of milk suppliers and type of milk suppliers, while the religious affiliation of milk suppliers is no decisive factor, on average, when consumers choose from whom to buy milk. Yet, we observe low attendance rates for this attribute, which could explain why we do not find dominant preferences for this attribute. Given that liquid milk is typically traded in spot market transactions and almost daily purchases of small quantities, consumers can easily shift to other suppliers if they are not satisfied. This flexibility could explain why not all consumers pay attention to the

religious background of suppliers, but rather focus on characteristics they value more, which seem to be the type of supplier, proximity of the supplier, and milk prices. When we accounted for attribute non-attendance, we observe that some of the consumers do take religion into account when deciding to engage in hypothetical milk transactions and they tend to self-select to co-religious suppliers. These consumers are willing to pay more or walk further to find a co-religious supplier but this extra price and effort is smaller than what consumers are willing to pay more or walk further to buy milk from milk producing households. For milk producers, we find that, on average, they do not reveal significant preferences for co-religious buyers. Yet, we observe significant preference heterogeneity around this attribute. This implies that some producers have strong preferences for the religious affiliation of milk buyers, while others have less or no preference. More research is needed to repeat our experiment and validate our findings, but overall we seem to find evidence that religious segmentation might be at stake in the Ethiopian milk market.

## **Conclusion**

In this dissertation, we examined how the Ethiopian milk system has evolved within a diverse and long-standing religious context. Accounting for the impact of socio-cultural factors (of which religion is one) on ASF demand and supply patterns is pivotal and therefore deserves more attention from policy makers and scholars. We unpacked our general objective in three research questions, each tackling a specific element within the milk system: i.e. milk consumption, milk production and output use, and milk transactions. This dissertation concludes that religious fasting practices undeniably impact milk consumption and production in the country, thereby creating considerable market inefficiencies. Furthermore, we find evidence of market coordination problems along religious lines.

Although the findings of this dissertation are specific to the studied research localities and thus cannot be extrapolated as such, we gained a better understanding of how religion affects the Ethiopian milk system. This, not only helps us to address gaps in the academic literature, but also allows us to formulate more effective interventions in the country that aim at developing the dairy sector, and improving food security and nutritional outcomes. To improve the potential of the Ethiopian dairy sector, interventions are needed to smooth the effect of seasonal demand swings and possibly increase returns on investments in the sector. To achieve this, further efforts are needed in terms of supporting farmers, enhancing processing practices, ensuring greater availability of chilling centres for storage, as well as improving market access and transportation facilities to assure market integration and to allow marketing to areas where fasting is less prevalent. Furthermore, investing in school milk programmes could be an effective way to increase milk consumption of children, while such programmes simultaneously allow the establishment of a guaranteed milk market outlet during fasting as children are exempt from fasting participation. Finally, nutrition awareness creation is needed to raise the intake of milk in the country but also to alter social norms that compel vulnerable population groups to engage in fasting practices since this has been shown to have negative repercussions on nutritional and health outcomes.

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