# Red Meat and Poultry Production and Consumption in Ethiopia and Distribution in Addis Ababa

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**A project made possible by**


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## Table of Contents

**Acknowledgements**

I would like to thank Mr. Nick Nichols for introducing me to the World Food Prize. It was a first for both of us, but what a wonderful learning experience it turned out to be.

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Finally, I would like to thank my family and friends for supporting me during this wonderful, life-changing experience.

Thank you,
Abbey Avery
2004 Borlaug-Ruan World Food Prize International Summer Intern, ILRI

**List of Acronyms, Abbreviations, and Glossary**

ETB……..Ethiopian Birr. 1USD = 8.635ETB (July, 2004)

FAO…….Food and Agricultural Organization

GDP…….Gross Domestic Product

ILRI……..International Livestock Research Institute

USD…….United States Dollar

mmt…….Million metric tons

kCal……..Kilocalorie ($10^3$ calories)

kg……..…Kilogram ($10^3$g)

g……...gram

mg……milligram ($10^{-3}$g)

µg……microgram ($10^{-6}$g)

Bioavailability…Ability for the human body to absorb micronutrients in the gastrointestinal tract and utilize them at the tissue level.

Poultry……Chicken or pertaining to chicken

Small ruminant…Sheep and goat

## List of Tables and Figures

**Tables**



**Figures**

**Notes**

1) Even though it is an important aspect of Ethiopia’s meat industry, in a two-month project, there was no time to further examine the production of Ethiopia’s meat.

2) Also due to time constraints, it was not possible to personally study Ethiopia’s consumption patterns at the household level.

3) Caution note: Data under the Distribution heading is likely to be influenced by tax obligations and may not be accurate.

## Introduction

### *Abbey Avery and the World Food Prize*

A rural Iowa farm girl from the North Central town of Rowan, where 92% of the 218 people are white, does not usually stray far from the comfort of her red Jeep, American Quarter Horse, fluffy comforter, country music, loving family, or cherished meals of Iowa corn-fed beef. Technically I did leave home for a year to study animal science at Iowa State University, but it was less than a one-hour drive from my front yard. Even though I involved myself in extracurricular activities like Block and Bridle, the ISU Equestrian Team, the Pre-Vet Club's Large Animal Intensive Care Unit volunteer team, and Alpha Gamma Delta women's fraternity, I was back home at least every other weekend to ride my horse or visit my grandparents.

After hearing testimonials during an introductory animal science class, I soon realized how important internships are to establish a future career. I began my search with Colorado dude ranches; trail guiding in the mountains would be a perfect summer internship! It did sound fun, but I somehow felt I was selling myself short. The potential for a life changing internship was out there, but did I want to leave all those comforts behind? Then a slight twinkle appeared from a far off distance. I started to reflect on the presentations of the Borlaug-Ruan interns that I had heard in 2001 at the World Food Prize Youth Institute. At the time, I was just beginning my junior year in high school. My summers were filled with 4-H projects, FFA livestock, lifeguarding, and horses. There was no chance I could give that up. The summer of 2004, however, was different. My county fair showing career had come to a close, and my summer schedule was relatively empty. It has always been a distant dream of mine to travel to developing countries to

learn about their cultures, and help. I did not know what help I would be, but I wanted to help. Just help.

Then that twinkle turned into a glowing fireball. I would apply for the World Food Prize summer internship, but I would also send out a few applications later in the spring to ranches in case I was not selected. I was always too busy before, and this was already my last chance to apply for a World Food Prize internship. Just to say I applied would be an honor. I was ecstatic, to say the least shocked, when I found out I was granted an interview. Of course I was even more honored to receive that. Then, sometime in March, Abbey Avery, the rural Iowa farm girl, was named the 2004 Borlaug-Ruan World Food Prize summer intern at the International Livestock Research Institute in Addis Ababa, Ethiopia, and at nearly twenty, by far the eldest of the thirteen 2004 interns.

***ILRI***

The International Livestock Research Institute, ILRI, is a non-profit organization belonging to CGIAR, the Consultative Group on International Agricultural Research. ILRI was formed in 1995 with the consolidation of two CGIAR livestock institutes: the International Laboratory for Research on Animal Disease (ILRAD), based in Nairobi, Kenya, and the International Livestock Center for Africa (ILCA), based in Addis Ababa, Ethiopia. ILRI is also one of the sixteen Future Harvest Centers. These centers focus on food and environmental research to help alleviate poverty and increase food security. ILRI, in particular, focuses on reducing poverty constraints by improving livestock conditions for owners and their communities. While "Better Lives through Livestock," is ILRI's running banner and ILRI's strategy plan to 2010 is entitled, "Livestock – A Pathway out of Poverty," the emphasis put into developing livestock in third world countries is obviously ILRI's main focus. ILRI's primary office is located in Kenya, with several branches throughout the world, including a principal campus in Addis Ababa, Ethiopia (International Livestock Research, 2004). As an animal science major devoting my life to agriculture and livestock, I was elated to accept my placement at ILRI's center in Addis Ababa.

## ***Project***

### *Interests and Project Objective*

After developing an English accent on the twenty-hour British Airway flight, I arrived in Addis Ababa at 2:00 a.m. on the morning of June 10, 2004. Other than a great fear of airports, I had no reservations for the few months before I departed, but as the wheels screeched across the runway, my heart pounded in my ears. On the ten-minute drive to ILRI from the airport, I was in shock. The drivers spoke an ancient language born only in Ethiopia. The city reeked of poverty and filth. Mud shacks with tin roofs lined the roadways. Several people were bundled up in tattered blankets on every sidewalk. And on the other side of every corner the car careened around, I was looking out the window at a donkey, sheep, or steer. I finally understood where I was, and what I could do.

Following a day of shock recovery and solitude in my apartment style dormitory, I was greeted by a lovely woman who came to be my Ethiopian mother. Tigist Mamo introduced me to Dr. Yilma Jobre Makonnen, ILRI's capacity strengthening manager. As an "attachment associate," I was to be directed by Dr. Yilma in terms of housing, project organization, and finance. Tigist also introduced me to my project supervisor, Dr. Salvador Fernandez-Rivera, head of the CGIAR System-Wide Livestock Program. I was eager to start a project immediately, but Dr. Salvador first wanted me to experience some of the agricultural areas and livestock issues facing Ethiopia. After touring the dairy and other facilities at the Debre Zeit ILRI site, Dr. Salvador and I discussed what would interest me most. Debre Zeit was beautiful; I would have loved to be stationed there. My interests, however, took me in another direction. After graduation from Iowa State, I hope to be employed by the United States Department of Agriculture and the Animal and Plant Health Inspection Service as a livestock inspector. I am very interested in the meat process, specifically quality and health safety, for livestock and consumers. By just driving through the streets of Addis, I knew there were severe quality issues facing Ethiopia's meat industry.

There has been very little research done concerning meat in Ethiopia. ILRI has placed a large amount of its involvement in the dairy field. Dr. Salvador and I both agreed researching Ethiopia's meat industry would not only be an interesting project, but

also highly unique. More importantly, it would be on a subject that I want to develop in my career. With this in mind, we designed a research project for which I was the sole "owner." It was to be exclusively my individual project. From that point on, I spent my internship researching "Red Meat and Poultry Production and Consumption in Ethiopia and Distribution in Addis Ababa."

The objective of this project was to better understand Ethiopia's meat industry and make further suggestions on how to improve the quality and availability of red meat and poultry.

***Project Importance***

Animal products, specifically the red meats of cattle, sheep and goat, but also the white meats of poultry, are essential to the human diet, especially in developing children. According to a 1999 publication, Charlotte Neumann, M.D., M.P.H, and Diane M. Harris, PhD, of the University of California in Los Angeles agree that meat is significantly high in zinc, iron, protein, and vitamins of the B group, particularly $B_{12}$, and also have a full complement of the essential amino acids. Coming from animals, these micronutrients can also be easily absorbed by the human body. Even though some plants may have a similar amount of micronutrients, as shown in Table 1, the human body exceeds more energy digesting these materials and never receives the necessary amounts. These micronutrients not only have a high impact on physical growth, but also cognitive function and performance. These micronutrients also prevent such health problems as anemia (iron and Vitamin $B_{12}$ deficiencies) and immune function diseases, which can result in or be intensified by iron, zinc, and Vitamin $B_{12}$ deficiencies in addition to Protein-Energy Malnutrition

**Table 1 Harris and Neumann 1999**

| Breakdown of Meat Contents vs. Plant Contents | | | | | | |
|---|---|---|---|---|---|---|
| Food | Energy (kCal) | Protein (g) | Fat (g) | Iron (mg) | Zinc (mg) | Vitamin $B_{12}$ (µg) |
| Beef | 263 | 18.5 | 20 | 3.2 | 6 | 2.4 |
| Goat | 269 | 13.4 | 3.4 | 3.7 | 0 | 1.2 |
| Chicken | 161 | 31 | 6 | 1.3 | 1.8 | 0.23 |
| Offal | 143 | 11.2 | 10.6 | 2.1 | 0 | 0 |
| Maize | 204 | 5.9 | 3.1 | 2.9 | 0 | 0 |
| Wheat | 364 | 10.5 | 1 | 0.8 | 0 | 0 |
| Beans | 127 | 9 | 0 | 2 | 2 | 0 |

(PEM) (Harris and Neumann, 1999). Table 2 complements the use and availability of micronutrients from a meat source.

**Table 2**

**Harris and Neumann 1999**

| Micronutrients Availability and Function | | | |
|---|---|---|---|
| | Iron | Zinc | Vitamin $B_{12}$ |
| Meat | +++ | +++ | +++ |
| Functional Area | | | |
| Anemia | +++ | 0 | +++ |
| Immunodeficiency | ++ | +++ | + |
| Cognition | +++ | 0 | ++ |
| Activity | +++ | ++ | 0 |
| Work Capacity | +++ | 0 | 0 |

Iron deficiency is one of the world's most widespread nutritional problems. In developing countries 26 percent of men, 42 percent of women, 46 percent of school age children, and 56 percent of children under the age of four suffer from Iron deficient anemia (Scrimshaw, 1996). At minimum, adult males require 10 milligrams of iron per day, while adult females require 15 milligrams, pregnant females 30 milligrams, and children 16 milligrams (Harris and Neumann, 1999). The effects of even a moderate deficiency can be devastating. Iron deficiency is generally characterized by weakness and tiredness. This in turn can decrease the physical capacity and work performance of adults and adolescents. In children, a deficiency can decrease growth and immune salts. Iron deficiencies also increase the morbidity from infections and interfere with the body's ability to regulate its temperature. As evidenced by Table 3, a deficiency can decrease psychomotor development and mental development, resulting in poor motor skills, lack of coordination, and poor test scores during school years. During pregnancy, Iron deficiencies increase maternal mortality, the rate of premature births, and pre and peri-natal infant loss. Studies in Costa Rica and Thailand suggest that iron supplements did not reverse the effects of severe anemia. When supplements were given to patients with only a mild deficiency, such as in Indonesia, however, it reversed the effects

| Effect of Iron Status on Baley Test Performance of 12 Month Old Infants in Chile | | | |
|---|---|---|---|
| | Normal (n=42) | Anemic (n=32) | Sideropenic (n=95) |
| Mental Development | 105±9 | 98±9 | 104±9 |
| Psychomotor Development | 101±11 | 90±14 | 100±8 |

**Table 3 Scrimshaw 1996**

considerably (Scrimshaw, 1996). If children were supplied with an adequate amount of red meat, however, iron deficiencies would be unlikely to develop.

Zinc deficiencies, on the other hand, are extremely harmful to women at reproductive age, developing fetuses, and young children. A zinc deficiency interferes with gene expression, cell division, differentiation, and DNA and RNA synthesis. In turn, these altered steps may pose a threat to growth and development, in addition to increasing mortality. A starchy tuber, for example a potato, offers a very low level of zinc, while meat products present high levels that are easily absorbed. In addition to the low bioavailability, a high fiber level, such as that found in plants, decreases zinc absorption (Harris and Neumann, 1999).

A Vitamin $B_{12}$ deficiency can also result in tragedy. In developing countries, many face Vitamin $B_{12}$ malabsorption due to intestinal parasites. A deficiency may have harmful effects on the hematological, immune, and nervous systems, in addition to irreparable effects on a pregnant mother or a developing fetus (Harris and Neumann, 1999).

Even though the micronutrients supplied by meat are highly beneficial, the majority of people living in developing countries, such as Ethiopia, have little to no meat in their diets. Poverty, availability, and meat quality all contribute to the meat deficiency in diets, resulting in micronutrient deficiencies. In this developing country, it is essential to understand the process that takes place to provide consumers with their meat supply. Since the trends of production, distribution, and consumption may all be linked together, it is necessary to explore all of these processes. By examining these relationships, data may be analyzed so that we may find important steps to take in providing Ethiopians in the growing capital city of Addis Ababa a better quality and an adequate supply of red meat and poultry.

## Methods

I applied two methods to obtain the necessary data to understand Ethiopia's meat industry. The first was conventional literature research to gain understanding of Ethiopia's meat industry and its development status. I consulted ILRI publications, library materials and multiple Internet sources. The purpose of this background research

was to identify the general trends of red meat and poultry consumption in Ethiopia, as well as general production and distribution, including exportation.

The second method consisted of field research within Addis Ababa to better understand the process of meat distribution in the growing capital city of Ethiopia. I interviewed and toured local supermarkets, butcheries, slaughterhouses, and ELFORA, a livestock finishing and product distribution company. The interview questions addressed issues concerning suppliers, customers, cost, meat quality, and meat safety. Most questions were multiple choice, in addition to several open ended questions and a few yes/no questions. From the multiple choice, interviewees were also allowed to add additional information. A sample of 34 butcheries, seven supermarkets, ELFORA and the Addis Ababa abattoirs supplied most of the data used to address the understanding and description of red meat and poultry production, distribution, and consumption in Addis Ababa. I also discussed local laws and regulations concerning the meat industry with the Ministry of Health and the Ministry of Agriculture.

After collecting all data, I analyzed most numbers by figuring the average and standard deviation. A simple analysis displayed many the necessary figures to describe the meat industry in Addis Ababa.

## Ethiopia as a Developing Country

Ethiopia is agriculturally and economically in distress, shown only too well through its millions of poverty stricken, malnutritioned citizens. Like many developing countries, Ethiopia's differences from developed countries, such as the United States, often go unnoticed by those who can help. Simple differences that can lead a nation forward or hold a nation back are often inconsequential statistics in the eyes of most. Table 5 depicts Ethiopia as the developing country it is in comparison to the United States (World development indicators, 2004).

| Development Indicators | | |
|---|---|---|
| | **Ethiopia** | **United States** |
| **Water** | | |
| Access to improved water source | | |
| % Urban residents | 17 | 100 |
| % Rural residents | 12 | 100 |
| **Agriculture** | | |
| Fertilizer 100g/hectacre | 150 | 1097 |
| % Irrigated cropland | 1.7 | 12.6 |
| Rural population density (ppl/sq km) | 517 | 37 |
| % Total population living in rural areas | 84 | 22 |
| **Nutrition** | | |
| % Population undernourished | 42 | |
| Low birth weight | 15 | 8 |
| % Children under age 5 underweight | 47 | |
| % Children under age 5 under height | 52 | |
| % Children under age 5 overweight | 1.2 | 4.5 |
| **Health** | | |
| % Adults with HIV | 6.4 | 0.6 |
| % Males ages 15-24 with HIV | 4.39 | 0.47 |
| % Females ages 15-24 with HIV | 7.82 | 0.22 |
| **Mortality** | | |
| Infant mortality / 1000 live births | 114 | 7 |
| Under age 5 mortality / 1000 | 171 | 8 |
| % Male survival to age 65 | 26 | 81 |
| % Female survival to age 65 | 30 | 91 |
| Life expectancy | 42 | 77 |
| **Income** | | |
| % Population in lowest 10% income group | 30 | 40.8 |
| % Population in lowest 20% income group | 3.9 | 1.9 |
| % Population in highest 20% income group | 39.4 | 45.8 |
| % Population in highest 10% income group | 25.5 | 29.9 |

| | | |
|---|---|---|
| **Economy** | | |
| Net income (USD millions) | -23 | -3968 |
| External debt (USD millions) | 6523 | |
| Tax revenue % GDP | 15.3 | 17.7 |
| **Modernization** | | |
| Motor vehicles / 1000 people | 2 | 779 |
| % Population that has access to electricity | 4.7 | |
| Electricity produced (billion kwh) | 1.8 | 3863.8 |
| Energy 1000 mt oil equivilant | 18,000 | 1,968,196.00 |

**Table 4 Data source: World development indicators 2004**

## Meat Production and Consumption in Ethiopia

### *Meat Consumption*

As Ethiopia's 2003 estimated population of 70.5 million continues to grow at a rate of 2.7 percent, it is critical to understand the food situation. Many Ethiopians, like residents of other developing countries, do not consume an adequate amount of meat. The few that do, however, maintain a meat diet of beef, sheep, goat, and poultry. In 1987, 51 percent beef, 19 percent sheep, 14 percent goat, and 15 percent poultry contributed to a meat diet composition (MapZones). Most Ethiopians do not consume pork, in addition to

many types of fish, due to religious beliefs.

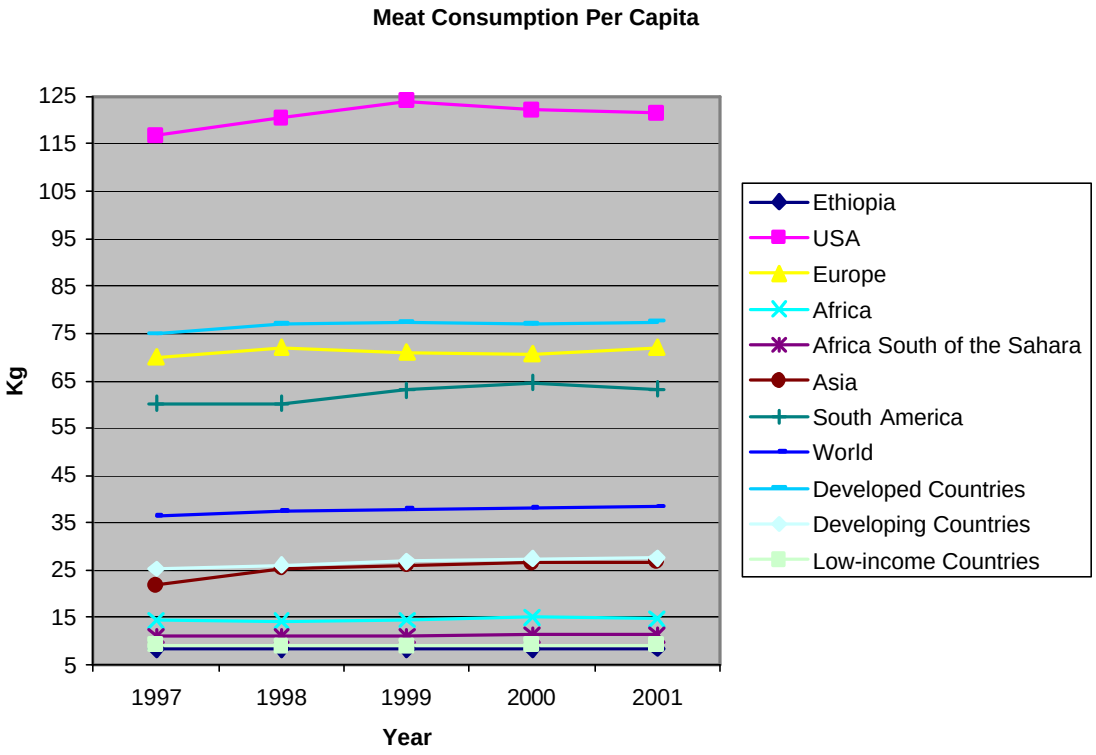


**Figure 1 Data source: FAOSTAT 2004**

The consumption of sufficient meat is a rare extremity in most developing countries. Figure 1 illustrates the general trends of meat consumption from 1997 to 2001. While developed countries consumed a consistent level of 77kg of meat per capita annually, developing countries struggled to maintain a diet with only 25kg of meat per capita annually. More specifically, while the United States had an average meat intake of over 120kg per capita annually, at hardly over 8kg annually, Ethiopians remained slightly below the meat intake of all low-income countries consuming 9kg per capita annually (FAOSTAT, 2004).

| Meat Projections to 2020 | | | | | |
|---|---|---|---|---|---|
| | Projected Annual Growth of Total Consumption %1993-2020 | Total Consumption (mmt) | | Annual Per Capita Capita Consumption (kg) | |
| | | 1993 | 2020 | 1993 | 2020 |
| Developed Countries | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Beef | 0.4 | 32 | 36 | 25 | 26 |
| | Poultry | 1 | 26 | 34 | 20 | 25 |
| | Meat | 0.6 | 97 | 115 | 76 | 83 |
| Developing Countries | | | | | | |
| | Beef | 2.8 | 22 | 47 | 5 | 7 |
| | Poultry | 3.1 | 21 | 49 | 5 | 8 |
| | Meat | 2.8 | 88 | 188 | 21 | 30 |
| Meat Production Sub Sahara Africa | | 3.4 | | 11 | | 10 |
| Meat Consumption Sub Sahara Africa | | 3.5 | | 12 | | 11 |

**Table 5 Courbois, Delgado et al. 1999**

Referring to Table 4, the projected meat consumption for developed countries remains similar to the previous years shown in Figure 1. The meat consumption in developing countries, however, increases slightly. At a 2.8 percent increase from 1993 to the year 2020, developing countries will consume 30kg of meat per capita in 2020. Meat consumption in sub-Saharan Africa, however, remains at only 11kg per capita annually (Courbois, Delgado et al., 1999).

***Agricultural Contributions to Ethiopia's Economy***

In the 1.1 million square meter country, agricultural products like coffee, cereals, pulses, oilseeds, the stimulant chat, meat, hides, and skin, contribute 45 percent of the $6.1 billion GDP (US Department of State, 2004). Livestock products alone contribute 40 percent of the agricultural GDP and 20 percent of the total GDP (Akiliu, 2002). Together with the 20 percent of Ethiopian residents employed by industry and commerce, the 80 percent contributing to the country's agriculture take in only USD92 per capita annually (US Department of State, 2004).

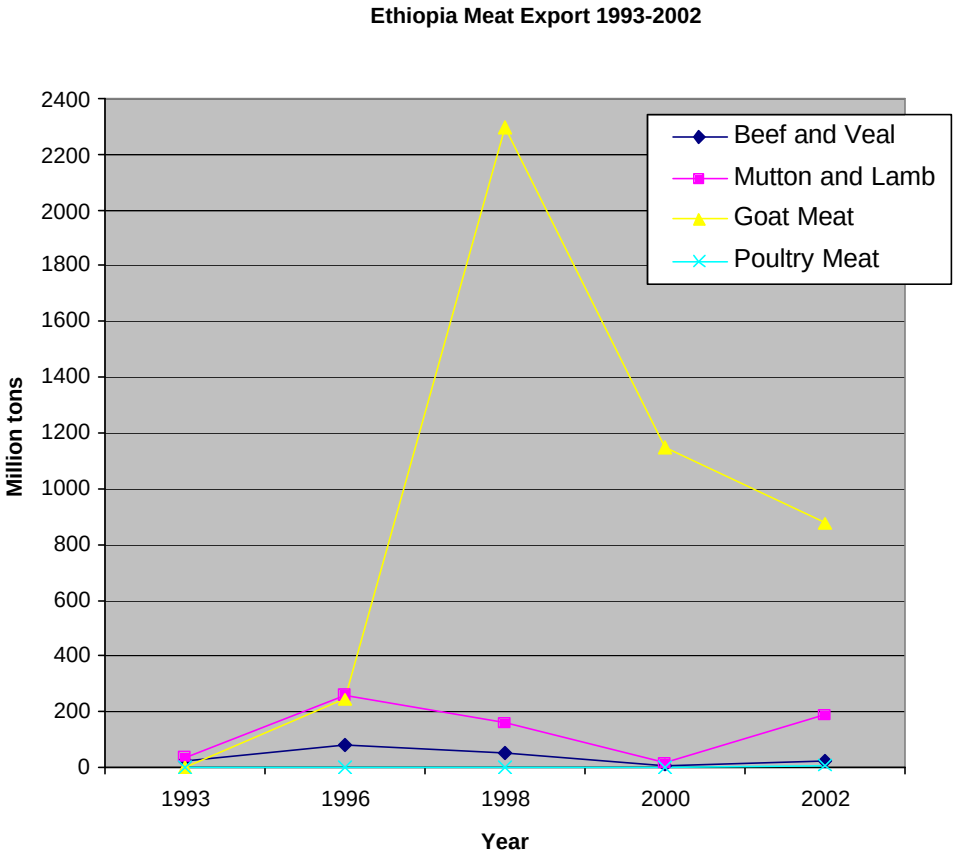


**Figure 2 Data source: FAOSTAT 2004**

***Export***

Ethiopia also has an underdeveloped export industry. As shown in Figure 2, Ethiopia's meat exportation has improved very little over the last decade. While goat meat had a dramatic increase between 1996 and 1998, it has seen almost as dramatic a decrease from 1998 to 2002. The country exports almost no poultry meat, in addition to very little beef and sheep meat. The country's live animal export market is almost as troubled. While live sheep exports increased from 1996 to 2000, Figure 3 suggests that almost all live animal exports fell from 2000 to 2002 (FAOSTAT, 2004).

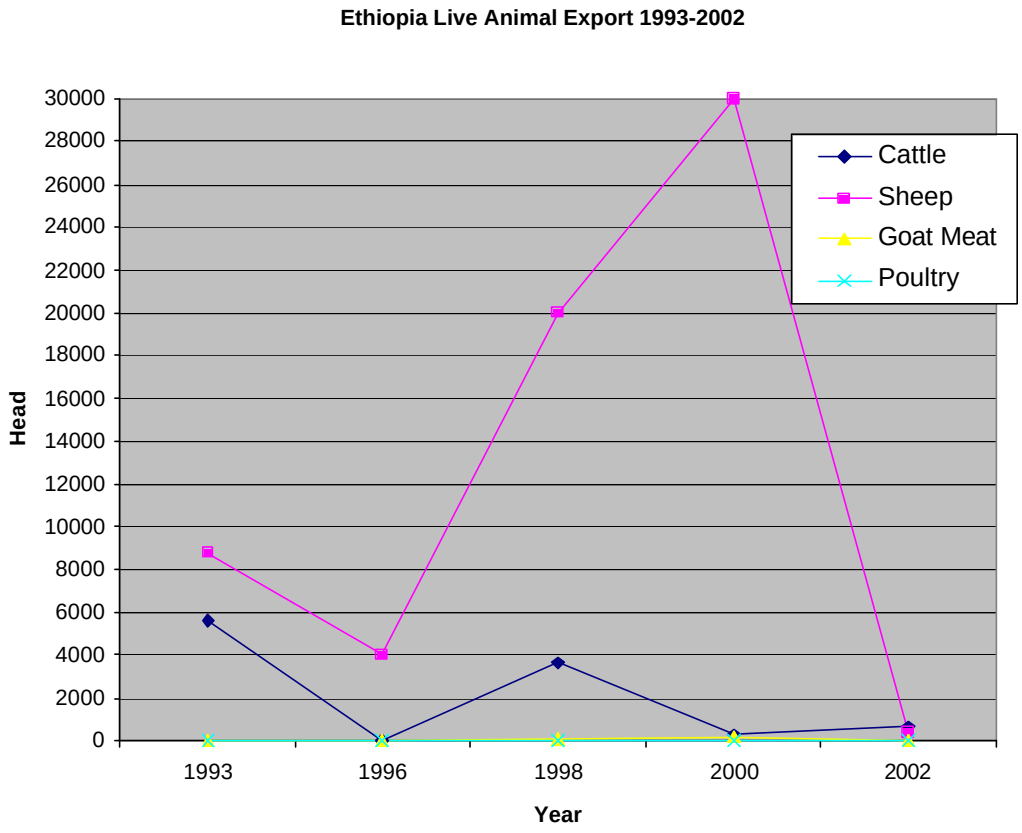


**Figure 3 Data source: FAOSTAT 2004**

Finally, as evidenced by Figure 4, the animal export structure has seen no real trends; over the past 30 years, live animals and hides or skins have seen a few dramatic increases that immediately fell shortly after. The meat exportation remained slightly more stable at extremely low levels (Ahmed, Hurissa et al., 2003).

**Ethiopia Animal Product Export**

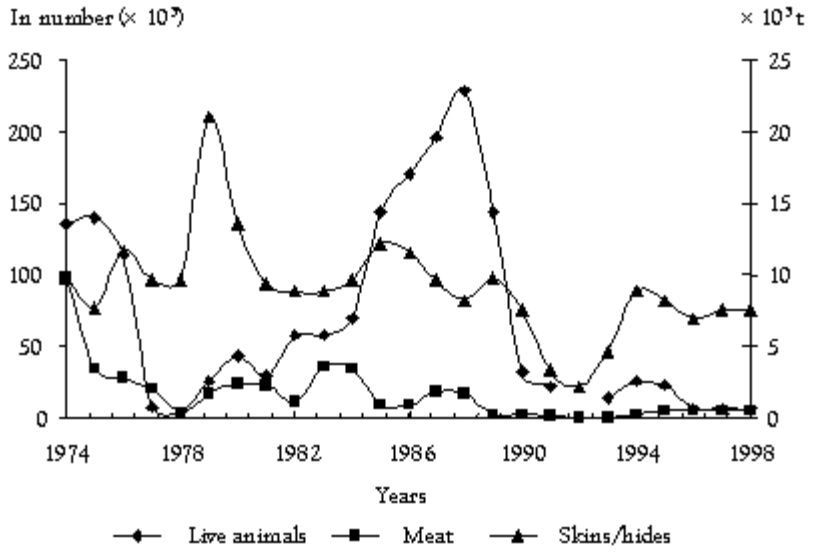


**Figure 4 Ahmed, Hurissa et al. 2003**

Agricultural products, however, provide 80 percent of the exports needed to supply the country's annual $451 million international revenue. Even though Ethiopia faces many agricultural barriers like drought, soil degradation due to overgrazing and poor farming practices, deforestation, high population density, underdeveloped water sources, and a poor product transport infrastructure, agriculture still seems to be the most promising resource Ethiopia has to offer (US Department of State, 2004). In 2003, the livestock population in Ethiopia, only including cattle, sheep, goats, and chickens, had reached 95.6 million head. Ninety percent of the 35.5 million cattle, 11.5 million sheep, 9.6 million goats, and 39 million poultry remained in the highlands. With the largest livestock population in Africa, Ethiopia may find a future in food animals (FAOSTAT, 2004).

***Poultry Production***

Yet with a large poultry population, Ethiopia's poultry industry remains highly underdeveloped and unorganized. Even with the development of ELFORA Agro-Industries PLC, the 1984 statistic stating that 99.2 percent of all poultry is produced and consumed within a private rural setting is probably not far from accurate (Dessie and Ogle, 1996).

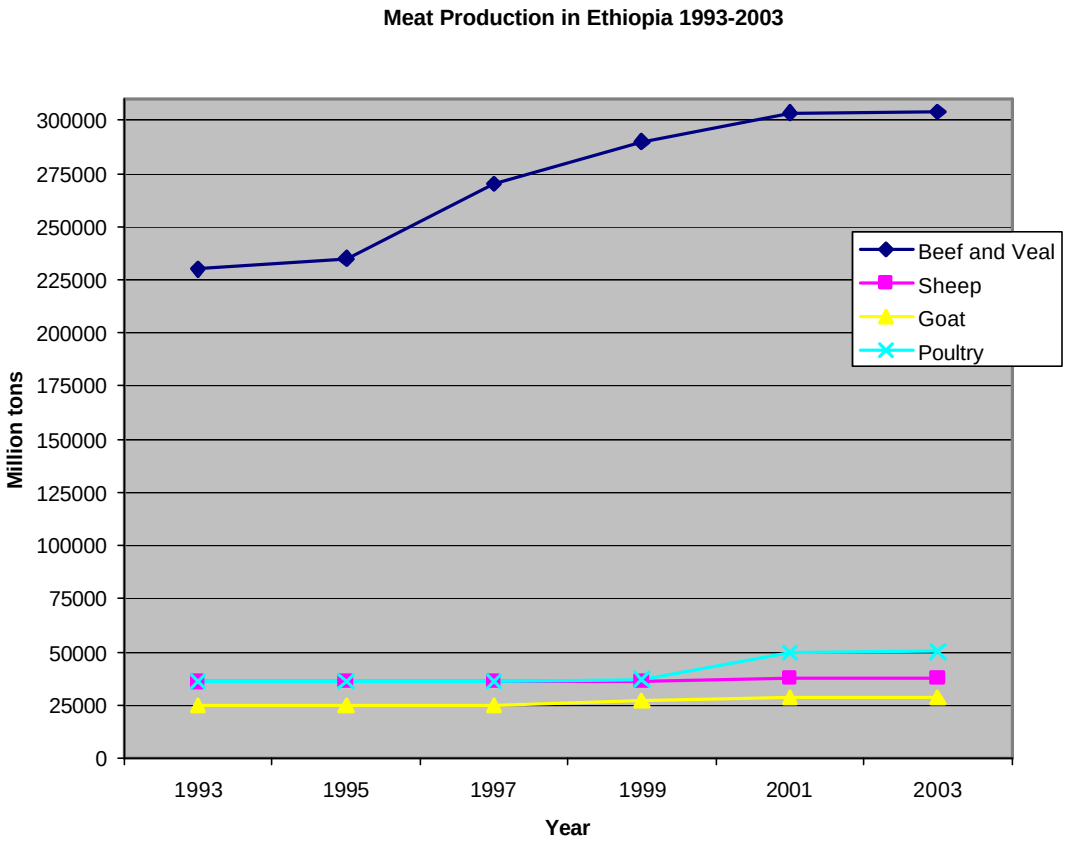


**Figure 5 Data source: FAOSTAT 2004**

It is likely that the poultry amounts represented by Figure 5 are misleading. Most poultry is owned by women in smallholder farms, and is often a rural woman's only source of income. In these smallholder farms, poultry is an inexpensive means of producing, with very little labor, food, gifts, or religious elements. The 99 percent of local birds that make up Ethiopia's poultry are kept as scavenger animals. They require a minimal input and also aid in insect control around the homestead. The typical Ethiopian rural household owns six birds from a non-crossbred strictly Ethiopian background. Many owners prefer the double combs or unique colors of native birds for sacrificial purposes. If the poultry survive the 61 percent chick mortality rate, they are used for several purposes. Of the birds, only 26.6 percent are produced for sale, while 25 percent are used for sacrifice or healing, 20.3 percent for replacement, and only 19.5 percent for home consumption (Dessie and Ogle, 1996).

***Ethiopian Livestock Markets***

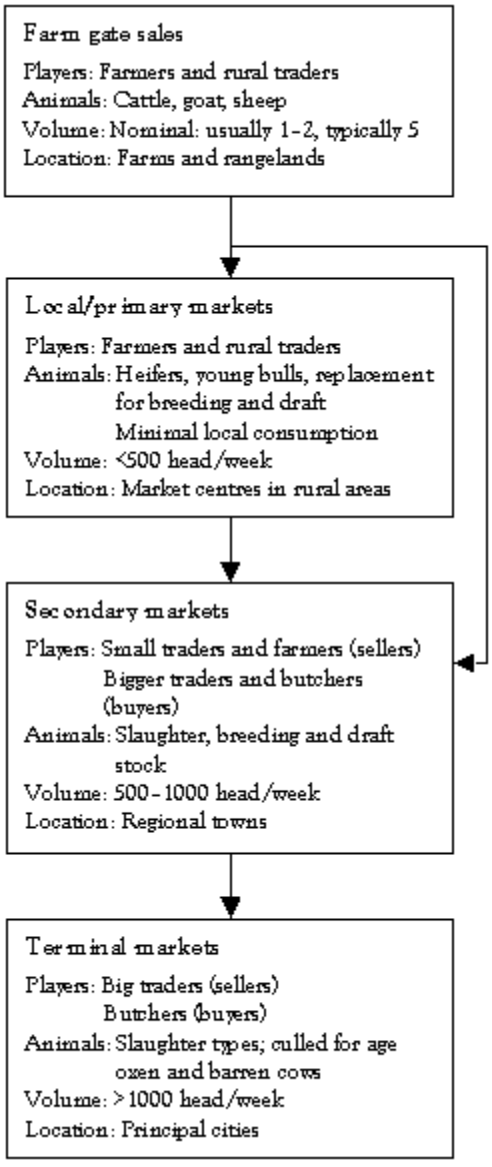


**Figure 6 Ahmed, Hurissa et al. 2003**

While the poultry operation continues to grow both in smallholder farms and commercially, the small ruminant and particularly cattle livestock markets follow a set pattern. As depicted by Figure 6, animals are sold from a farm to rural traders. The rural traders, or the farmers that prefer not to sell locally, herd their livestock to a local and/or

primary market. These market centers are generally concentrated in the rural areas. Less than 500 head come through these markets per week. The animals are then sold by the rural traders and still possibly farmers in a secondary market in regional towns to larger traders and butchers. The 500-1000 head that are sold per week will be sold for consumption or used for breeding or draft purposes. The animals used for consumption are resold again by the larger traders at a terminal market to butchers, supermarkets, or occasionally individuals. More than 1000 head per week are brought into the country's principal cities and are sold typically for slaughter and consumption. Large traders are beginning to dominate and manipulate Ethiopia's livestock markets. In only 1984, Figure 7 suggests 23 percent of farmers still sold animals at terminal cattle markets. Figure 8 shows the number of traders who bought livestock at the terminal markets is also declining from 1984 (Ahmed, Hurissa et al., 2003).

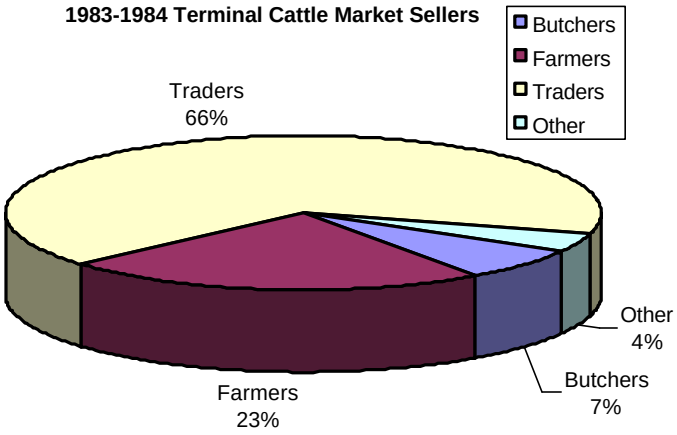


**Figure 7 Data source: Ahmed, Hurissa et al. 2003**

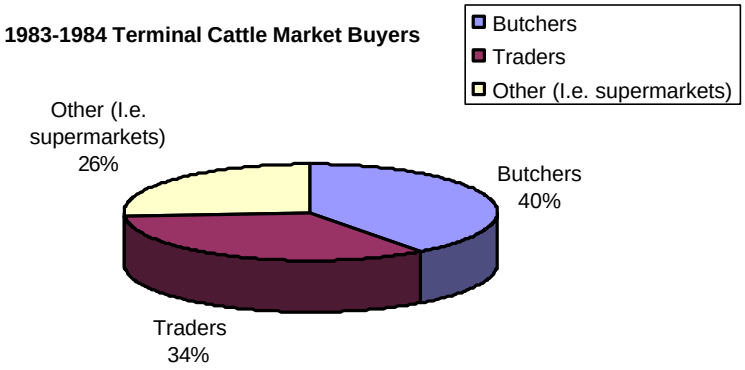


**Figure 8 Data source: Ahmed, Hurissa 2003**

The 1984 terminal cattle markets had a unique system, which is most likely still followed today. Live animals were sold from 9:00 a.m. to 2:00 p.m. As they day continued, the price per kilogram rose until 12:00 p.m., and then saw just as much a decline to the end of the sale. Typically, the largest animals were sold very early in the day. Therefore, the best time to by was early in the morning. Sixty percent of the oxen sold were full mouth, while nearly 20 percent were broken mouth. That is, most oxen were younger animals with a full set of teeth, with still a large number with broken teeth, indicating they were older culled animals (Ahmed, Hurissa et al., 2003).

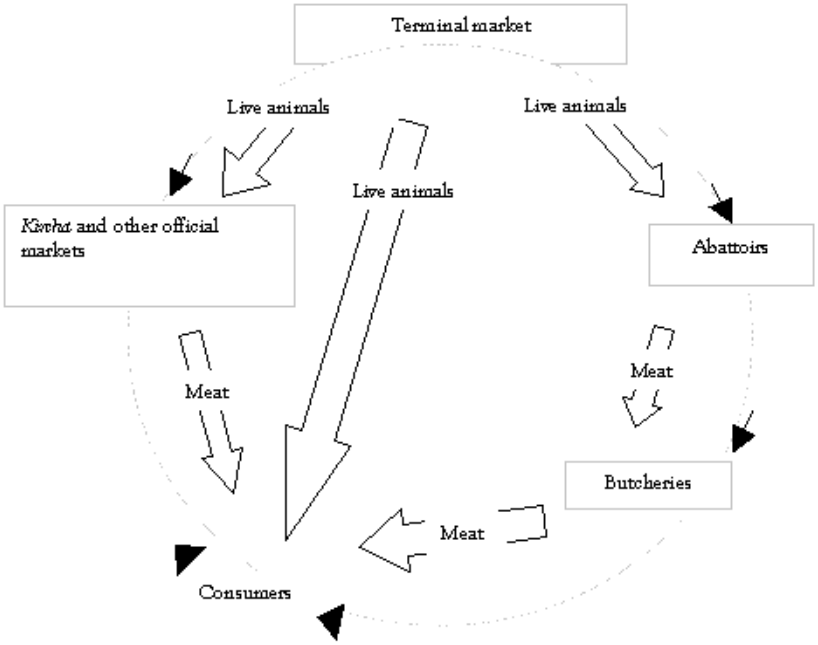


**Figure 9 Ahmed, Hurissa et al. 2003**

In today's system, from the terminal market, as shown in Figure 9, live animals are delivered to customers many ways. A few are sent through official markets, while another unknown amount is bought for home slaughter and consumption. Many, however, are sent to the abattoirs by butcheries or supermarkets (Ahmed, Hurissa et al., 2003).

## Meat Distribution in Addis Ababa

### *Cost at Markets*

Of the 34 butcheries interviewed in the Addis Ababa area, only one bought live animals directly from a farmer. The remaining 33 bought live animals, priced per kilogram, from a trader at a live market. The Addis butcheries typically sold only beef. Only 5.8 percent sold sheep meat and 2.9 percent sold poultry, in addition to beef. No butcheries reportedly sold goat meat. At an average live weight of 160kg and an average carcass weight of 114kg (error of 54.65kg), these Zebu type cattle reportedly brought an average price of 16.5ETB/kg (error 732ETB/kg) at the live terminal market.

The seven supermarkets interviewed followed a similar trend. All beef, sheep, and goat were also purchased at a live terminal market from a trader and sent to the Addis

Ababa abattoir. While 100 percent sold beef with an increased 85.7 percent that sold sheep meat and 28.5 percent that sold goat meat, a high 85.7 percent sold poultry meat. At 66.7 percent, most poultry was bought from ELFORA, while a smaller 33.3 percent were bought from farmers. Purchased by projected carcass weight, supermarkets paid an average of 12ETB/kg beef (error of 1.22ETB/kg), 13.2ETB/kg sheep (error of 1.44ETB/kg), and 16.35ETB/kg goat (error of 6.15ETB/kg). Poultry saw an average carcass weight price of 14ETB/kg (error of 2.14ETB/kg).

***Slaughter***


After the live animals are purchased at the terminal market by butcheries or supermarkets, they are sent directly to the official Addis Ababa Abattoirs Enterprise. The animals are kept in a holding lot for a maximum of three to four hours, and then sent through the Orthodox, Muslim, or European slaughter facilities. Sheep and goats are slaughtered on a long table, skinned, and vertically hung and inspected by one of the 30 full-time veterinarians from the Ministry of Agriculture. Cattle are brought into the building and are slaughtered on the ground, followed by a haphazard butchery in which the carcasses are cut into four parts. After inspection by the Ministry of Agriculture, the carcasses are shipped to the customers within 30 minutes. Every week, the abattoir slaughters an average of 3500 cattle at 139ETB/head, 1050 sheep at 16ETB/head, and 350 goats at 16 ETB/head.

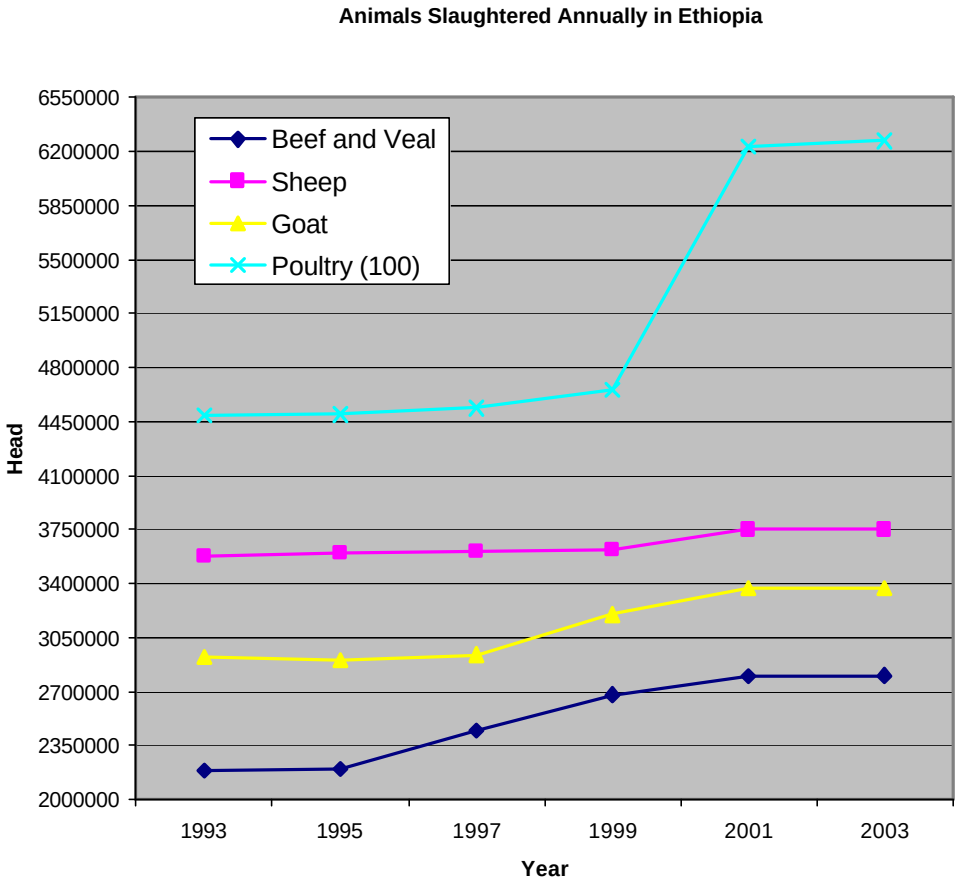


**Figure 10 Data source: FAOSTAT 2004**

Figure 10 shows that in Ethiopia fewer cattle are slaughtered than any other animal, even with most butcheries selling only beef (FAOSTAT, 2004). Although slaughtering takes place at official slaughterhouses throughout the country in the areas shown in Table 6, most animals for Addis Ababa residents are slaughtered at the Addis Ababa Abattoirs Enterprise (Mahmud, 2000).

| Slaughter Locations | | | | |
|---|---|---|---|---|
| Region | Slaughterhouse | Slaughter Slab | Meat Processing Plant | Export Abattoir |
| SNNPR | 31 | 27 | 1 | 0 |
| Oromiya | 42 | 20 | 0 | 5 |
| Amhara | 15 | 6 | 2 | 0 |
| Tigray | 15 | 0 | 0 | 0 |
| Addis Ababa | 3 | 0 | 1 | 0 |
| Afar | 1 | 0 | 0 | 0 |
| Somali | 1 | 0 | 0 | 0 |
| Harar | 1 | 0 | 0 | 0 |
| Dire Dawa | 1 | 0 | 1 | 0 |
| Others | 3 | 0 | 0 | 0 |
| Total | 113 | 53 | 5 | 5 |

**Table 6 Mahmud 2000**

***Meat Sales***

Even with 85.3 percent closed during the traditional Wednesday and Friday Ethiopian fasting, Addis Ababa butcheries sell an average of 313.5kg (error of 210kg) of raw beef per week. While only about half of the butcheries interviewed sell cooked beef as well as raw beef, cooked beef sales average at 263.7kg (error of 163kg) per week. As depicted in Figure 11 and Figure 12, the men and housewives of the middle-income group account for the majority of Addis Ababa butchery customers.

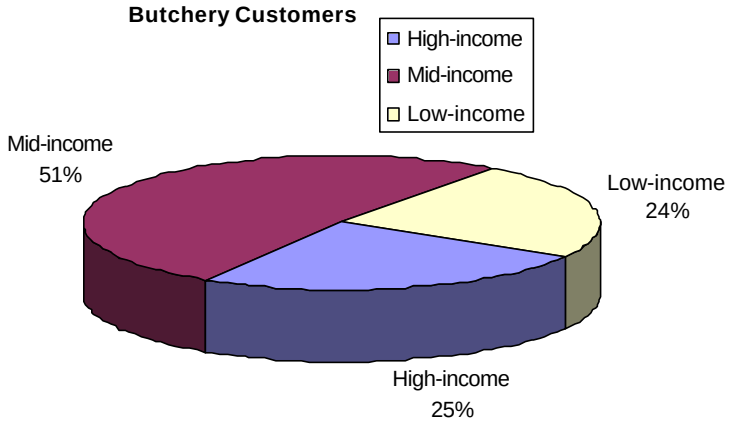


**Figure 11**

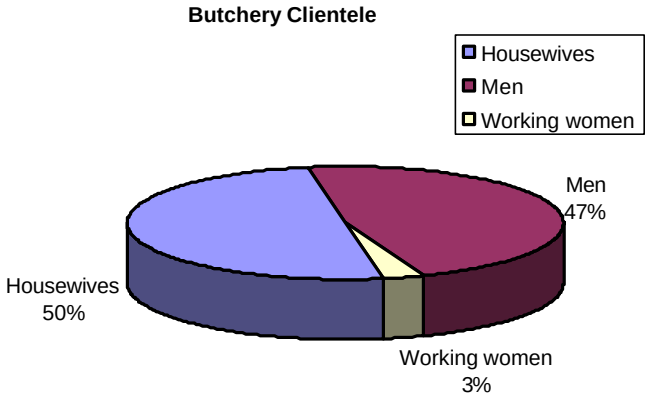


**Figure 12**

Most customers bought raw meat to prepare and consume within their home. At the larger butcheries, however, many frequently sit at makeshift tables and devour the traditional meal of raw meat or kitfo, the higher quality raw meat.

While fasting days do not affect the meat sales of 42.9 percent of the supermarkets, an additional 42.9 percent have a decrease in business. Another 14.3 percent have, in fact, an increase in meat sales, probably because they are the suppliers non-fasting cultures. According to Figure 13, supermarket sales follow a similar trend to butchery sales. The middle-income group accounts for 55 percent of the supermarkets customers, with a close trailing 45 percent high-income group completing the supermarket's meat customers. With a large number of customers, supermarkets sell and average of 498kg (error of 473.65kg) beef, 197kg (error of 302.57kg) sheep meat, 18.5kg (error of 2.12kg) goat meat, and 268kg (error of 263.85kg) poultry meat per week.

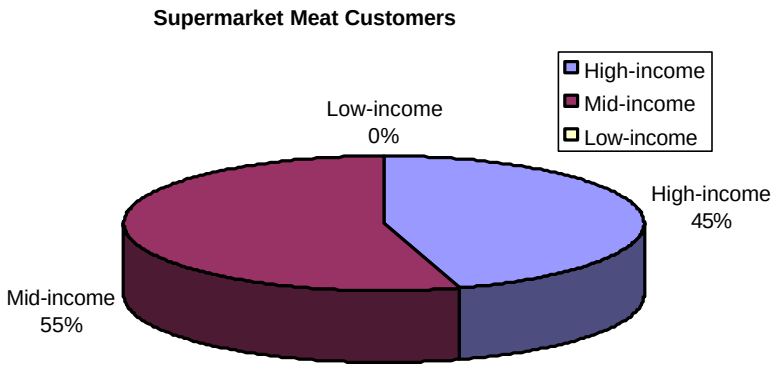


**Figure 13**

***Meat Affordability***

While the butchery customers may face inaccurate scales and bone filled meat, many still hesitate to frequent the supermarkets due to religious fears. Many Ethiopians, especially the low-income group, exhibit apprehension towards the supermarkets because they are misinformed about the quality of meat, the types of meat sold (i.e. pork), and the employees at the supermarket. Supermarkets can offer, however, better meat for the price paid. The scales are accurate and the meat is boneless with much fat removed, unless otherwise requested. Supermarket customers in the Addis Ababa area can expect to pay 18ETB/kg (error of 3.2ETB/kg) for beef, 19ETB/kg (error of 3.7ETB/kg) for sheep meat, 20.5ETB/kg (error of 6.4ETB/kg) for goat meat, and 16.60ETB/kg (error of 2ETB/kg) for poultry meat.

Many of the locals prefer to buy meat at personal butcheries. Even though this meat may not be the best option considering quality, most prices are slightly cheaper than those in supermarkets. Customers can expect to pay an average of 16ETB/kg (error of 5.2ETB/kg) for raw beef. Those butcheries that sold cooked meat charged an average of 19.87ETB/kg (error of 4.9ETB/kg) for prepared meat. Prices may also vary according to

the area of the city. For example, in the poorer area of Kotebe, prices may reach as low as 7ETB/kg, while in other areas, such as Arada and Urael, prices may reach as high as 26ETB/kg.

***Meat Safety***

While meat prices can vary, the quality usually remains low, compared to developed country's standards. From slaughter to resale, there is no formal classification of carcass quality. The export abattoirs are required to inspect all meat prior to shipment in regards to a 1976 proclamation, clarified by a set of guidelines developed by the Ministry of Agriculture. Many of the guidelines, however, are not enforced by abattoirs that produce meat for local consumption. For example, during a tour of the Addis Abattoir facilities that slaughters animals for local consumption, I was not required to wear the set forth head covering, as stated in the document. The export abattoirs, however, did strictly enforce the covering statement. Also, much of the building was open air, in violation of part 5.1.8 of the *Meat Hygiene Guidelines*. In part 7.1.10, the guidelines state, "pumping of air or gas between the skin and the carcass to facilitate skinning is not permitted." This technique, however, was precisely how sheep and goat hides were removed. This practice increases the risk of *E. Coli* 0157-H7 recontamination; the fecal dust on the outer hide pollutes the inner meat product. Additionally, section 2.1 of the *Meat Inspection Procedures* states, "One of the most important functions of ante-mortem inspection is to ensure that animals are rested sufficiently so that signs important to inspection disposition are not masked." Most animals, however, travel from the Harar region, at a distance of 500km from Addis Ababa, and are slaughtered within a maximum of four hours. The guidelines also clearly summarize the disposal procedures for unusable carcasses, bones, blood, and other offal. The Ministry of Agriculture states that they should be properly incinerated, sent to a rendering plant, or otherwise sanitarily disposed of. Behind the Addis Ababa Abattoir, however, there is a vast wasteland with many scavenger birds eating the remains of animals previously discarded. Finally, if the carcasses in an export abattoir are deemed unusable for export, they are detained for a set amount of time, re-inspected, and usually sold to local customers (*Meat hygiene requirements*, 2000).

In regards to sanitation and employee health, the Ministry of Health inspects all food establishments, including butcheries and supermarkets. The inspection, however, is less that frequent and also followed loosely. For instance, section 19 of the Food Safety laws, a sub-article following Proclamation No. 200/2000, Public Health Proclamation of 2000, clearly outlines that packaging material must preserve the composition of the food and be stored in a clean, sanitary environment (*Food safety*). In Addis butcheries, however, meat is packaged in newspaper pieces that are stored on the floor.

Additionally, the guidelines state that raw foods of animal origin should be stored between one and four degrees Celsius (*Food safety*). The supermarkets follow this guideline closely. Beef, sheep meat, and goat meat are stored at an average temperature of 1.8 degrees Celsius (error of 2.9 degrees Celsius), while poultry is frozen at -5 degrees Celsius or below. Addis butcheries, however, are rarely equipped with refrigeration. One hundred percent of the butcheries stored their meat in a room temperature, open-air environment display. Because only 8.8 percent of the butcheries had refrigerators for nightly storage, 91.2 percent of the meat was stored at room temperature permanently. While supermarkets only kept their refrigerated red meat an average of two days (poultry ten days), the butcheries stored their room temperature meat for an average of two and a half days, with a frequent maximum of five days.

***Meat Quality***

Quality can be defined in an economic and nutritional value. Economic quality reflects upon the physical lean meat yield. A high nutritional quality refers to a high bioavailability of amino acids, in addition to sufficient essential fatty acids for energy, iron, zinc, and vitamins.

As previously mentioned, there is little to no classification of carcass quality, and therefore little classification of economic quality of Ethiopia's meat products. Age, marbling, tenderness, etc. are not considered when setting the price. There is no system of grading or naming meat. A few butcheries and several supermarkets reported that the beef round was the highest quality of meat, but there was no price differentiation except for one supermarket case. Butcheries also reported that kitfo was classified as the highest quality, with still no price differentiation. The supermarkets butcher and package meat similar to supermarkets in developed countries. Butcheries, however, cut off random pieces of meat, bone, and fat and sell only per kilogram. Thus the higher quality meat is purchased in the supermarkets.

In regards to the sanitation of meat disposal, this process is also unorganized and inefficient. While the supermarkets sell bones and trimmings as pet food, the butcheries sometimes sell bones but more frequently simply discard them into the street for stray dogs. Some also reportedly disposed of bones to waste containers. All meat, however, is sold. The butcheries and supermarkets trust the abattoirs to dispose of inedible meat before it is delivered to their establishment. They simply keep all meat until it is sold, regardless of the timeframe. The safety concerns from pathogens, chemicals, and physical hazards are not continuously controlled.

***ELFORA***

Even though Ethiopia's meat industry is in the developmental stages, in 1997 the livestock market system grew with Sheik Mohammed Hussein Ali Al-Amoundi's establishment of ELFORA Agro-Industries PLC. The company operates in three distinct areas: poultry, livestock, and food processing and crop production. While ELFORA's cattle and small ruminants are slaughtered and processed throughout the country in places such as Debre Zeit, Melge Wondo, Dire Dawa, Kombolcha, and Gondar, its main poultry

operations take place in Debre Zeit. Not only does ELFORA maintain a modern hatchery to supply farmers with day old chicks, it also operates a modern poultry farm and chicken-slaughtering abattoir at its Debre Zeit location. ELFORA is one of the country's most contemporary livestock facilities with thorough quarantine and meticulous refrigeration.

Excluding the meat sold to hotels, supermarkets, Ethiopian Airlines, butcheries, the military, universities, and individuals, exports account for 70 percent of ELFORA's business. ELFORA successful business is due in part to their claim for high quality, affordable products. While individual farmers still supply most of the cattle and small ruminants, poultry is either company raised or imported from other large poultry operations. Animals are vaccinated shortly before slaughter during their time of quarantine. Cattle are kept for a minimum of three days in a holding area, while small ruminants may scuttle through at a quicker pace often resulting in only a one or two day quarantine.

Because ELOFRA manages its own abattoirs, it either produces their own herds or buys livestock directly from farmers, at the smallholder farm or pastoral price. On average, ELFORA pays only 3.95ETB/kg for cattle and 5ETB/kg for small ruminants. Compared to the price that supermarkets or butcheries pay at terminal markets, this illustrates the price inflation from the initial livestock sales to the terminal sales.

ELFORA runs a wealthy business of selling live animals, whole carcasses, meat cuts, processed meat, and canned meat products. In fact, ELFORA is the number one food supplier to the Ethiopian military. During active times, canned meat products can

reach sales of 96,000kg per week. During a typical week, however, the ten percent profit made by ELFORA not only makes ELFORA the leading livestock company in Ethiopia, but it also supplies customers with meat priced extremely low. Compared to the cost at butcheries or supermarkets, ELFORA offers by far the best price. Beef can be purchased for only 4.35ETB/kg, while sheep and goat meat may be purchased for as little as 5.5ETB/kg. Poultry remain at a similar price of 15.5ETB/carcass. Most of the 35,240kg beef, 78,750kg sheep and goat meat, and 5000kg chicken meat, in addition to the 115 live animals, however, are sold to buyers outside of the country.

**Discussion**

When comparing prices from purchase of the live animal to resale of the product, it is obvious that the price increases with every exchange of ownership. While a farmer or pastoralist may only receive 4.35ETB/kg for his cattle, the final trader at a terminal market will receive nearly four times that amount. Most small farmers and pastoralists do not slaughter their own animals. For the individual farmer who relies on draft power, livestock are a crucial means of income in desperate times. They are often sold with the intent to buy medicines or other necessary commodities. When the supermarkets or butchers finally sell the end product, the poor farmers and pastoralists who initially sold their livestock have little chance of buying meat back at such high prices as 26ETB/kg of beef, almost six times the amount they sold for.

Even if the severely low-income group, including the small farmers and pastoralists, could afford the nutritionally necessary meat products, the quality is so low many of the essential nutrients would be nearly impossible to obtain, especially from the large number of older culled animals slaughtered. Additionally, the meat is tough and sinewy from older animals as well as animals that travel as far as 500km by hoof. In the case of butcheries, meat that is left outside for up to five days would likely pose more risks than benefits.

**Suggestions**

Perhaps one of the largest problems is Ethiopia's livestock market system. When animals must go through a large number of ownership exchanges, the price increases

dramatically. They are also exposed to more diseases and therefore put the consumers' health at risk. If the initial farmer or pastoralist could take their herds directly to the secondary or even terminal markets, they would receive a much higher price. Because of the large distance between individual farms and the urban terminal markets, in addition to the lack of transport equipment, this poses a great challenge.

The low-income farmers may be able to benefit from an increased demand for meat products. As Ethiopia's economy continues to expand, more people will be able to purchase meat. Because of limited forage, the meat supply will likely remain consistent. Livestock numbers have remained fairly stable in the last seven years (FAOSTAT, 2004). While more people start to consume meat, specifically those in the lower middle-income group, the demand will increase. If farmers and pastoralists can gain control of their own livestock markets back from the livestock traders, they will receive more competitive prices at the initial markets.

Regarding meat quality, education may play the most important role. While most local consumers purchase meat at butcheries, the supermarkets may offer better quality products. If the local low-income groups were informed about the operation of supermarkets, including the meat source, more would possibly be apt to purchase their meat from the supermarkets.

Because so many Ethiopians traditionally consume raw meat, and many will not abandon the comfort of purchasing meat at local butcheries, education about refrigeration is also essential. One of the greatest risks posed by the consumption of raw meat is trichinosis, caused by the roundworm *T. spiralis*. It is killed when meat is frozen for twenty or more days at a temperature below -18 degrees Celsius (Campbell, Campbell and Kenealy, 2003). Because cooking may cause some meat nutrient loss, it is not so unconventional to consume raw meat. If butcheries are equipped with adequate refrigeration, human health risks decrease, and local butcheries can also withhold the future of their businesses.

More thorough inspection would also aid in improving meat safety. While the Ministries of Agriculture and Health have adequate guidelines to ensure meat safety, the actual inspection process could benefit from improvements. In the Ministries, increased

staff, higher education for employees, and more detailed record keeping regarding the individual butchery contracts would assist in the improvement of meat safety.

## Conclusions

In Ethiopia, as well as in developing countries around the world, low-income groups are constantly deprived of a healthy amount of meat in their diets. Prior to my eight week Ethiopian lifestyle, I thought meat was a big juicy Iowa rib eye. After studying Ethiopia's meat industry, it now seems almost impossible to achieve that healthy amount of "meat." And that is precisely why more information needs to be gathered and spread across the world. I have always known I would devote my life to agriculture. After this experience, I have decided exactly in what direction I will travel. High quality meat comes only from a healthy animal. I have every intention of completing my animal science degree with an international agriculture minor and continue on to veterinary school. Perhaps I will one day return to the International Livestock Research Institute to further examine Ethiopia's meat industry.

Before I traveled across the world to this budding wonderland of raw meat, shy but friendly people, exhaust filled air, and barnyard city streets, I thought I was "worldly." I was open to all ideas, all beliefs, and all customs. I have always been concerned with world hunger and people suffering from diseases and insect plagues devouring crops and water quality around the world. But there is a difference from being concerned with it and experiencing it.

My experience reflects, more than anything, on the lack of education Americans have concerning *details* of food security. We all know there are millions of starving people and there is not an adequate supply of food. On television, we see the pictures of starving children dying in the streets as flies crawl over their tear filled eyes. We hear about millions of livestock dying from a single year's drought. But we do not know details. I did not know *why* there is not enough food. I did not know *who* is suffering. I did not know *where* they are suffering. Hearing the name "Ethiopia," on television told me nothing. I could rattle off a hundred facts about Ethiopia, of course: "Ethiopia is in the Horn of Africa. Ethiopia has the largest livestock population in Africa. Ethiopia is home to Lucy the hominid. Ethiopia is called the Cradle of Mankind. Ethiopia was never

colonized. Ethiopia has more than 70 million residents." But I did not *know* Ethiopia. I now believe that you can never fully understand anything until you experience it.

After indulging in the cultural delicacy of raw meat, gasping at the splendor of Lake Tana and the source of the Nile, relishing in the curiosity of Anubis baboons and Ethiopian children, practicing, for a very brief moment, the life of a farmer in a mud and manure straw covered home, and stepping foot into the very heart of world hunger, I was blessed to have the chance to open my eyes to another world. As the saying goes, "A picture is worth a thousand words." If I took an average of one picture every minute, I would now have 86.4 million words to help others understand what is truly happening outside the shelter of their developed country.

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## Annex 1 Supermarket Questionnaire

*Supermarket Name*
*Interviewee Name*
*Position*

1. Where does your meat come from? (May circle more than one)

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Farmer** | **Live market** | **Butchery** | **Slaughterhouse** | **Import** |
| | | **Elfora** | | | |
| Sheep | **Farmer** | **Live market** | **Butchery** | **Slaughterhouse** | **Import** |
| | | **Elfora** | | | |
| Goat | **Farmer** | **Live market** | **Butchery** | **Slaughterhouse** | **Import** |
| | | **Elfora** | | | |
| Poultry | **Farmer** | **Live market** | **Butchery** | **Slaughterhouse** | **Import** |
| | | **Elfora** | | | |

2. How does meat get to your supermarket?

| | | |
|---|---|---|
| Beef | **Delivery** | **Pick up** |
| Sheep | **Delivery** | **Pick up** |
| Goat | **Delivery** | **Pick up** |
| Poultry | **Delivery** | **Pick up** |

3. How often does your store get new meat?

| | | | |
|---|---|---|---|
| Beef | **Daily** | **Weekly** | **Other _____** |
| Sheep | **Daily** | **Weekly** | **Other _____** |
| Goat | **Daily** | **Weekly** | **Other _____** |
| Poultry | **Daily** | **Weekly** | **Other _____** |

4. At what time does new meat arrive at your supermarket?

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Morning** | **Noon** | **Evening** | **Night** | **Time_____** |
| Sheep | **Morning** | **Noon** | **Evening** | **Night** | **Time_____** |
| Goat | **Morning** | **Noon** | **Evening** | **Night** | **Time_____** |
| Poultry | **Morning** | **Noon** | **Evening** | **Night** | **Time_____** |

5. How much meat is brought to your supermarket per week?
   Beef
   Sheep
   Goat
   Poultry

6. How is the meat you buy priced?

| | | | |
|---|---|---|---|
| Beef | **Live weight** | **Carcass weight** | **Type of processing** |
| Sheep | **Live weight** | **Carcass weight** | **Type of processing** |
| Goat | **Live weight** | **Carcass weight** | **Type of processing** |
| Poultry | **Live weight** | **Carcass weight** | **Type of processing** |

7. How much does the meat cost your supermarket (per kg)? (7)
   Beef
   Sheep
   Goat
   Poultry

8. How is the meat processed when it arrives?
   Beef **Live Carcass Cuts Packaged**
   Sheep **Live Carcass Cuts Packaged**
   Goat **Live Carcass Cuts Packaged**
   Poultry **Live Carcass Cuts Packaged**

9. Who packages the meat?
   Beef **Supplier Your Supermarket Other_____**
   Sheep **Supplier Your Supermarket Other_____**
   Goat **Supplier Your Supermarket Other_____**
   Poultry **Supplier Your Supermarket Other_____**

10. What types of cuts are sold? (8)
    Beef
    Sheep
    Goat
    Poultry

11. Is there any classification of meat quality?
    Beef
    Sheep
    Goat
    Poultry

12. If so, what system is used?
    Beef
    Sheep
    Goat
    Poultry

13. Where is the meat stored while at your supermarket?
    Beef **Freezer Refrigerator Cooler Shelves Other_____**
    Sheep **Freezer Refrigerator Cooler Shelves Other_____**
    Goat **Freezer Refrigerator Cooler Shelves Other_____**
    Poultry **Freezer Refrigerator Cooler Shelves Other_____**

14. At what temperature is your meat stored?
    Beef **Freezing 2°C 4.4°C 7°C Room temperature (22°C) Other_**
    Sheep **Freezing 2°C 4.4°C 7°C Room temperature (22°C) Other_**
    Goat **Freezing 2°C 4.4°C 7°C Room temperature (22°C) Other_**
    Poultry **Freezing 2°C 4.4°C 7°C Room temperature (22°C) Other_**

15. How long is the meat kept at your supermarket?
    Beef **1-3 days 4-6 days 7-10 days 11-14 days 14+ days**
    Sheep **1-3 days 4-6 days 7-10 days 11-14 days 14+ days**
    Goat **1-3 days 4-6 days 7-10 days 11-14 days 14+ days**
    Poultry **1-3 days 4-6 days 7-10 days 11-14 days 14+ days**

16. What classifies unusable meat?
    Beef
    Sheep
    Goat
    Poultry

17. How is unusable meat disposed of?
    Beef
    Sheep
    Goat
    Poultry

18. Are there other products you dispose of, and how?
    Bones
    Blood
    Other offal

19. How many kg meat are sold per week?
    Beef
    Sheep
    Goat
    Poultry

20. Who buys most meat at your supermarket? (May circle more than one)
    Beef **Low income Mid-income High-income Foreigners**
    Sheep **Low income Mid-income High-income Foreigners**
    Goat **Low income Mid-income High-income Foreigners**
    Poultry **Low income Mid-income High-income Foreigners**

21. Regarding meat purchases, how is your supermarket affected in times of fasting?

22. Does new meat still arrive?

23. What is done with meat during fasting?

24. How is the meat priced?

| | | | | |
|---|---|---|---|---|
| Beef | **Per kg** | **By the type of cut** | **By the quality of cut** | **By supplier** |
| Sheep | **Per kg** | **By the type of cut** | **By the quality of cut** | **By supplier** |
| Goat | **Per kg** | **By the type of cut** | **By the quality of cut** | **By supplier** |
| Poultry | **Per kg** | **By the type of cut** | **By the quality of cut** | **By supplier** |

25. What is the average price per kg?
    Beef
    Sheep
    Goat
    Poultry

26. What is the average price per cut? (8 + 10)
    Beef
    Sheep
    Goat
    Poultry

27. Are there any types of state regulations that your supermarket must abide by? (i.e. quality, sanitation, etc.).

28. Is there any type of inspection done? Public heath, veterinary, government, etc.

## Annex 2 Butchery Questionnaire

*Butchery*
*Interviewee Name*
*Position*

1. Describe your business. How does it work? Do you slaughter any live animals? Do you just buy carcasses?

2. How many employees work at your butchery?
   Number of men _____
   Number of women _____

3. What types of meat are available at your butchery? (May circle more than one)
   **Beef Sheep Goat Poultry Other_____**

4. Where does your meat come from?
   Beef **Farmers Live markets Slaughterhouse Elfora**
   Sheep **Farmers Live markets Slaughterhouse Elfora**
   Goat **Farmers Live markets Slaughterhouse Elfora**
   Poultry **Farmers Live markets Slaughterhouse Elfora**

5. From what area or region does you meat come from?
   Beef
   Sheep
   Goat
   Poultry

6. How is the meat processed when it arrives? (1)
   Beef **Live Carcass Cuts**
   Sheep **Live Carcass Cuts**
   Goat **Live Carcass Cuts**
   Poultry **Live Carcass Cuts**

7. How is meat transported to your butchery?
   Beef **Delivery Pick up By hoof**
   Sheep **Delivery Pick up By hoof**
   Goat **Delivery Pick up By hoof**
   Poultry **Delivery Pick up By hoof**

8. How far do live animals travel (in km)? (6)
   Beef
   Sheep
   Goats
   Poultry

9. From what distance does meat arrive (in km)? (6)
   Beef
   Sheep
   Goat
   Poultry

10. How often does your butchery get new meat?
    Beef **Daily Weekly Other _____**
    Sheep **Daily Weekly Other _____**
    Goat **Daily Weekly Other _____**
    Poultry **Daily Weekly Other _____**

11. At what time does meat arrive?
    Beef **Morning Noon Evening Night Time_____**
    Sheep **Morning Noon Evening Night Time_____**
    Goat **Morning Noon Evening Night Time_____**
    Poultry **Morning Noon Evening Night Time_____**

12. How is the meat you buy priced? (6)
    Beef **Live weight Carcass weight Other_____**
    Sheep **Live weight Carcass weight Other_____**
    Goat **Live weight Carcass weight Other_____**
    Poultry **Live weight Carcass weight Other_____**

13. How much does meat cost your butchery per kg?
    Beef
    Sheep
    Goat
    Poultry

14. How many animals are butchered per week?
    Beef
    Sheep
    Goat
    Poultry

15. How are animals butchered?
    Beef
    Sheep
    Goat
    Poultry

16. Where are animals butchered?

| | | | | |
|---|---|---|---|---|
| Beef | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |
| Sheep | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |
| Goat | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |
| Poultry | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |

17. How long are the butchered animals kept before being sold?

| | | | | |
|---|---|---|---|---|
| Beef | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |
| Sheep | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |
| Goat | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |
| Poultry | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |

18. How are the carcasses/ butchered animals stored?

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Sheep | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Goat | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Poultry | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |

19. Is the meat exposed to the environment? To what and for how long?
    (Weather, insects, outside air, etc.)

20. What products do you sell? (May circle more than one)

| | | | |
|---|---|---|---|
| Beef | **Whole carcass** | **Raw cuts** | **Cooked cuts** |
| Sheep | **Whole carcass** | **Raw cuts** | **Cooked cuts** |
| Goat | **Whole carcass** | **Raw cuts** | **Cooked cuts** |
| Poultry | **Whole carcass** | **Raw cuts** | **Cooked cuts** |

21. What types of cuts are sold?
    Beef
    Sheep
    Goat
    Poultry

22. Is there any classification of carcass quality? (18)
    Beef
    Sheep
    Goat
    Poultry

23. If so, what system is used? (19)
    Beef
    Sheep
    Goat
    Poultry

24. Is there any classification of cut quality? (18)
    Beef
    Sheep
    Goat
    Poultry

25. If so, what system is used? (20)
    Beef
    Sheep
    Goat
    Poultry

26. Who are most of your products sold to?

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Low-income** | **Mid-income** | **High-income** | **Foreigners** | **Farmers** |
| Sheep | **Low-income** | **Mid-income** | **High-income** | **Foreigners** | **Farmers** |
| Goat | **Low-income** | **Mid-income** | **High-income** | **Foreigners** | **Farmers** |
| Poultry | **Low-income** | **Mid-income** | **High-income** | **Foreigners** | **Farmers** |

27. Who makes up your clientele?

| | | | |
|---|---|---|---|
| Beef | **Housewives** | **Working women** | **Men** |
| Sheep | **Housewives** | **Working women** | **Men** |
| Goat | **Housewives** | **Working women** | **Men** |
| Poultry | **Housewives** | **Working women** | **Men** |

28. On average, how many clients buy meat at your butchery per day?
    Beef
    Sheep
    Goat
    Poultry

29. How many carcasses are sold per week? (18)
    Beef
    Sheep
    Goat
    Poultry

30. What is the average carcass weight (kg)?
    Beef
    Sheep
    Goat
    Poultry

31. How much raw meat is sold per week (in kg)? (18)
    Beef
    Sheep
    Goat
    Poultry

32. How much cooked meat is sold per week (in kg)? (18)
    Beef
    Sheep
    Goat
    Poultry

33. How is your butchery affected by the times of fasting?

34. Is meat still delivered?

35. What is done with the meat?

36. What is the average price of a carcass? (18)
    Beef
    Sheep
    Goat
    Poultry

37. What is the average price of raw cuts per kg? (18)
    Beef
    Sheep
    Goat
    Poultry

38. What is the average price of cooked cuts per kg? (18)
    Beef
    Sheep
    Goat
    Poultry

39. What classifies an unusable animal or carcass?
    Beef
    Sheep
    Goat
    Poultry

40. How are unused carcasses disposed of?
    Beef
    Sheep
    Goat
    Poultry

41. How are other unused byproducts disposed of?
    Blood
    Bones
    Other offal

42. Are there any state regulations that your butchery abides by? (quality, sanitation, etc.)

43. Is there any type of inspection done? Public health, veterinary, government?

## Annex 3 Slaughterhouse Questionnaire

*Slaughterhouse*
*Interviewee Name*
*Position*

1. Describe your business. Do you slaughter animals for clients and charge per animal? Do you buy animals for slaughter and sell the carcasses?

2. How many employees work at your facility?
   Number of Men _____
   Number of Women _____

3. What types of animals do you slaughter? (May circle more than one)
   Beef Sheep Goat Poultry Other_____

4. Where do the animals come from? (May circle more than one)
   Beef **Farmer Live market Import**
   Sheep **Farmer Live market Import**
   Goat **Farmer Live market Import**
   Poultry **Farmer Live market Import**

5. What area or region do the animals come from?
   Beef
   Sheep
   Goat
   Poultry

6. How are they transported to your facility?
   Beef **Delivery Pick up On the hoof (by seller) On the hoof (by employee)**
   Sheep **Delivery Pick up On the hoof (by seller) On the hoof (by employee)**
   Goat **Delivery Pick up On the hoof (by seller) On the hoof (by employee)**
   Poultry **Delivery Pick up On the hoof (by seller) On the hoof (by employee)**

7. How far do the animals travel (in km)?
   Beef
   Sheep
   Goat
   Poultry

8. What is the average cost of live animals per kg? (1)
   Beef
   Sheep
   Goat
   Poultry

9. What is the average charge per animal (per kg) to slaughter? (1)
   Beef
   Sheep
   Goat
   Poultry

10. How long are animals kept before slaughter?
    Beef
    Sheep
    Goat
    Poultry

11. How many animals are slaughtered per week?
    Beef
    Sheep
    Goat
    Poultry

12. How are animals slaughtered?
    Beef

    Sheep

    Goat

    Poultry

13. Where are animals slaughtered?
    Beef **Outdoors Indoors (Room temp) Indoors (Cooled) Temp_____**
    Sheep **Outdoors Indoors (Room temp) Indoors (Cooled) Temp_____**
    Goat **Outdoors Indoors (Room temp) Indoors (Cooled) Temp_____**
    Poultry **Outdoors Indoors (Room temp) Indoors (Cooled) Temp_____**

14. How long are the carcasses kept before being sold?
    Beef **<1 day 1-2 days 3-5 days >1 week**
    Sheep **<1 day 1-2 days 3-5 days >1 week**
    Goat **<1 day 1-2 days 3-5 days >1 week**
    Poultry **<1 day 1-2 days 3-5 days >1 week**

15. What is the approximate average carcass weight?
    Beef
    Sheep
    Goat
    Poultry

16. How are the carcasses stored?

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Sheep | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Goat | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Poultry | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |

17. Are any chemicals used in the facility?

**None** **Disinfectant** **Bug Repellant** **Cleaning chemicals** **Other____**

18. How are slaughtered animals sold?

| | | | |
|---|---|---|---|
| Beef | **Carcass** | **Cuts** | **Processed** |
| Sheep | **Carcass** | **Cuts** | **Processed** |
| Goat | **Carcass** | **Cuts** | **Processed** |
| Poultry | **Carcass** | **Cuts** | **Processed** |

19. What types of cuts are sold? (17)
    Beef
    Sheep
    Goat
    Poultry

20. What types of processed meat are sold? (17)
    Beef
    Sheep
    Goat
    Poultry

21. Is there any classification of carcass quality?
    Beef
    Sheep
    Goat
    Poultry

22. If so, what system is used? (20)
    Beef
    Sheep
    Goat
    Poultry

23. To whom are the slaughtered animals sold?

| | | | | |
|---|---|---|---|---|
| Beef | **Butcheries** | **Supermarket** | **City Residents** | **Export** |
| Sheep | **Butcheries** | **Supermarket** | **City Residents** | **Export** |
| Goat | **Butcheries** | **Supermarket** | **City Residents** | **Export** |
| Poultry | **Butcheries** | **Supermarket** | **City Residents** | **Export** |

24. How many kg carcass are sold per week?
    Beef
    Sheep
    Goat
    Poultry

25. How many kg cuts are sold per week? (17)
    Beef
    Sheep
    Goat
    Poultry

26. How many kg processed are meat sold per week? (17)
    Beef
    Sheep
    Goat
    Poultry

27. How is your slaughterhouse affected by times of fasting?

28. What is done with the animals during fasting? (Slaughtered and frozen, kept alive?)

29. What is the average carcass price per kg?
    Beef
    Sheep
    Goat
    Poultry

30. What is the average cuts price per kg? (17)
    Beef
    Sheep
    Goat
    Poultry

31. What is the average processed meat price per kg? (17)
    Beef
    Sheep
    Goat
    Poultry

32. What is the cost of running the slaughterhouse?

33. What classifies an unusable carcass?
    Beef
    Sheep
    Goat
    Poultry

34. How are unused carcasses disposed of?
    Beef
    Sheep
    Goat
    Poultry

35. How are other unused byproducts disposed of?
    Blood
    Bones
    Other offal

36. What is done with the hides, skins, wool, or feathers of animals?
    Beef
    Sheep
    Goat
    Poultry

37. Are there any state regulations on slaughterhouses in Addis Ababa (i.e. quality, sanitation, etc.)

38. Is there any type of inspection done? Public heath, veterinary, government, etc.

## Annex 4 ELFORA Questionnaire

*ELFORA*
*Interviewee Name*
*Position*

1. Describe your business in general? What does Elfora do? Do you buy animals for slaughter? Breed to finish?

2. How many employees work at your facility?
   Number of Men _____
   Number of Women _____

3. From where do the majority of your animals come? (May circle more than one)
   Beef **Farmer Live market Import Company Raised**
   Sheep **Farmer Live market Import Company Raised**
   Goat **Farmer Live market Import Company Raised**
   Poultry **Farmer Live market Import Company Raised**

4. From what area or region do your animals come?
   Beef
   Sheep
   Goat
   Poultry

5. How are they transported to your facility?
   Beef **By hoof Motorized vehicle Other_____**
   Sheep **By hoof Motorized vehicle Other_____**
   Goat **By hoof Motorized vehicle Other_____**
   Poultry **By hoof Motorized vehicle Other_____**

6. How do they get to your facility?
   Beef **Delivery by outside person Pick up from outside farm by employee Delivery by employee (from company farm)**
   Sheep **Delivery by outside person Pick up from outside farm by employee Delivery by employee (from company farm)**
   Goat **Delivery by outside person Pick up from outside farm by employee Delivery by employee (from company farm)**
   Poultry **Delivery by outside person Pick up from outside farm by employee Delivery by employee (from company farm)**

7. How far do the animals travel (in km)?
   Beef
   Sheep
   Goat
   Poultry

8. What is the average cost per animal per kg? (1 + 3)
   Beef
   Sheep
   Goat
   Poultry

9. Where are the new animals kept?
   Beef
   Sheep
   Goat
   Poultry

10. Do you quarantine *all* new animals?
    Beef **Yes** **No**
    Sheep **Yes** **No**
    Goat **Yes** **No**
    Poultry **Yes** **No**

11. What symptoms or behaviors do you watch for while in quarantine?
    Beef
    Sheep
    Goat
    Poultry

12. What are the animals vaccinated for, and which vaccine is used?
    Beef
    Sheep
    Goat
    Poultry

13. From where do you get vaccines?
    Beef
    Sheep
    Goat
    Poultry

14. Does Elfora have its own veterinarians?
    **Yes**
    **No**

15. How long are new animals kept before slaughter?
    Beef
    Sheep
    Goat
    Poultry

16. At what weight do you slaughter animals?
    Beef
    Sheep
    Goat
    Poultry

17. How many animals are slaughtered per week?
    Beef
    Sheep
    Goat
    Poultry

18. How are animals slaughtered?
    Beef

    Sheep

    Goat

    Poultry

19. Where are animals slaughtered?

| | | | | |
|---|---|---|---|---|
| Beef | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |
| Sheep | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |
| Goat | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |
| Poultry | **Outdoors** | **Indoors (Room temp)** | **Indoors (Cooled)** | **Temp_____** |

20. How long are the slaughtered animals kept before being sold or processed?

| | | | | |
|---|---|---|---|---|
| Beef | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |
| Sheep | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |
| Goat | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |
| Poultry | **<1 day** | **1-2 days** | **3-5 days** | **>1 week** |

21. How are the carcasses stored?

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Sheep | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Goat | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |
| Poultry | **Freezer** | **Refrigerator** | **Cooler** | **Room temp** | **Other_____** |

22. What products do you sell?

| | | | | | |
|---|---|---|---|---|---|
| Beef | **Live** | **Carcass** | **Cuts** | **Processed** | **Canned** |
| Sheep | **Live** | **Carcass** | **Cuts** | **Processed** | **Canned** |
| Goat | **Live** | **Carcass** | **Cuts** | **Processed** | **Canned** |
| Poultry | **Live** | **Carcass** | **Cuts** | **Processed** | **Canned** |

23. What is the approximate carcass weight?
    Beef
    Sheep
    Goat
    Poultry

24. Is there any classification of carcass quality?
    Beef
    Sheep
    Goat
    Poultry

25. If so, what system is used? (24)
    Beef
    Sheep
    Goat
    Poultry

26. What types of cuts are sold? (22)
    Beef
    Sheep
    Goat
    Poultry

27. What types of processed meat are sold? (22)
    Beef
    Sheep
    Goat
    Poultry

28. What types of canned meat are sold? (22)
    Beef
    Sheep
    Goat
    Poultry

29. Who are your products sold to?

| | | | | |
|---|---|---|---|---|
| Beef | **Butcheries** | **Supermarket** | **City Residents** | **Export** |
| Sheep | **Butcheries** | **Supermarket** | **City Residents** | **Export** |
| Goat | **Butcheries** | **Supermarket** | **City Residents** | **Export** |
| Poultry | **Butcheries** | **Supermarket** | **City Residents** | **Export** |

30. How many live animals are sold per week? (22)
    Beef
    Sheep
    Goat
    Poultry

31. How many kg of raw, unprocessed meat are sold per week? (22)
    Beef
    Sheep
    Goat
    Poultry

32. How many kg of meat cuts are sold per week? (22)
    Beef
    Sheep
    Goat
    Poultry

33. How many kg of processed meat are sold per week? (22)
    Beef
    Sheep
    Goat
    Poultry

34. How many kg of canned meat are sold per week? (22)
    Beef
    Sheep
    Goat
    Poultry

35. How is Elfora affected by times of fasting?

36.What is done with the animals during fasting? (Slaughtered and frozen, kept alive?)

37. What is the average price of live animals per kg? (22)
    Beef
    Sheep
    Goat
    Poultry

38. What is the average price per kg of raw, unprocessed meat? (22)
    Beef
    Sheep
    Goat
    Poultry

39. What is the average price per kg of meat cuts? (22)
    Beef
    Sheep
    Goat
    Poultry

40. What is the average price per kg of processed meat? (22)
    Beef
    Sheep
    Goat
    Poultry

41. What is the average price per kg of canned meat? (22)
    Beef
    Sheep
    Goat
    Poultry

42. What classifies an unusable animal or carcass?
    Beef
    Sheep
    Goat
    Poultry

43. How are unused animals or carcasses disposed of?
    Beef
    Sheep
    Goat
    Poultry

44. How are other unused byproducts disposed of?
    Blood
    Bones
    Other offal

45. What is done with the hides, skins, wool, or feathers of animals?
    Beef
    Sheep
    Goat
    Poultry

46. Are there any state regulations that Elfora must abide by? (i.e. quality, sanitation, etc.).

47. Is there any type of inspection done? Public heath, veterinary, government, etc.