

CLIMATE, FOOD SECURITY, & GROWTH

ETHIOPIA'S COMPLEX RELATIONSHIP
WITH LIVESTOCK

ETHIOPIA





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AS POPULATIONS GROW and urbanize and demand for animal products increases, the United Nations Food and Agricultural Organization (FAO) projects that the global market for meat and milk will double by 2050.¹ A number of developing countries are seeking to expand and industrialize their livestock sectors to compete in the international agricultural economy. Ethiopia is poised to join the race.

Despite a modern history of deadly droughts, famine, near-famine, and persistent poverty, Ethiopia is not starting from zero. It is home to Africa's largest livestock population, and is Africa's top livestock producer and exporter (principally to the Middle East).² Until the recent global recession, Ethiopia's economy had been growing at a healthy clip, about 11 percent annually, well above the world average.³

Ethiopia is the world's tenth largest producer of livestock,⁴ and the livestock sector represents about one-fifth of its gross domestic product (GDP).⁵ The government has indicated a strong interest in increased foreign investment in the agriculture sector, specifically cash crops and horticulture,⁶ along with commercial breeding and production of meat, milk, and eggs. Although domestic demand for animal products in Ethiopia is increasing—driven by the urban middle- and upper-class—export potential is a key force encouraging expansion and intensification of livestock production.

In 2008, Ethiopia exported nearly 300,000 live animals—primarily cattle—as well as 6,000 metric tons of meat products, earning about U.S.\$56 million.⁷ In 2009, the government sought to double the previous year's income from live animal exports (\$40 million⁸) and raise the number of animals exported to 400,000.⁹ The government is keen to foster an upward trend. For 2009–10, it set targets for export of meat products of nearly 16,000 metric tons,¹⁰ a nearly four-fold increase over the 2007 level.¹¹

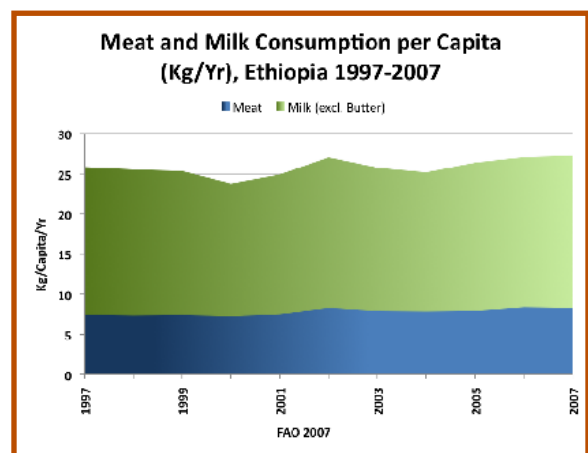
"While the contribution of the livestock industry to the country's total exports is currently low compared to its potential, this sector holds great promise as a source of export diversification for the future," states an Ethiopian government document on opportunities for agricultural investments.¹²

NO FAST-FOOD NATION—YET

Landlocked in the Horn of Africa, Ethiopia is anything but a fast-food nation. No McDonald's or other international

quick-serve chain yet operates, and only 1–2 percent of the average diet is animal protein.¹³ Currently, each Ethiopian eats about 8.3 kilograms (kgs) of meat a year (18 pounds/lbs)¹⁴ less than one-tenth of the U.S. per capita average.

But, even as Ethiopia's production of meat has been growing, overall domestic consumption levels have remained flat, or declined. Combined per capita consumption of animal-based foods has remained steady since 1990 at six grams (0.2 ounces) per person per day.¹⁵ Milk consumption has also fluctuated, but has seen a small rise in the past several years, to almost 19 kgs (42 lbs) per person per year in 2007.¹⁶ National data, however, do not capture wide differences in consumption between a small, urban elite and the poor, rural majority.¹⁷



Most domestic animals in Ethiopia are still raised by small-scale farmers or pastoralists, not modern commercial operations. However, industrial animal agriculture is present in the country. Intensive, factory-style facilities operate in areas with access to major markets, including in cities near the capital, Addis Ababa, such as Debre Zeit and Nazret, and on the outskirts of Addis itself. These include sheds and

AFRICA'S AND ETHIOPIA'S CLIMATE CHALLENGE AND GHGs

Africa's greenhouse gas (GHG) emissions are not even 5 percent of the world total. Nonetheless, according to the Intergovernmental Panel on Climate Change (IPCC), a rise in one degree Celsius by 2050 will put 75–250 million people in Africa at risk of increased water stress. If the temperature increases by two degrees Celsius, a scenario considered likely, up to 600 million Africans will face this risk.¹⁹

The Hadley Center for Climate Change predicts that arid and semi-arid regions throughout sub-Saharan Africa will increase by 60–90 million hectares (ha) (150–222 million acres/ac) by the end of the century, by which time a vast majority of Ethiopia's land will be considered drought-prone.²⁰

The effects of global climate change on Ethiopia will be far in excess of what it has contributed (or likely ever will) to global emissions of GHGs. Consider that Ethiopia's CO₂ emissions currently comprise less than 0.1 percent of the world total.²¹ But if Ethiopia's livestock population grows, its methane emissions, too, will rise; emissions could expand further, and more quickly, if grain-based feed is fed to ruminants.

Globally, livestock are responsible for 37 percent of emissions of methane, a greenhouse gas with twenty-three times the warming potential of CO₂.²² Each year, Ethiopia's cattle produce 1.28 million metric tons of methane through enteric fermentation (ruminant digestive processes).²³ This number, while less than one-quarter of the methane produced through enteric fermentation by the world's largest cow population, India's, is not insignificant. Farmed animals' manure also emits methane as well as nitrous oxide, a GHG with 296 times the global warming potential of CO₂.

The manure can also pollute freshwater and groundwater; as can residues of chemical fertilizers used on feed crops. Water pollution from intensive animal agriculture is a significant problem in industrialized countries, and increasingly, in fast-growing developing nations where factory-farm methods of production have become more common.

Growing feed crops for domestic animals also has significant climate impacts. CO₂ is emitted through production of chemical fertilizers, clearing of forests or other vegetation for cropland, and processing and transport of commercial feed. Additional CO₂ is released from the burning of land to create pasture, as well as from livestock-induced desertification. ■

cages for poultry (to produce both meat and eggs); feedlots for cattle, goats, and sheep; and a small but growing number of factory-style dairy operations, in which cows are confined indoors and milked intensively.

Ethiopia “plans to transform the old and backward type of animal husbandry into a modern ranching system and export processed meat, hides and skin and other leather goods rather than live animals,” according to Berhe Egziabher, head of the country's Animal and Plant Regulatory Board.¹⁸

This paper will explore whether Ethiopia can industrialize its livestock sector, primarily to serve export markets, without forestalling or derailing development prospects for its people and the 150–170 million Ethiopians expected to be alive in 2050. Is such a path viable when large numbers of Ethiopians already scramble to gain access to good soils, grazing land, and water; food security is a huge national challenge; and the effects of climate change are increasingly felt?

DEVELOPMENT CONSTRAINED, CLIMATE CHANGING

Similar to many countries in Africa and the Middle East, Ethiopia's population of 85 million is young—nearly half is fourteen or under—and growing by 3.2 percent a year, one of the world's fastest rates. By 2050, the population is expected to at least double. More than 80 percent of Ethiopia's people are rural.²⁴ The result is a heavy reliance on natural resources, and the country's development needs remain immense. Nearly 40 percent of the population lives below the poverty line,²⁵ and average GDP (calculated by PPP or purchasing power parity, a measure that considers the relative cost of living and inflation rates in different countries) is just \$780 per person per year.²⁶

Ethiopians experience significant deficits in access to education, availability of health care and clean water, and overall life expectancy.²⁷ Nearly two-thirds of adults are illiterate and 38 percent of children aged five or younger are underweight.²⁸

As in many poor countries where agriculture is the economic mainstay, production of staple foods in Ethiopia is highly dependent on rain, not irrigation. This means significant fluctuations in harvests as climatic conditions shift.²⁹

Overgrazing and over-production of crops have degraded much of the country's range- and farmland, and Ethiopia has one of the world's highest rates of soil erosion. This makes growing food or grazing livestock more of a challenge, while diminished plant cover increases Ethiopia's vulnerability to drought and flash flooding.

And, twenty-five years after a debilitating famine that drew the world's shocked attention, food security for Ethiopia remains stubbornly elusive. Forty-four percent of the popula-

tion was considered undernourished when assessed in the period 2004–2006, considerably higher than the sub-Saharan African average of 30 percent.³⁰ As much as one-tenth of Ethiopia’s population remains dependent on food aid, year in and year out, regardless of drought or other crises.³¹

Even as the need for enhanced domestic food production grows, Ethiopia is vulnerable to climate shocks. The effects already can be seen, perhaps most spectacularly and devastatingly, in the increased frequency of drought. Oxfam estimates that drought costs Ethiopia \$1.1 billion a year.³² Other indicators of global warming are a rise in average temperature and reduced rainfall. Of course, all of these have significant impacts on Ethiopia’s crop and livestock production today, as well as on their future viability.³³

Can Ethiopia industrialize its livestock sector when large numbers of Ethiopians already scramble to gain access to good soils, grazing land, and water; food security is a huge national challenge; and the effects of climate change are increasingly felt?

THE SPECTER OF FAMINE

As Ethiopians seek to adapt to the changing environment, traditional livelihoods are, in some cases, already shifting. Fitala Lemu, from Oromia state (also spelled Oromiya), where the average household includes ten people, described his experience at the United Nations climate change conference in Poznan, Poland in 2008.³⁴ He spoke of shortages of water and grass, the result of higher temperatures and insufficient rain, as well as, when the rains did fall, floods that engulfed crops, livestock, and village structures.³⁵ “My father, at any given time, kept around 100 head of cattle, but today I am forced to keep only fifteen,” he said.

In 2008, the specter of famine again stalked Ethiopia after seasonal rains failed for the third year in a row, a phenomenon attributed at least in part to climate change. Thousands of livestock died in the ensuing drought and widespread human deaths were prevented only by an influx of emergency food aid.

The following year, late and erratic rainfall disrupted maize (corn) and sorghum crops and constrained pasture in many parts of the country. The rains that fell in November 2009 were

not even 5 percent of normal volume in parts of Ethiopia and neighboring Kenya, according to Oxfam.³⁶ That same month, the FAO estimated that more than 6 million Ethiopians required food aid.³⁷

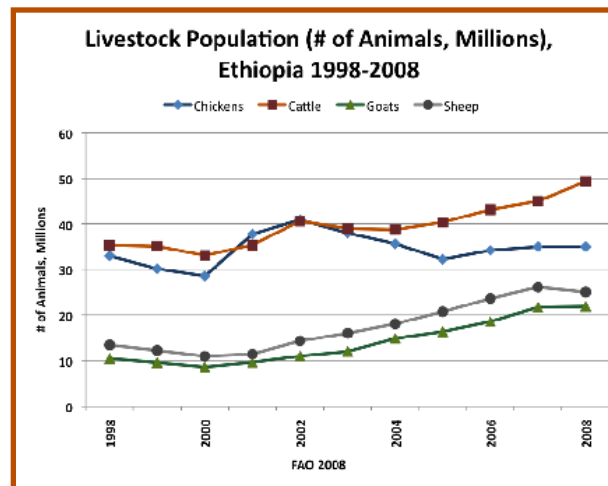
Since the 1984 famine, hunger, emergency food assistance, and the government’s response have been highly sensitive issues in Ethiopia. In October 2009, the government requested food aid for 6.2 million people, but just two months later, denied that hunger was widespread in the country.³⁸ “In the Ethiopian context, there is no hunger, no famine,” Mikitu Kassa, minister for disaster prevention, told the BBC in December 2009.³⁹

ROOTED IN THE LAND

As in many poor countries, Ethiopia’s economy is rooted in agriculture, the mainstay for 80 percent of the population. Agricultural products comprise 60 percent of exports⁴² and almost half of GDP.

In 1991, after the conclusion of the decades-long Ethiopian civil war, the new government headed then (as now) by Meles Zenawi (whose party won nearly all the parliamentary seats in May 2010 elections, securing Meles another five-year term as prime minister) liberalized Ethiopia’s agricultural sector, which had been tightly controlled by the state. The new approach called for expanding agricultural exports to promote economic growth and earn foreign exchange, and greater coordination between national agricultural and industrial development policies.⁴³

The government has, as is the case in most African and other developing nations, continued to put a priority on export-led growth. Ethiopia is Africa’s largest coffee exporter, and coffee is a key earner of foreign currency. Other major exports (in value or volume) include sesame seeds, beans, molasses, sugar, oilseeds, and cotton. Ethiopia’s main imports include wheat, maize, vegetable oils, palm oil, rice, raw sugar, and dried peas.⁴⁴ Roots and tubers, cows’ milk, maize, chili peppers, cereals, and wheat are produced primarily for domestic consumption.⁴⁵



Surprisingly, given the country's large livestock population, Ethiopia exports vegetables and roots for use as fodder—food for domestic animals. In 2007, such exports totaled 16,000 metric tons, valued at \$1.7 million. The per ton value, however, at \$108, is a fraction of the \$2,634 per ton earned by Ethiopian coffee exports.⁴⁶

Both numbers of livestock, and livestock production, are expanding. In 2008, Ethiopia's livestock population included 49 million cattle, the sixth largest cattle population in the world (just behind Argentina); 25 million sheep; 22 million goats; 35 million chickens; and 2 million camels.⁴⁷ Between 1998 and 2008, the cattle population in Ethiopia increased by nearly 40 percent; sheep by 85 percent; and goats by more than 100 percent. Chicken numbers grew more slowly, by about 6 percent over the ten-year period.⁴⁸

Increases in production were most marked for meat from cattle and buffalo, as well as milk, with each sector's output rising nearly 40 percent between 1998 and 2008. Poultry meat production over the same period grew by 25 percent.⁴⁹ ELFORA Agro-Industries PLC, a homegrown Ethiopian agribusiness, has the capacity to produce 1 million kgs (2.2 million lbs) of poultry meat and 50 million eggs a year.⁵⁰

The government has set targets for annual meat exports of 30,000 metric tons, according to the Ethiopian Meat and Dairy Institute.⁵¹ But the markets aren't always steady. Ethiopian meat has been banned for short and long periods by some key importers, including its largest purchaser, Saudi Arabia, citing concerns about possible animal diseases or hygiene standards in slaughter or processing.

Along with the government, international donor agencies are also engaged in encouraging greater efficiencies in, as well as intensification of, Ethiopia's livestock sector. A U.S.

Agency for International Development (USAID) funded project, for example, is working with the government to expand export of meat and live cattle, sheep, and goats through marketing and standard-setting for meat processing plants and the livestock industry overall.⁵²

Ethiopia's export of food, including meat, is controversial among some Ethiopian civil society groups and international non-governmental organizations (NGOs) given the persistence of food insecurity in the country.

A number of other donors are working to support small-scale, livestock production in Ethiopia, rather than more intensive crop production, due to poor land quality in areas across the country. Some researchers recognize that Ethiopia already may have too many domestic animals to sustain. "The

capacity to support more poultry is very high [in Ethiopia]," says Claudia Ringler, senior research fellow at the International Food Policy Research Institute (IFPRI). "But the capacity to support more ruminants is limited."⁵³

Many Ethiopian farmers are isolated in small villages, far from good roads that would allow them to transport their products to larger, urban markets. Some suggest that

this lack of infrastructure will constrain moves in Ethiopia toward a more intensive livestock sector. Industrial agriculture also makes demands that usually push independent farmers out of potential markets. For instance, small producers, including women, cannot sell to agribusinesses like ELFORA, because they cannot produce consistently to the standards set or timelines established, and often cannot afford the inputs required (such as feed and veterinary drugs).

BEYOND SUBSISTENCE

Ethiopia's geography is diverse, encompassing mountains in the north and lowlands and highlands to the west and east.



Livestock is valued more for draft power than as a source of meat in rural Ethiopia.

The Great Rift Valley, which extends the length of the African continent, divides the western (larger) and eastern (smaller) Ethiopian highlands. The highlands are mainly savannah (or grassland) with a temperate climate, while the lowlands are hot and dry. The upper Rift Valley is among the most populated and productive regions of the country.⁶³

For the most part systems of food production remain traditional: herding for cattle, sheep, and goats; backyards for poultry; and small-scale cultivation of teff (a staple grain), wheat, barley, maize, millet, sorghum, and coffee. Pastoralists, just over 10 percent of Ethiopia's population, migrate through the drought-prone arid and semi-arid regions in the east, west, and south.⁶⁴ Over time, farmed animals in Ethiopia have adapted to the array of geographic and climatic conditions present in the country.⁶⁵

Farmers in Ethiopia's lush, highland areas tend approximately 75 percent of the country's domestic animals in mixed "crop-livestock systems," using the animals for draft power, transportation, sources of milk, nutrition in times of drought, and manure for fertilizer and fuel.⁶⁶ Women are often engaged in many aspects of rearing livestock, including herding, feeding, watering, and processing and selling what's produced.

More than 95 percent of Ethiopia's farmers operate near subsistence level, and are wholly dependent on rain for crops and to feed and water their livestock. According to the Ethiopian government, only about 4 percent of land with irrigation potential is currently irrigated.⁶⁷ Largely as a result of population growth over succeeding generations, landholdings have been subdivided repeatedly among families, leaving most rural Ethiopians with small plots and a mostly unquenched hunger for land.

For Ethiopia's rural poor, livestock remain an important safety net, a living bank, and a hedge against hard times for

those with few other assets. The World Bank estimates that livestock in Ethiopia represent more than half the average wealth of rural households.⁶⁸ For many families, net worth is measured by how many livestock they own, with cattle at the top of the valuation. This helps account for the near-omnipresence of cattle, sheep, and goats across the Ethiopian countryside.

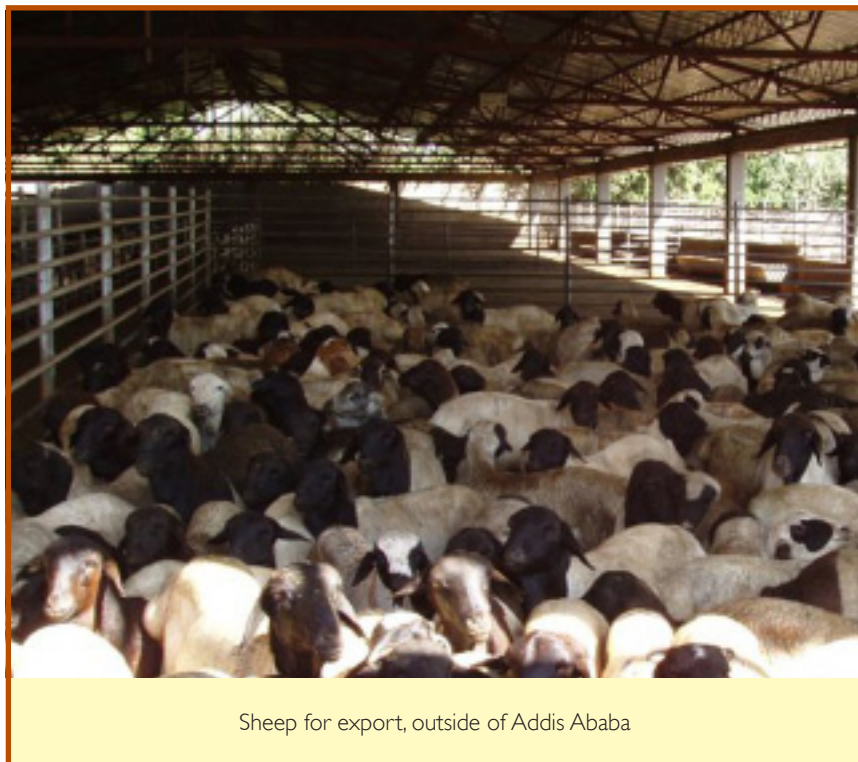
In addition, livestock in Ethiopia provide a tangible claim to land, all of which is still owned by the state. Having domestic animals actually on land is a way of strengthening an individual or household's claim to it. However, both realities—livestock as assets and as signifiers of land ownership—often lead to farmers and pastoralists increasing their livestock numbers as funds allow. More animals means more demand

for food and water, and securing it can increase the likelihood of further land degradation or even desertification. Pressures on land and water grow more acute during droughts or periods of erratic rainfall, each of which has become more frequent in Ethiopia in recent years.

With the majority of Ethiopians engaged in agriculture, the sector has been a focus of efforts by international development

NGOs and donor agencies. They are working with farmers and herders to improve agricultural yields on existing cultivated land—including reducing soil erosion through crop rotation, intercropping (planting two or more crops in the same field), and tree planting. They are also seeking ways to make small-scale livestock production more efficient and remunerative, including through the use of higher-yield breeds, better veterinary care, and greater access to markets.

As a way of avoiding further land degradation from overgrazing, farmers in Ethiopia are being encouraged to adopt "zero grazing." In these systems, farmed animals no longer range over pasture, but instead are kept in enclo-



Sheep for export, outside of Addis Ababa

sure and fed usually agricultural by-products like straw, or elephant grass, which farmers plant and harvest. (Elephant grass has an added benefit in that it can help stem soil erosion.) Women generally manage confined animals and process their manure into briquettes for use as fuel.

In rural areas, a large number of ownership exchanges characterize the livestock economy, with farmers or herders entering the cycle by selling their livestock to rural traders.⁶⁹ The traders then herd the livestock to local primary markets, where they are available for purchase by larger traders or butchers. The price rises with each subsequent sale.

THE POULTRY SECTOR INTENSIFIES

Throughout rural Ethiopia, chickens are a feature of most households. Generally, women tend a handful of low-maintenance indigenous birds that roam freely, eating insects or crop residues.⁷⁰ In recent decades, however, the Ethiopian government has taken steps to commercialize the poultry industry and increase each bird's productivity. In the 1950s, four high-producing breeds (Rhode Island Red, Australorp, New Hampshire, and White Leghorns) were imported to Ethiopia from the U.S., Denmark, and neighboring Kenya, and the first modern poultry farms were established in the country in 1959.

Since then, government-supported research stations have provided high-yielding breed "stock," along with advice on housing, feed, and marketing to individual farmers as well as commercial operations. Rhode Island Reds, ubiquitous in industrial "broiler" chicken operations, are now common in urban and peri-urban areas in Ethiopia, and among both large- and small-scale producers.⁷¹

Native Ethiopian chicken breeds produce between thirty and eighty eggs a year,⁷² while commercial layer hens, bred for maximum production, can lay 250 to 300 eggs annually.

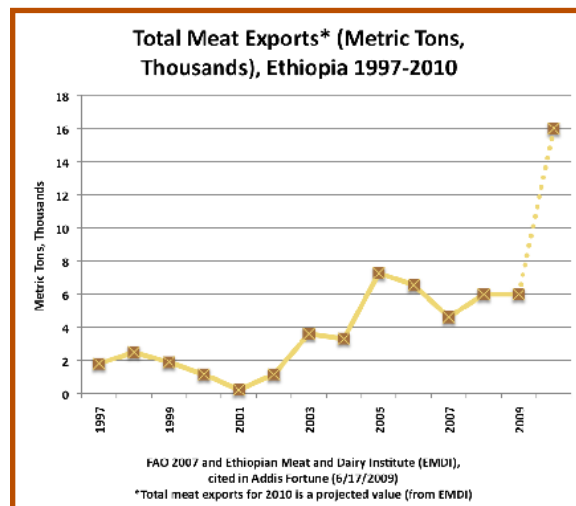
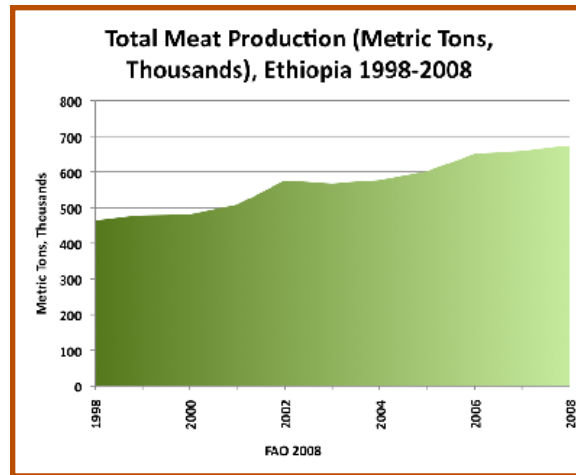
In 2007, Ethiopia produced 38,000 metric tons of eggs and 48,000 metric tons of poultry meat.⁷³ Today, at least twenty large-scale, commercial poultry farms with populations of between 2,500 and 50,000 birds each, housed in indoor sheds, operate in and around Addis Ababa and Debre Zeit, southeast of Addis, producing chicken meat and eggs.⁷⁴ ELFORA Agro-Industries PLC, Ethiopia's largest livestock producer and the leader in the poultry sector, opened its doors in 1997 by acquiring state-owned facilities from the government as part of a privatization policy.⁷⁵ It is a major force pushing the sector toward commercialization.

ELFORA also runs a modern poultry production facility and chicken abattoir in Debre Zeit and provides farmers with day-old hatchlings. One of its foreign suppliers is U.S.-based Cobb, the world's oldest and largest

"broiler" breeding operation. Unlike free-ranging chickens, those in industrial operations are fed commercially produced feed. Along with the second and third largest Ethiopian poultry companies, Alema Farm and Genesis Farm, ELFORA also operates hatcheries and feed mills.⁷⁶ ELFORA, Alema, and Genesis all use grain-based feed for their poultry, of which wheat bran and maize are primary components.

In addition, ELFORA owns modern ranches that can hold up to 65,000 cattle and 400,000 goats and sheep, and operates feedlots and slaughterhouses across Ethiopia. It supplies markets not only with live cattle, sheep, and goats, but also frozen meat products and processed foods like chicken sausage and canned vegetable soup. ELFORA also sells cereal and pulses.

The company's reach is large. ELFORA sells its products to Ethiopian supermarkets, which serve the country's middle and upper economic classes, as well as to the Addis Sheraton and Hilton hotels, Ethiopian Airlines, colleges, and hospitals. ELFORA also has a lively export trade, shipping products to,



in Africa, Côte d'Ivoire, Congo Brazzaville, and Egypt, as well as to Saudi Arabia, Dubai, and Yemen in the Middle East.

ELFORA's Chairman, Sheik Mohammed Hussein Ali Al-Amoudi, a joint Ethiopian–Saudi Arabian citizen, is Ethiopia's richest person, and is reportedly close to senior government officials. Al-Amoudi's business investments range over oil, mining, and agriculture. He ranked 64th on *Forbes* magazine's 2010 list of the world's 100 wealthiest people. According to *Forbes*, Al-Amoudi "claims to be investing more than \$3 billion into Ethiopian agriculture and industry with the aim of modernizing farming and eventually exporting much of the output to Saudi Arabia."⁷⁷

A FLOOD OF MILK?

Unlike the poultry sector, the Ethiopian dairy industry has been largely resistant to commercializing forces, even as milk demand, particularly in urban areas, outstrips supply. Several factors account for this, including the price of exotic, high-yielding breeds of dairy cow; the scarcity and cost of feed and water; and insufficient veterinary services. As a result, the milk industry remains reliant on small-scale production.

Still, in and around Addis Ababa, commercial dairy processing plants do operate, including the largest, Shola, which the government owns. Sebeta Agro Industry, which calls itself "the leading private company on milk and milk product supplies in and around Addis Ababa," runs a modern dairy farm west of Addis, in the town of Sebeta. It also processes milk from small farmers and milk collectors.⁷⁸

Perhaps the most significant initiative to date to expand Ethiopia's dairy sector has been a low-tech endeavor by the Ethiopian government. Begun in 1960, the Dairy Development Enterprise operates collection points throughout Ethiopia for both individual and larger-scale producers of milk.⁷⁹ More recently, the government established the Ethiopian Meat and Dairy Technology Institute to facilitate the growth of modern dairy production. It also has plans to assist pastoralists to deal with the risks of climate change by offering feed, water, and veterinary services in each of Ethiopia's districts.

Other commercialization efforts continue, spearheaded by donor agencies, sometimes working with private sector partners. In 2003, for example, USAID initiated a project to connect pastoral producers with livestock exporters and policy-makers to help streamline the marketing process and reduce the large number of ownership exchanges. In 2005, in conjunction with U.S. dairy products giant Land O'Lakes, USAID launched a project to support small dairy farmers in Ethiopia by providing them with crossbred cattle and training.

In return, farmers are expected to reach out to fifty other farmers to discuss the program's virtues. "We want

GROWTH IN LIVESTOCK NUMBERS AND PRODUCTION^{40,41}

Between 1998 and 2008, livestock numbers in Ethiopia rose by:

- Cattle: 39 percent
- Sheep: 86 percent
- Goats: 109 percent
- Chickens: 6 percent

Between 1998 and 2008, metric ton production increased by:

- Beef (cattle and buffalo): 39 percent
- Milk: 41 percent
- Poultry meat: 25 percent

Comparison of 2008 and 1998 production levels:

- In 2008, Ethiopia produced more than 674,000 metric tons of meat, up from 463,000 metric tons in 1998.
- Ethiopia produced 13 million metric tons of cereals in 2008, up from 7.2 million metric tons in 1998.
- Ethiopia produced 2.24 million metric tons of fruits and vegetables in 2008, up from 1.36 million metric tons in 1998.

Ethiopia's share of global production in 2008:

- Meat: 0.24 percent
- Cereals: 0.52 percent
- Fruits and vegetables: 0.15 percent

him to transfer our knowledge," says Asfaw Tolessa, Land O'Lakes' manager in Ethiopia.⁸⁰

Other projects focus on increasing the number and use in Ethiopia of high-producing, commercial dairy cattle. "Introduction of crossbred cattle, improving feeding and management practice could bring remarkable positive impact in the future prospect of the sub sector," reads an analysis of the milk value-chain completed for a joint Dutch–Irish project to support increased market access for Ethiopian business associations.⁸¹

Since the 1940s, Holstein-Friesians and other breeds commonly used in industrial dairy operations in other parts of the world have been introduced to Ethiopia to replace indigenous zebu cattle. The Holstein-Friesians grow bigger—faster—than indigenous breeds and produce much larger

SOCIETY, MEAT, AND ANIMALS

Meat and abstaining from eating it play an important role in Ethiopian cultural and religious traditions. Most Ethiopians (61 percent) are Christians.⁵⁴ Fifty-one percent are members of the Orthodox Tewahedo Christian Church, which has a long fasting tradition.⁵⁵ In this context, a fast doesn't mean not eating, but rather abstaining from animal products. Only fully vegetarian foods—vegetables, fruits, grains, and legumes—are eaten on fasting days. Most Wednesdays and Fridays are fast days, as are longer periods around Lent, Easter, and Christmas, other festivals, and saints' days.⁵⁶ (Some Ethiopians eat fish during fasts, but without church approval.)

Often, those who can afford to will eat large quantities of meat before a fasting period.⁵⁷ In the lead up to the two-month fast for Lent in 2010, for instance, record numbers of oxen were slaughtered in Addis Ababa Abattoirs Enterprise facilities.⁵⁸

Ethiopians living in cities and earning higher incomes are often enthusiastic consumers of meat. About 40 percent of meat in Ethiopia is eaten in urban areas, and increases in meat-eating are more closely tied to rises in income in cities than in the countryside.⁵⁹ In Addis Ababa, meat is readily available from butchers, small retailers, and supermarkets, as well as in restaurants and the city's many high-end hotels.

Restaurants serving meat do exist in rural parts of Ethiopia, but, according to Don Peden, a senior scientist at the International Livestock Research Institute (ILRI), they are typically too expensive for small-scale farmers to patronize. Rural Ethiopians generally eat meat only on special occasions, such as a wedding, or when draft

animals are no longer fit to pull plows.⁶⁰ Then, communities may join together to purchase a live animal, slaughter it, and share the meat.⁶¹

While the welfare of domestic animals is not a widespread concept in Ethiopia, it is not wholly absent, either: Several groups address issues of working animals, primarily donkeys and horses, including the U.K.-based Brooke, the Donkey Sanctuary, and the Society for the Protection of Animals Abroad. Each provides veterinary services along with education on good animal care.

Tekelye Bekele of the Society of Animal Welfare (SAW)-Ethiopia is working to raise awareness of the conditions for many farmed animals in the country, including inhumane practices at slaughterhouses, long transport journeys by road or truck to markets and slaughtering facilities, and methods of transport likely to cause stress or pain, such as live chickens being hung upside down. He also is trying to draw attention to the reality that, when emergency food aid is provided during droughts, the food and water needs of livestock are neglected, with large numbers starving or dying.⁶²

Other groups in the country address the needs of stray cats and dogs, and make spay and neuter services for them more accessible. In factory farms, tens of thousands of chickens are stacked in tiny wire cages or massed on the floors of indoor sheds, and thousands of cows, sheep, and goats are crowded into barren feedlots. Their feed is often laced with antibiotics and hormones, and none of the animals is able to express their natural behaviors. The welfare of these animals is not yet a focus of campaigners' efforts in Ethiopia. ■



Butcher in an Addis Ababa market

quantities of milk. However, they also need to be fed much more to maintain production levels, and such feed is generally grain-based. For a small-scale producer, meeting the feed demands of a Holstein-Friesian cow can be difficult.

Exotic breeds of goats and sheep also have been brought to Ethiopia, but on a smaller scale than cattle. A recent project funded by USAID, implemented by two U.S.-based land grant colleges, imported sheep (Dorper) and goat (Boer) breeds from South Africa to crossbreed with local sheep and goats.⁸²

However, indigenous breeds are more likely than exotic, high-performing breeds to be resilient to the effects of climate change, including drought and rising temperatures. Ethiopia's Institute of Biological Diversity also expresses concern that, as indigenous breeds are replaced, "not only indigenous farm animal genetic resources, but also indigenous knowledge and skills of the local communities" are threatened.⁸³

ECOLOGICAL DEFICITS

Ethiopia's varied ecosystems are home to a wide range of flora and fauna. It is estimated that 15 percent of the country's 6,000 plus species of higher (typically larger) plants and 29 percent of its nearly 300 mammal species are endemic.⁸⁴

But Ethiopia's land, water, and forests, and their capacity to support crops and livestock, are under pressure—even without the advent of industrial animal agriculture on a large scale. Total arable and permanent cropland is only 10.7 percent of Ethiopia's landmass.⁸⁵ Nonetheless, Ethiopia has some extremely fertile soils, particularly in valleys watered by the Blue Nile. This has led government officials to declare that virtually any crop can grow in the country. At the same time, however, considerable stretches of Ethiopia are arid and semi-arid, and land degradation from overuse is widespread.

Ethiopia loses two billion metric tons of soil to erosion each year, one of the highest rates in the world.⁸⁶ Overgrazing, as well as over-production of crops and the consequent loss of soil cover, are the main contributors. If unaddressed, the ultimate result is desertification, as the land loses valuable topsoil and its ability to retain moisture that sustains vegetation. (Such activities also increase the amount of carbon dioxide released into the atmosphere, while the capacity of the depleted, disrupted soil to store CO₂ declines.)



Chinese-built roads in Aksum, Tigray province

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In the Ethiopian highlands, soil degradation results in a loss of productivity ranging between 2–3 percent of agricultural GDP each year, according to the World Bank.⁸⁷ More than 70 percent⁸⁸ of land in Ethiopia is prone to desertification, threatening both crop production and animal husbandry. "One of the huge problems is that people are extending inappropriate cultivation practices into drought-prone areas, fueling land degradation," says Don Peden, a senior scientist at the International Livestock Research Institute (ILRI). Another challenge: an increase in livestock numbers on the land when rains and pasture are favorable.

DWINDLING FORESTS

Land degradation, coupled with deforestation, makes rural livelihoods less tenable, further intensifying the effects of poverty and underdevelopment. Forest loss can also alter or reduce rainfall, a critical factor in Ethiopia where the vast majority of herders and farmers rely on seasonal rains. So important is rain to Ethiopia that, as rainfall volume drops, so too does the country's GDP.¹⁰¹ Without forests to provide a barrier, the effects of floods on crops, livestock, homes, and infrastructure are magnified.

NEW VENTURES: LEASING LAND

As part of its efforts to commercialize the agricultural sector, the Ethiopian government is leasing large parcels of land—as much as 2.7 million ha⁸⁹ (6.7 million ac)—to investors from abroad to grow grain, sugarcane, tea, vegetables, and flowers. In a \$100 million deal, Saudi investors are producing wheat, rice, and barley in Ethiopia.⁹⁰ Once harvested, the crops can be exported in their entirety, tax-free.⁹¹

Other land-lease agreements the Ethiopian government has signed, documented by IFPRI, include one with India to produce flowers and sugar, valued at \$4 billion; another with Flora EcoPower, based in Germany, to grow crops for biofuels on 13,000 ha (32,124 ac); and another with U.K.-based Sun Biofuels, for an undisclosed amount of land.⁹²

In total, Ethiopia has approved more than 800 such leasing agreements since 2007. More may have been concluded, but have not been disclosed publicly.⁹³ Such arrangements constitute a trend in Africa, fueled by demand from nations with growing populations and dwindling land and water resources. Critics term these deals “land grabs” and warn of a new form of old-style colonialism. They also point to the relatively low prices being paid to governments: some Ethiopian land has been leased to foreign investors for as little as 50 U.S. cents an acre (2.5 ha).⁹⁴

While these land-leases generate funds for the host country, they also serve to intensify domestic land pressures and economic stratification. Due to the expanding external market, in Ethiopia the value of land is rising, putting it even further out of reach of small farmers. The Ethiopian government, however, is undeterred. It contends that 60 million ha of land suitable for agriculture (148 million ac) currently goes uncultivated.⁹⁵

Local farmers object to such claims, complaining that they are no longer able to use the land designated for leasing to graze livestock, or to grow teff or other grains.⁹⁶ Nonetheless, countering charges that leasing land to foreign governments or corporations puts the nation’s food security at risk, or that high levels of land degradation argue for apportioning available, fertile land first to Ethiopian farmers, the government has highlighted large parcels in the country’s western and eastern lowlands available to lease to foreign agricultural producers.

Foreign investment, government officials also say, will help move the country from subsistence to commercial agriculture. They also contend that Ethiopian soils have untapped potential to provide a wide range of food. “There’s no crop that won’t grow in Ethiopia, but we cannot produce quantity and quality,” Esayas Kebede of Ethiopia’s Ministry of Agriculture told the U.K. *Guardian* in early 2010. “Why? It’s a vicious cycle of the lack of capital and technology. So leasing land is a real opportunity for us.”

U.S., Chinese, Japanese, and Middle Eastern agribusinesses are also interested in signing contracts to lease Ethiopian land, according to the *Guardian*.⁹⁷ The Chinese government is already active in the country. Seeking new sources of food and to expand its presence across Africa, China is building and improving roads in Ethiopia. These roads can, and should, increase smaller-scale farmers’ access to regional markets. But the roads are also making the purchase of Ethiopian produce by the Chinese easier, too. Cabbages, carrots, and onions are bought in Ethiopian markets and shipped to China; sometimes a farmer’s full supply is sold this way, even before Ethiopians have a chance to buy them.⁹⁸

While none of the leasing agreements reported so far have been for land to grow food for livestock, representatives of U.S. agribusiness Cargill have reportedly been in Ethiopia, scouting locations for future grain production for farmed-animal feed.⁹⁹

Teressa Agassa, an Ethiopian whose farm is just one hectare (2.5 ac), commented on the sight of the fleet of tractors the Indian horticultural company Karuturi Global brought to Ethiopia for the 300,000 ha (741,316 ac) it is leasing in Gambella, close to the Sudanese border: “They’re only for the company’s benefit,” Agassa observed. “Maybe there can also be benefits for us—but we will only know in the future.”

Not all land-leasing deals exclude Ethiopian farmers as partners. One being piloted in the Rift Valley includes a cooperative. Approximately 300 Ethiopian farmers, using between four and ten ac of land, grow green beans for export to the Netherlands during the European winter. Once the beans designated for Dutch consumers are harvested, the farmers grow maize and other crops for sale within Ethiopia.¹⁰⁰ ■

Ethiopia’s forests have become scarce as they have been encroached upon or cleared to make way for cropland or pasture. From 1990 to 2000, slash-and-burn farming techniques contributed to a deforestation rate of 0.93

percent per year. That’s equivalent to the loss of 140,900 ha (348,171 ac) of forest annually. Between 2000 and 2005, growing demand for land edged deforestation rates in Ethiopia up further, to 1.03 percent.¹⁰² This is significantly higher

than both the global average annual deforestation rate (0.18 percent) and the African average (0.62 percent).¹⁰³ As of 2002, only 2.7 percent of Ethiopia's land remained forested, according to a UN study.¹⁰⁴ This is a dramatic reduction from the 40 percent forest cover estimated in the 1960s. Forest loss not only speeds soil erosion but also contributes significantly to loss of biodiversity. As grazing lands have encroached into Ethiopia's forests, species such as the Ethiopian wolf—one of the rarest wolf species in the world—are increasingly threatened. With their habitats shrinking, wolves venture into human settlements, where they destroy crops and kill livestock. Farmers, regarding them as pests, respond by trapping, shooting, and poisoning the wolves, which are now the focus of a number of conservation efforts.¹⁰⁵

The UN study on Ethiopia's forests projected a dire outcome: if current trends persist, the forests could vanish entirely by 2020 or sooner, according to study co-author Dechassa Lemessa.¹⁰⁶ Some concrete steps are being taken to avoid such an outcome. Ethiopia launched a national tree planting campaign in an effort to restore degraded landscapes and improve the health of its soil. In 2008, nearly 700 million trees were planted, Ethiopia's Ministry of Agriculture reported as part of the UN Environment Programme's Billion Tree Campaign.¹⁰⁷

Smaller-scale ecosystem restoration projects are also underway. Legesse Negash, a professor of biology at Addis Ababa University has transformed a severely eroded landscape 50 kilometers (31 miles) west of Addis Ababa into fertile terrain by planting indigenous trees and other vegetation. Now, rain is retained in the water table rather than washing away loose topsoil.

A similar restoration project has taken place in the northern village of Abraha Atsebaha where, with funds from the Ethiopian government, community members set aside land for natural vegetation to return. Trees, grasses, and streams are now abundant in the landscape, which had become infertile after years of burning to make way for cultivation and grazing.¹⁰⁸ The World Food Programme has supported ecological restoration efforts in

Ethiopia, too, aimed at regenerating capacity for food production, which are likely to be expanded.¹⁰⁹

WATER STRESS

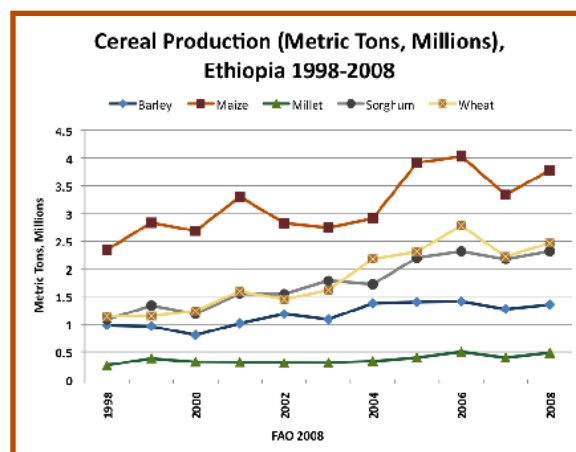
Ethiopia's forests are also essential to the country's water supply. If deforestation is not arrested, water shortages already felt in rural Ethiopia could worsen. Currently, only 22 percent of Ethiopians have access to an improved water source (one that has been treated or protected), and 86 percent of them live in urban centers.¹¹⁰ The lakes and rivers that are vital sources of drinking water for both people and livestock are being polluted by sedimentation from soil erosion.¹¹¹ Rural springs and wells are also drying up as the water tables fail to regenerate due to lack of plant cover.

In addition, water quality and volume in Ethiopia's Rift Valley lakes are decreasing as a result of over-irrigation, chemical fertilizers, and industrial pollutants. Heavy metals from tanneries processing leather and small manufacturing plants, and fertilizer run-off from large flower farms, for example, have been found in Lake Koka, south of Addis Ababa. Most fish in the lake have died, and people in communities that rely on Lake Koka for water have experienced a range of illnesses.¹¹²

Agriculture is by far the largest user of fresh water in Ethiopia, dwarfing levels of use by households and industry.¹¹³ Farmers living in the semi-arid and arid lowlands who have less diversified assets and are heavily reliant on rain-fed agriculture are, along with their livestock, particularly vulnerable to climate change. If water sources dwindle due to drought or erratic rainfall, crops will face greater risks of failing, more livestock will perish, and pastoralists and farmers will have to travel greater distances to access water for their households and animals.¹¹⁴

The economic costs are also high: Robert Mendelsohn of Yale University estimates that for each one degree Celsius rise in global temperatures, African farmers dependent on rain-fed agriculture will lose \$28 per hectare.¹¹⁵ In addition, conflict is a risk, and has been a reality, as farmers from Ethiopia's arid and semi-arid lowlands migrate into the more densely populated highlands in search of fertile land.¹¹⁶

For each one degree Celsius rise in global temperatures, African farmers dependent on rain-fed agriculture will lose \$28 per hectare.



While the Ethiopian government and some outside experts define Ethiopia's water resources as plentiful—citing nine major river basins, including the Nile, and large lakes in the Rift Valley—using this water to expand, or intensify livestock or crop production, depends on expanding irrigation. "Ethiopia has vast water resources, but they have not been developed," observes Claudia Ringler of IFPRI.¹¹⁷

The government is encouraging construction of more irrigation systems, including through foreign commercial partnerships. However, not only is irrigation costly, making it likely that foreign investors will require a significant return on any investment, its benefits are often skewed. The water usually flows on a priority basis to large farms, industrial operations, or to cities, not to rural small-holders.

In addition, irrigated land in Ethiopia tends to be a magnet for herders and farmers seeking water for domestic animals. The highest livestock population densities are found in such areas, according to ILRI's Peden.¹¹⁸ This has the unfortunate effect of magnifying the impacts of overgrazing, leading to significant rates of soil loss, as well as sedimentation and contamination of water sources.

GRAIN REALITIES

Nearly half the total increase in global demand for coarse grain in the next fifty years will be for animal feed, a figure that will grow by 553 million metric tons by 2050.¹¹⁹ If the intensification of Ethiopia's livestock sector continues, demand for grain to produce feed will expand. This means that Ethiopia must produce more grain domestically, channeling land and water away from growing cereals for its people; or import it, spending foreign currency and navigating the vagaries of world food markets—and sometimes volatile price swings. Ethiopia's cereal production grew 80 percent

between 1998 and 2008, but with drought becoming more common, such gains may not be sustainable in future, even as demand for grain rises.

Today, comparatively few ruminants in Ethiopia are fed grain. It is simply too costly for a small-scale farmer, and out of the question for a pastoral herder, according to Don Peden.¹²⁰ Most ruminants in Ethiopia graze on pasture year-round and also eat *chinki* (maize and sorghum residues from farmers' fields). However, the animals in factory-style operations in and around Addis Ababa are routinely fed grain-based feed.

As recently as 1992, no grain in Ethiopia was being fed to livestock. Eight years later, however, in 2000, nearly 738,000

metric tons of cereals, maize, wheat, sorghum, and millet, was allocated to animals raised for meat, milk, or eggs. Each "livestock unit" consumed an estimated 33 kgs (72.6 lbs) of cereals. (The unit size is determined by the size and food requirements of different domestic animals. Cows and buffalo, for example, are defined as 0.5 of a unit; sheep and goats, 0.10.) Between 1993 and 2003, the FAO estimated a 4 percent

annual rise in the amount of cereals used per livestock unit in Ethiopia.¹²¹

Since 2003, the percentage of grain apportioned to livestock in Ethiopia has remained relatively small and has been declining. In 2004, 1.4 percent of grain was being fed to livestock; by 2007 this had fallen to 0.6 percent.¹²² Whether this downward trend can, or will, be maintained as intensive poultry production and meat exports expand is not yet clear. And even though as a percentage, the amount of grain fed to livestock is minimal, it does represent hundreds of thousands of metric tons of grain not available for people to eat directly, in a country with chronic shortages of food.



Staple grains at a market in Harar

And while Ethiopia does not import grain specifically for livestock, its growing livestock production has attracted the attention of foreign grain producers, eager to enter a potentially lucrative market.

“Ethiopia will have to open its markets to grain imports in order to keep up with the growing demand for meat, milk, and eggs,” says Kurt Shultz, director of the U.S. Grains Council (USGC) in the Mediterranean and Africa. The USGC works to develop export markets for grain produced in the U.S.

“The lack of an open market and the ability to import grains has put local livestock production in direct competition with human consumption,” Shultz observes.¹²³ Indeed, the main ingredients of the animal feed currently used in Ethiopia, wheat

bran and maize, are also nutrient-dense staples for the country’s human population.¹²⁴ The USGC is laying the foundations in Ethiopia for future trade in grains, establishing connections with grain users and livestock producers. It is also, in conjunction with USAID, investigating trade opportunities with Ethiopian feedlot producers, and invited them to visit feedlot operations in Morocco where the USGC has been actively engaged.

Globally, the intensification of the livestock sector is an important factor in rising global food prices. In 2008, price spikes of staple foods like rice, wheat, and maize led to protests in many countries, including Ethiopia, where inflation rose to an estimated 22.4 percent due primarily to the higher food prices. As recently as 2006, Ethiopia was exporting some grain, but in January of that year the government banned all grain exports as a means of countering rapidly rising domestic grain prices.¹²⁵

In coming years, increased need for and allocation of domestically produced wheat bran, sorghum, and maize to livestock will likely cause the price of each to rise, creating

another hurdle for Ethiopians to access key dietary staples. Ethiopia’s government, keen to quell potential domestic unrest, has considered imposing price controls on food items; these could, however, be detrimental to small farmers.

GRAIN FUTURES?

In coming years, Ethiopia may face a stark choice: use available water and land resources to grow food for direct human consumption, or grain for livestock raised in feedlots or broiler and layer sheds. Given Ethiopia’s history of food emergencies and the growing frequency of drought, an intensive livestock sector in the mold of industrialized countries could deal a heavy blow to efforts to achieve domestic food security.

To meet requirements for grain (cereals) from Ethiopia’s growing human population, plus anticipated demand for more animal-based foods, crop yields in Ethiopia will have to increase significantly. Assuming annual GDP growth in Ethiopia of between 5 and 10 percent a year through 2030, one set of researchers projected that annual per capita consumption of cereals in 2030 would be 154 kgs (339



Prolonged drought and heavy bursts of rain destroyed this farmer's crops in Adami Tullu Jido Kombolcha district in the Rift Valley.

lbs).¹²⁶ Per capita annual meat consumption would also rise, to between 14 and 20 kgs (30.8–44 lbs), as would that of milk, to 40–60 kgs a year. In all three cases, projected consumption in 2030 would be more than twice what it was in 2005.¹²⁷

Even if demand for meat did not grow at all, and the human population rose by what is known as the medium variant (neither the highest nor lowest demographic projection), overall meat consumption in Ethiopia in 2030 is expected to double from 2005 levels, and milk demand to triple.¹²⁸ As a result, cereal production in Ethiopia by 2030 would have to increase by between 22 and 44 million metric tons. Given population growth, cereal yield would have to



Planting sisal as part of a restoration project in eroded terrain in Konso in the southwest

double, too, even if per capita consumption of cereals and meat do not rise from 2005 levels.¹²⁹

Water is another important consideration. Providing drinking water for livestock does not add a significant extra draw on water resources, but growing feed crops does. The proportion of water used to provide farmed animals with drinking water is less than 2 percent of what is used to produce feed.¹³⁰ Already, according to Don Peden, an estimated 500 billion cubic meters (654 billion cubic yards)¹³¹ or more of water each year is used globally for farmed animal “maintenance.”¹³² The total water resources required by the global livestock population may well be double this amount.

Water use by intensive livestock facilities in Ethiopia today is judged to be quite small. But as the sector intensifies, water demands will grow. Expanding meat exports will also accelerate water use. Ethiopia may find itself in the position of shipping increased volumes of water embedded in agricultural products (called “virtual water”), including livestock, outside of its borders, even as shortages of water bedevil its farmers and herders. Producing beef is particularly water-intensive. One estimate puts the virtual water content of a kilogram of beef at 15,500 liters (4,095 gallons).¹³³

DROUGHT AND A CHANGING CLIMATE

“In the last fifty years the annual average minimum temperature over the country has been increasing by about 0.2

degrees Celsius every decade,” states Ethiopia’s first report to the UN Framework Convention on Climate Change, completed in 2001. It continues, “We have experienced frequent and extensive droughts in recent decades which caused food shortages and famine.”¹³⁴

Over the past decade, farmers in four districts of Amhara and Oromia states have experienced more variable rainfall and higher temperatures, according to a recent study on the effects of climate change. One farmer, fifty-five-year-old Ato Adefiris Yilma, explained that droughts used to occur less frequently and so could be dealt with more effectively. Now, however, it is difficult for communities to cope with even minor shocks. Forests, once abundant, have been destroyed, he said, reducing rainfall. The land has “aged,” according to Yilma, and is less productive. Trees used to grow well in the past, but now they don’t. “Everything is up to God,” he adds. “What we know is that there is shortage of land and severe shortage of water.”¹³⁵

In the arid lowland areas of eastern Ethiopia, a three-year drought (2005–08) wiped out crops and destroyed livestock herds and increased hunger and malnourishment.¹³⁶ Changing rainfall patterns in the highlands of West Bandawacho in southwest Ethiopia have resulted in a startling phenomenon known as a “green famine.” In 2008, delayed rains led to widespread crop failure, and more than 50 percent of the farmland on the green hillsides went uncultivated. The lack of water killed many of the farmers’ draft animals, leaving the farmers to plant crops by hand.¹³⁷

“[O]ur presence changes the delicate components of the environment into vulnerability, our land has been degrading fast, and our lives with it,” Tewolde Berhan Gebre Egziabher, who heads Ethiopia’s national environmental protection agency, told the inaugural meeting of Ethiopia’s National Forum for Climate Change in 2009.¹³⁸

The lack of land is a prime obstacle to farmers in Ethiopia being able to adapt to global warming, according to a recent IFPRI study. Other bottlenecks were insufficient information, credit, labor, and water, as well as unproductive soils.¹³⁹ Indeed, some research suggests that climate change, combined with the fragile state of much of Ethiopia’s land, will force major changes in the livestock economy and livestock-based livelihoods.

Research by IFPRI among Ethiopian farmers in the Nile Basin found that one of the main strategies they employed to deal with ecological deficits was to sell off their livestock. Other measures included eating less, using food aid, participating in food-for-work programs, or seeking a job away from their farms. Farmers in agro-ecological zones that were already warm and semi-arid were more vulnerable

than farmers in other zones.¹⁴⁰ “Ethiopia: land degradation to reduce livestock population by 10 percent,” read a 2005 headline on news portal AllAfrica.com.

Declines in livestock numbers among pastoralists have been precipitous in some southern provinces, according to a recent study by Ethiopian and Dutch NGOs. In the Borena zone in Oromia, for example, the researchers found that household ownership of animals over the past two decades had fallen to an average of three oxen from ten; to seven cows from thirty-five; and to six goats, down from thirty-three. Drought and diseases related to a changing climate were the most common reasons cited. Generally, goats, sheep, and camels are more resilient than cattle to shifting ecological conditions, including increased heat and drought, and can survive for longer periods without water. But in Borena, sheep died, too, from high heat and lack of rain and water.¹⁴¹

In Oromia, conflicts over water and pasture for surviving animals flared during dry seasons, with the incidence of cattle-raiding rising significantly in the Borena and Guji zones between 2004 and 2008.

“I pray for rain,” herder Ute-Muda Garero said. A resident of the village of Dhuko in Oromia, Garero eschewed temporary migration in search of water or pasture, fearing the conflicts that engulfed other pastoralists desperate to find grazing grounds.

When the researchers visited, Garero’s animals were categorized as between two and a three on a four-point scale; four indicates an animal is nearing death. “My cattle will be ‘threes’ even if the rains start on time,” he said. “If the rains fail, they’ll die for sure.”¹⁴²

Even though drought, higher temperatures, and drier landscapes will make livestock more vulnerable, these conditions could, paradoxically, pull farmers away from rain-fed agriculture and push them toward more investment of household resources in livestock, particularly goats and sheep.¹⁴³ But this will bring new pressure on soils and vegetation and potentially further accelerate the cycle of degradation and desertification, rendering the land even less able to sustain crops, livestock, or livelihoods.

At the same time, researchers also suggest that global warming may well impede the spread of commercial meat or dairy operations that rely on exotic breeds that require more water.¹⁴⁴ In the face of climate change, smaller operations

may prove more durable. They can change “stock” or de-stock more easily than larger ones, and small farmers may earn more income—with less risk.¹⁴⁵

“Are livestock holding capacities in the country sustainable everywhere? Probably not,” says IFPRI’s Claudia Ringler. In her view, intensive livestock systems in Ethiopia are only likely to develop on the outskirts of Addis Ababa, given the country’s poor infrastructure.¹⁴⁶

CONCLUSION AND RECOMMENDATIONS

The government of Ethiopia is contending with a central development challenge: how to provide its people with basic services, food security, and a route out of poverty amid a range of serious ecological deficits, compounded by climate change. It is seeking to do this with a fast-increasing population, the largest number of livestock in Africa, and a global economy that has transformed farmed animals from household assets into thriving export commodities for which demand continues to rise: meat, milk, and eggs.

Proponents of the intensification and further commercialization of

Ethiopia’s livestock production, using the outlines of the Western industrial model, consider the sector an important, underdeveloped source of national income, export market share, and funds for poverty alleviation. They also suggest that, given the large swathes of overgrazed and overcultivated land in Ethiopia, reducing the dispersal of domestic animals by confining more of them in feedlots or production sheds could have ecological benefits.

But intensive livestock systems have high, albeit often hidden, costs. Rearing large populations of animals in close confinement, including the “high-yielding” commercial breeds, requires enormous amounts of grain-based feed, water, and energy. Factory farms also generate significant amounts of animal waste that has to be treated and disposed of, create relatively few jobs, often worsen gender disparities in access to agricultural income, ignore basic animal welfare, and rarely lead to food security or equity in equal measure. They also emit GHGs in significant quantities, as do cultivation of feed crops and production of chemical fertilizers.

In a poor country like Ethiopia, such systems can also result in humans and livestock competing for grain—and the resources used to produce it—an opportunity cost of

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immense magnitude. It is fair to ask whether it is equitable to direct these essential, natural resources to producing more animal-based foods for consumption by a small minority of people within Ethiopia, and many more outside of the country.

In Europe and the U.S., the myriad impacts of industrial animal agriculture are being re-examined and their near-universal adoption reconsidered, even as factory-farm facilities are being replicated in developing regions. The balance sheet is tilting away from intensification as the costs added up. For example, a multi-year, multi-disciplinary commission established by the Pew Charitable Trusts and the Johns Hopkins University's Bloomberg School of Public Health to study industrial farm animal production in the U.S. concluded that: "The present system of producing food animals in the United States is not sustainable and presents an unacceptable level of risk to public health and damage to the environment, as well as unnecessary harm to the animals we raise for food."¹⁴⁷

The World Bank also has acknowledged the challenges posed by and downsides of expanded, large-scale

livestock production. "The livestock revolution has its own costs, especially in densely populated and peri-urban areas, through animal waste and the spread of animal diseases such as avian influenza," states the Bank's 2008 annual development report, focused on agriculture. "Many less-favored areas suffer from deforestation, soil erosion, desertification, and degradation of pastures and watersheds."¹⁴⁸

Can Ethiopia create a more sustainable, equitable agricultural economy that avoids the nightmare of future famine and ensures food security and resilience as global warming hits harder? To do so will require political will from the government and key stakeholders, the right incentives, participation of civil society and donor agencies, and long-term thinking coupled with immediate measures.

Based on the facts and analysis presented in this paper, the following actions are recommended:

- **The Ethiopian government should adopt a long-term plan for achieving food security** that puts a priority on meeting current and anticipated needs for varied, nutritious foods for human consumption produced in ecologically sustainable ways that promote greater food equity than exists in Ethiopia today.

The myriad impacts of industrial animal agriculture are being re-examined and their near-universal adoption reconsidered in Europe and the U.S., even as this system is being replicated in developing regions. The balance sheet is tilting away from intensification as the costs are added up.

- **The government should re-assess the country's heavy reliance on livestock**, the use of natural resources by the livestock sector, and the ethical, economic, and ecological implications of the allocation, or potential import, of grain for livestock feed.
- **The government should end policies, official or unofficial, that encourage the further industrialization of the livestock sector**, given the threats this system of production poses to food security, the environment, the climate, livelihoods, and equity.
- **The government, together with civil society groups, donor agencies, and international NGOs, should develop a comprehensive plan to expand domestic capacity to produce vegetables, fruits, pulses, and cereals for the Ethiopian people.** Historically, Ethiopia

has been known for its plant and crop diversity. Fertile land, including that slated for foreign leases, should be apportioned to this endeavor. Reviving and expanding cultivation

of staple foods—those planted and harvested before the advent of commodity crops—could benefit the soil, improve diets by adding nutrient-dense foods, and increase household and even national agricultural income. These varied crops could also offer Ethiopia a more effective buffer against the effects of climate change. Many vegetable species have shorter growing seasons than maize or wheat, and require less water—a huge benefit as Ethiopia becomes increasingly drought-prone. All such efforts should ensure the participation of women farmers on an equal basis with men.

- **The government, donor partners, and civil society should address, on a basis of urgency, the need for new means for rural Ethiopians to store wealth apart from livestock**, and work toward a consensus on the destocking of ruminant herds—before climate change becomes more intense. Considerable evidence suggests that Ethiopia's environment cannot sustain the current population of domestic animals, let alone significant increases in their numbers, or the intensity of production practices, in the future.

- **The government, donor agencies, and civil society ought to collaborate on implementation of large-scale ecosystem restoration projects**, with the objectives of revitalization of Ethiopia’s over-grazed and over-harvested lands to create opportunities for food production; re-growth of forests and other vegetation essential to stable rainfall patterns; and provision of greater protection from current and anticipated impacts of global warming. Restoration projects could also create new jobs or livelihoods. Such efforts can build on successful models already piloted in Ethiopia. Resources could be forthcoming from new global mechanisms designed to fund countries’ adaptation to climate change, and to protect forests and promote reforestation as a means of reducing global GHG emissions. (These include the UN’s Reducing Emissions from Deforestation and Forest Degradation, or REDD initiative; a related effort, REDD+, that includes forest conservation and sustainable forest management; and other climate change–adaptation funds, including those established by bi- and multilateral donors.)
- **Relevant members of Ethiopia’s civil society (which operates under significant government constraints) should undertake a broad analysis of the issues of industrial livestock production and food security.** This could lead to a new set of policies and priorities for joint implementation by NGOs, government agencies, donors, and international civil society groups—with the active participation of Ethiopian communities. It would be important to link such an effort with a national conversation on food security, agriculture, livestock, and climate change, which would include the government, NGOs, and community-based organizations.
- **The government, with, as relevant, international partners, should re-assess policies and practices that lead to land degradation, desertification, further aridity, and increase the risk of drought, in the context of global warming.** Such an analysis could also be useful to other countries in the Horn of Africa as well as throughout the continent. The findings could be shared through bodies of the African Union. This analysis could enhance, or complement, prime minister Meles’ leadership role in UN and other international bodies established to assist developing countries’ adaptation to climate change, and ensure adequate financial resources to do so.¹⁴⁹
- **The government, with donor and civil society partners, should launch a national program to raise awareness among Ethiopians of the realities of climate change and what these are likely to mean for their livelihoods and lives.** Farmed animals should be among the main topics covered. Such a program would offer individuals, households, and communities an increased understanding of the changes evident around them, along with, potentially, a greater capacity to adapt. It could also provide them with an opportunity to participate in developing a comprehensive national response to global warming, and a new vision for Ethiopia’s relationship with livestock. ■



A herd of goats rushes down to the Omo River in southern Ethiopia.

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