Food and Agriculture Organization of the United Nations

AFRICA SUSTAINABLE LIVESTOCK 2050

The future of livestock in UGANDA

Opportunities and challenges in the face of uncertainty



USAID FROM THE AMERICAN PEOPLE

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Preface

Ugandan decision makers have to grapple with so many uncertainties from multiple directions that prioritizing interventions and holding a straight course prove a daunting task. In the next decades, population growth, urbanization, technological innovations and adoptions, increased movements of people and goods, not to mention climate change, will thoroughly transform Ugandan society, in ways that are often unpredictable.

Take the livestock sector: its development is fundamental to support the transformation of the country in a sustainable way socially, environmentally and from a public health perspective. A robust analysis of livestock production systems and value chains, an understanding of trends in consumption of animal source foods, and an assessment of returns to different investments are essential to formulate and prioritize policy actions.

However, this alone does not ensure that policies are resilient to a future that, to a large extent, is uncertain. Take a moment and ponder over these questions: in the next three decades, how will technology uptake affect livestock productivity? How will the feed-food competition unfold? How will livestock value chains transform to satisfy the demand of an increasingly affluent and urbanized population? We must humbly admit that we can neither easily predict nor precisely plan the long-term future of livestock in Uganda.

The Government of Uganda, with support from FAO and USAID, engaged a multitude of stakeholders in a conversation around the knowns and unknowns of the future of the cattle and poultry sectors, such as projected trends of societal and livestock dynamics, current policy priorities, technology uptake and institutional changes. Stakeholders did not predict or forecast with accuracy the future of cattle and poultry in Uganda, but generated evidence on alternative plausible futures, a key piece of information for decision-makers to anticipate and shape coming trends, grasp opportunities, and deal with emerging challenges and threats associated to the coming growth and transformation of the livestock sector.

The report "The future of livestock in Uganda: Opportunities and challenges in the face of uncertainty" provides invaluable insights to decision-makers on actions to take today to make the Ugandan livestock systems more robust and resilient to an uncertain future, and sustainable from a social, environmental and public health perspective. It makes a strong case to broaden our perspective and take a forward-looking approach when designing policies and investments targeting dynamic and rapidly changing societies, such as that of Uganda.

We are grateful to stakeholders from across Uganda, and to FAO and USAID in particular, who provided the invaluable expertise and knowledge that underpin this report.



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Executive summary

Uganda will swiftly grow and extensively transform in the next three decades. The human population is expected to more than double by 2050 and 44 percent of the people will live in urban areas vis-à-vis 22 percent today; GDP per capita will increase by 175 percent; and consumption of livestock products will more than triple (FAO, 2018a).

The livestock industry will radically transform to respond to the increasing demand of animal source foods. Between 2015 and 2050 poultry production is projected to increase by more than 400 percent and most of the chicken will be likely kept in intensive and semi-intensive production systems. The cattle population will slightly reduce with respect to today, but beef and dairy animals will be more productive and at least a quarter of them will be raised in intensive or semi-intensive production systems. Novel value chains will emerge to serve an increasingly affluent and urbanized population, with peri-urban middle-size livestock farms likely to become an important player in the future.

The Government of Uganda is implementing a variety of policies and strategies to ensure a sustainable growth and transformation of the livestock sector. These are guided by the Agriculture Sector Strategic Plan (ASSP) 2015/16 – 2019/20, which prioritizes investments in beef, dairy cattle, poultry and goats as well as in other agricultural commodities. However, the transformation of the livestock sector is expected to be so rapid that existing policies and strategies might become inadequate in few years' time to steer a sustainable growth of livestock.

The Government of Uganda - represented by the Ministry of Health, the Ministry of Water and Environment, the Ministry of Agriculture, Animal Industry and Fisheries and the Uganda Bureau of Statistics - and the Africa Sustainable Livestock 2050 of the Food and Agriculture Organization of the United Nations (FAO) have thus engaged stakeholders to articulate long-term livestock scenarios for 2050, that is to explore long-term livestock-related opportunities and challenges and inform the policy debate. These scenarios are four plausible stories about the future: they build on information on past trends and long-term projections on societal and livestock dynamics to describe alternative possible structures of the cattle and poultry sectors and their likely impacts on public health, the environment and livelihoods.

In 2050, the cattle and poultry sectors will be dramatically different than today. In two scenarios, cattle and poultry production increases tremendously, one with moderate and one with high level of intensification. In the other two other scenarios, productivity and production levels remain low, with a significant presence of the extensive production system. Even though different, the scenarios indicate that, in all cases, the growth and transformation of the livestock sector will bring about major developmental opportunities and challenges for society.

BUSINESS OPPORTUNITIES

The expected growth in demand for beef, milk and poultry products will provide major business opportunities for cattle and poultry farmers who will invest to expand their herd/flock and improve productivity. There will be business opportunities also for value chain actors, such as input and service suppliers, traders, processors, wholesalers and retailers of animal source foods (ASFs). Most importantly, consumers might benefit from the availability of affordably priced ASFs in the market. However, these developmental opportunities come with some major challenges that, if not properly addressed, risk jeopardizing the development of the livestock sector itself, with broader negative impacts on public health, environment and livelihoods.

ZOONOSES AND (RE-)EMERGING DISEASES

Due to growth in the animal and human population, there will be increased risk of outbreaks and spread of zoonotic diseases, including infectious emerging and re-merging diseases (EIDs). More frequent interaction with wildlife will further exacerbate this risk. Even in the best-case scenario, EID outbreaks have devastating consequences for society. Besides animal loss, reduced production and increased health costs, they can result in restriction of people's movements, closure of businesses and public offices, trade bans, decrease in tourism, social unrest, and political instability.

ANTIMICROBIAL RESISTANCE (AMR)

Even in the best scenarios, AMR has devastating consequences. Already today, specific infectious diseases cannot be or are difficult to treat with commonly available first and second-line antimicrobials as the pathogens have developed resistance to antibiotics, such as Bovine Tuberculosis. In 2018 the Ugandan government launched the Antimicrobial Resistance Action Plan. Its effective implementation is of paramount importance as, in the future scenarios, the likelihood that farmers will make improper use of antimicrobials in animals will increase: farmers will have to deal with an increased risk of infectious diseases while at the same time attempting to fully tap into the growing business opportunities provided by the expanded market for animal source foods.

The growth and transformation of the livestock sector will bring about major developmental opportunities and challenges for society in the future decades



NATURAL RESOURCES DEPLETION AND CLIMATE CHANGE

In all scenarios, the competition for land, feed and water is fierce. In the favorable scenarios, high level of livestock production poses an immense environmental challenge, while in less appealing scenarios bad management and lack of regulations can result in land degradation, soil and water pollution, high levels of greenhouse gas emissions and biodiversity loss. Impact of droughts is expected to worsen as are climate change associated problems such as reduced rainfall, rising temperature, desertification and flooding, further increasing the pressure on natural resources.

LIVELIHOODS AND EMPLOYMENT

The transformation of the cattle and poultry sectors might result in reduced livelihoods opportunities. Because of the increased competition to access productive inputs, starting with land and water, smallholders might in fact decide or be forced to exit the livestock sector altogether. This will be the case also in good scenarios, because of major shifts towards capital intensive and labor-saving livestock production systems. The creation of alternative employment opportunities will be thus essential to avoid increased levels of poverty and food insecurity in the future.

MIDDLE-SCALE FARMERS IN URBAN AND PERI-URBAN AREAS

A high level of urbanization occurs in all scenarios, leading to the emergence and concentration of middle-scale commercial farms in and around urban centers. This is anticipated to pose major public health and environmental threats. On the one hand, high density of and frequent interactions between humans and animals – as well as wildlife such as urban rodents – are major determinants of outbreaks and spread of emerging and reemerging infectious diseases. On the other hand, concentration of animals and processing of livestock products in urban and peri-urban areas, especially slaughtering, can result in water and soil contamination, contributing further to health threats.

NEXT STEPS

Cognizant of the above, the Government of Uganda may wish to prioritize certain investments within the existing policy framework to establish strong foundations to tap into emerging livestock-related opportunities and effectively deal with coming challenges and threats. It might also appreciate what additional actions, if any, should be taken today to ensure a sustainable livestock in the long term, which provides affordable animal source foods to the growing population while having marginal or no negative impact on the environment and public health.

Introduction

Uganda will rapidly grow and extensively transform in the next three decades. The country population is anticipated to reach about 106 million in 2050, vis-a-vis 40 million today, and the size of the economy to more than triple. Such a pace of change is unparalleled in Uganda's history.

Along this transformative process, the demand for animal source foods will exponentially increase. As a response, the livestock sector will grow and transform to become one of the most important sectors of agriculture. The growth and transformation of the livestock sector will be unprecedented and pose immense puzzles to society, being livestock a cornerstone for livelihoods and food security, environmental sustainability and public health. These include emerging challenges, which escalate as the years pass and in the medium to long-term risk to undermine sustainable development, and uncertain one-off events with great disruptive impact not only on the livestock sector but also, and more broadly, on society as a whole.

How can Uganda be prepared for and take action to ensure sustainable livestock production and value chains in 2050?

This is the question at the basis of this report. In the last 2 years, the Ministry of Agriculture Animal Industry and Fisheries, the Ministry of Water and Environment, the Ministry of Health and the Uganda Bureau of Statistics have joined forces with the FAO Africa Sustainable Livestock 2050 (ASL2050) to engage a multitude of stakeholders in an evidence-based conversation around the long-term future of Uganda, and of its cattle and poultry sectors in particular. The consensus stakeholders reached is presented here.

This report portrays Uganda's possible cattle and poultry futures. It sheds light on opportunities, emerging challenges and uncertain disruptive events associated with a transformed livestock sector, and identifies priority areas for action to take today for a sustainable livestock in the long-term.

What are scenarios?

Scenarios are plausible snapshots of the future. They help think on key factors driving long-term changes and identify emerging opportunities, challenges and threats. They are constructed by engaging stakeholders in a conversation on available information on anticipated trends, such as population growth and climate change, and unpredictable dimensions of the future, such as the level of market integration and technology development and adoption.

There are multiple scenario building methods. In Uganda, stakeholders used the double uncertainty matrix to formulate four plausible livestock scenarios for 2050: they agreed upon two key uncertainties that will shape the future and explored how their interactions with known trends might result in significantly different futures for the cattle and poultry sectors.

Scenarios build on the premise that the future is still in the making and can be actively shaped by anticipating emerging opportunities, challenges and threats, and by taking strategic action today that supports resilience and sustainability in the long-term.

Uganda today: a country with a long-term vision

Uganda is a low-income, rapidly changing society: average annual growth has been over 4 percent in the last years. The Uganda Vision 2040 seeks to transform the economic landscape to ensure the country reaches middle income status within the next two decades.

Uganda today

Uganda is a low-income country with a population of 40 million (UN, 2018) and a GDP per capita of USD 607 per year. Agriculture is a critical sector of the economy, contributing about 24.6 percent to GDP and 71 percent to employment. Industry and services contribute around 20.3 and 47.1 percent to GDP, respectively (WB, 2019).

The Ugandan agricultural sector is heterogeneous, comprising small, medium and large farmers and farms with different levels of efficiency. Smallholders, however, dominate the agricultural landscape. They mainly cultivate cereals, coffee, plantains, cassava, sweet potatoes, beans, and keep cattle, small ruminants, poultry and pigs. Beekeeping and aquaculture are gaining importance. Agricultural productivity is constrained by a variety of institutional and economic bottlenecks, as well as by agro-ecological constraints: 44 percent of the total agricultural land of the country is semi-arid.

The World Bank (2019) estimates that 41.7 percent of the Ugandan population lives under the poverty line. About 31.3 million people, or 78 percent of population, live in rural areas, where poverty is more pervasive than in urban areas. Undernourishment affects 41.4 percent of the population, and wasting and stunting in children are a major concern (FAO *et al.*, 2018).



Twenty five percent of the population is food insecure, while the remaining 75 percent gets at least one basal meal a day. Several government programs, such as the Operation Wealth Creation, and a multitude of initiatives by development partners support agricultural development and food security in semi-arid areas, which are often affected by droughts.

Life expectancy is 60 years. The major causes of death are infectious diseases, such as HIV/AIDS, malaria, lower respiratory infections, tuberculosis and diarrheal diseases. The overall disease burden, expressed as disability adjusted life years (DALYs) or years of healthy life lost, is about 20 500 DALYs. There are nine physicians for every 100 000 people. About 19 percent of the population uses basic sanitation services while less than half (39 percent) has regular access to drinking water (WB, 2019). The government spends about USD 41 person/year on health (WHO, 2014); the total health budget is around 7.2 percent of the GDP.

Regular climatic shocks affect Uganda, mainly associated to low rainfall and dry spells. Uganda, and particularly the Karamoja region in the northeast, is considered one of the countries with the highest exposure to climate extremes (FAO *et al.*, 2018). About 4 percent of the wetlands and forests are annually reclaimed for agricultural or other uses, making environmental sustainability a serious challenge. The number of documented threatened species include 31 mammals, 30 birds, 60 fishes and 64 higher plants (WB, 2018a).

GDP per capita

607 *USD*
or **1 698** *USD*
PPP per year

URBANIZATION

Roughly, **22%**
of the population
dwells in urban areas

POPULATION

40.1 *million*

AGRICULTURE

Dominated by
smallholders,
it contributes about

25%
to ***GDP***

71%
to ***employment***

54%
of ***export value***

LIVESTOCK

Farmers keep
cattle,
small ruminants,
poultry
and **pigs.**

Beekeeping and
aquaculture are
gaining importance

CROPS

Main crops are
cereals,
coffee,
plantains/
matooke,
cassava,
sweet
potatoes
and **beans**



Livelihoods



41.7%
of the population
live under poverty line.

Poverty is largely
a rural phenomenon



41.4%
of the population is
undernourished
and about
3 out of 10
children
under age 5
are **stunted**

Public health



Life expectancy *is*
60 *(62 for women,*
and 58 for men)



Major causes of
death are
infectious
diseases, *such as*
HIV/AIDS, malaria, lower
respiratory infections,
tuberculosis and diarrheal
diseases



Environment



Uganda is highly exposed
and **vulnerable to**
climate extremes.
There is limited capacity to
cope with climate change



Rainfall *is very*
erratic *and prolonged*
dry spells *are common*



Between 1990 and 2016,
the **forest** *area has*
reduced *by* **60%**

Livestock today

The livestock sector accounts for about 17 percent of agricultural value added and 4.3 percent of GDP. Fifty-eight percent of households depend on livestock for their livelihoods. Most of them are subsistence-oriented smallholders.

In Uganda there are 14.2 million cattle, 16 million goats, 4.5 million sheep, 47.6 million poultry and 4.1 million pigs (MAAIF and UBOS, 2018). Cattle and poultry – the focus of this report – are by far the most important species, with their production valued at USD 8.7 and USD 0.9 million per year, respectively (UBOS, 2017). About nine out of ten cattle and poultry are indigenous.

Beyond providing food and other goods and services to the population – such as manure and draft power – the livestock sector contributes between 1 and 1.5 percent to Uganda's export trade value. Uganda is net exporter of livestock products and live animals. Livestock exports are dominated by dairy products and eggs (USD 80 million), with meat and meat products (USD 6.2 million) playing a minor role. Few live animals are exported.

The total supply of animal source foods in the country, including of net trade, translates in a per capita consumption of about 14 kg of meat, 36 liters of milk, and 22 eggs per year (FAO, 2019a). Market transactions are largely in urban areas as self-consumption dominates in rural areas.

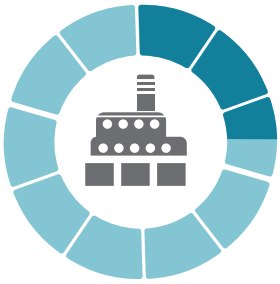
3.9 million households own livestock



58% of population

92% of them are subsistence farmers

Agriculture value added



25% of gross domestic product

Livestock value added



17% of agricultural gross domestic product

Poultry
47.6
million

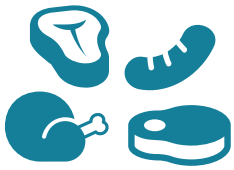
Goats
16
million

Cattle
14.2
million

Sheep
4.5
million

Pigs
4.1
million

Meat production (all kind)



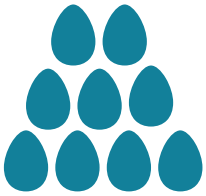
0.4
million tonnes

Milk production (all animals)



1.7
billion litres

Egg production



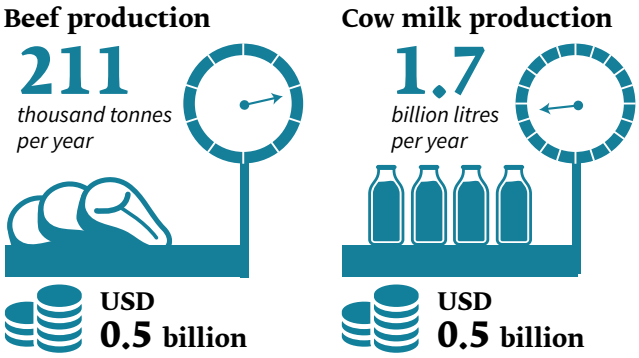
0.9
billion pieces

Per capita consumption
per year

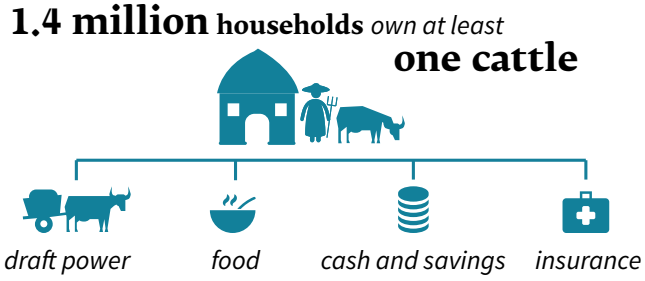
Meat	Milk	Eggs
14 (kg)	36 (lit)	22 (pieces)

Cattle today

Cattle is the most important livestock sub-sector in Uganda. The country has 14.2 million cattle, of which 13.3 million are indigenous or native breeds. Out of the national herd, 11.9 million cattle are raised for meat. The cattle sector contributes to over 40 percent to the value of livestock production and to about 7 percent to the value of agricultural production (UBOS, 2017). Cattle farming provides income, food, draft power, insurance and savings, social capital and other goods and services to the population.



Most cattle are in the 'Cattle Corridor', which extends diagonally across Uganda from the pastoralist Ankole area in the Southwest to the Karamoja region in the Northeast (Egeru *et al.*, 2014). The highest concentration of cattle (head/km²) is found in the pastoral areas of Karamoja, where cattle is the main source of livelihoods and the backbone of the local economy (Gradé *et al.*, 2009). The agro-pastoral or mixed crop-cattle production system dominates the livestock production landscape.



Per capita annual consumption of milk is 36 liters; that of beef is 6 kg. Forty-four and 40 percent of all households consume milk and beef on a weekly basis, respectively.

There are four cattle production systems in Uganda: the commercial ranching, pastoral, agro-pastoral and semi-intensive production systems. While cattle generate both meat and milk, this report focuses on beef cattle. Focusing only on beef cattle has facilitated engaging stakeholders in an evidence-based conversation around the future of the cattle sector in Uganda. The main conclusions, however, largely apply to cow milk production too.

Pastoral

In the pastoral or free-grazing production system, farmers move cattle from place to place in search of pastures and water. They keep indigenous breeds, with herd size ranging from few to 100 heads. The main products are beef, milk, blood, hides, manure and horns. This system is dominant in the Northeastern sub-region.

Agro-pastoral

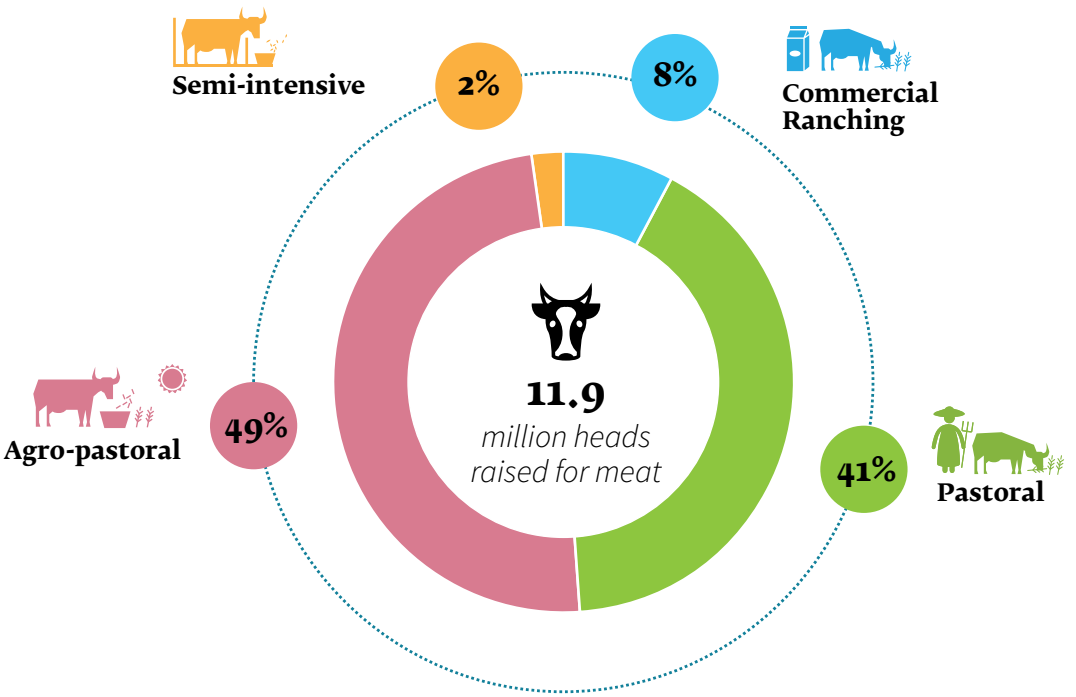
In the agro-pastoral production system, farmers keep indigenous cattle that browse both on private and public pastures. They also feed them with crop by-products. Cattle produce beef and milk, hides, manure and horns and provide draught power. Investments to improve productivity, including in animal health, are none to minimal. This system is present in the Eastern, Central 2, Western, North and West Nile Sub-regions.

Commercial Ranching

Ranching is a market-oriented beef production system, with milk being a by-product. Farmers in this system keep large herds (between 500 and 3 000 per holding). Animals browse / graze during the day in fenced areas and are often paddocked at night. Farmers make significant investments to maintain animals in good health. Animals are of indigenous, cross and exotic breeds. This production system is prevalent in the Southwest and the Central 2 sub-regions.

Semi-intensive

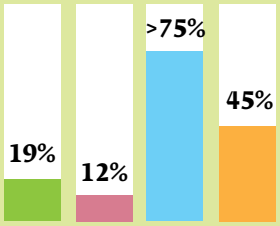
Farmers keep cattle, mainly cross-bred, in kraals, paddocks and cattle barns/stalls and feed them with high-quality feed. They make significant investments in animal health, such as regular vaccination and deworming. Cattle produce milk and beef. This system is mainly found in Central 1 and 2 and the Southwest sub-regions.



Livelihoods

About **1.4 million households keep cattle**, which contribute from 12 to 75 percent to their total income.

Cattle income as % of total household income



- Pastoral
- Agro-pastoral
- Commercial Ranching
- Semi-intensive

Cattle provides **income, food,** draft power, insurance and savings, social capital and other goods and services to the population

Per capita consumption

of beef and cow milk is **6 kg** and **36 litres** per year, respectively.

Public health

Cattle can negatively impact on public health through **zoonotic diseases**, which jump from animals to humans

USD 1 billion

Production losses due to **brucellosis** and **bovine tuberculosis** amount to **22%** of the **value of cattle production**. The combined animal and human cost of both diseases is over USD 1 billion per year

About **60%** of **cattle farmers** are estimated to **use antibiotics.** Inappropriate use of antibiotics can result in livestock-driven **antimicrobial resistance** in humans

Environment

Overgrazing in the cattle corridor is a major concern as it contributes to both **grassland degradation** and biodiversity loss.

Cattle are a **major user of green water**, used for drinking and feed production

Cattle contribute to greenhouse gas emissions, both directly (e.g. enteric fermentation) and indirectly (e.g. feed production)

Greenhouse Gas Emissions from cattle (CO_2e)

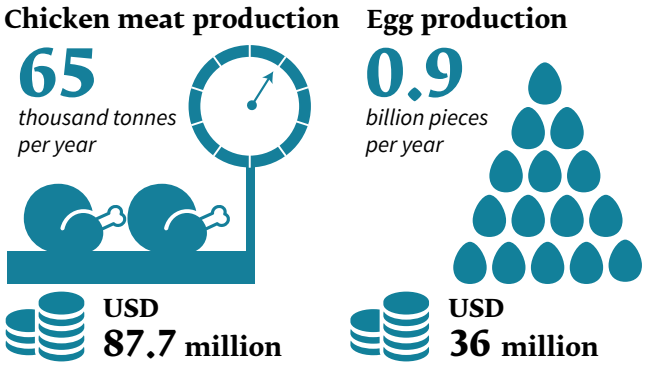
million tonnes

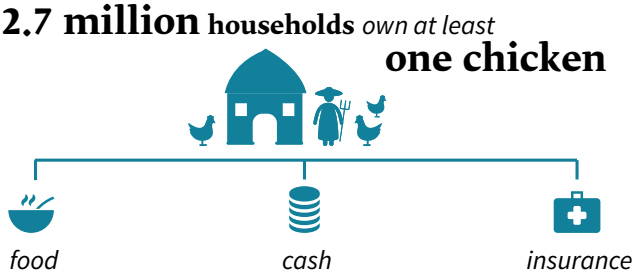
Systems:

- Pastoral = **4.6**
- Agro-pastoral = **7.6**
- Commercial Ranching = **1.2**
- Semi-intensive = **0.5**

Poultry today

There are 47.6 million poultry in Uganda, of which 85 percent are indigenous. Out of the national flock, 37.4 million are used for meat production. Poultry is synonymous with chicken as the number of turkeys, ducks and other domesticated birds is insignificant in the country. The poultry sector contributes 4.3 percent to the total value of agricultural production. About 40 percent of all households keep chickens, largely in free-range systems. They provide food (meat and eggs) and income and can be easily sold in time of need, for example to pay doctor's fees or purchase medicines.





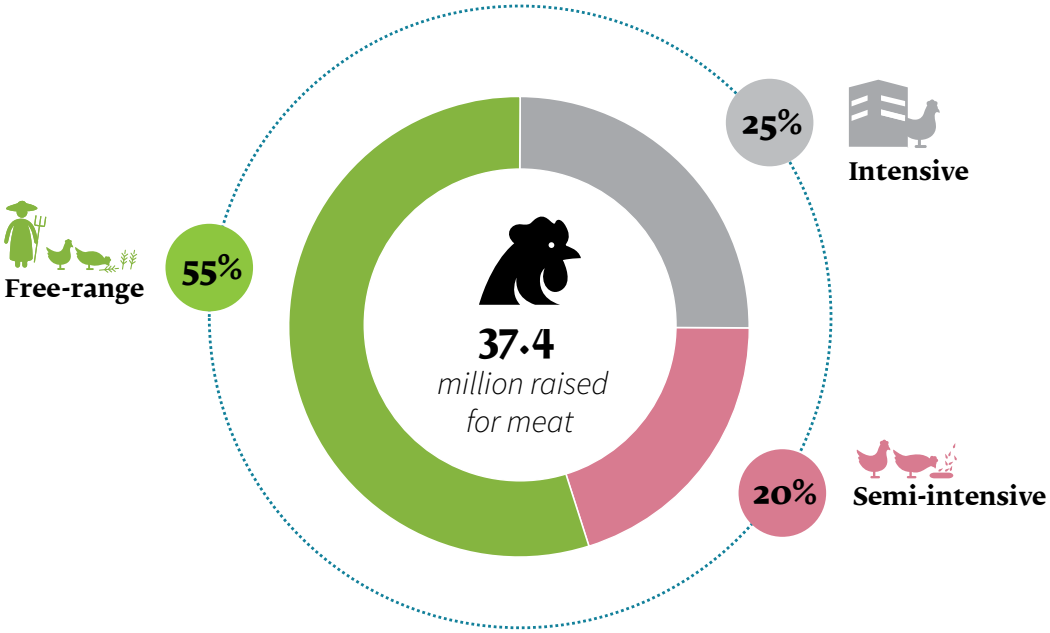
While poultry generate both meat and eggs, the following focuses on chicken meat, though in backyard systems dual purpose birds are often raised. Focusing only on poultry for meat production has facilitated engaging stakeholders in an evidence-based conversation around the future of the poultry sector in Uganda. The main conclusions, however, largely apply to egg production too.

There are three major chicken production systems in Uganda: the free-range, the semi-intensive and the intensive production systems.

Intensive
In intensive production systems, farmers keep thousands of exotic chickens, either broilers or layers. The birds are housed in large permanent structures with strong biosecurity measures. Farmers comply with the strict animal health standards and feed birds with compound feeds (maize is the main feed). Intensive chicken farms are located in peri-urban areas and mainly in Central 1 and 2 and the East Central sub-regions.

Semi-intensive
In semi-intensive production systems, farmers keep flocks of few hundred broilers or layers. The birds are housed in basic structures with litter materials spread on the floor; they are given compound feeds and usually vaccinated against major diseases, such as Newcastle. Biosecurity measures are not necessarily strong. Semi-intensive chicken farms are mainly located in peri-urban areas, and predominantly in the East Central and Central 2 sub-regions.

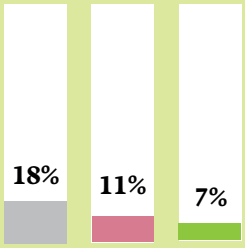
Free-range
In free-range production systems, farmers keep from a few to a dozen indigenous chicken, which freely scavenge for food. Biosecurity measures are minimal. Birds produce both eggs and meat for the household. Occasionally, farmers sell live birds that are well valued in the market because consumers have a preference for local breeds. The free-range system is common throughout the country, but particularly in the West Nile and Southwest sub-regions.



Livelihoods

2.6 million households keep chickens – about 40 percent of all households – which contribute from 7 to 18 percent to their income.

Chicken income as % of total household income



- Intensive systems
- Semi-intensive systems
- Free-range systems

Poultry contribute to **food security** and **nutrition** through the regular provision of meat and eggs. They are an **insurance** and **saving tool**.

Per capita consumption of chicken meat and eggs is **0.8 kg** and **22 eggs** per year, respectively

Public health

Poultry can have negative effects on public health through **zoonotic diseases**, which are transmitted from chicken to humans

USD PPP 103 million Total cost of **salmonellosis**

The annual cost of **salmonellosis** is estimated at **USD 10.7 million for the poultry sector** and at **USD 92 million in humans**. Emerging infectious diseases, such as highly pathogenic avian influenza, might result in higher negative impact on society.

Inappropriate use of antibiotics in poultry farms, particularly in semi-intensive and intensive production systems, might result in livestock-driven **antimicrobial resistance in humans.**

Environment

The poultry sector exercises a **limited pressure on the environment.** However, **intensive poultry production** can result in **heavy pollution of soil and water.**

Intensive poultry production systems contribute to over 70% of the total greenhouse gas emissions from the sector

Greenhouse Gas Emissions from poultry (CO_2e)
thousand tonnes

Systems:
- Intensive systems = **252**
- Semi-intensive systems = **37**
- Free-range systems = **66**

Uganda in 2050: knowns and unknowns

The way Uganda and its livestock sector will be in 2050 depends on the interactions between known factors, including current long-term policies and existing megatrends, and uncertain factors, such as consumers' behavior and government accountability.

Knowns

Long-term policies and strategies

Uganda Vision 2040 aims "to change the country from a predominantly low income to a competitive upper middle-income country within 20 years with a per capita income of USD 9 500". The Vision is implemented through three 10-year plans; six 5-year National Development Plans (NDPs); Sector Investment Plans (SIPs); Local Government Development Plans (LGDPs) and Annual Work Plans.

The Agriculture Sector Strategic Plan (ASSP) 2015/16–2019/20 is the overarching framework for developing the agricultural sector. Priority interventions in the ASSP focus on 12 commodities (bananas, beans, maize, rice, cassava, tea, coffee, fruits and vegetables, dairy, fish, livestock (meat)), and on four strategic commodities (cocoa, cotton, oil seeds and oil palm).

The **ASSP envisages** a variety of **investments for the development of the livestock sector.** These include, for instance, the Presidential directive for the provision of one heifer per household; the establishment of a dairy herd information system; the establishment of mobile and regional laboratories; control of vectors and diseases through vaccination, disease surveillance and construction of infrastructure for disease control; pasture development. The ASSP envisages livestock-related investments to the tune of USD 300 million.

Megatrends, 2015-2050

POPULATION

+160%

from **40** to **106** *million*



The demand for livestock products will increase and by 2050 most of livestock products will be marketed and consumed in urban areas

URBANIZATION

+420%

from **9** *to* **47** *million*



CLIMATE CHANGE

Temperatures will be much warmer



Changed rainfall pattern and frequent extreme weather events will make livestock production increasingly challenging

TECHNOLOGY

Big data and automation technologies will improve productivity in all sectors



Livestock production and husbandry practices, livestock products and livestock value chains will be markedly different than today

Consumption of livestock products } 2015-2050 *in thousand tonnes*



beef +320%
from 220 to 932



chicken meat +330%
from 72 to 316

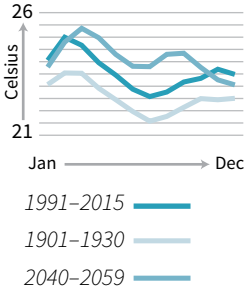


milk +200%
from 1 527 to 4 615

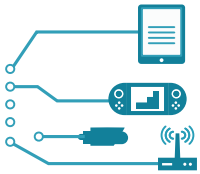


eggs +240%
from 39 to 136

Past and projected average monthly **temperature**



Technology development *will change the way individuals and organizations, including the government, will behave, work and interact*



Unknowns

Peace and stability, the role of Regional Economic Communities, the market size of artificial meat, and the use of drones for the provision of livestock services are examples of unpredictable factors that will shape the future. However, there are two bottom line uncertainties that will largely shape how Uganda and its livestock sector will be in 2050: the governance system and the economic system.

GOVERNANCE SYSTEM

Governance is the way the government guides – through policies, institutions, investments and rules and regulations – social behavior and economic activities. At the extremes, the governance system can be either good or bad.

Good governance
"Vibrant, strong and transparent public institutions at national and sub-national level. An open democracy that is hinged on the rule of law, with human rights respected and valued"

Bad governance
"Autocracy, nepotism and a dictatorial attitude characterize the governance system. Rules and regulations are hardly enforced. There is limited freedom of expression and civil society participation"

ECONOMIC SYSTEM

The economic system is the manner in which resources are allocated to produce, distribute and trade goods and services. At the extremes, the economic system could be either good or bad.

Good economic system
"Vibrant, thriving and diversified economy"

Bad economic system
"Unidimensional, fragile and weak economy"

Pairing the governance and the economic uncertainties allows constructing four possible scenarios for Uganda in 2050.
The four scenarios shed light on how the known and unknown factors of the future might differently interact to result in alternative, yet all plausible futures for Uganda and its livestock sector.

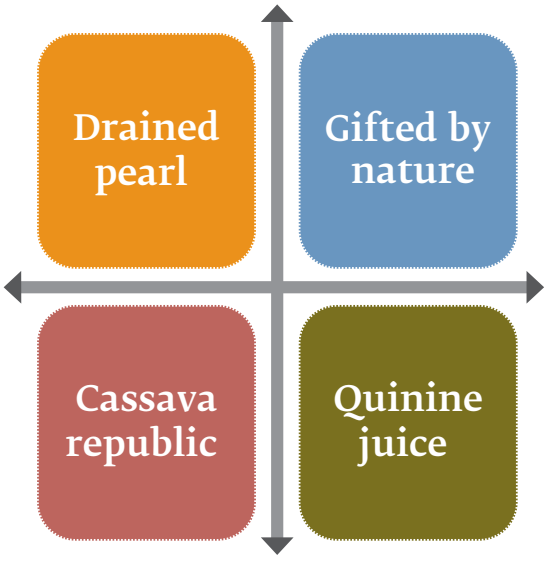
SCENARIO NAMES

GIFTED BY NATURE: the good-governance-good-economy scenario. This name refers to the peaceful and uncontaminated nature and wildlife that characterize the amazing natural parks of Uganda.

DRAINED PEARL: the good-governance-bad-economy scenario. Uganda, known today as the Pearl of Africa, will be a drained pearl in the good governance and bad economy scenario. It will be an opaque and all but shiny pearl.

QUININE JUICE: the bad-governance-good-economy scenario. It refers to the use of quinine to treat malaria. A bad government will continue recommending its use despite its poor tolerability and several negative side effects.

CASSAVA REPUBLIC: the bad-governance-bad-economy scenario. Cassava is one of the most important staples in Uganda. In the bad-governance-bad-economy scenario it will be the only source of nourishment for most of the population, with farmers unable to grow more productive and profitable crops.

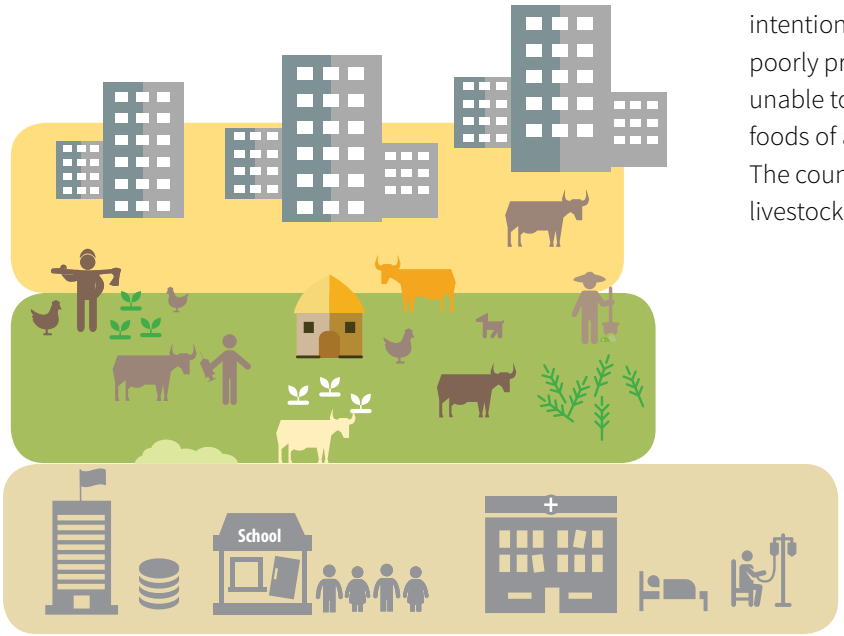


Uganda 2050 scenarios

Governance system

DRAINED PEARL

Ugandans struggle to thrive, as economic growth and development are unstable in spite of all good intentions of the government. The livestock sector, poorly productive because of lack of finance, is unable to satisfy the demand for animal source foods of a population of 106 million people.
The country does not export any live animals or livestock products.



Economic system





CASSAVA REPUBLIC

Many Ugandans are poor: an inefficient government is unable to provide good services to the population and there is little private sector investment.
Livestock contribute to grassland degradation and biodiversity loss; make inefficient use of water; negatively affect public health because of zoonoses and livestock-driven anti-microbial resistance; and marginally support people's livelihoods.



Governance system

Governance system

GIFTED BY NATURE

Ugandans are well-off and live in a prosperous, technologically advanced, politically stable, democratic, and culturally intact country. The country's livestock sector is an exemplary model of sustainability, providing affordably-priced and healthy food to the population while at the same time having minimum negative effects on the environment and public health.



Economic system

QUININE JUICE

Uganda is a middle-income country with a diversified economy. The governance system is ineffective and there is high inequality in the distribution of wealth and income. There is a dual livestock sector, comprising of large corporations that are politically connected and overexploit natural resources, and millions of small producers who survive tending few poorly productive animals.



Governance system

Uganda in 2050: cattle scenarios

The alternative futures of Uganda will shape the development of its cattle sector. Different futures will result in different cattle production systems and value chains and in diverse impacts on livelihoods, the environment and public health.

Cattle in Gifted by nature

CONSUMPTION

With respect to today there is a tremendous increase in the annual per capita consumption of beef, which has reached 22 kg per year in 2050. In terms of aggregate demand, this means a huge increase in total consumption. Most households regularly consume good quality and healthy animal source foods.

Per capita consumption
per year

	Today	2050
beef (kg)	6	22 ↑

PRODUCTION

Trade ↘

The production of beef in Uganda has increased threefold with respect to today, reaching over half a million tonnes per year. However, in 2050 the huge growth in domestic demand surpasses national production, so the country relies on importation of high quality beef to fill the supply gap.

CATTLE POPULATION AND PRODUCTION SYSTEMS

The total number of cattle in the country has not changed much with respect to today. There has been a major shift towards the ranching production system (30 percent of the total herd) and the semi-intensive production system (25 percent), i.e. improved and exotic breeds are more common than today. Some feedlots have emerged. There has been a reduction of the pastoral and agro-pastoral production systems.

PRODUCTIVITY

Increased levels of production with respect to today are explained by major gains in productivity in the commercial ranching and the semi-intensive production systems, where farmers keep improved genotypes. Because of rising incomes, there are productivity gains also in agro-pastoral and pastoral systems, where farmers mainly keep improved indigenous and local breeds.

Livelihoods

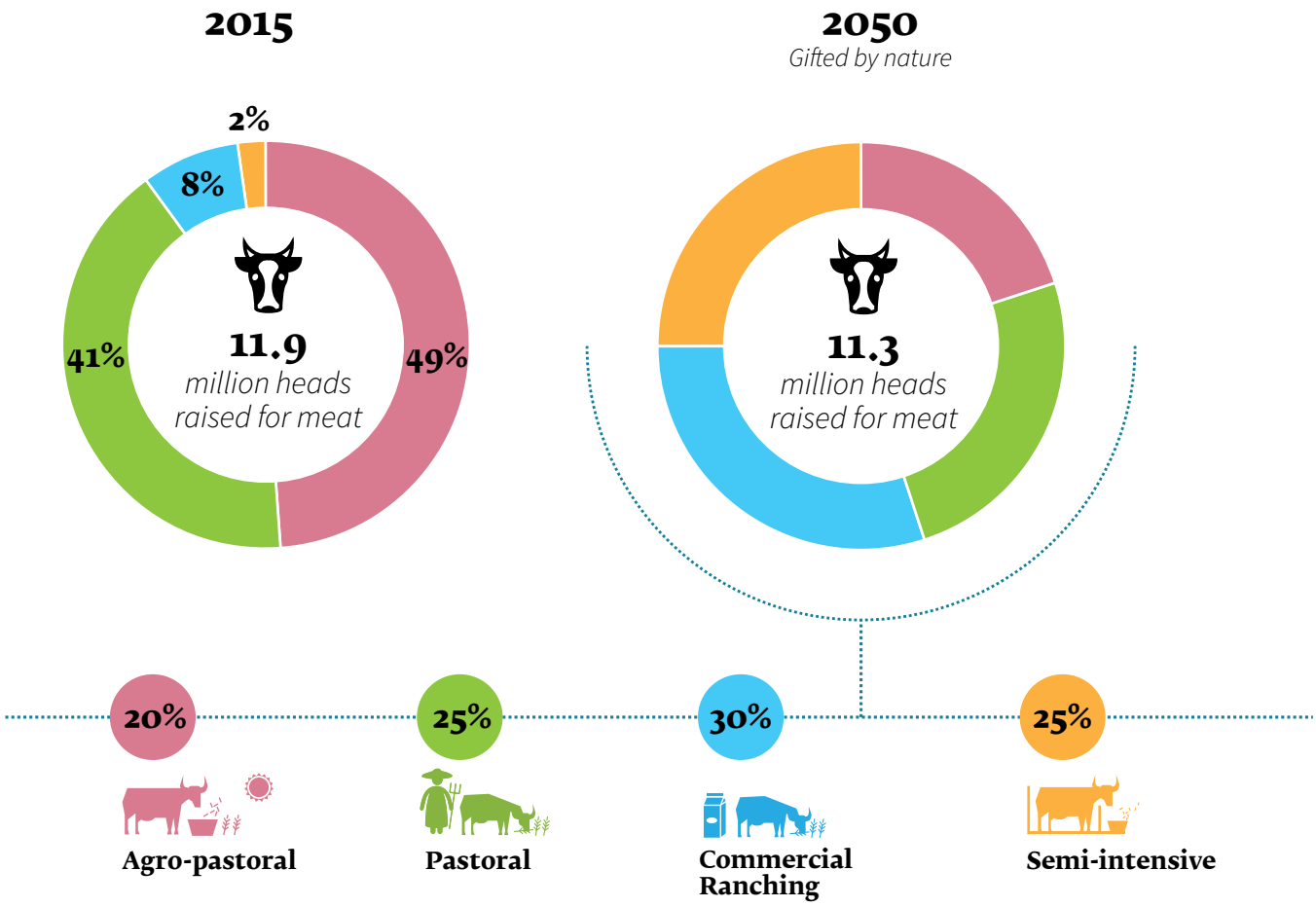
A small share of the population own cattle as many have exited agricultural self-employment to **well-paid salary jobs.** However, some smallholder cattle keepers and input suppliers have become uncompetitive and have lost their main source of livelihoods. Cattle remain a significant contributor to livelihoods in extensive systems and provide **employment opportunities in the commercial and semi-intensive systems and along the value chain.**

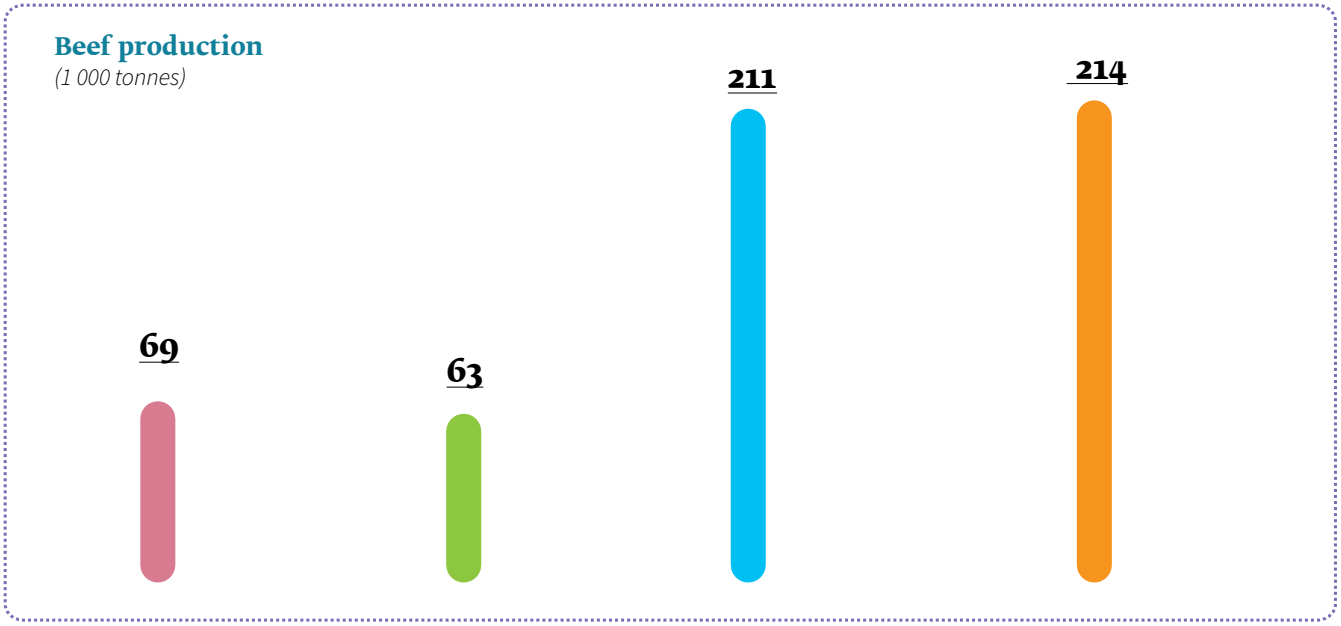
Public health

The expanded commercial ranches and the semi-intensive cattle farms employ many workers on farm, in abattoirs and associated industries. The **share of population interacting with cattle is thus significant, but zoonotic diseases and antimicrobial resistance are under control.** As the population is much better off than today, many more people consume cattle products and **food security has increased.**

Environment

High levels of production result in **large pressure on the environment**, though there have been great improvements in efficiency due to intensification. However, good rules and regulations, which are complied with, ensure **cattle production is largely sustainable. Greenhouse gas emissions per unit of produce are low** because of high efficiency in production.

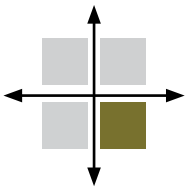




Challenges

The major challenge this scenario poses comes from the significant intensification of the cattle sector, which is dominated by ranches and semi-intensive farms. The human-cattle interactions, natural resource use and emissions related to production all happen in a much more concentrated area than before. This increases the risk of emergence and spread of diseases, and poses a challenge on natural resources and emission management. Additionally, Ugandans consume more cattle products than ever though consumer awareness about antimicrobial resistance and on the other negative effects of overconsumption of livestock products on health are likely to minimize any public health risk from livestock.

Cattle in Quinine juice



CONSUMPTION

In *Quinine juice*, Uganda is economically strong but there is high inequality in income and wealth distribution and the government is, to a large extent, inefficient. Due to the good economic performance of the country, per capita consumption of cattle products is slightly higher than today. This increase and the vast population growth result in a major increase in aggregate demand.

Per capita consumption
per year

	Today	2050
beef (kg)	6	↑

PRODUCTION

Trade

Total beef production is larger than today due to an increase in the cattle population and productivity gains in large cattle farms, which need little if any government support. However, total production is insufficient to satisfy the national demand, and Uganda is a net importer of beef and beef products.

CATTLE POPULATION AND PRODUCTION SYSTEMS

The cattle population in *Quinine juice* has marginally increased with respect to today. About 40 percent of animals are raised in commercial ranches and semi-intensive farms, which have bigger herds than today. Some feedlots have emerged. However, the pastoral and agro-pastoral production systems still dominate, jointly accounting for about 60 percent of the national herd.

PRODUCTIVITY

Productivity is relatively high in semi-intensive and ranching production systems, where farmers have not only technical and financial resources but also good political connections. Improved breeds, feed and animal health practices all contribute to improved productivity. Conversely productivity is low in pastoral and agro-pastoral systems.

Livelihoods

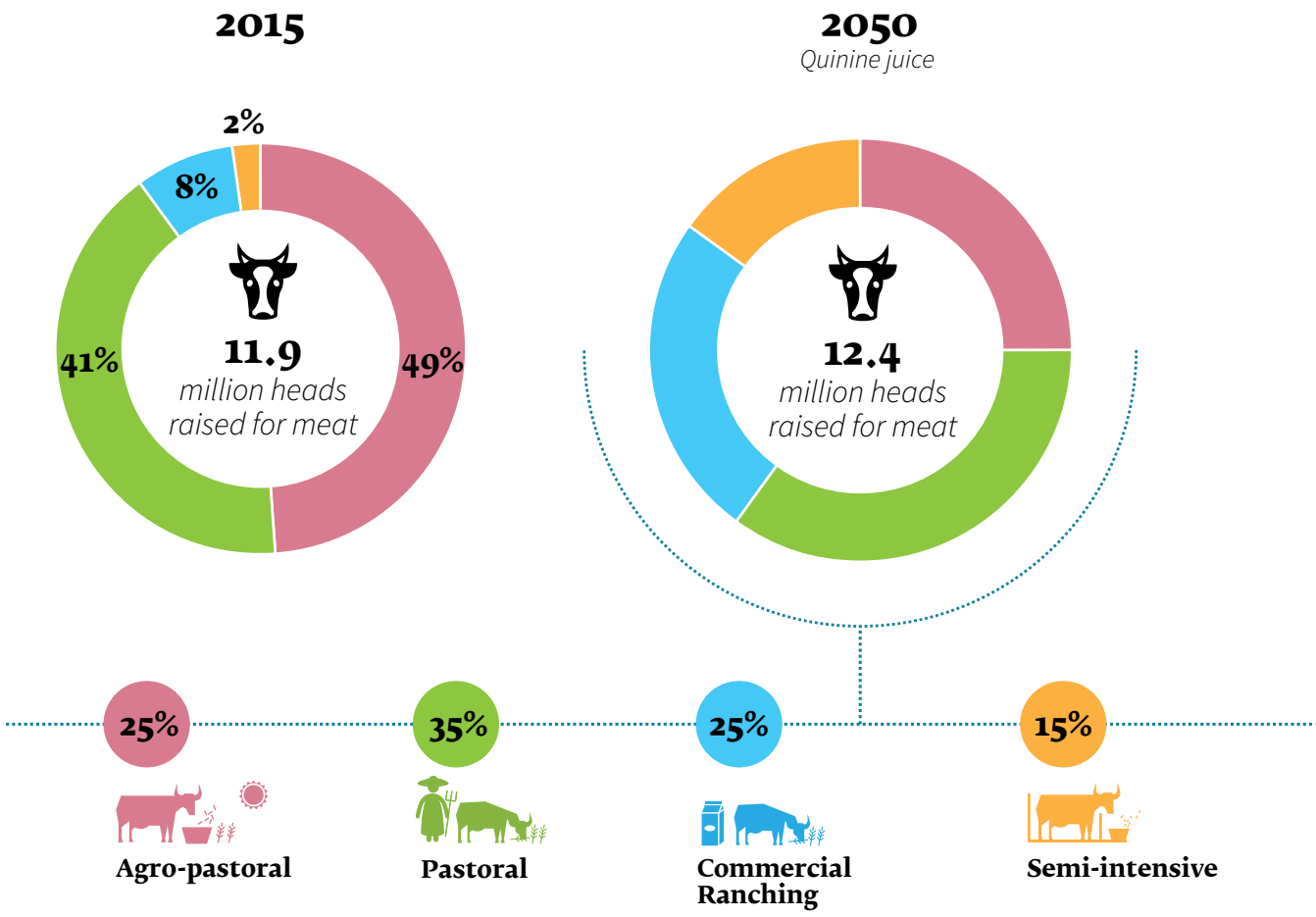
The contribution of cattle to **income and employment** has **increased in** the **semi-intensive and in commercial ranching production systems.** It is **moderate in pastoral and agro-pastoral systems**, where productivity is low. There is an increased availability of beef in the market, which **marginally contribute to food security and nutrition** because of the limited purchasing power of the typical Ugandan.

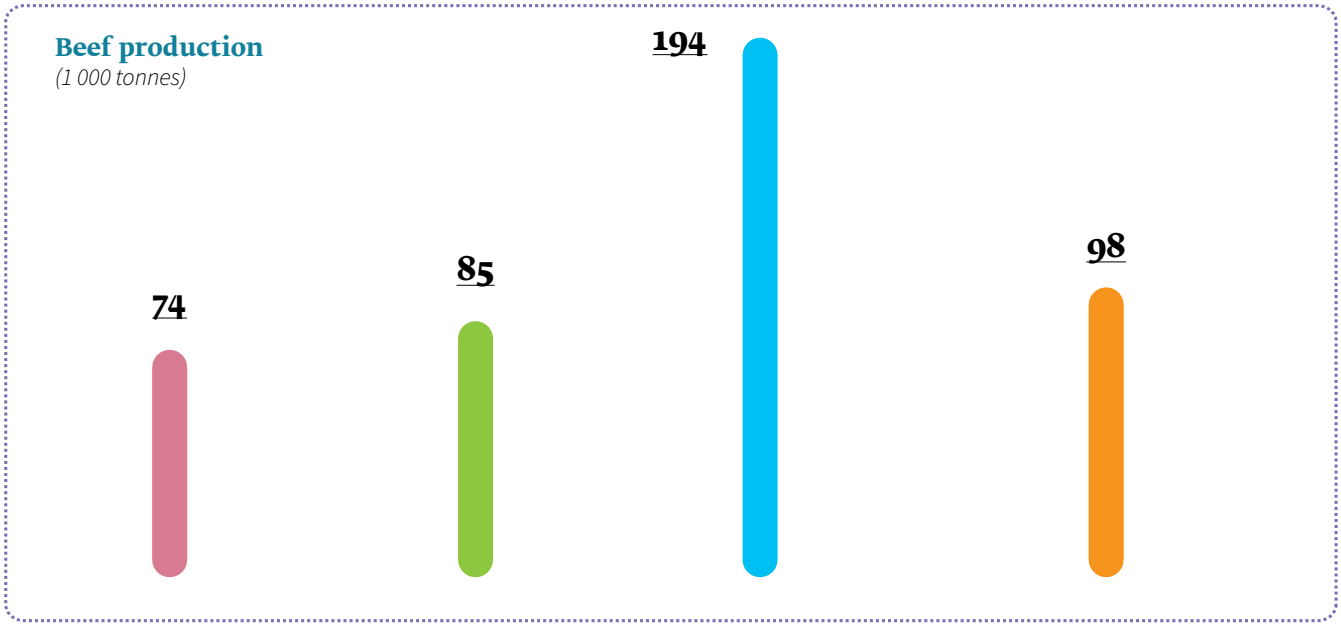
Public health

While **animal diseases** are largely **under control in semi-intensive and ranching systems,** their incidence is **high in pastoral and agro-pastoral systems** as the government is unable to provide efficient services to farmers. Farmers in semi-intensive and ranching systems have incentives to **use antimicrobials for prophylaxis and for growth promotion**, as rules and regulations are inadequate and poorly enforced. This might contribute to **antimicrobial resistance in humans.**

Environment

The large cattle population in ranching and semi-intensive systems **exercises high pressure** on natural resources, and particularly **on land and water**. This is of concern because of weak government rules and regulations. At the same time, because of the relatively high efficiency in these production systems, **greenhouse gas emissions per unit of produce are relatively low.**





Challenges

The major challenges in Quinine Juice are associated with the increase in the cattle population in ranching and semi-intensive systems and the inability of the government to support small scale producers in pastoral and agro-pastoral systems. In intensive and semi-intensive systems, human-cattle interactions, natural resource use and greenhouse gas emissions related to production all happen in a much more concentrated area than before. In extensive systems, farmers are unable to adopt good production and husbandry practices. The risk of emergence and spread of animal diseases is high, and there are challenges related to natural resources and greenhouse gas emission management.

Cattle in Cassava Republic

CONSUMPTION

Per capita consumption of beef is very low with respect to today as only few households can afford consuming livestock products on a regular basis. Almost all livestock products are traded in informal markets and citizens are poorly aware of food safety issues, such as foodborne diseases and antimicrobial resistance.

Per capita consumption
per year

	Today	2050
beef (kg)	6	↓

PRODUCTION

Trade ↘

Total beef production is lower than today and unable to satisfy the domestic demand. Both imports and exports of cattle products have reached lowest-ever level. The cattle value added as percent of agriculture has declined significantly, with staple crops contributing the most to the value of agricultural production.

CATTLE POPULATION AND PRODUCTION SYSTEMS

There are 10 million heads of beef cattle in Cassava Republic. The agro-pastoral production system dominates, accounting for over 67 percent of the national herd, followed by the pastoral production system (20 percent). The semi-intensive and ranching production systems are marginal. In all production systems the average herd is smaller than is today, due to the weak economy and the ineffective government.

PRODUCTIVITY

Productivity has deteriorated in all cattle production systems. Feed resources are degraded, and grazing is the predominant feeding system: animals browse whatever is available on degraded pastures, crop aftermath and roadsides. Water is not readily available from natural as well as constructed sources. Milk yield, offtake rate and carcass weight are low.

Livelihoods

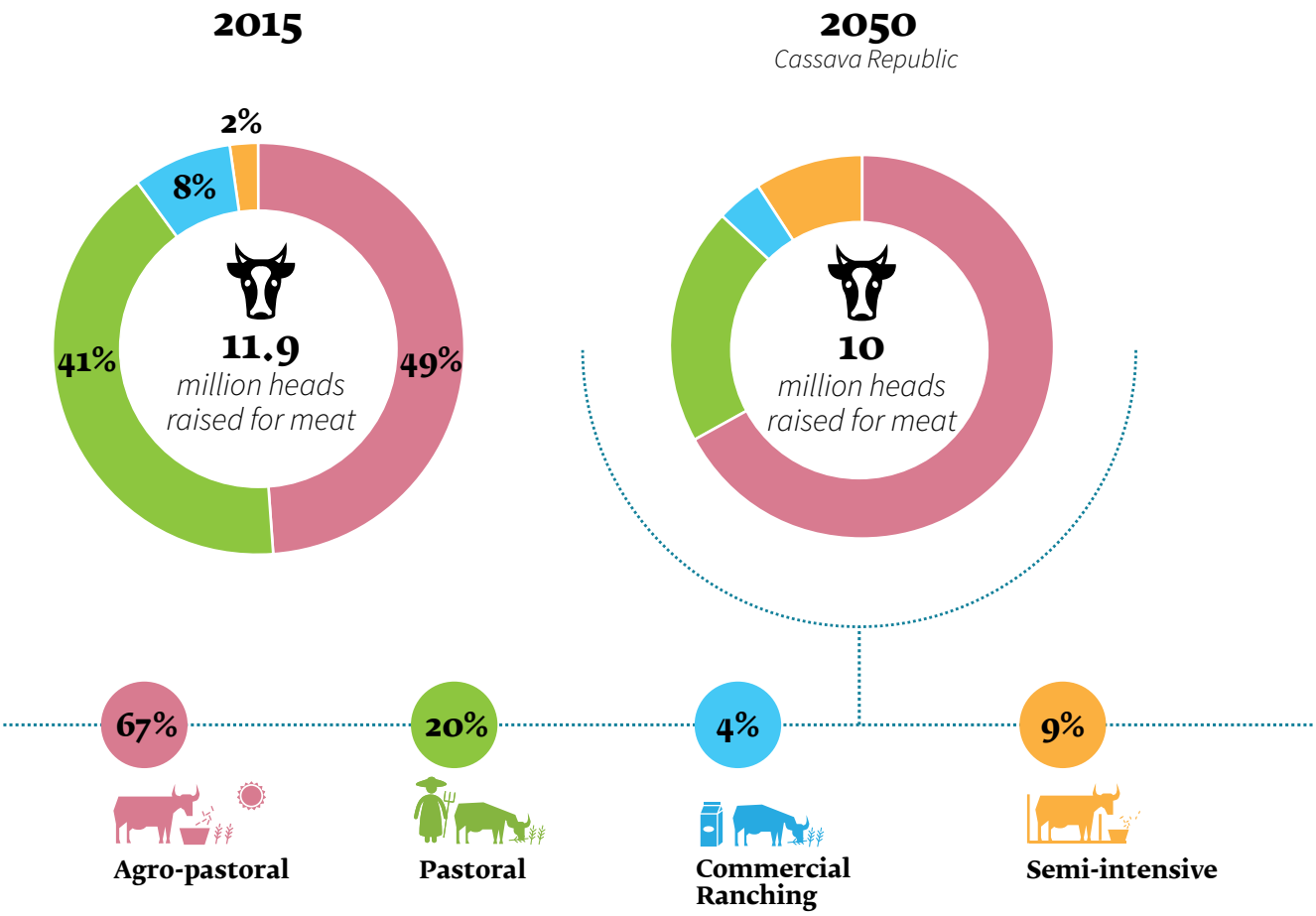
There is a significant number of **cattle keeping households,** who are however **poor and subsistence oriented.** Cattle remain one of the few livelihood options for many households in rural areas. There are few commercial ranches and few semi-intensive producers and, therefore, limited employment opportunities along the cattle value chain. **The contribution of the cattle sector to the national and the household economy is limited.**

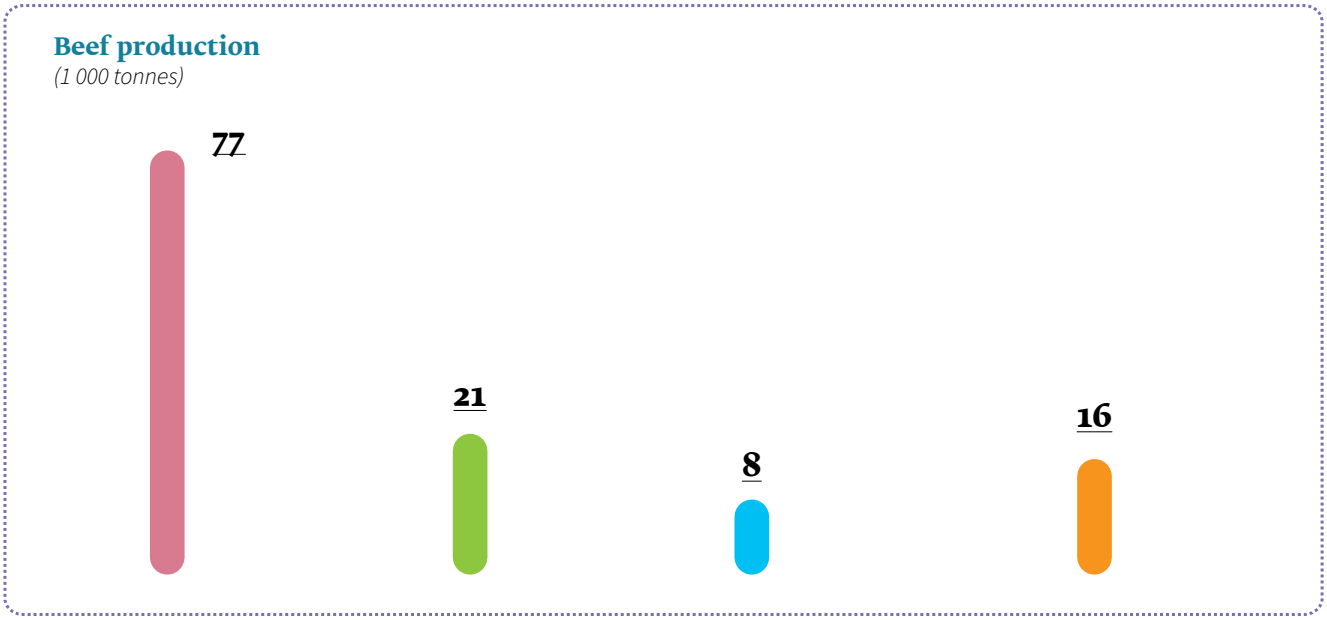
Public health

The **risk of outbreaks and spread of zoonotic diseases** is high due to the large animal and human populations, poor production practices, widespread informal markets, and high levels of undernourishment. While there is **risk of inappropriate use of antimicrobials in animal farming,** a badly performing economy makes them poorly available on the market.

Environment

The **negative impact of cattle production on land, water and biodiversity is high** due to rudimentary production practices and poor natural resource management. **Total greenhouse gas emissions from cattle systems is modest** due to the contraction in the cattle population but there is **high emission per unit of product** as productivity is low. Overgrazing and poor natural resource management plans reduce biodiversity.





Challenges

Major challenges in Cassava Republic include the massive increase in human population and the expansion of poorly productive agro-pastoral and pastoral systems. There are high risks of outbreaks of zoonoses and (re)-emerging zoonotic diseases, in the face of extremely weak public animal health services, and of livestock-related land degradation. In addition, the expansion of the informal sector makes animal disease surveillance and control difficult. The low consumption of animal source foods contributes to food insecurity and decreases the resilience of the population to diseases.

Cattle in Drained pearl

CONSUMPTION

In Drained pearl per capita consumption of beef is lower in comparison with today. Many people consume more white meat, a cheaper source of protein. The aggregate consumption for cattle products is however high because of the large Ugandan population in 2050.

Per capita consumption
per year

	Today	2050
beef (kg)	6	↓

PRODUCTION

Trade ↘

Uganda produces about 187 000 tonnes of beef in 2050, vis-à-vis 154 000 today. Production levels, however, are not able to meet consumers' demand and the country is a net importer of beef and of any other livestock products for that matter.

CATTLE POPULATION AND PRODUCTION SYSTEMS

The number of cattle in the country stands at 11.9 million heads, which is not different than today. The agro-pastoral system dominates the production landscape in terms of number of animals (62 percent), followed by the pastoral, the semi-intensive and the ranching systems. The agro-pastoral system contributes the most to total production (53 percent) followed by the commercial ranching (19 percent) and the semi-intensive (16 percent) systems.

PRODUCTIVITY

The weak economy does not allow high levels of cattle productivity. However, in semi-intensive systems the share of productive crossbred animals has increased with respect to today, because less animals are used for draft power due to shrinking land area and because farmers wish to increase productivity to satisfy the growing demand of animal source foods.

Livelihoods

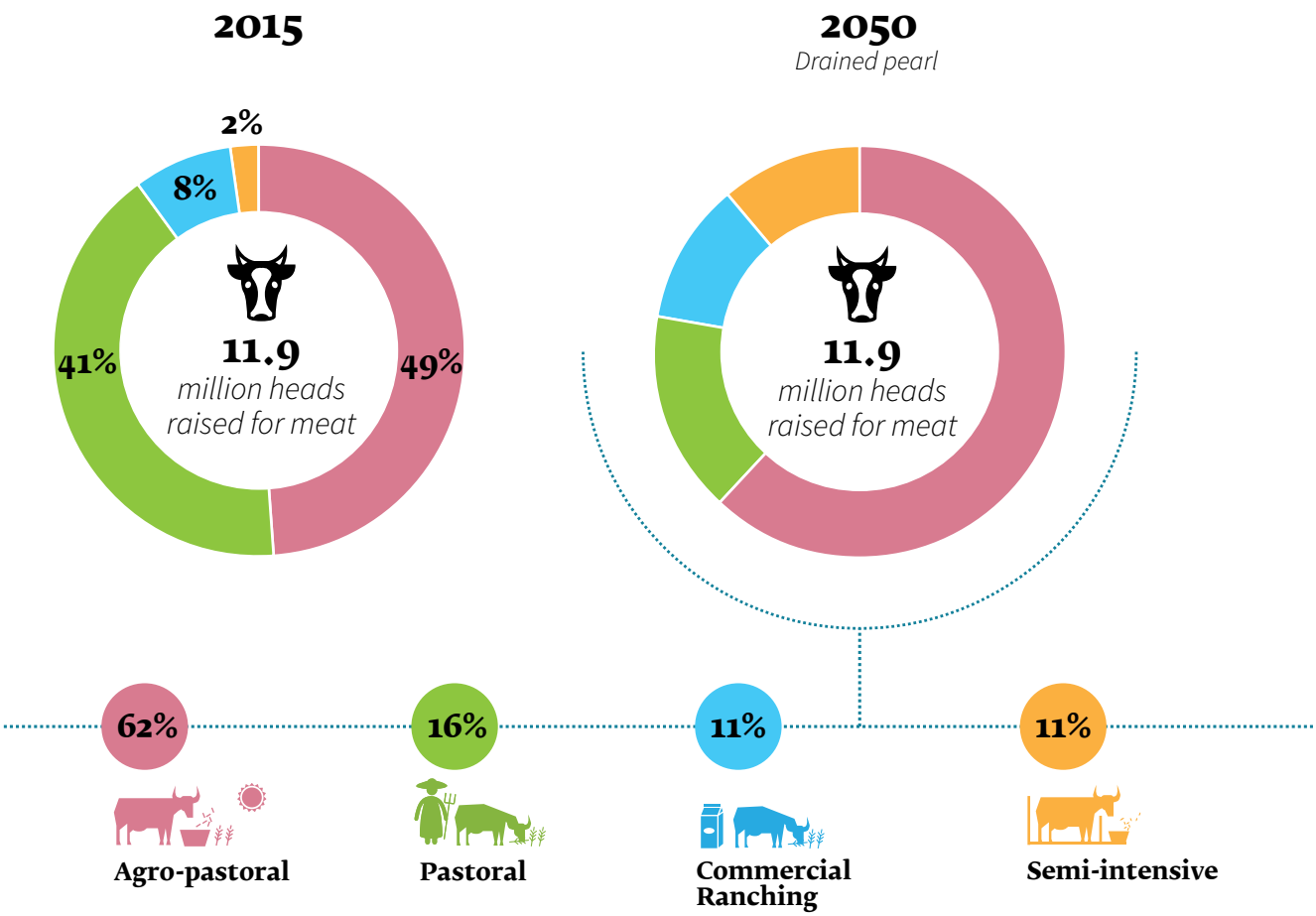
The number of households keeping cattle has increased in absolute and decreased in relative terms with respect to today. The agro-pastoral system dominates. **Household income from livestock activities is moderate** for agro pastoralists and pastoralists, because of the weak economy and significant challenges in accessing productive inputs. There are, however, **thousands of people employed in cattle value chains** serving urban areas.

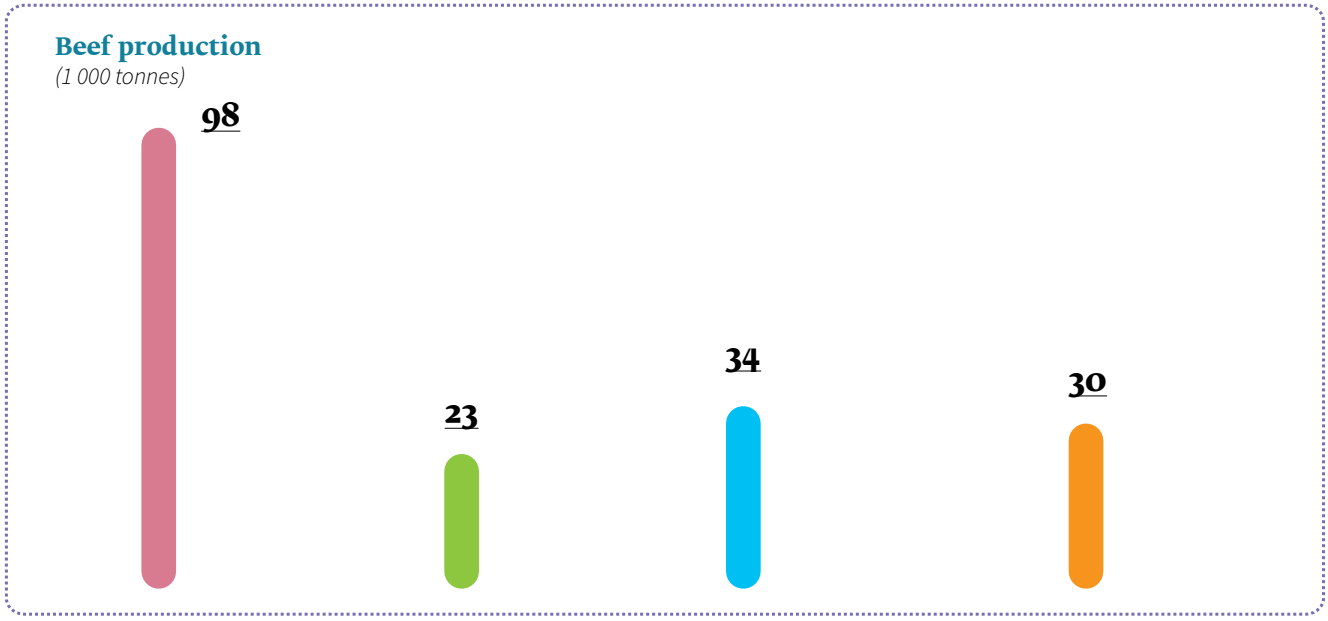
Public health

The **large number of cattle** and cattle keepers and a **large human population** make the **risk of zoonotic disease outbreaks** high. Farmers have incentives to **use antibiotics for disease prevention**, particularly in peri-urban farms around densely populated cities. However, as the share of people consuming cattle products is limited, **the risk of food-borne diseases is moderate.** It is also mitigated by a good governance system.

Environment

The **cattle population continues exerting an enormous pressure on land and water resources,** also threatening biodiversity. As productivity is relatively low, with most animals raised in agro-pastoral and pastoral systems, the cattle sector's **contribution to greenhouse gas emissions is high.** There are some improvements in terms of GHG emissions per unit of output in a growing number of middle scale efficient farms, largely located in peri-urban areas.





Challenges

A large cattle population in a weak economic system, with little finance available, makes it challenging even for an efficient government to ensure sustainability in livestock production. In particular, the fast expansion of agro-pastoral and mixed farms, particularly around increasingly populated cities, results in fierce competition to access natural resources, such as land and water, increased risks of pollution of soil and water, inappropriate use of antibiotics, and frequent outbreaks and spread of zoonotic diseases. However, due to the good governance, foreign aid is available for development initiatives as well as in case of environmental and public-health related crises.

Uganda in 2050: poultry scenarios

The alternative futures of Uganda will shape the development of its poultry sector. Different futures will result in different poultry production systems and value chains and in diverse impacts on livelihoods, the environment and public health.

Poultry in Gifted by nature

CONSUMPTION

With respect to today there is tremendous improvement in annual per capita consumption of chicken meat, which has reached 6.5 kg per year in Gifted by nature. In aggregate terms, over 659 000 tonnes of chicken meat are available for human consumption. Majority of households regularly consume chicken meat and eggs, which contributes to food security and nutrition.

Per capita consumption
per year

	Today	2050	
chicken meat (kg)	0.8	6.5	↑

PRODUCTION

Trade

Chicken meat production has increased eleven-fold with respect to today, from 60 to over 569 thousand tonnes. Uganda is a net exporter of poultry products, which contributes to a positive trade balance.

POULTRY POPULATION AND PRODUCTION SYSTEMS

The chicken population has reached 187 million birds in 2050, vis-a-visa 37 million today. The intensive and semi-intensive production systems dominate. Sixty and 30 percent of all chicken are raised in intensive and semi-intensive production systems, respectively, which contribute about 97 percent to the national production. The free-range system is marginal, as households can easily purchase affordably price poultry products in both urban and rural markets and have thus little incentives to raise their own birds.

PRODUCTIVITY

Poultry productivity is very high, due to investments in housing, biosecurity practices, feeding and animal health. In addition, the government has passed and ensure compliance of good rules and regulations that ensure the sustainability of poultry production. Because of high per capita incomes and an effective government, productivity is high also in the free-range system, where farmers continue keeping indigenous birds.

Livelihoods

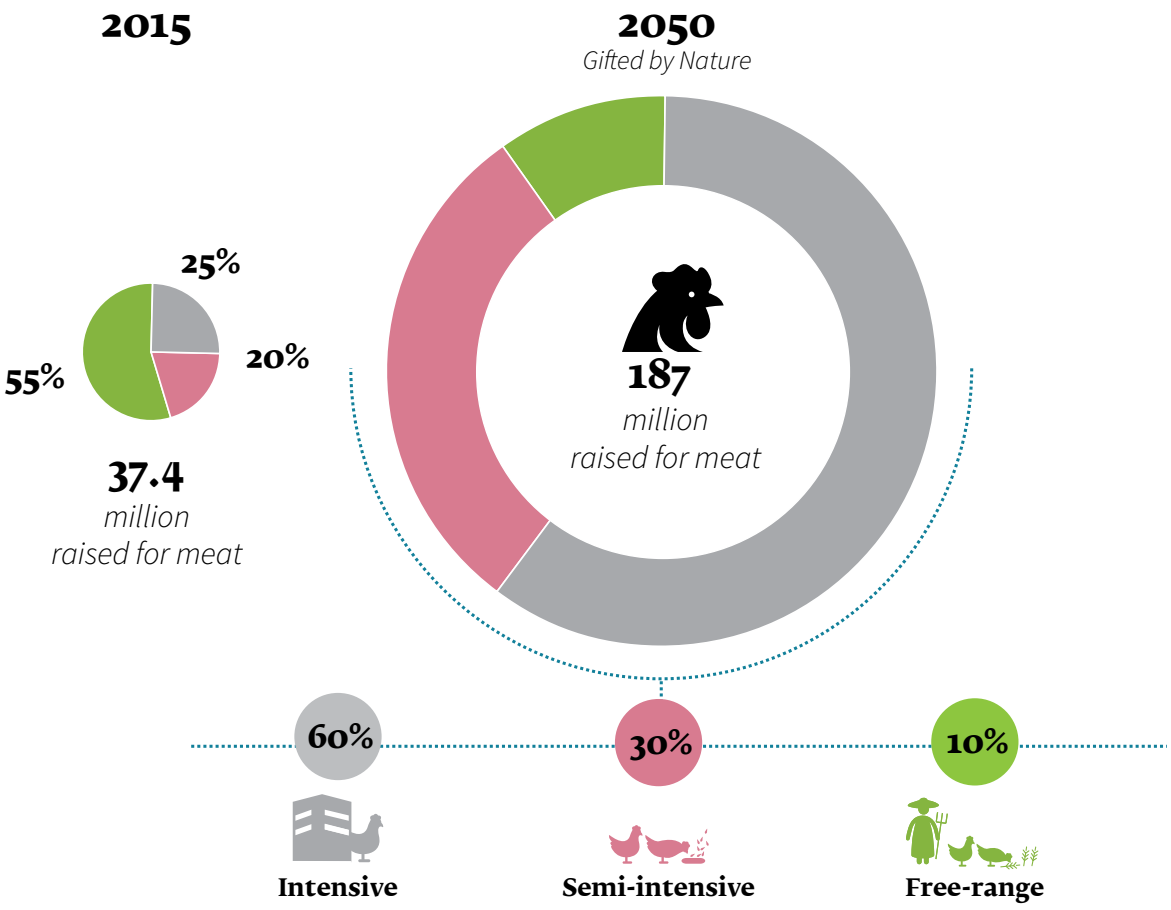
A small share of the population own poultry. Many farmers have exited agricultural self-employment to **well-paid salary** jobs in semi-intensive and intensive poultry farms as well as along the value chain. Some, however, have been unable to find alternative employment opportunities and struggle survive. The existing few smallholder farmers derive a significant livelihood from their poultry as indigenous birds receive a price premium on the market as highly valued by consumers.

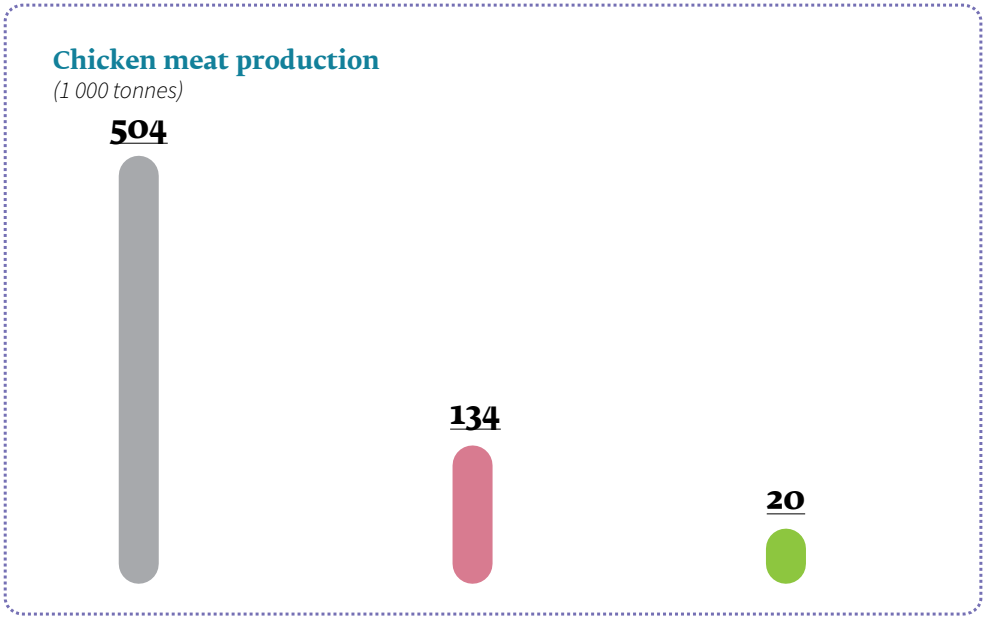
Public health

The expanded commercial poultry sector employs many workers on the farm, in processing plants and in associated industries. The **number of people interacting with poultry is thus significant,** but **zoonotic diseases and antimicrobial resistance are under control.** As the population is much better off than today, a large share of the population people consume chicken meat and eggs and **food security is high.**

Environment

The tremendous increase in poultry production and the fact that most chicken are raised in intensive systems result in a **large pressure** on the environment. On the one hand, concentration of birds in a limited area have negative impacts **on soil and water** quality; on the other hand, the increased demand for poultry feed contribute to **increased greenhouse gas emissions** from the sector.





Challenges

The major challenge this scenario poses comes from the significant intensification of the poultry sector, which is dominated by intensive and semi-intensive farms. The human-poultry interactions, natural resource consumption and emissions related to production, all happen in a much more concentrated area than before. This changes the dynamics of the risk of outbreak and spread of diseases, including emerging infectious diseases, and poses challenges for natural resources and greenhouse gas emission management. Ugandans consume more poultry products than ever but efficient production systems as well as consumer awareness about antimicrobial resistance are likely to minimize any public health risk.

Poultry in Quinine juice

CONSUMPTION

In Quinine juice the economy is strong but there is high inequality in income and wealth distribution and the government is to a large extent ineffective. Poultry being a cheap source of protein, consumption of chicken meat has however reached 2 kg per capita per year, vis-à-vis less than 1 kg today. Aggregate consumption of chicken meat has thus increased much with respect to today.

Per capita consumption
per year

	Today	2050	
chicken meat (kg)	0.8	2	↑

PRODUCTION

Trade

In 2050, production of chicken meat is around 12 times higher than today, reaching over 720 000 tonnes. This not only supports relatively higher consumption levels than today, though a significant share of the less well-off cannot afford consuming poultry products, but also allows Uganda to be an exporter of poultry products, in line with government policy priorities.

POULTRY POPULATION AND PRODUCTION SYSTEMS

The poultry sector is dominated by few intensive integrators that have enough capital and technical capacity to flourish even though the governance system is ineffective. In Quinine juice over 70 percent of all chicken are raised in intensive systems, which account for over 92 percent of the national production. The semi-intensive production system comes second, accounting for 25 percent of all chicken and 17 percent of the national production. The free-range system has almost disappeared in relative terms.

PRODUCTIVITY

Productivity is high in intensive and semi-intensive production systems, because of targeted investments in genetics, feeding and animal health. Productivity is very low in free-range systems as the government is unable to provide adequate services to small scale producers.

Livelihoods

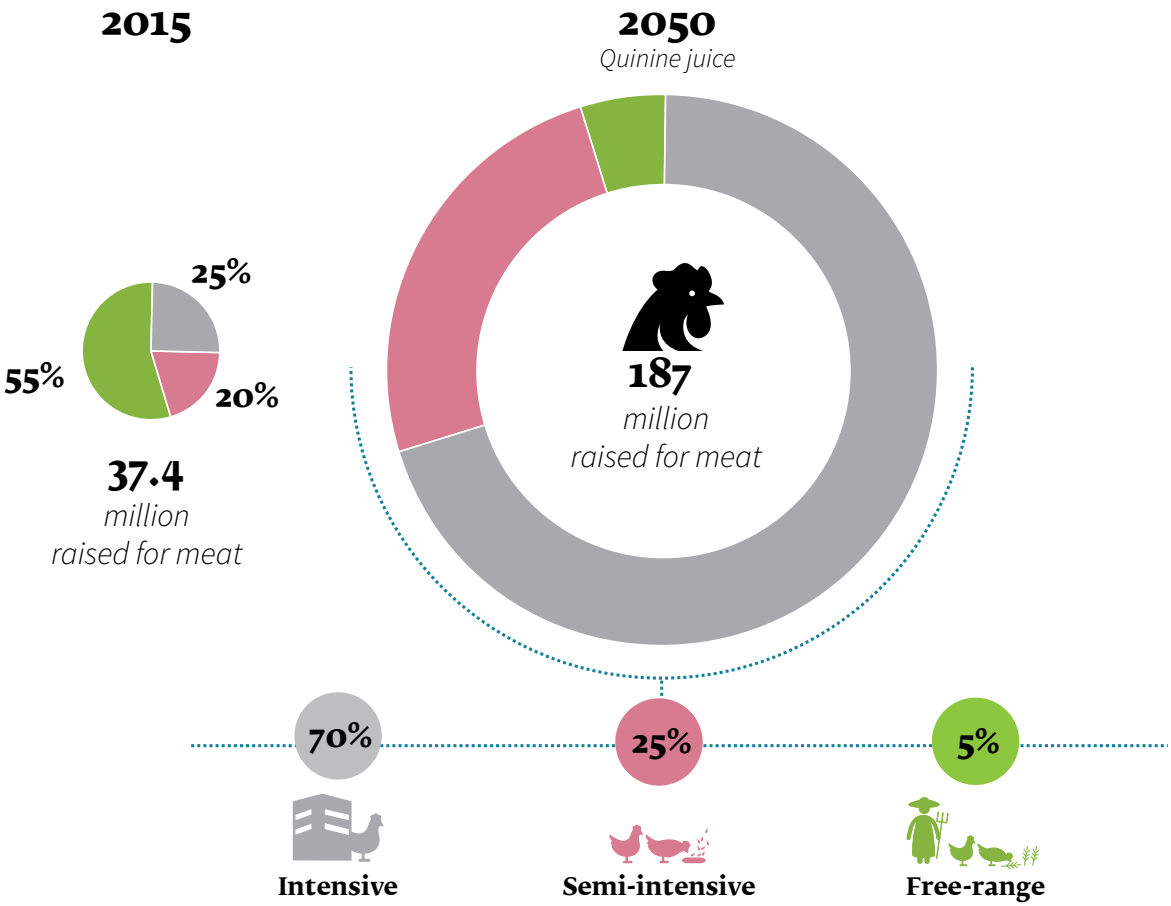
A **few households** are partly or fully **dependent on poultry for their livelihoods.** A number of **jobs** are available in intensive and **semi-intensive production systems and along the value chain**, but **wages are low** and working conditions often poor as the government is unable to monitor the enforcement of labor laws and regulations.

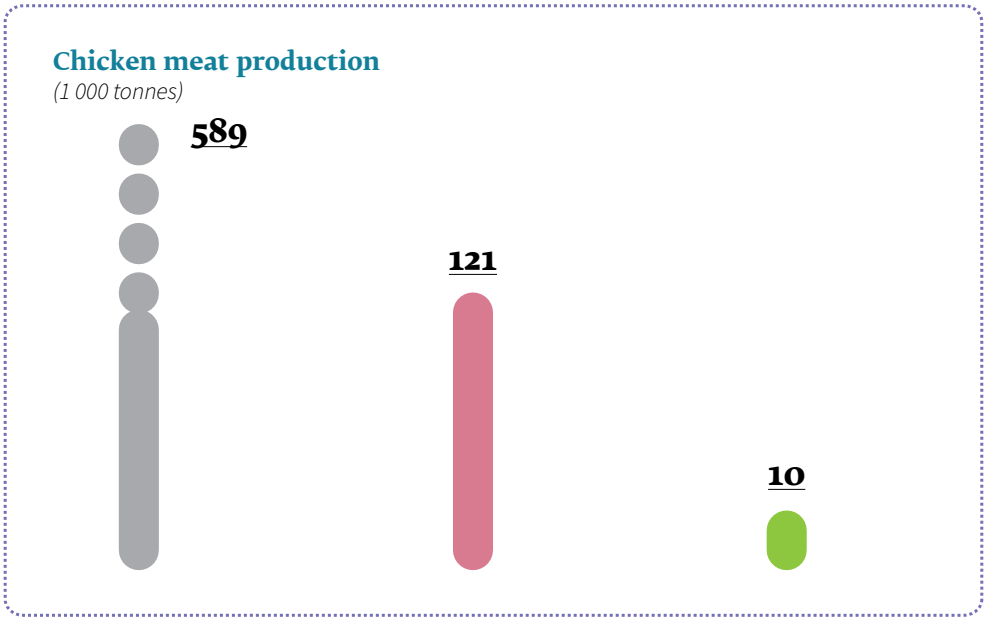
Public health

The **risk of outbreaks of zoonotic diseases is high in free-range and semi-intensive systems,** as the government is unable to provide services to farmers. It is lower in intensive production systems where, however, **farmers have high incentives to use antibiotics** for disease prevention and growth promotion, which contributes to **antimicrobial resistance in humans.**

Environment

The huge increase in the poultry population exercises **enormous pressure on environmental resources,** both because of the water requirements of feed production and nutrients overload due to **inappropriate waste management practices.** The increase demand for feed from the poultry industry results in **high greenhouse gas emissions** from the sector.





Challenges

The major challenge in Quinine juice is associated with the massive increase of the chicken population in intensive production systems in a weak policy and institutional system. The human-chicken interactions, use of natural resources and greenhouse gas emissions related to production all happen in a much more concentrated area than before. This vastly increases the risk of emergence and spread of animal diseases, including zoonoses, and poses a challenge on natural resources and greenhouse gas emission management. Public and animal health services are poor due to weak governance, which risks further increasing the negative impact of poultry on the environment and public health.

Poultry in Cassava Republic

CONSUMPTION

Per capita consumption of chicken meat is lower than today as only few households can afford consuming poultry products on a regular basis. Almost all poultry products are traded in informal markets and citizens are hardly aware of any food safety issues, such as of foodborne diseases and antimicrobial resistance.

Per capita consumption
per year

	Today	2050
chicken meat (kg)	0.8	0.5 ↓

PRODUCTION

Trade

Total chicken production is lower than today and insufficient to satisfy the domestic demand. Imports of poultry products have thus increased. The poultry value added as percent of agriculture has declined significantly, with staple crops contributing the most to the value of agricultural production.

POULTRY POPULATION AND PRODUCTION SYSTEMS

The national chicken flock is over 51 million in 2050 birds vis-à-vis 38 million today. The free-range poultry production system is the dominant one, accounting for 87 of all chicken and about 82 percent of all chicken meat production. Intensive and semi-intensive production systems account for 3 and 10 percent of the chicken population, respectively, and together for about 18 percent of the national chicken meat production.

PRODUCTIVITY

Productivity is very low, because of lack of both public and private investments in the sector. In addition, most of chicken and poultry products are traded informally along uncompetitive value chains, with negative consequences on the safety and quality of chicken meat and eggs.

Livelihoods

A large number of households keep chickens. **Poultry**, however, **marginally support livelihoods** because of small flock sizes and limited productivity. Reduced per-capita consumption of chicken meat and eggs contributes to **food security and malnutrition,** both in rural and urban areas.

Public health

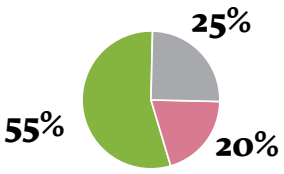
The **risk of zoonotic disease outbreak and spread is high** due to increase in both the poultry and human population in a poorly ruled country. Farmers have incentives to make use of **antimicrobials for disease prevention** though these, in many cases, are not readily available on the market.

Environment

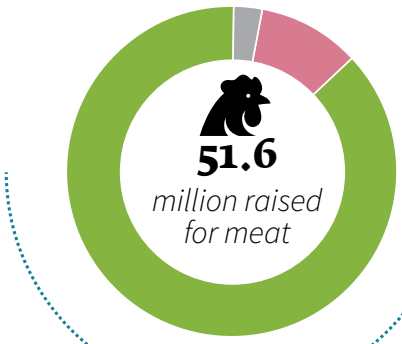
The **impact** of the poultry sector **on the environment is limited,** as scavenging birds have minor if any negative impacts on soil, water and air. However, **intensive and semi-intensive chicken farms heavily pollute soil and water** as the government is unable to design and monitor compliance with waste management rules and regulations.

2015

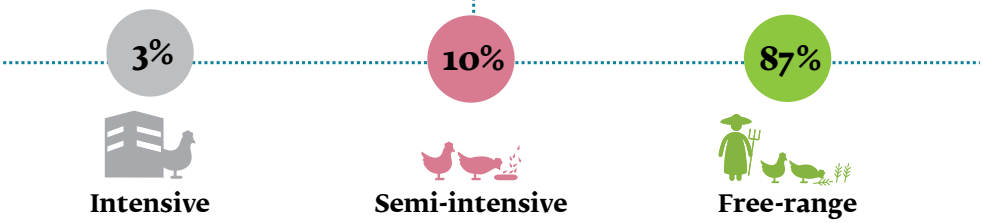
2050
Cassava Republic



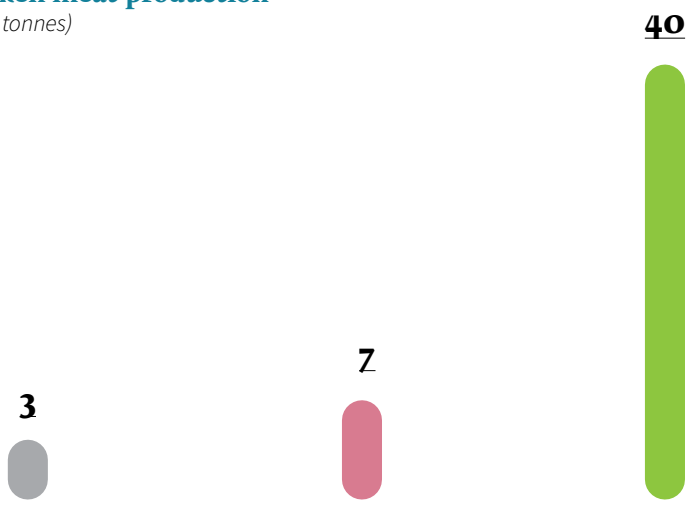
37.4
million
raised for meat



51.6
million raised for meat



Chicken meat production
(1 000 tonnes)



Challenges

Major challenges in Cassava Republic include the massive increase in human population and the expansion of the free-range production systems accompanied with declining productivity; increased risks of (re)-emerging zoonotic diseases, because of extremely weak public animal health services. In addition, the expansion of the informal sector makes disease surveillance and control a challenge. The low consumption of poultry products, and of other animal source foods more in general, contributes to food insecurity and decreases the resilience of the population to animal diseases.

Poultry in Drained pearl

CONSUMPTION

Per capita consumption of chicken meat is not signicantly different than today. A large share of people consume chicken meat, and poultry products more general as they are one of the cheapest sources of protein. The aggregate demand for chicken meat is higher than today because of the larger Ugandan population.

Per capita consumption
per year

	Today	2050	
chicken meat (kg)	0.8	0.8	=

PRODUCTION

Trade

Chicken meat production has increased by a quarter with respect to today, reaching over 75 000 tonnes in 2050. The country, however, is not able to meet the national demand and is a net importer of poultry products.

POULTRY POPULATION AND PRODUCTION SYSTEMS

The total number of chicken has reached 66 million vis-à-vis 38 million today (+ 76 percent). Over three quarters of the birds are kept in free-range systems, which contribute about 60 percent to the national production. The intesive production system has reduced in size and represents about 8 percent of the national flock, contributing about 14 percent to the national production.

PRODUCTIVITY

The weak economy does not allow high level of productivity in poultry production and along the value chain. Farmers lack resources to adopt good production and husbandry practices and value chains are poorly performing. The lack of finance makes it challenging even to comply with existing rules and regulations, which further limits productivity.

Livelihoods

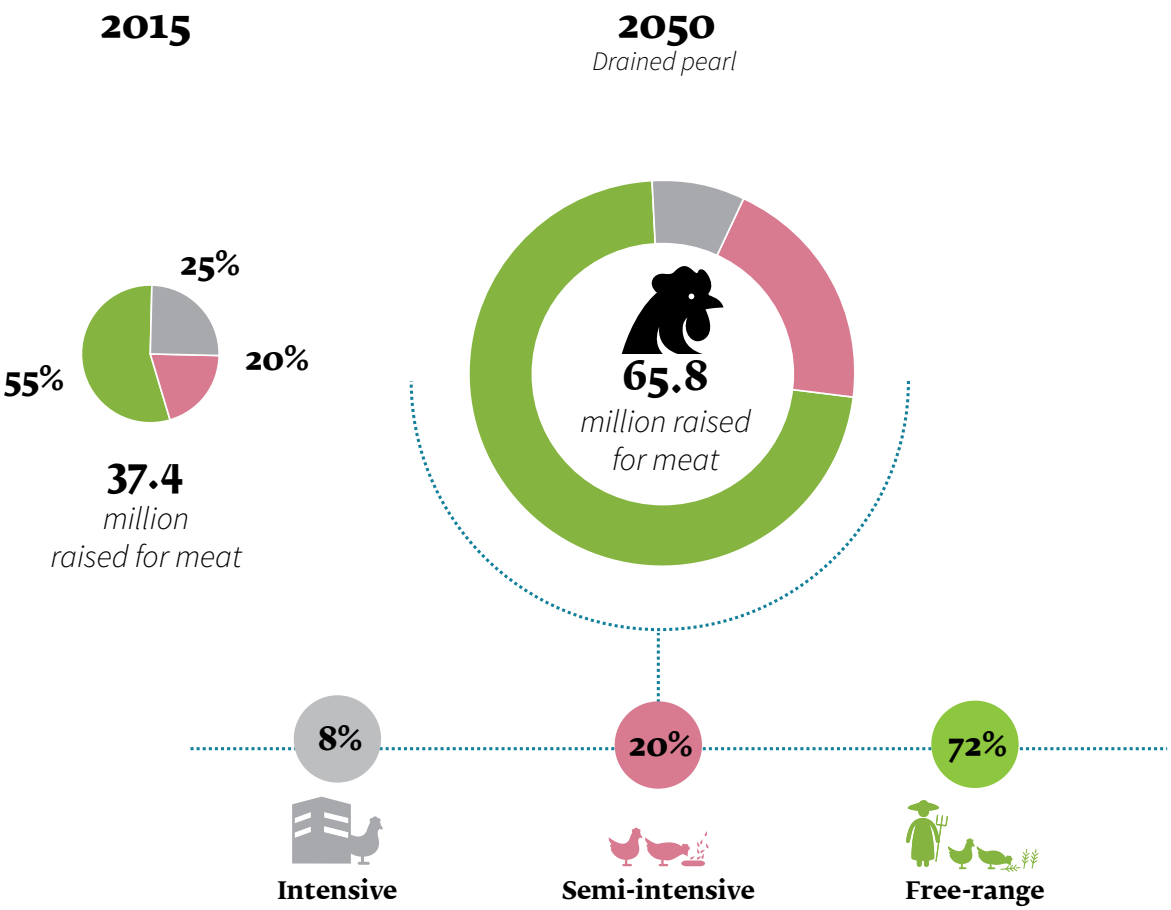
A large the number of households keep poultry in free-range and semi-intensive production systems. **Income from poultry has not changed or marginally decreased with respect to today** and the intensive and semi-intensive systems have not created many jobs. Rules and regulations are often poorly enforced, with **negative impacts on food safety and quality.**

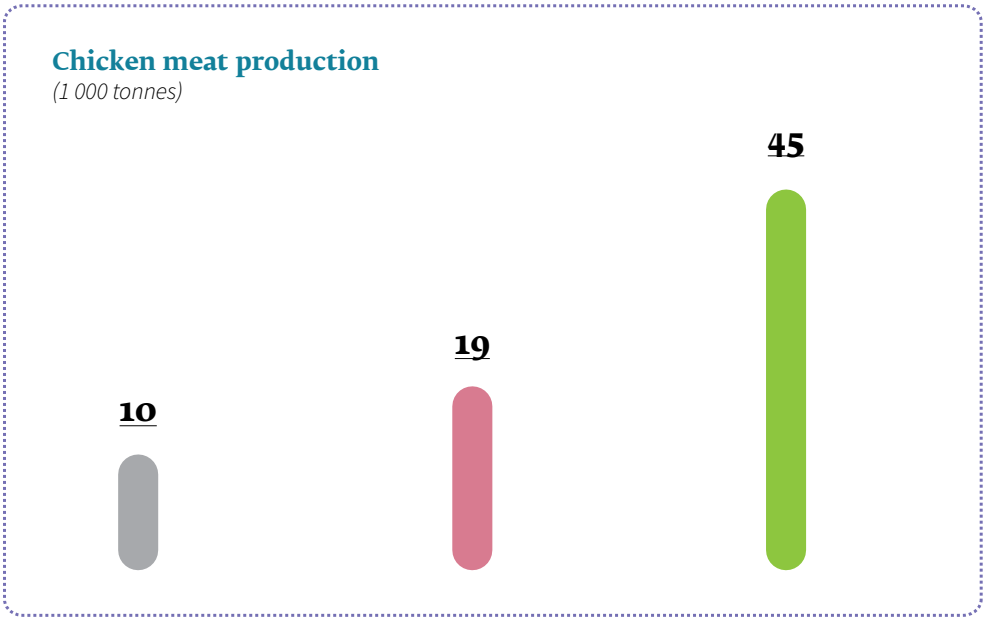
Public health

The **large number of poultry** and poultry keepers and a **large human population** result in high **risk of zoonotic disease outbreaks.** Farmers have incentives to use **antibiotics for disease prevention,** particularly in peri-urban farms around densely populated cities. However, as only part of the population consumes poultry products on a regular basis, **the risk of food-borne diseases is moderate** and also mitigated by a good governance system.

Environment

There is **limited impact of the poultry sector on the environment,** as most of chicken scavenge. However, the difficulty for the government to enforce existing rules and regulations might result in poor waste management practices **in semi-intensive and intensive production systems, with negative impacts on soil and water.**





Challenges

The larger poultry population in a weak economic system, with little finance available, makes it challenging even for an efficient government to ensure sustainability in poultry production. In particular, the expansion of the free-range and the semi-intensive production systems, including around or in increasingly populated cities, results in increased risk of emergence and spread of zoonotic diseases and the use of antibiotics for disease prevention. Due to the good governance, foreign aid continues to be available for development initiatives as well as in case of environmental and public-health related crises.

Conclusion

Stakeholders should ensure that policies and programmes effectively deal with zoonoses, emerging infectious diseases and natural resource use along the livestock value chains serving urban areas. This is essential for a sustainable livestock in the future.

Opportunities and challenges

The coming growth and transformation of the livestock sector will have major consequences on Uganda's society in the next decades. As part of the future remains unpredictable, however, it is difficult to anticipate how the livestock sector will eventually affect people's livelihoods, the environment and public health in 2050. Portraying alternative development pathways for Uganda and its cattle and poultry sectors, by shedding light on the multitude of future opportunities, challenges and threats, assists in strategically designing policies that are more resilient to an uncertain future.

Livelihoods



- In the future, livestock farmers and other actors along the livestock value chains will face expanding business opportunities, because of the growing demand for animal source foods.
- Smallholder farmers will find it increasingly challenging to derive a livelihood from livestock, because of increased competition to access scarce natural resources and inability to meet food safety standards.
- Many smallholders will exit the livestock sector and, in many cases, will move from rural to urban areas in search for employment opportunities.
- If the livestock sector develops sustainably, consumers will be better nourished and food secure because of the increased availability of affordably-priced animal source foods in the market.

Public health



- Expansion of the livestock herd will result in growing demand for and pressure on land for pastures and feed, and in an increased demand for water at farm level and in industries along the value chain.
- Pressure on natural resources will be particularly high in peri-urban areas, where the growing animal and human populations will compete to access scarce natural resources.
- Livestock intensification and concentration might result in increased risk of point source pollution of soil and water and in biodiversity losses.
- A larger herd size, if unproductive, will result in increased greenhouse gas emissions from livestock, exacerbating the negative impacts of livestock on climate change.

Environment

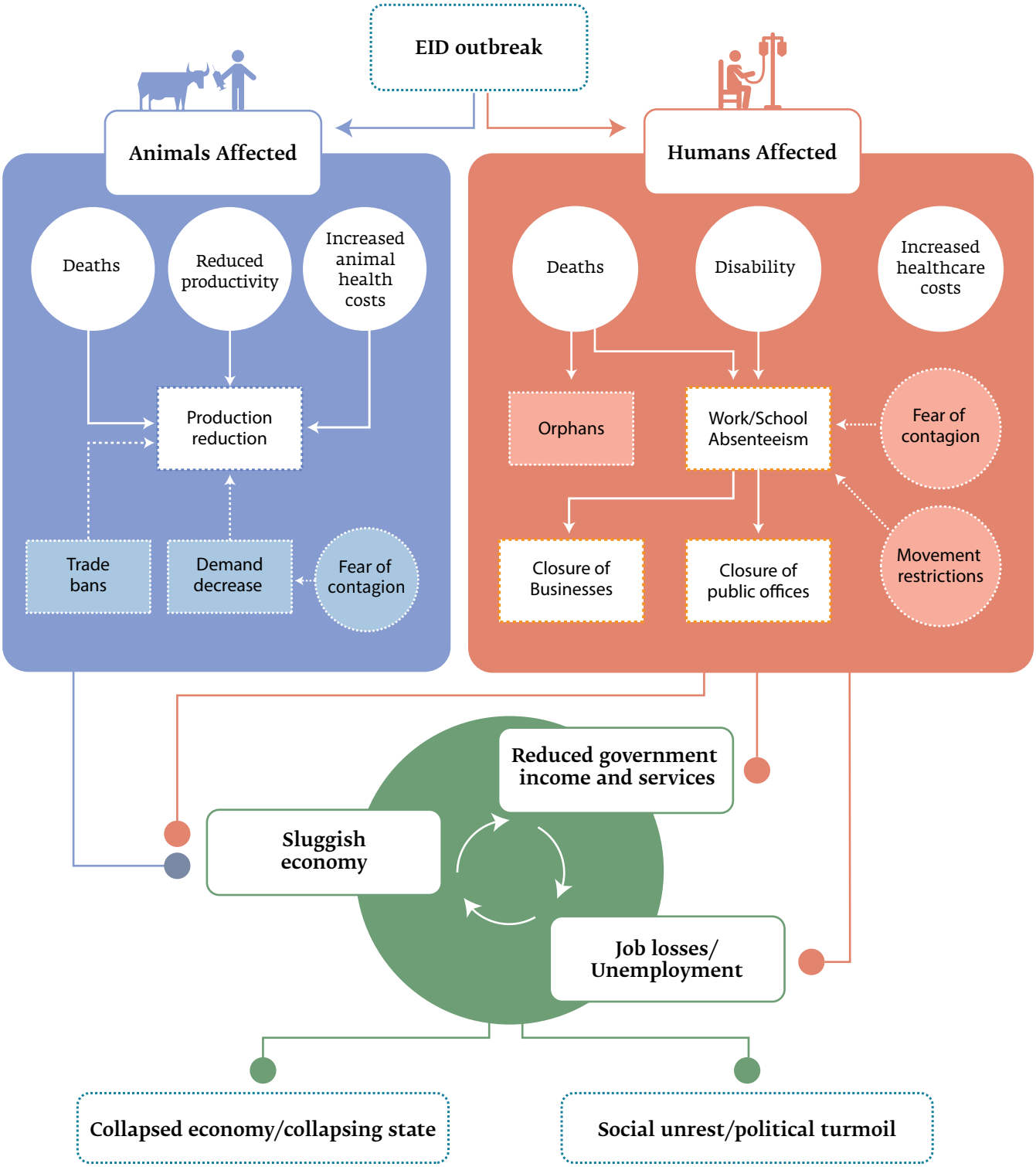


- The future will be characterized by an increased risk of outbreaks of zoonotic diseases, including emerging and re-emerging infectious diseases (EIDs). The growing animal and human populations, in fact, will result in novel interactions between humans, animals and wildlife. This holds particularly true along value chains serving expanding urban and peri-urban areas.
- There will be increased risk of livestock-driven antimicrobial resistance in humans, with the associated negative impact on society. Either because of stiffer competition or because of the increased risk of zoonotic diseases, farmers will be tempted to imprudently use antibiotics not only to treat sick animals but also as growth promoter and/or for prophylaxis.

The magnitude of the future livestock-related livelihoods, environment and public health challenges will vary in the different 2050 scenarios. However, two elements deserve closer scrutiny, including the **increased risk of outbreaks of emerging and re-emerging infectious diseases** and the ongoing **rapid urbanization.**

EMERGING AND RE-EMERGING INFECTIOUS DISEASES (EIDs)

An outbreak of an emerging infectious disease (EID) originating in domestic and/or wild animals and that jumps to humans might not only negatively impact the livestock sub-sector, but also result in a high human death toll with broader disruptive impact on society, such as through reduced people's movement, work absenteeism, closure of businesses and schools, children losing parents, trade bans, reduction in foreign direct investments, etc. Eventually, EIDs might trigger social unrest and destabilize governments by eroding public trust and confidence and, when spreading rapidly across countries, regions and continents, they can even turn into worldwide pandemics.

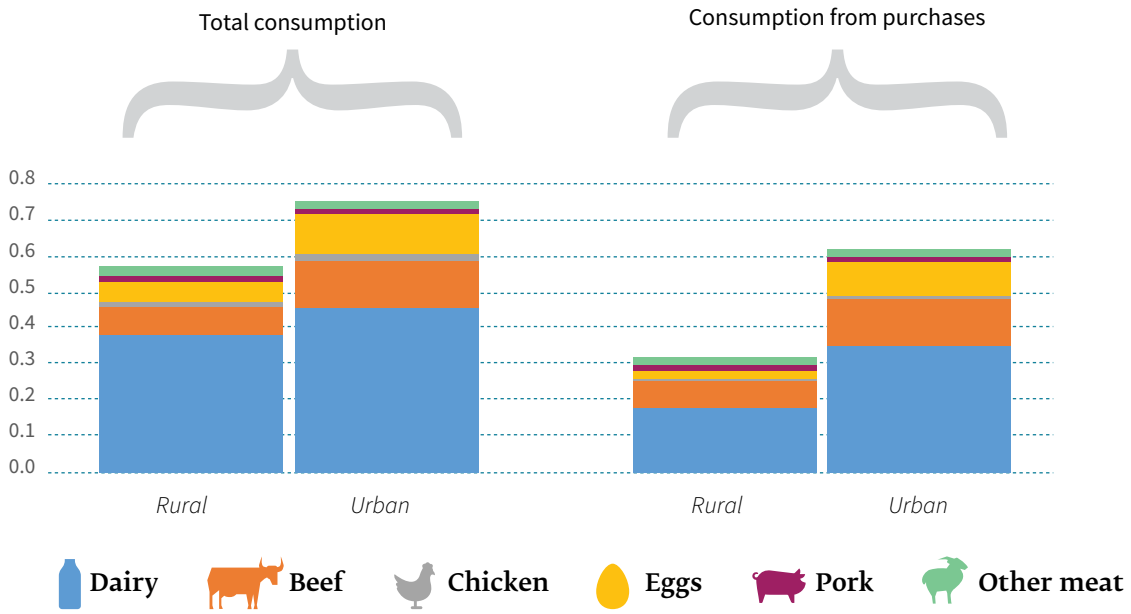


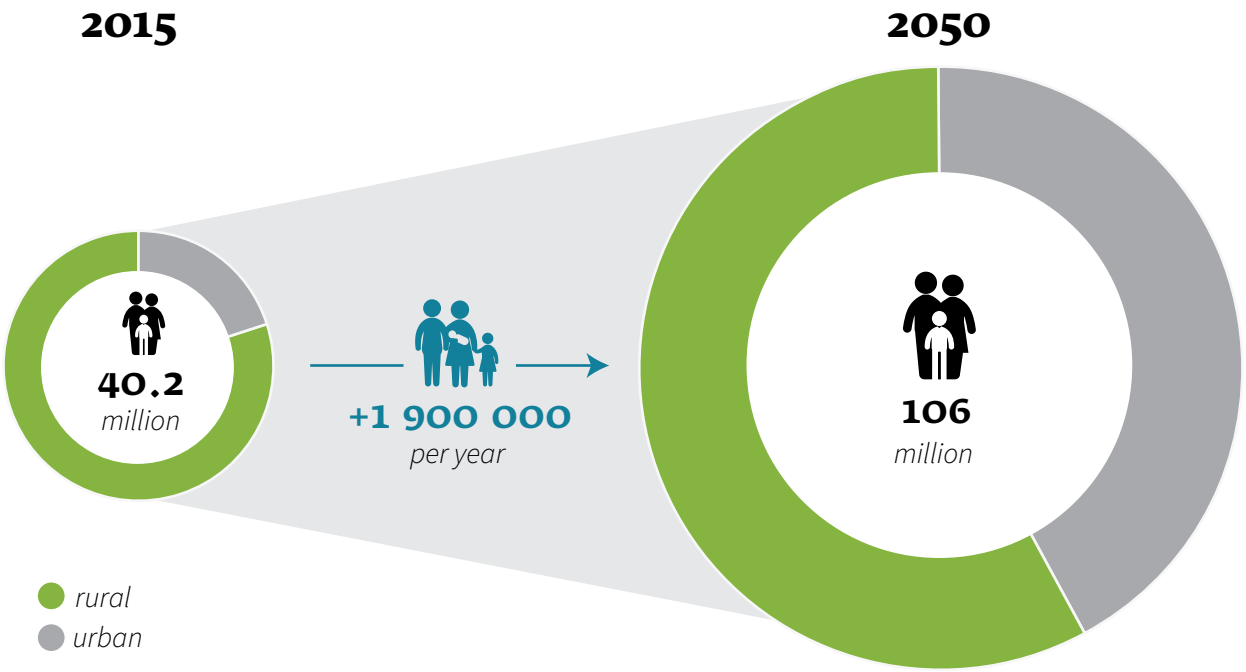
URBANIZATION

The transformation of livestock will largely aim at satisfying the demand for animal source foods of a growing urban population. Between 2015 and 2050, nearly 60 percent of the anticipated increase in the Uganda population will occur in urban areas, and the average per capita consumption of animal source foods is higher in urban than rural areas.

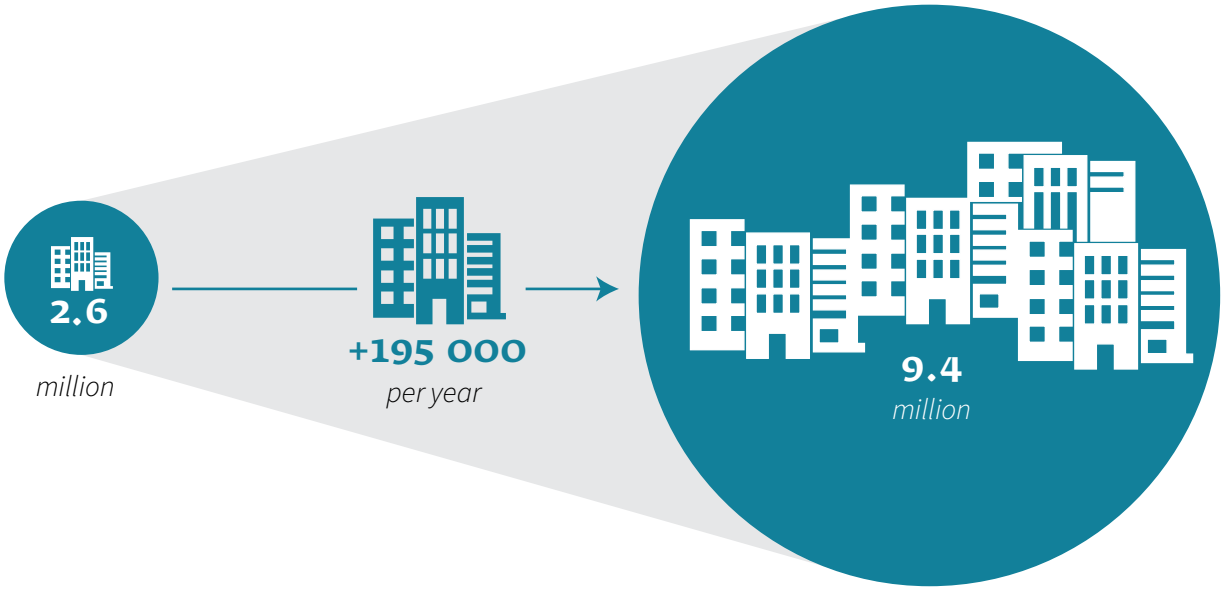
Livestock farms and value chains in and around peri-urban and urban areas are thus expected to transform more rapidly and hastily than anywhere else in the country, exacerbating exponentially the risk of negative impacts of livestock farming on the environment and public health in densely populated areas.

Per capita weekly consumption (kg) of livestock products by rural and urban area





2015–2050 population projections by rural and urban area



Kampala population, 2015–2050

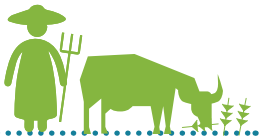
Towards resilient policies

Multiple plausible futures await Uganda and its cattle and poultry sectors, each of them having highly different impacts on society. The future will eventually depend on the interactions between known megatrends – from population growth to technology development – and unpredictable factors of which governance and the economic system are extremely critical. This report presented four internally consistent views of what Uganda and its livestock sector might turn out to be in 2050. None of the alternative scenarios will most likely materialize and the future will comprise elements from all of them. They do, however, point to a number of opportunities and to numerous common social, public health and environmental challenges.

The scenarios convincingly show that there will be major business opportunities for the livestock sector to develop and benefit society, including through proving income and livelihoods to farmers and affordably-priced and healthy protein to consumers. However, the also show the likely escalation of many known challenges such as fierce competition for environmental resources, particularly land and water, structural changes in employment and the increased risks of emergence and spread of zoonotic diseases and livestock-driven antimicrobial resistance. These risks will be better managed in some scenarios than in others. However, unpredictable outbreaks of an emerging or re-emerging infectious disease(s) will not only drastically affect the livestock sector, or one of its subsectors, but also have such negative spillover effects on society to jeopardize years of growth and development.

The scenarios point to an issue that is often overlooked in livestock sector policies and strategies: the increased relevance of urban, peri-urban middle-scale commercial livestock operations and value chains. These entities operate closely to fast expanding and densely populated urban areas, and they will become more important as the urban population grows and is better off, demanding increasingly larger quantities of livestock products, especially beef, dairy and poultry products. It

> Urban, peri-urban middle scale commercial livestock operations… will become increasingly important in the future



is critical that these hotspots of human-animal interaction are properly regulated, as any disease outbreak would escalate rapidly in such densely populated areas. Of course, the cattle corridor should remain at the center of the livestock policy debate as it is there that most of the animals will be raised in the future.

Stakeholders should adopt a One Health approach to appreciate the relevance and efficiency of current policies dealing with priority zoonotic diseases, emerging infectious diseases, antimicrobial use and farms in urban and peri-urban areas. Making the current policy framework resilient to these anticipated challenges is a pre-condition for an expansion of the Ugandan cattle and poultry sectors that ensures affordable and healthy milk and meat to the urban population while having minimal negative impact on the environment and public health.

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Data sources

Data and statistics in this report originate from a multitude of sources, including the Uganda Bureau of Statistics; the Ministry of Agriculture, Animal Industry and Fisheries; the Ministry of Water and Environment; and the Ministry of Health. When national statistics were not readily available, data was sourced from FAOSTAT, the World Development Indicators dataset of the World Bank, the Health Statistics and Information Systems of the World Health Organization, and the Institute for Health Metrics and Evaluation.

An expert elicitation protocol was designed and implemented to gather data on variables for which information was not available from any source, such as the incidence of selected zoonoses among the human population.

The FAO's Global Perspective Studies, the United Nations Population Divisions and Hoornweg and Pope* (2016) provided long-term projections for social, economic and livestock-related variables. When data portraying the current situation of country and its livestock sector differed markedly by source, stakeholders jointly agreed on the statistics to utilize in the report.

Stakeholders, however, never considered conflicting statistics on the current situation a critical issue, as the focus of the scenario exercise was on portraying long-term, alternative development pathways, around which they reached broad consensus.

**Hoornweg D. and K. Pope. 2016. Population predictions for the world's largest cities in the 21st century. Environment & Urbanization, 29(1): 195-216.*

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