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SUSTAINABLE  
LIVESTOCK  
2050

*Transforming livestock sector*

# NIGERIA

What do long-term projections say?



Federal Republic  
of Nigeria



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## 1. Introduction

Africa is in the midst of simultaneously unfolding and substantial, unprecedented, urban, socio-economic, policy and technological transitions. The UN predicts that, in 2050, the African population will reach 2.5 billion, from 1.2 billion today, and that 56 percent of the population will live in urban areas, vis-à-vis 40 percent today (UN, 2017 and 2018). Gross domestic product, currently at USD 4.7 trillion, is estimated to almost triple by 2050 (FAO, 2018), resulting in increased purchasing power for African consumers. An emerging middle class will support the democratization of the continent, further reinforcing economic growth and development (AfDB, 2011). Basic infrastructure, such as power supplies and communications, will be increasingly available, allowing Africa to benefit from technology development and, in the best case, to use technology to leapfrog over some of its current and emerging challenges (Swarth, 2011).

These rapid transitions will have major implications for African agriculture, which will be challenged to supply affordably-priced, nutritious and safe food to an increasingly affluent and urbanized population. Evidence from other regions suggests the sector will undergo two major structural transformations in the coming decades. The first is that, while the quantity and value of agricultural production will increase, the contribution of the sector to GDP and employment will reduce. Currently, agriculture accounts for 17.5 and 11.7 percent of GDP and contributes 57 and 22.3 percent to total employment in sub-Saharan Africa and North Africa, respectively. In high income countries, these shares are less than 2 and about 3 percent, respectively (WDI, 2018). The second transformation is that livestock will become one of the most important sectors of agriculture in value terms. Today, it accounts for 25 percent of agricultural value added in Africa, and to 55 percent and 67 percent in North America and Western Europe, respectively (FAOSTAT, 2018). The reason is that, as economic development progresses, increasingly well-off consumers will move away from a predominantly cereal-based diet and start purchasing the high-value proteins that meat, milk and other livestock products offer, as well as fruits and vegetables. This trend in animal source food consumption pattern, often referred to as Livestock Revolution (Delgado *et al.*, 1999), will profoundly affect the development of African livestock in the coming decades.

This note presents long-term projections, for the period 2012-2050, of key socio-economic and livestock-related variables for Nigeria, as estimated by the FAO Global Perspective Studies Team for a reference projection<sup>1</sup> (Box 1). Projections base year is taken from FAOSTAT (Box 2). Projections for a sustainable and an unequal development trajectory, which are not presented here, are slightly different but the overall trends stay the same.

Long-term projections do not reflect the current policy thrust, as they capture the fundamental forces underpinning society's growth and transformation. However, by identifying the opportunities and challenges associated with long-term livestock trends, they provide an essential piece of information to decision makers when designing country policies and strategies. For example, evidence of a growing demand for animal source foods points to an opportunity for inclusive agricultural development, e.g. through the creation of jobs along the livestock value chain. On the other hand, evidence of increased livestock production should draw attention to potential environmental and public health threats, e.g. because of manure and wastewater mismanagement, the emergence of zoonotic diseases with pandemic potential, and the proliferation of antimicrobial resistant pathogens.

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<sup>1</sup> The FAO's Global Perspective Studies Team has developed a recursive dynamic multi regional multi commodity partial equilibrium model – the Global Agriculture Perspectives System (GAPS) – which simulates the evolution of national and international agro-food markets and solves for supply, demand and prices that equilibrate markets by equating world supply and demand. This brief presents GAPS draft livestock-related projections for Ethiopia, for discussion and validation with national stakeholders.

The next section presents 2012-2050 trends in the drivers of livestock sector transformation in Nigeria, including population growth, urbanization and GDP per capita. Section three and four explore trends in the demand and supply of major livestock products, as well as of the animal population over the period 2012-2050. Section five summarizes the main evidence and suggests decision-makers should build on long-term projections to explore how a transformed livestock sector will affect people's livelihoods, the environment and public health in the decades ahead. This allows anticipating coming opportunities and emerging challenges, and taking decisions now for the livestock sector to develop sustainably in the long term.

### **Box 1. The reference projection**

In the reference projection, the future develops according to socio-economic, technological and environmental global trends similar to those that have been observed historically. Population growth is high in sub-Saharan Africa with moderate increases in per capita income. Persistent inequalities jeopardize social cohesion, with medium to high unemployment rate. Local conflicts persist amidst broader international instability. Developing countries find it often difficult to provide quality education to the population, and access to health-care services remains a challenge. Current trends of moderate reduction in extreme poverty are maintained, with modest improvement in food security. In terms of diets, there is a marginal shift towards the consumption of more nutritious and processed food, with consumers exhibiting limited willingness to pay for environmental services. Food waste and losses continue at current levels. Agricultural land expands and there are modest gains in agricultural productivity. Innovation is largely generated by the private sector, with limited benefits for smallholders, and yields are variably affected by climate change. Deforestation continues at its current rate, land degradation is only partially addressed and, while water efficiency improves, the lack of major changes in technology leads to the emergence of more water-stressed countries. GHG sequestration is limited, and GHG emissions from agriculture contribute to the world's average temperature increasing by 0.8-1.8 °C by 2050 relative to the period 1986–2005. In this future, both challenges for access and utilization, as well as for sustainable food stability and availability range from a medium to a high level.

### **Box 2. Base year data**

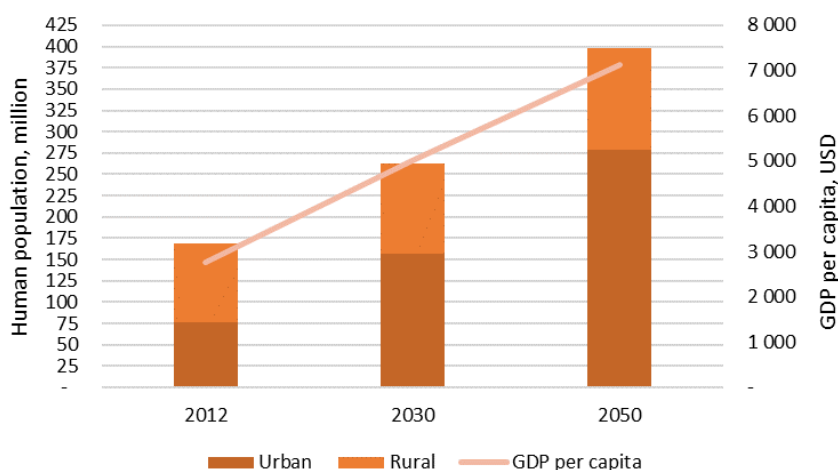
The FAO reference projection, as generated by the Global Perspective Studies Team, builds upon base year data for agricultural-related variables as in FAOSTAT, including data on livestock population and on production and on supply of animal source foods for human consumption. FAOSTAT disseminates data compiled from FAO member countries either through annual production questionnaires distributed to countries, from official country websites or from national publications (e.g. Statistical Yearbooks). The sourced data originate from national surveys, administrative records or estimates based on expert observations. Official country data are disseminated as countries report them, with any validation focusing on transmission errors, significant outliers and data consistency. For example, the current value of a variable should be consistent with its past values and with the value of associated variables (e.g. milk production level should be consistent with the number of animals producing milk). When no official data is available, because for example countries do not report to FAO or do not collect data on certain items, FAOSTAT reports data from non-official sources or FAO expert estimates. The accuracy of the imputation may be uncertain because of the many underlying assumptions. In this latter case, FAOSTAT data are not necessarily aligned with country level statistics, with the differences explained by the ultimate source of the data and the imputation method used. Any difference between the base year data presented here and available country statistics is not an issue for the purpose of this note, whose aim is to appreciate long-term dynamics and relative changes in livestock-related

variables. The base year in FAO GAPS is created by averaging FAOSTAT data for the years 2011, 2012, and 2013 and is referred to as “2012”.

## 2. Changing drivers in the demand for animal source foods

The demand for animal source foods in a country is influenced by three major factors. The first is the human population: the larger the population, the larger the demand for livestock products, and of any other food and non-food products and services for that matter. The second is income per-capita, as consumers’ purchasing power is positively associated with consumption of animal source foods. Once nutritional requirements are met, however, further increases in disposable income do not translate into increased intake of calories, proteins and other nutrients. The third factor is urbanization. Urban dwellers are typically better-off than rural households and can allocate a larger share of their food budget to purchase “luxury” food items as the availability of infrastructure, such as cold chains (electric power), allows trading and storing perishable products, including milk and meat (Satterthwaite *et al.*, 2010).

**Fig. 1.** Nigeria: Current and projected population and GDP per capita, 2012-2030-2050



Source: UN 2017, 2018; SSP, 2016

The drivers of the demand for animal source foods are anticipated to dramatically change in the coming decades in Nigeria. Over 38 years from 1974 to 2012, the Nigerian population grew by more than 100 million, from 62 to 168 million people. In the 38 years between 2012 and 2050, it is projected to increase by nearly 230 million and reach 398 million people by 2050 (UN, 2017). About 19.4 and 45.2 percent of the Nigerian population lived in urban areas in 1974 and 2012, respectively. Projections indicate that, by 2050, 69.9 percent of the population will live in urban areas, or about 279 million people vis-a-vis 76 million in 2012 (UN, 2018). Lagos is projected to be the sixth largest city in the World, growing from 10.5 million in 2010 to 32.6 million people in 2050 (Hoornweg and Pope, 2014). GDP per capita, a proxy of consumer purchasing power, is estimated to increase from about USD 2 751 per capita per year to almost USD 7 132, representing a more than two-fold increase between 2012 and 2050 (SSP, 2016).

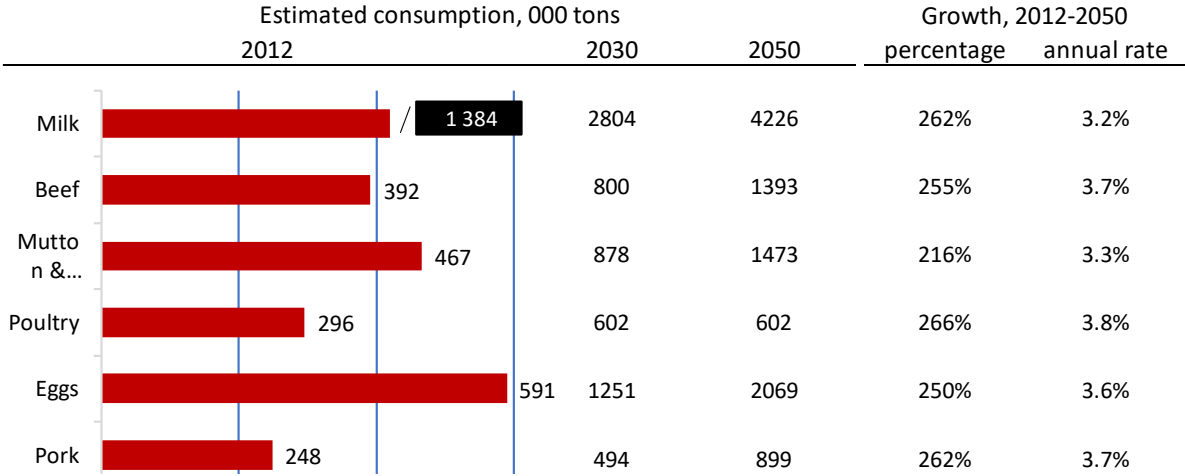
### 3. Projected increases in the demand for animal source foods

Population growth, urbanization and gains in real per capita income will result in an increased demand for livestock products. Fig 2 presents data on projected trends in consumption of major livestock products, including:

- Aggregate consumption, as measured by the volume of recent (2012) and projected consumption levels of livestock products in 2030 and 2050.
- Consumption growth, as measured by relative change and annual growth rate in consumption of livestock products between 2012 and 2050.

Between 2012 and 2050, the aggregate consumption of all livestock products will more than triple, projected increase varies from 216 percent for mutton and goat meat to 266 percent for poultry meat. This means that on an annual basis, demand will grow between 3.3 and 3.8 percent, which translate in major increases in volume terms. For example, the volume of milk and poultry meat consumed will increase by 2 842 and 306 thousand tons by 2050, respectively, with aggregate consumption estimated at 4 226 thousand tons for milk and 602 thousand tons for poultry in 2050. These increases in demand of livestock products represent a major opportunity for livestock producers to expand their business. At broader societal level, they are an opportunity for a growth of agriculture that supports inclusive and sustainable development.

**Fig. 2. Nigeria: Current and projected consumption of livestock products, 2012 – 2030 - 2050**



### 4. Projected increases in the supply for animal source foods

As a response to the growing demand for animal source foods, Nigerian livestock producers are anticipated to make investments that increase production and productivity. In the reference projection, it is estimated that, between 2012 and 2050, total production of poultry meat, eggs and milk will increase by 532, 657 and 287 percent, respectively. Production will increase by 159 percent for small ruminant meat and 233 percent for beef, with annual growth rates of 2.8 to 3.5 percent, respectively (Fig. 3). Eventually, production will increase more than demand, improving the milk supply gap: currently, around 60 percent of the Nigerian milk supply is imported.

Increases in livestock production are the result of both a larger animal population and improved productivity. Fig 4 suggests that, in the reference scenario, the estimated increases in production will be accounted for more by a larger animal population than by increases in productivity, though the

latter become more and more relevant as one moves towards the future. Between 2012 and 2050, improved productivity will contribute about 32 percent to increases in beef production; 45 percent to increased milk production, and 2.5 percent for poultry meat. These estimates are consistent with past livestock development trajectories of cattle production. Brazil, with almost 228 million cattle, is currently a leading player in the world beef market exporting about 1.4 million tons of beef in 2016 valued at over US\$ 5.5 billion (FAOSTAT, 2018; ABIEC, 2017). Between 1980 and 2015, increased productivity explained about 38 percent of all increases in Brazilian beef production, which currently stands at over 9 million tons. In 1970 India launched Operation Flood, a national program that for about 20 years supported the creation of a national dairy industry integrating small-scale farmers with cooperatives and commercial processors and distributors, including supporting the adoption of new technologies and practices (Cunningham, 2010). In 2005, 35 years after the launch of Operation Flood increased milk productivity explained about 44 percent of the total increase in milk production in India, which is currently the largest producer of milk in the world (FAOSTAT, 2018). The poultry sector on the other hand shows greater evidence of productivity increase. The Chinese poultry sector has experienced robust growth over the past three decades, supported by growing intensification and concentration (FAO, 2008). Production levels increased from 1.2 to 12.6 million tonnes between 1980 and 2015, with increased productivity contributing about 25 percent to the total increase in poultry production (FAO, 2018).

**Fig 3.** Nigeria: Current and projected production of animal source foods, 2012 – 2030 - 2050

	Estimated production, 000 tons			Growth, 2012-2050	
	2012	2030	2050	percentage	annual rate
Milk	579	1372.2	2241.6	287%	3.9%
Beef	392	846.4	1306.1	233%	3.5%
Mutton & Goat	468	850.8	1214.7	159%	2.8%
Poultry	297	671.0	671.0	532%	5.4%
Eggs	642	1630.0	4857.2	657%	6.0%
Pork	249	444.4	928.5	273%	3.8%

**Fig. 4.** Determinants of relative changes (%) in production level, 2012 - 2050

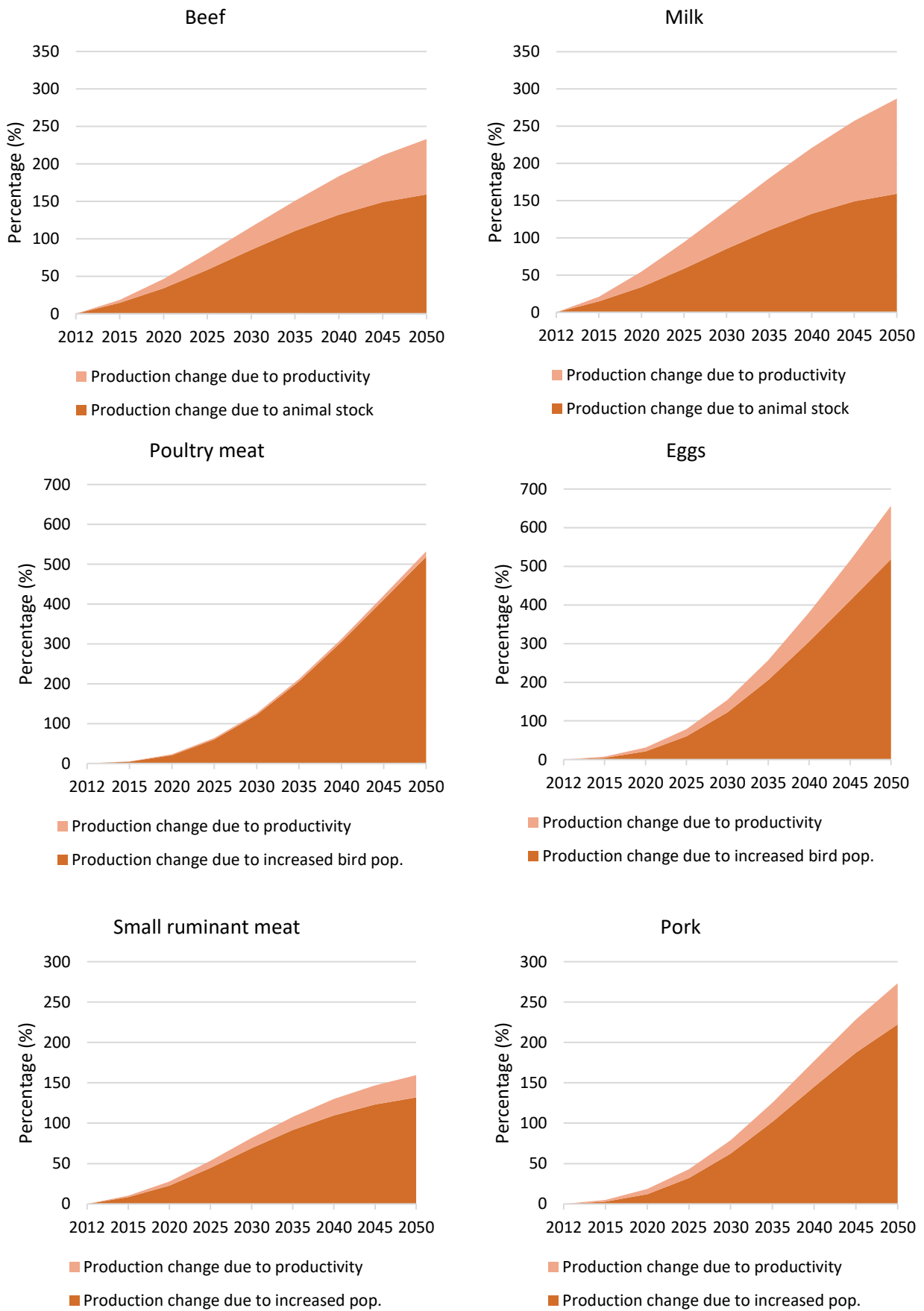
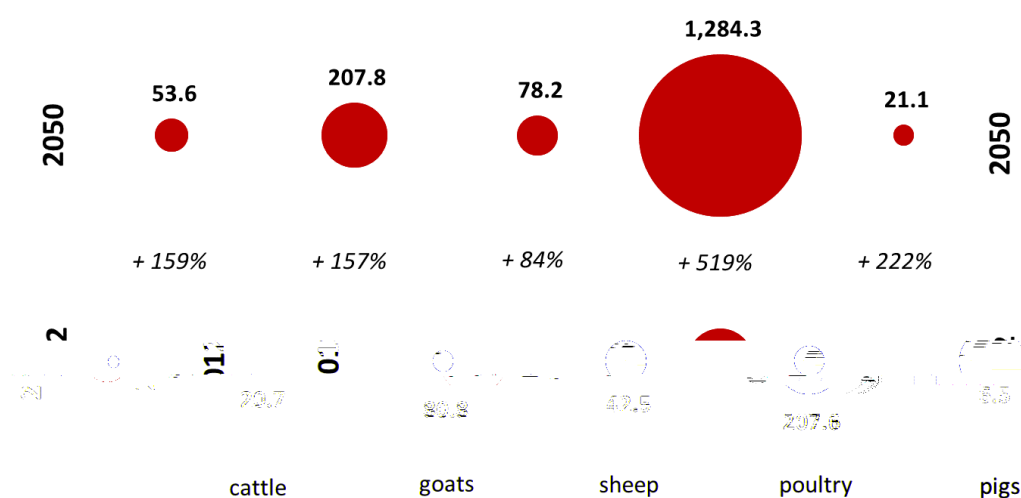


Fig 5 and 6 present in detail changes in animal population and yield between 2012 and 2050 in the reference scenario, respectively. These were estimated assuming the same animal population growth rate and productivity trends of the past two decades and with constant base-year pastures and rangelands, provided that the land carrying capacity does not reach its upper limit.

The increases in standing stock are very high, ranging from 84 percent for sheep to 519 percent for poultry. In absolute terms, between 2012 and 2050, the poultry population will increase by more than one billion birds, passing from 208 to 1 285 million, and the cattle population will increase by almost 33 million, from 20.7 to 53.6 million heads. These numbers suggest increased pressure of livestock on natural resources, because of the demand for feed and water to raise animals, and mounting challenges for livestock-environment and the livestock-human health interfaces.

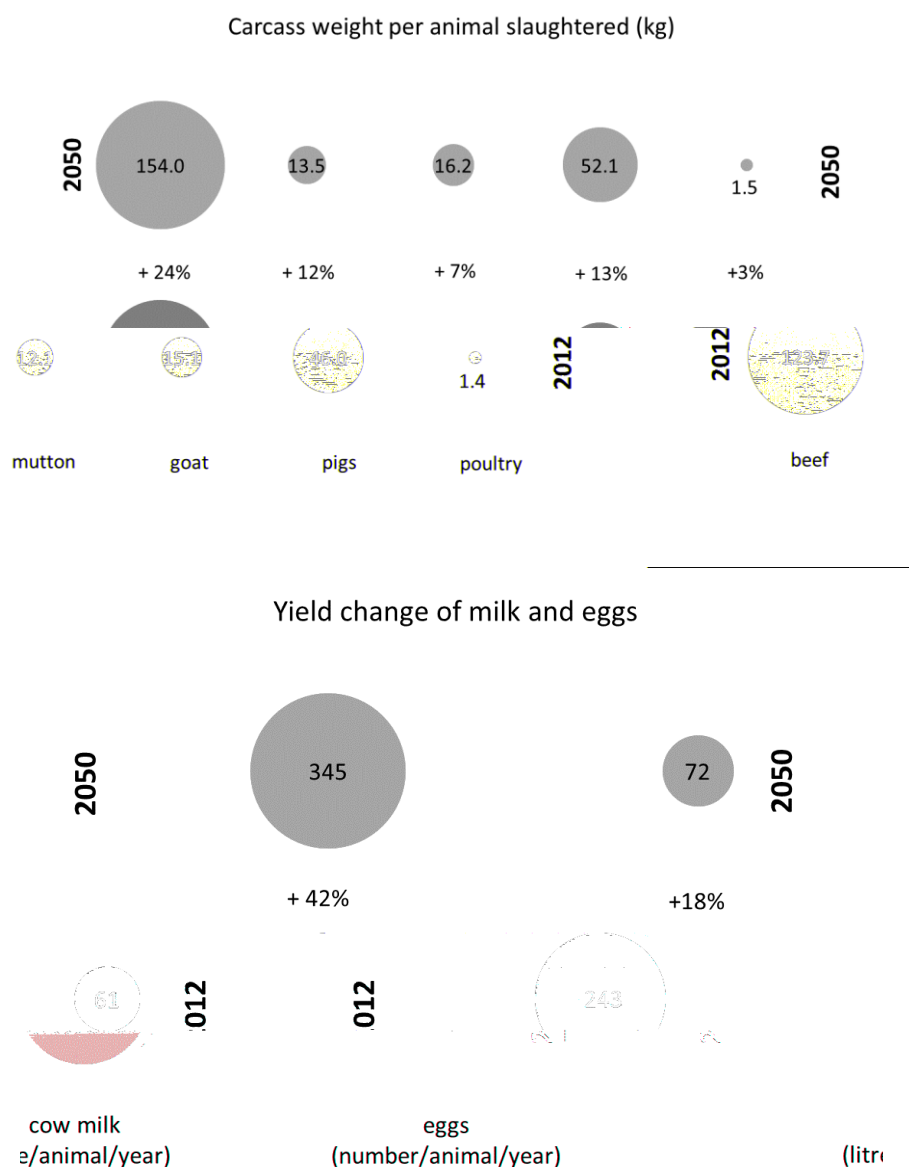
**Fig. 5. Nigeria: Current and projected livestock population by species (million heads), 2012-2050**



Livestock productivity is also projected to increase by 2050. As carcass weight and milk yield, two of the key measures of livestock productivity, vary widely by production system, the estimated productivity levels should be considered as national average and increases in productivity to also reflect shifts across production systems. In Nigeria, the average carcass weight is projected to increase between 2012 and 2050 by 24 percent for cattle (+30 kilograms), and between 7 and 13 percent for mutton, goats and pigs. There is a slight increase (+3 percent) of average poultry carcass weight, though we must note that there is a shift in production systems towards a practice where birds grow faster and get slaughtered earlier, therefore the projections suggest a higher increase in annual production per standing population. Improvement in cow milk productivity will be higher, estimated at 42 percent, and egg productivity is expected to increase by 18 percent. These estimates are somewhat lower than past development trajectories observed elsewhere such as in Brazil, China and India. In the past 35 years, Brazil cattle productivity increased by 35 percent; between 1980 and 2005, as a result of the Operation Flood Program, milk productivity in India increased by 64 percent in aggregate (FAOSTAT, 2018).



**Fig.6.** Nigeria: Current and projected livestock productivity by commodity, 2012-2050



**Projections and stakeholder consultation**

The projections above have been presented at a stakeholder consultation in Abuja in October 2018. The participants agreed that these results are acceptable in the light of the assumption that there are no interventions to improve the livestock sector. Such interventions however are expected, resulting in higher yield increases and lower animal population growth than the presented above. Demand projections, driven by population growth, increase in income and urbanisation were accepted as a plausible trajectory, though shifts in consumer preferences may happen in the coming decades.

## 5. Summary and Conclusion

A growing, increasingly affluent and urbanized Nigerian population will demand more and more high quality and healthy animal source foods in the coming decades. As a result, the livestock sector will significantly transform. The sheer numbers are impressive: between 2015 and 2050, the Nigeria population will increase from about 190 to almost 400 million and GDP will more than double. Demand for livestock products will surge, with consumption of all types of animal source foods more than tripling. Producers will respond by expanding their livestock stock and investing in productivity-enhancing technologies. It is estimated that, by 2050, milk and beef production will increase by 287 and 233 percent, respectively, and poultry production by over 532 percent. The livestock standing stock will pass from 26 to 73 million Tropical Livestock Unit<sup>2</sup>, with the cattle population increasing from 21 to 54 million heads and the poultry flock from 208 to 1 284 million birds.

Available projections suggest the Nigeria livestock sector will go through enormous changes in the coming decades. However, they do not provide details on how a transformed livestock sector will enhance the availability of animal source-foods for the food insecure, affect the environment, influence human-animal-ecosystem dynamics, and create new environmental and public health threats. Some, such as emerging zoonotic diseases, may also have pandemic potential and add to existing food safety hazards and proliferation of antimicrobial resistant pathogens. Indeed, a variety of unpredictable factors, such as the future effectiveness of the governance system and the inclusiveness of the economy, will determine if and how the livestock sector will grow along a sustainable trajectory. When uncertainty looms large, long-term projections can be used as an input to articulate alternative long-term livestock scenarios to help guide policy decisions. Scenarios are “stories of [...] multiple futures, from the expected to the wildcard, in forms that are analytically coherent and imaginatively engaging” (Bishop et al., 2007, p. 5). They are built through multi-stakeholder processes that gather and process “genuine information, knowledge and information about future realities, as opposed to projecting ‘old’ data, assumptions and ‘hindsight’ from the past into the future” (UNDP, 2017). By exploring alternative plausible futures of the livestock production systems – such as in terms of number of animals, technology and husbandry practices, environmental and public health dimensions – livestock scenarios assist decision makers to formulate policies that, in all circumstances, support transformational pathways that improve livelihoods, are environmentally sustainable, and safeguard the health of humans and animals.

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<sup>2</sup> Tropical Livestock Units (TLU), equivalent to 250 kg live weight, standardise live animals by species mean live weight. TLU conversion factors are taken from FAO, 2011.

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