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# POULTRY SECTOR STUDY

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## ACRONYMS

AECF	The Africa Enterprise Challenge Fund
AFSP	Agriculture and Food Security Project
AgDevCo	Africa Agriculture Development Company
AMR	Anti-microbial resistance
BDT	Bangladesh Taka
BMGF	Bill and Melinda Gates Foundation
CASA	Commercial Agriculture for Smallholders and Agribusiness programme
CapEx	Capital Expenditure
CAGR's	Compound Annual Growth Rate
CAHW	Community Animal Health Worker
CARD-F	Comprehensive Agriculture and Rural Development-Facility
DFI	Development Finance Institute
DFID	UK Department for International Development
DOC	Day Old Chicks
FAO	Food and Agriculture Organisation of the UN
FCR	Feed Conversion Ratio
FTESA	Food Trade East and Southern Africa
GAFSP	Global Agriculture and Food Security Programme
GALVmed	Global Alliance for Livestock Veterinary Medicines
GMO	Genetically Modified
HPAI	High Pathogenic Influenza
KFC	Kentucky Fried Chicken
KPI	Key Performance Indicator
LEAD	Livelihood Enhancement Through Ag. Development, Tanzania
LFSP	Zimbabwe's Livelihoods and Food Security Programme
MADE	Market Development in the Niger Delta Programme
MFI	Microfinance Institution
MOST	Malawi Oilseed Sector Transformation Programme

MT	Metric Tonne
NAGRC	National Agricultural Research Centre (Uganda)
ND	Newcastle Disease
NGO	Non-governmental organisation
NUTEK	Northern Uganda Transforming the Economy through Climate Smart Agribusiness
OECD	Organisation for Economic Co-operation and Development
PPPA	Poultry per person annually
QSR's	Quick Service Restaurants (Fast food restaurants)
SACCO	Savings and Credit Cooperative Organisation
SME's	Small and Medium-sized Enterprises
SEDF	South Asia Enterprise Development Facility
SOBA	Sierra Leone Opportunities for Business Action
SSA	Sub-Saharan Africa
TA	Technical Assistance
VC	Value Chain

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## EXECUTIVE SUMMARY

Poultry is increasing in importance globally, including in Sub-Saharan Africa and South Asia. Growing populations, a shift toward urban living and increasing incomes are contributing to higher demand for non-staple foods: poultry products are some of the least expensive and highly sought-after animal protein sources. While poultry sector market actors in these regions face many challenges in meeting the increasing demand, poultry products offer a number of significant benefits to both producers and consumers.

The poultry value chain is deep and wide with opportunities throughout to increase employment, incomes and nutrition as well as opportunities for Small and Medium Enterprises (SMEs) to grow. The purpose of this study is to highlight the main challenges and to understand what has been done by DFID-funded programmes and others to address these. The study also offers recommendations for future investment into sustained, inclusive sector growth and improved nutrition, including for the flagship Commercial Agriculture for Smallholders and Agribusiness (CASA) programme.

Historically, poultry has been viewed in fairly binary terms as either a subsistence or an industrial activity. While donors have focused on subsistence farmers as a priority, programming has generally had disappointing results. Attempts to commercialise indigenous chicken systems or to create small scale outgrowers were economically infeasible and logistically taxing. Programmes that offered free starter packs of chicks and inputs were unsustainable while solutions placing an NGO, parastatal or other non-commercial entity in key market roles (for chick provision or finance for example) ended as soon as the funding did. In most cases, these types of programmes do little long-term harm, but occasionally, getting it wrong can leave farmers worse off than they were before.

In the past few years, the poultry sector has become more dynamic with different breeds of chickens being introduced that are more productive than indigenous chickens and less delicate than industrial breeds in developing market production environments. A more nuanced view of farmer activity shows that instead of only subsistence and industrial farmers, there are also small and medium-sized commercial farmers who occupy different and growing positions in the value chain, have different input needs and face different challenges. The growth of large, integrated farms that not only produce chicken meat and eggs but also increasingly supply day-old chicks, feed and other services to smaller farmers can simultaneously become a large, reliable off-taker of maize and soya, providing opportunities for thousands of crop farmers.

Recognising the complexity of the poultry value chain also expands the opportunities to create positive change, but it is critical to be clear about which development objective is desired and to align it with appropriate intervention models. There is no one-size-fits-all approach, so identifying and clearly stating the goals, being flexible to adapt to changes in programming and being able to attract highly skilled implementors is critical. Context matters, so taking the time to undertake a full analysis of the target market is also critical: testing options and designing hypotheses with knowledgeable stakeholders can increase the viability and acceptability of an intervention plan. Being mindful that sustainability and additionality throughout is equally important, initial and continued close collaboration with the market helps ensure that the programme is not subverting a commercial value chain role.

There are opportunities for wide-ranging impacts which can be broadly grouped under the following three headings, each of which has different target groups and intervention entry points (being clear about the desired objective prompts the relevant approach):

1. **Rural household food security** – Investments in health systems that deliver quality medicines and vaccines to backyard farmers can yield the largest benefits in this area. Up to 80% of households in rural areas keep some indigenous chickens, and simply helping these farmers to “hang in” by improving their flock’s overall health can help translate into improved household food security and nutrition<sup>1</sup>. However, attempting to commercialise indigenous poultry systems is not recommended, and providing options for farmers to “step up” to small commercial poultry requires a shift in sophistication with the addition of hybrid genetics and commercial feed, and won’t be appropriate for every farmer in every location.
2. **Widespread provision of low-cost protein** – All consumers will benefit simply by having greater access to low-cost, high-quality chicken and eggs with poor households benefiting the most. Supporting large-scale commercial farms to increase their efficiency and distribution will bring prices down and increase consumption with accompanying increased nutritional outcomes for poor households. There are many avenues available from financial assistance for scaling-up output to promoting innovative slaughter and processing technologies and policy assistance on issues such as reduction on input and output VAT for stock feed production. As many large-scale companies struggle to access sufficient quantities of quality soybeans at a competitive price, investing in feed inputs production can stimulate growth in this segment which can have knock-on benefits for small crop farmers that can sell to this growing market. In addition to these ‘trickle down’ benefits to the poor, there are models of serving the needs of poor consumers more directly / deliberately by offering lower quality parts of chicken to them, especially as by-products from production of ‘dressed chicken’ for higher end markets.
3. **Sustainable inclusive growth** - There is an exciting opportunity for DFID to play a major role in developing a “medium” model that supports SME producers as well as a range of SMEs providing services to the sector (such as vaccine distributors and brooding houses). This area leverages new research and technology (especially the rapid growth and success of dual purpose hybrid poultry across SE Asia and Africa) and focuses on markets, skills and finance as intervention areas. While the tendency to focus directly on the poorest farmer is understandable from a development point of view, it is important to keep in mind the whole system and job creation via SMEs as well as the knock-on impact they have for the rest of the chain.

Having clear objectives matched to appropriate intervention models and results frameworks is critical. To successfully implement these models requires the programme structure to be genuinely adaptable, with appropriate continuous learning frameworks and partners working alongside them. Identifying the right implementer(s) and team is critical for success. They must be flexible, creative, have high levels of technical expertise, commercial experience and credibility. Much of what is needed in the poultry sector generally, and for what CASA hopes to achieve in Malawi, will rely on key levers of technical assistance, finance and targeted action-learning and research.

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<sup>1</sup> So long as WASH environment is addressed in parallel to avoid especially children being contaminated with chicken feces / animals posing a threat to human health

# 1. INTRODUCTION

In accordance with DFID's Agriculture Policy Framework and Economic Development Strategy, commercial agriculture has been defined as a priority area for DFID interventions. DFID's approach to economic development and agriculture relies on an increasingly commercial approach to its agricultural programming by:

- Boosting agri-business investment, financing agricultural infrastructure and supporting smallholder farmer access to markets;
- Helping farmers and their families to have opportunities and jobs outside of their farms, and supporting SMEs in rural areas;
- Supporting subsistence farmers without other economic opportunities to avoid hunger, malnutrition and extreme poverty;
- Encouraging commercial approaches that reduce the cost of nutritious diets and increase availability of nutritious foods.

In support of this approach, DFID has launched the flagship Commercial Agriculture for Smallholders and Agribusiness (CASA) programme. The CASA programme seeks to change how investors, donors and governments view and invest in agribusinesses that work with smallholder supply chains. In doing so, CASA will increase economic opportunities for smallholders by: a) demonstrating the commercial viability of small and medium-sized (SME) agribusinesses with significant smallholder supply chains and attracting more investment into these businesses; b) deepening the smallholder impact of existing investments made by Development Finance Institutions and impact investors; c) enabling poor smallholder farmers to engage with and trade in commercial markets; and d) researching and communicating the case for successful engagement with smallholder-linked agribusiness.

## 1.1 Why poultry?

The poultry sector is growing rapidly across sub-Saharan Africa and South Asia and offers a multitude of potential economic and health benefits to these economies and their populations including:

- Improved nutrition;
- Incomes for poultry farmers, particularly women;
- Opportunities for SMEs, including women-owned;
- Employment at larger companies;
- Reliable grain market offtake for smallholder farmers and larger farms;
- Cheaper protein from more competitive national industry (Import substitution and exports / regional trade opportunities); and
- As a meat protein source, poultry has a relatively low impact on the environment, requiring far less land and irrigation water and producing less Green House Gas and Reactive Nitrogen, than cattle production (see figure 1 below) <sup>2</sup>

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<sup>2</sup> Environmental costs of animal-based categories by Gidon Eshel, Alon Shepon, Tamar Makov, Ron Milo. Proceedings of the National Academy of Sciences Aug 2014, 111 (33) 11996-12001; DOI: 10.1073/pnas.1402183111

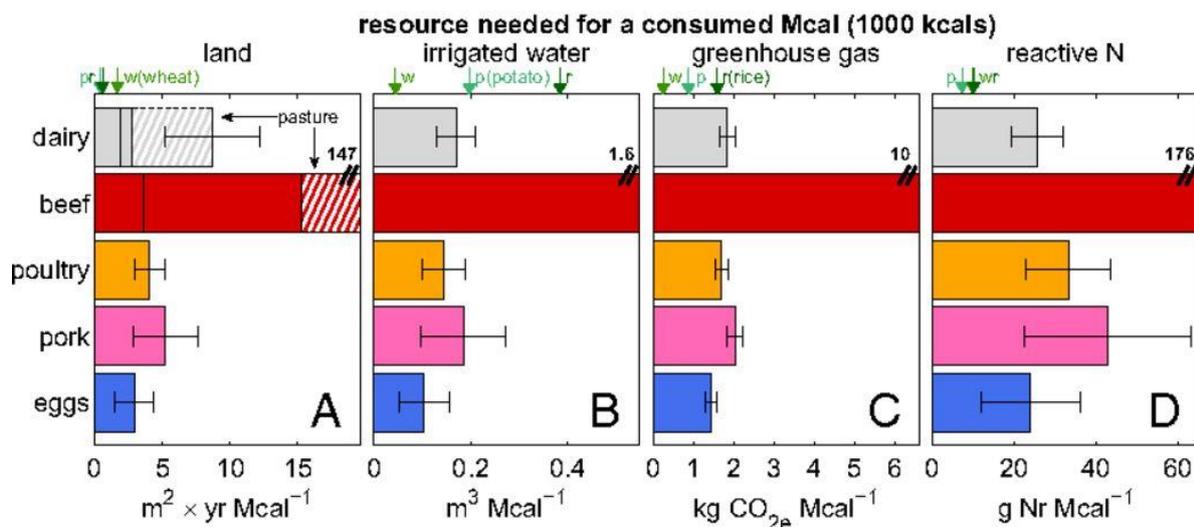


Figure 1: Environmental performance of the key livestock categories (NB – based on US data)

It is important to recognise some additional benefits offered to farmers and SMEs by the sector:

- Return to land and return to labour are higher than most other agricultural enterprises (except fruit and horticulture but these typically have higher barriers to entry for small/medium farmers).
- The production cycle is short, so cash flow is favourable for farmers making finance potentially more accessible.
- Eggs are difficult to transport, so import competition issues which often hamper the development of local industries in SSA are less relevant.
- Complements other types of crop production, e.g. using chicken manure as organic compost for vegetables.

Socially vulnerable groups can mobilise their human capital to support the sector's development as service providers and employees. For example, women may be able leverage their traditional roles in family nutrition and community mentorship to strengthen business networks.

Young people can also draw upon their education and digital literacy to modernise and professionalise the sector. Table 1 summarises some of these opportunities:

Table 1: Leveraging social capital for poultry. Source: Wellspring.

Opportunities for inclusive employment in poultry	
Inputs and technologies	Veterinary – Community Animal Health Workers (CAHW)/paravets; out-grower management and extension, and company-specific/sector-level data collection; sale and distribution of inputs/equipment; aggregators/traders at the village level
Extension services	Leverage the digital literacy of youth for ICT-driven agronomic training and on-farm peer-to-peer advisory services; such services can also be delivered in tandem with vet services
Production	Mobilise veterinary and equipment service providers to ensure proper/appropriate dosages of inputs – especially antibiotics
Producer coordination and marketability	Leverage the digital literacy of youth for ICT-driven mapping and data collection that informs sectoral-level decision-making and business planning for producer organisations; sectoral mapping initiatives are also a powerful investment tool

<b>Post-harvest handling, logistics and transport</b>	Facilitate technology/mechanisation shifts for slaughter/cold-chain (operations, maintenance, performance/staff management – i.e. Technical Assistance and Business Development Services)
<b>Business advisory services</b>	Mobilise female/young professionals (technicians, engineers, etc.) to market improved technical services to processors
<b>Processing and value addition</b>	Mobilise female/young professionals to market innovative financial products and services to dynamic farmers
<b>Financial service provision</b>	Mobilise female/young professionals to market value chain-specific financial products using improved data collection, market information/analysis, and value chain efficiencies

The poultry industry creates opportunities throughout the value chain, not only in poultry production but also in grain production (the largest opportunity for small-scale farmers), job creation by larger companies and various SME opportunities such as aggregators/traders, agroveterinarians, vet services, brooding units, mobile abattoirs, local retail outlets and other. While many programmes to date have focused on small-scale poultry production, providing support to the wider system can increase these opportunities throughout the industry. Further details on benefits by type of farmer/production system are outlined in more detail below in Section 5.

However, it is also important to note that the sector cannot offer promising solutions for all. At the poorest level, where there are insufficient suitable foraging/scavenging opportunities for poultry, even indigenous birds offer very limited respite due to the higher stress environment the birds are reared in. Crowded peri-urban areas and rural villages or dry/infertile land offer a harsh environment for all livestock.

However, inclusive opportunities for smallholders do exist in areas where there are basic scavenging potential and space for indigenous poultry, or where suitable land holdings provide for growing adequate surplus grains beyond food security needs for farmers to sell into the sector.

It is important to note that while small commercial poultry production or input provision is viable in rural areas further distant from markets, it is a more marginal opportunity due to the limited demand for poultry produce and limits the impact, scale and sustainability that can be achieved. That said, if nutrition in these areas is a key focus, then backyard and very small-scale commercial production can offer a strong impact due to the high efficiency and nutrient value from eggs and poultry meat.

## 1.2 Objectives of the poultry sector study

As part of the CASA programme, DFID contracted this study to better understand the scope of its current engagement in the poultry sector in Africa and South Asia and to identify a strategy and approach for engaging in the sector that will deliver the intended outcomes of increased sustainable, inclusive growth and improved nutrition.

The study provides an overview of:

- Overall poultry sector trends, globally and in focus geographies;
- Challenges and opportunities faced by subsistence and small-scale commercial farmers, SMEs as well as larger-scale poultry companies;
- DFID programmes which include poultry-sector development aimed at increasing smallholder incomes and growing poultry SMEs and agribusinesses;
- A wider look at other donor-funded initiatives and developmental investments in the sector;

- On the basis of the analysis, the study provides recommendations on strategy and approach for engaging in the sector that aims to best deliver the intended outcomes of increased sustainable, inclusive sector growth and improved nutrition.

## 2. PRELIMINARY ANALYSIS

### 2.1 Summary of current and future global trends in poultry

Animal protein market trends are rising globally, and the sector is expected to be one of the fastest growing agricultural sectors in the coming decades. Consumers in emerging economies are moving away from spending on basic foodstuffs in favour of higher-value items including dairy, meat and eggs (OECD/FAO, 2016). In some countries (e.g. Nigeria), protein products such as poultry and fish are increasingly capturing market share from red meat driven by fast food expansion, consumer preferences, competitiveness and concerns over the safety of red meat.

#### Global chicken meat production

Chicken meat production has been steadily increasing over the past decades from under 8 million metric tonnes (MT) in the early 1960s to over 109 million MT today. During that time, a shift from free-range poultry utilising a variety of breeds to large, confined intensive poultry operations utilising birds specifically bred for growth has become widespread. It is now more common for large chicken operations worldwide to move toward complete vertical integration of their operations to take advantage of economies of scale in feed, inputs, processing and distribution. The USA's Tyson Foods, the largest single broiler producer in the world, produces 40 million chickens per week (around 2 billion per year) (Vault, 2018).

Irvine's Chicken is an example of a vertically integrated poultry farm in Sub-Saharan Africa, producing, slaughtering and selling branded chicken meat and eggs in South Africa and Zimbabwe. They also offer day-old-chicks for outgrowers, feed and feed ingredients including vegetable- and animal-based protein mixes<sup>3</sup>. In Kenya, Kenchic produces its own day-old-chicks and has in-house grow-out facilities, slaughter and branded sales. To ensure feed supply and quality, they are in a close partnership with UNGA feeds, the country's largest feed mill. Kenchic also holds contracts with large-scale outgrowers and buys back finished birds.

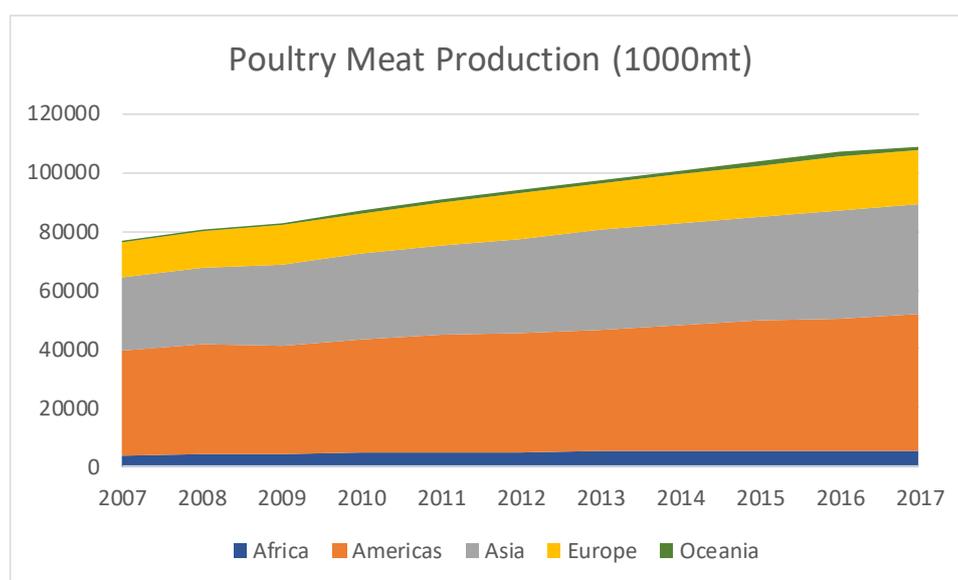


Figure 2: Cumulative chicken meat production, 2007-2017. Source: FAOSTAT

Global production of chicken meat has increased by 42% in the past decade from just under 80 million MT in 2007 to 109 million in 2017 (Figure 22). Dominated by the Americas (the USA and Brazil) and

<sup>3</sup> www.irvinesafrica.com

Asia (China), all regions expanded their poultry production output. The Americas saw the slowest growth (30%), while Europe and Asia increased by 55% and 50% respectively. Africa grew by 46%, albeit from a small base, comprising just 5% of global chicken production (FAO, 2019). If trends continue unchanged, the global supply of chicken meat will exceed 150 million MT by 2027 of which Africa would produce just under 8 million mt.

In the past three decades, chicken meat has risen dramatically in importance as a global meat source (Figure 33). In 1997, chicken meat and cattle meat production was approximately the same at around 54 million mt. Since then, chicken meat outpaced the growth of cattle meat, growing at 6.9% per year and doubling production, becoming the world’s second largest terrestrial animal meat source after pork. If all meat sources continue to grow at the rates seen in the past decade, chicken meat will outpace pork in the coming decade.



Figure 3: World Meat Production 1997 – 2017. Source: FAOSTAT

### Global chicken meat consumption

As populations and incomes rise, more consumers prefer a varied, higher value and higher protein food basket. Poultry is one of the most affordable meat sources due to commercial chicken’s efficient feed conversion rates (FCR<sup>4</sup>) and the ability of commercial farmers to raise thousands of animals on relatively small plots of land (Best, 2011). Figure 44 shows approximate FCRs for tilapia, chicken (raised in commercial settings), pig and cattle. For emerging economies especially, poultry products are often a highly sought-after source of protein. In real terms, poultry meat prices are projected to decline slightly through 2027, further fuelling demand (Conway, 2018).

<sup>4</sup> The ratio of grain/feed inputs to meat output. Poultry meat is ~2:1, beating all other land-based meat production and second to some forms of aquaculture (commercial tilapia cage production is ~1.5:1)

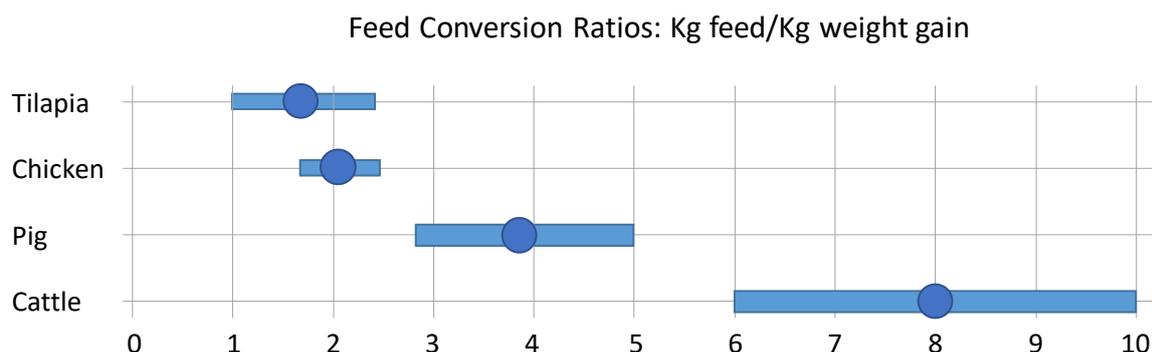


Figure 4: Food conversion ratios for fish, chicken, pig and cattle

Figure 55 shows the poultry meat consumption trends by volume from 2007 projected through 2027. The data set highlights the main blocks of poultry consumption, with the 32 OECD<sup>5</sup> developed countries and the BRIC<sup>6</sup> nations consuming over 60% of the world’s poultry. The yellow band includes the only four African countries available in the data set: Nigeria; Ethiopia; Egypt; and South Africa. While incomplete, it serves to highlight Africa’s relatively small share of total poultry consumption.

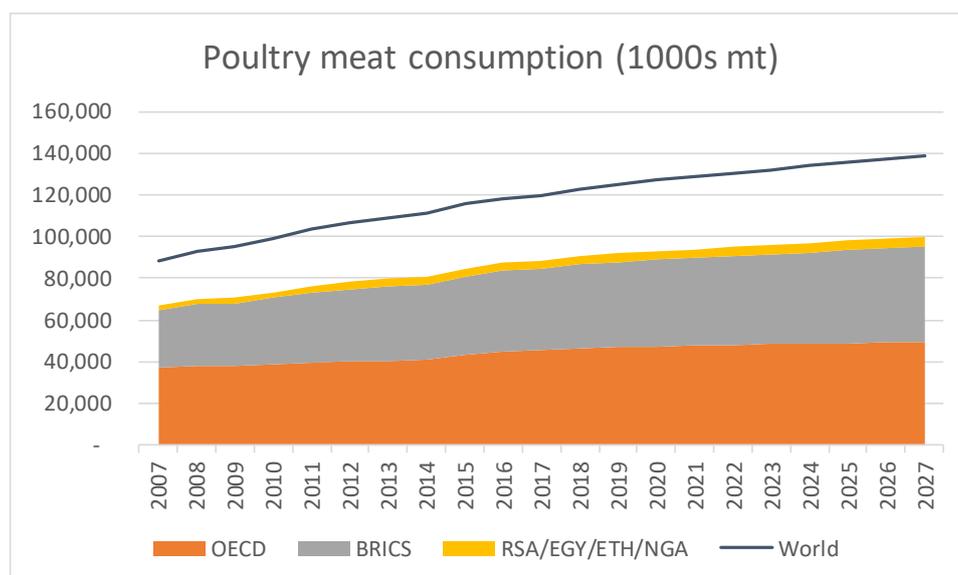


Figure 5: Cumulative poultry meat consumption by selected groups. Source: OECD.

In terms of per-capita consumption, Figure 66 highlights the marked differences between a selection of countries over the past decade. World average per-capita poultry consumption is around 12kg per person per year rising moderately. On one extreme of the scale though, the USA consumes nearly 50kg per capita annually, while at the other end, Ethiopia consumes less than 0.5 kg. Over the decade displayed, the compound average annual growth rate in overall global consumption was a modest 1.8%, it was nearly double that in South Africa and Pakistan at 3.4% and 3.5%, respectively. As urbanisation rates and incomes continue to grow in developing countries, per-capita consumption of meats including poultry is expected to experience strong growth.

<sup>5</sup> OECD Countries include: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States

<sup>6</sup> Brazil, Russia, India and China: A grouping of large, newly advanced economies

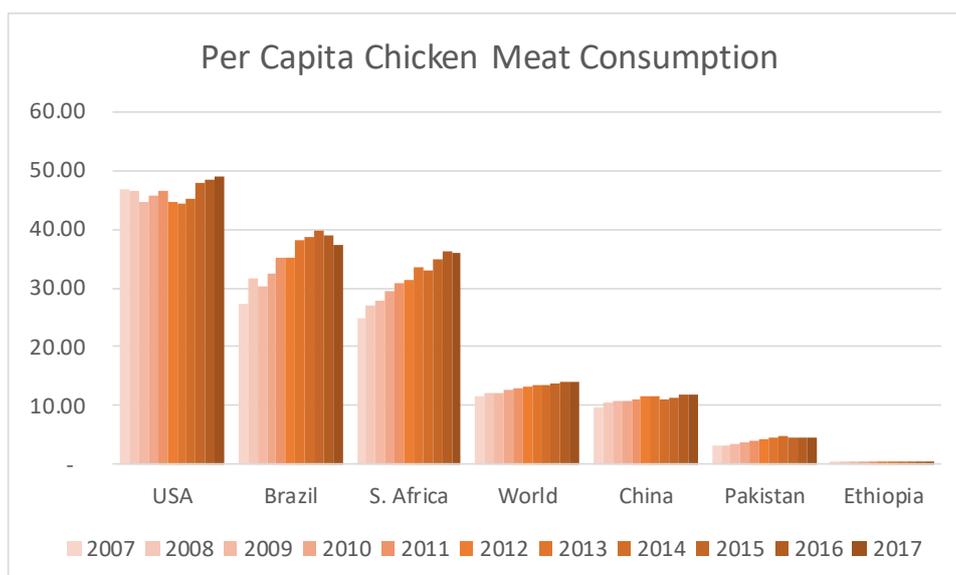


Figure 6: Per capita chicken meat consumption in KG. Source: OECD

### Global chicken meat trade

Official global chicken meat trade is categorised by the Harmonized Commodity Description and Coding System (HS System of Tariffs) into four sub-categories. Table 2 describes and ranks the four poultry products and indicates the relative importance of each to global chicken meat export from 2007 to 2017. Frozen products account for over 80% of exports by weight, with frozen chicken cuts making up nearly two-thirds of exports on its own. As frozen products do not spoil quickly, they can be transported further, and for this reason, they are the primary chicken meat exports.

Figure 77 highlights the relative importance of frozen chicken cuts and the global upward trend of chicken meat exports. From 2007 to 2017, global chicken meat exports have grown at 3.9% per year. What this formal data may not highlight is informal cross-border trade which can be significant in SSA (World Bank, 2013). An example of this is the high volumes of eggs and chicken meat traded from Zambia and Uganda into DR Congo and South Sudan.

Table 2: Types and rank of chicken exports from 2007 - 2017. Source: ITC Trade Map

Rank	HS Code	Description	Approximate share of exports
1	HS-020714	Frozen chicken cuts and offal	64.5%
2	HS-020412	Frozen whole chicken	18.0%
3	HS-020713	Fresh and chilled chicken cuts and offal	14.0%
4	HS-020711	Fresh and chilled whole chicken	3.5%

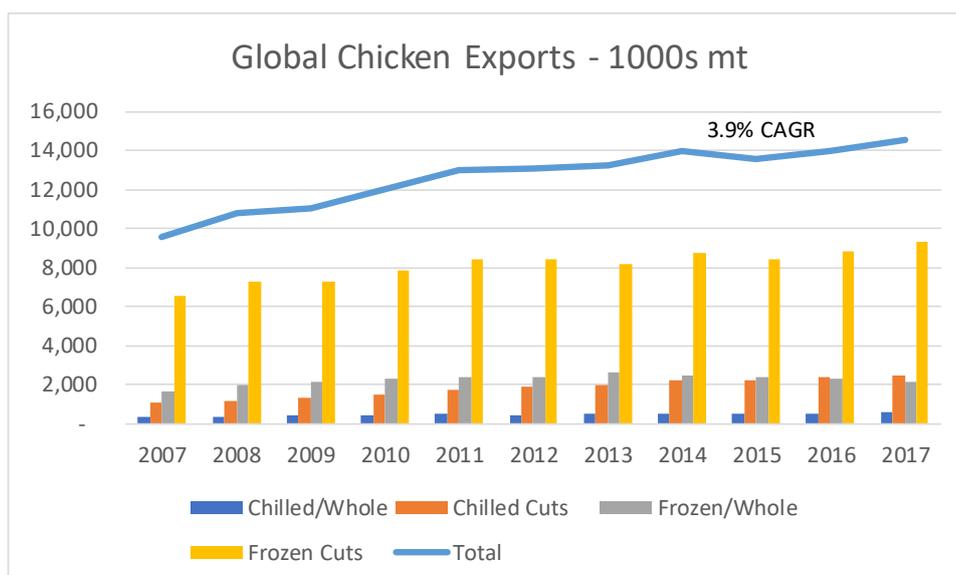


Figure 7: Global chicken meat exports by type, 2007-2017. Source: ITC Trade Map

Brazil and the USA are chicken meat export behemoths. In the past five years, these two countries were responsible for an average of 59% of exports in the largest chicken export category, frozen chicken pieces. Hong Kong, the Netherlands, Poland and Germany competed for the other three places in the top-five exporters, but together, they amounted to less than 20% of total global exports (Table 3).

Table 3: Top 5 exporters of frozen chicken pieces, 2012-2017. Source: ITC Trade Map

Top 5 Exporters, Frozen Chicken Cuts						
2012	2013	2014	2015	2016	2017	Rank
USA	USA	USA	Brazil	Brazil	Brazil	1
Brazil	Brazil	Brazil	USA	USA	USA	2
Hong Kong	Netherlands	Netherlands	Netherlands	Netherlands	Netherlands	3
Netherlands	Hong Kong	4				
Germany	Poland	Poland	Poland	Poland	Poland	5
62%	61%	58%	57%	57%	57%	US & Brazil
78%	76%	76%	75%	76%	75%	Top 5

Although global exports of poultry meat are highly concentrated, the global imports of the same products are much more disaggregated. Whereas only two exporters account for nearly 60% of frozen chicken cuts trade, the recipients of that volume of trade are far more varied. Figure 88 illustrates that the top 15 importers absorb roughly the output of USA and Brazil in frozen chicken pieces and that the importers are distributed widely across Asia, Europe, Central America and Africa/Middle East.

Top 15 Importers of Frozen Chicken Cuts by Rank						
2012	2013	2014	2015	2016	2017	Rank
Hong Kong	Hong Kong	Hong Kong	Hong Kong	Hong Kong	Hong Kong	1
China	China	Angola	Japan	China	Japan	2
Russia	Russia	Japan	China	Japan	China	3
Japan	Japan	China	Saudi Arabia	South Africa	South Africa	4
Netherlands	Angola	Russia	South Africa	UAE	Mexico	5
Angola	Netherlands	Netherlands	Mexico	Philippines	Cuba	6
South Africa	Saudi Arabia	Saudi Arabia	UAE	Mexico	Philippines	7
UAE	UAE	South Africa	Cuba	Cuba	UAE	8
Mexico	South Africa	UAE	Angola	Saudi Arabia	Saudi Arabia	9
Kazakhstan	Mexico	Mexico	Netherlands	Iraq	Angola	10
Cuba	Cuba	Cuba	Taipei	Netherlands	Iraq	11
France	Ghana	Philippines	Philippines	Taipei	Netherlands	12
Ghana	Kazakhstan	France	France	France	Kazakhstan	13
Saudi Arabia	France	Kazakhstan	Iraq	Kazakhstan	Taipei	14
Taipei	Germany	Taipei	Russia	UK	France	15
59%	59%	60%	56%	58%	57%	

Asia
  Europe
  Central America
  Africa/Middle East

Figure 8: Global frozen chicken cuts import destinations, ranked. Source: ITC Trade Map

### Global egg production

Since the early 1960s, worldwide egg production has undergone a shift of focus from Europe and the Americas, which accounted for three-quarters of egg production in the 1960s, to Asia which now produces over 60% of global egg output (Figure 99). China alone is responsible for the bulk of the growth in past decades and is by far the largest global egg producer accounting for 38% of the world's production in 2017. The next largest producers, the USA and India, account for only 7% and 6% of production respectively (FAO, 2019).

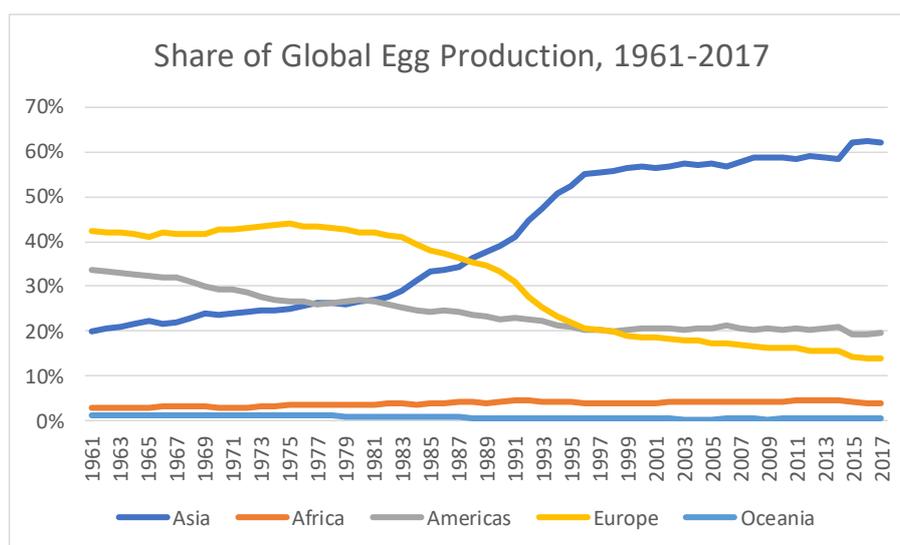


Figure 9: Share of global egg production, 1961 - 2017. Source: FAOSTAT

From 2007 to 2017, egg production has grown globally at 2.7% annually from 60 million MT to 80 million MT (Figure 1010). The most aggressive growth took place in Asia and Oceania at 3.4% while

Europe was nearly stagnant at less than 1% and Africa, and the Americas grew just below the global average at 2.2% and 2.3% respectively.

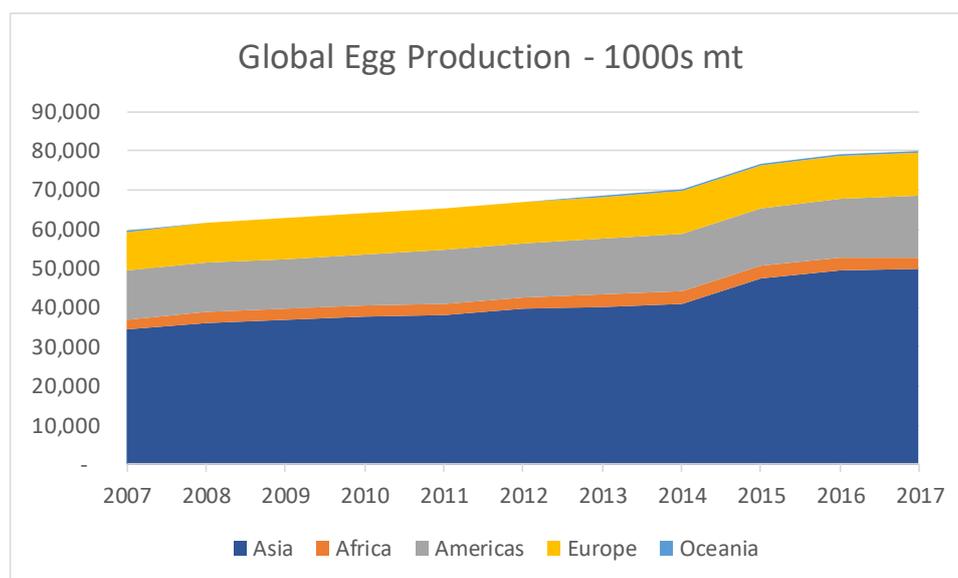


Figure 10: Global egg production 2007 - 2017. Source: FAOSTAT

### Global egg consumption<sup>7</sup>

The average per-capita egg consumption was 200/year in 2013, with Mexico, Japan, Ukraine, China and Russia comprising the top five consumers. In contrast, Nigeria and India consumed only 57 eggs per capita. China, the global leader in egg production, consumes nearly all of its domestic production which indeed is the case for most countries (Windhorst, 2013).

Rising population, urbanisation and incomes in developing countries and growing acceptance of eggs as a quality protein source are the drivers of increased global egg consumption over the past decade (Conway, 2018). Meanwhile, predictions for continued growth are strong: Rabobank indicates a steady annual growth of 1.8% globally between 1985 and 2035 (Mulder, Global Poultry and Pork Outlook, 2017).

### Global egg trade

Global egg trading is clustered in three primary geographies: Europe, the Near East and South-East Asia between Singapore and Malaysia. Unlike chicken meat, shell eggs cannot be frozen, resulting in trade being primarily confined to tight geographic areas. The US and Brazil have substantial surpluses but do not trade in eggs as readily as Europe. Within Africa, trade is minimal, though there are some imports of dried egg products as they permit longer transport distances than fresh egg products (Windhorst, 2013).

## 2.2 A brief analysis of current and future trends in Sub Saharan Africa poultry

The population of Sub-Saharan Africa (SSA) stands at more than 950 million people currently and is set to grow to 1.2 billion by 2025. This population growth, coupled with rapid urbanisation, increased per-capita incomes and a growing middle class will drive demand for higher value food items such as poultry and eggs (OECD/FAO, 2016). Due to the relative ease in investment and quick returns in broiler

<sup>7</sup> Unlike the case for chicken meat, no reliable raw data for egg consumption or trade were found that corresponded to industry reports. OECD does not collect consumption data for eggs; the ITC Trade Map trade data was patchy while the USDA trade data seemed to have mis-labelled importers/exporters, showing a picture contrary to industry reports.

production, which is bringing the cost of chicken meat down over time, consumers in SSA are expected to increase their consumption of chicken at a more rapid rate than other meats in coming years (Towers, 2016).

### Sub-Saharan Africa chicken meat production

Sub-Saharan Africa chicken meat production grew at 3.5% per year between 2007 and 2017, from 2.1 million MT to 3.1 million mt. South Africa is the dominant player by far, responsible for 54% of production during the decade (Figure 11). By comparison, the next four countries in the top five produced just 16% of the total. The top producing countries experienced low-steady growth of between 2% and 3.6% over the period (except Nigeria, which had negative growth), but there was dynamism in the sector over the period (Table 4). This dynamism took place in less prominent producing countries in the Region, notably in Mozambique, Angola and Rwanda, which had annual growth rates of between 12% and 22%.

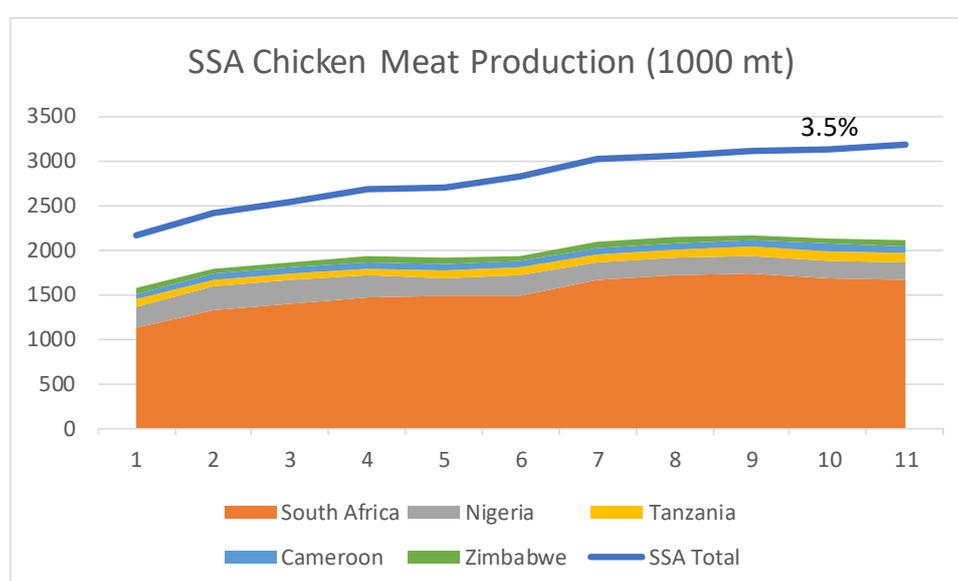


Figure 11: Sub-Saharan Arica chicken meat production, 2007 - 2017. Source: FAOSTAT

Table 4: Countries with rapid chicken meat production annual growth rates. Source: FAOSTAT

Country	% Share	CAGR 07 - 17
Top 5 Average	39.6%	3.5%
Malawi	4.8%	22.7%
Senegal	4.4%	6.8%
Mozambique	4.1%	12.9%
Cote d'Ivoire	3.1%	9.0%
Angola	2.1%	13.2%
Niger	1.3%	5.2%
Sierra Leone	1.0%	7.7%
Rwanda	0.9%	21.3%
Guinea	0.8%	6.7%
Cape Verde	0.1%	5.6%

In SSA, meat from cattle is very popular (Figure 122) and production was just over 5 million MT in 2017 compared with just over 3 million for chicken meat and under 1.5 million for both pork and goat meat. This is in contrast to the global preferences seen in Figure 33, where pork dominated, and poultry meat was second and climbing fast. Like the global figures, however, the annual growth rates for both

chicken and pig meat are climbing faster than that of cattle. Cattle farmers face land pressure and have limited ability to increase productivity per animal compared to commercial poultry which can raise birds designed for rapid feed conversion on relatively small plots of land. A rise of medium-sized farms also contributed to the shift towards poultry production.

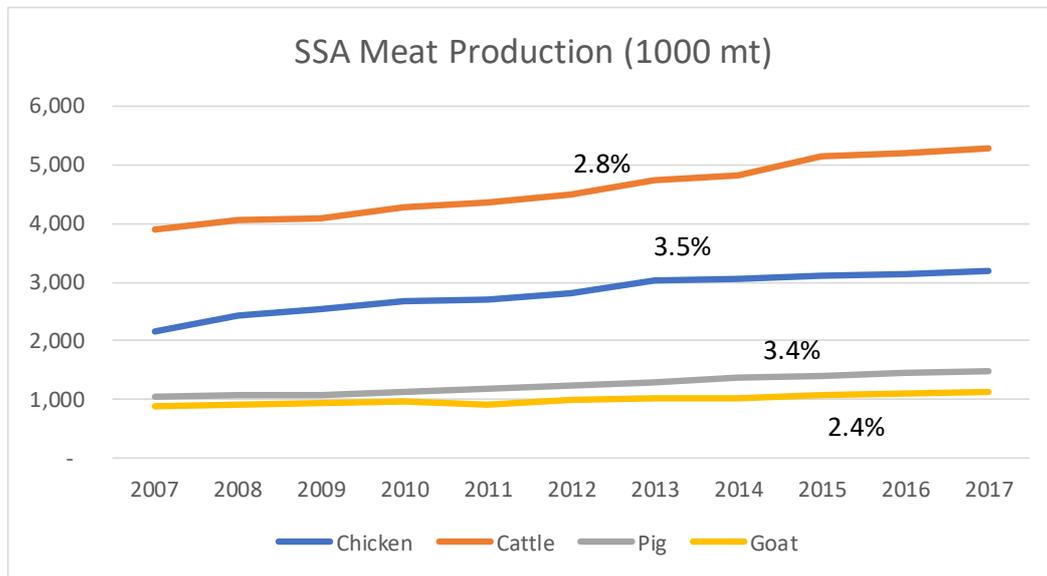


Figure 12: Sub-Saharan Africa meat production (Source: FAOSTAT)

SSA cannot be viewed as a single entity when it comes to meat production or preference. However, Table 5 highlights the variation that exists between nations in terms of their cattle or chicken meat production output. On the left is a select list of countries which produce more chicken meat than cattle meat, along with their population densities. On the right is a list of countries which produce more cattle meat than chicken meat. While conclusions should not be drawn based on population density and preference for chicken meat production, some generalities are evident with interesting, notable exceptions.

In general, the chicken-producing countries are more densely populated and have smaller land areas, while the cattle producing countries are larger and less populated (or, as in Kenya and Ethiopia, have large sections of grazing land). Indicators omitted from this simple chart are wealth, urbanisation rates and cultural preferences. Concerning the latter, both Kenya and Ethiopia have strong preferences for cattle meat, but for different reasons. In Kenya, the influence of pastoral communities and large swathes of open grazing land has created a culture of cattle meat production and consumption. In Ethiopia, Ethiopian Orthodox Christians are partly vegetarian and rarely consume poultry, saving it for special religious holidays two or three times per year (Wonde, 2017).

Table 5: SSA Chicken and cattle meat production ratio (average 2007 – 2017) and population density. Source: FAOSTAT

Country	Chicken/Cattle	Pop Density (per km <sup>2</sup> )	Country	Cattle/Chicken	Pop Density (per km <sup>2</sup> )
Mauritius	20.75	623	Kenya	17.90	87
Liberia	10.46	49	Somalia	15.82	24
Equatorial Guinea	5.04	45	CAR	15.25	7
Mozambique	4.80	38	Eritrea	13.60	n/a
Gabon	3.44	8	S. Sudan	11.18	n/a
Togo	3.00	143	Niger	9.59	17
Ghana	2.13	127	Ethiopia	9.03	105
Malawi	1.71	198	Guinea	6.73	52
Cote d'Ivoire	1.39	76	Mauritania	6.19	4
Sierra Leone	1.26	105	Madagascar	4.07	44
Cape Verde	1.14	136	Mali	3.55	15

### Sub-Saharan Africa chicken meat consumption

Population growth, rising urbanisation rates and growth in chicken meat production imply increasing demand in consumption. Rabobank projects this will continue in the coming years, with some SSA countries – Nigeria, Uganda, Cote d'Ivoire, Kenya, Ghana, Tanzania, Ethiopia and Mozambique – expected to grow between 6% and 10% year-on-year between 2015 and 2025 (Mulder, 2017).

Despite rapid growth in chicken meat demand in some countries, SSA is developing from a relatively small base. Table 6 lists a selection of SSA countries and their estimated current demand. For perspective, the combined total of the estimates below is only slightly larger than South Africa itself.

Table 6: Estimated chicken meat demand in selected SSA countries. Source: Rabobank

Country	1000s mt	Country	1000s mt	Country	1000s mt	Country	1000s mt
Nigeria	330	Zambia	90	Ethiopia	62	Kenya	50
Angola	250	Uganda	85	Ghana	53	Mozambique	45
DRC	120	Congo	85	Sudan	53	S. Sudan	15
Tanzania	100	Madagascar	73	Benin	51	Botswana	12
Zimbabwe	92	Sengal	65	Cote d'Ivoire	50	CAR	10

There is evidence that consumption patterns in SSA are changing with increasing preferences for cheaper and processed white meat and a declining share of cereals in the total food budget. In Zambia for example, there has been a rapid increase in demand for chicken meat which grew since the early 2000s by 8% to 9.2kg per capita (Paul Samboko, 2018).

SSA chicken consumption is expected to grow more quickly than other meats in coming years due to the growth of large modern poultry facilities which are increasing the availability of chicken for consumers (Towers, 2016). This is an important point to note, in that the larger volumes of production will most likely come from large commercial integrated producers who benefit from scale economies. However, the growth in the sector can remain inclusive and create opportunities for small-scale and emerging producers in the value chains, though it will be critical to be realistic about where these opportunities lie and how these are likely to shift as the sector matures. Later sections of this Report explore this in more detail.

### Sub-Saharan Africa chicken meat trade

Imports of chicken meat to SSA are concentrated on the West Coast and South Africa. Ghana, Benin, Congo and Angola import significant quantities from the USA and Brazil primarily. Rabobank indicates

that global poultry trade into Africa is around 1.3 million MT, 80% of which comes from outside the continent (Mulder, 2017). Some countries, such as South Africa, are in ongoing debates about how to handle the influx of cheap imports of frozen chicken pieces from overseas which challenge domestic production but on the other hand reduces the price of chicken, thus benefitting poor consumers (Viljoen, 2017).

Intra-Africa trade in chicken meat is primarily located in East and Southern Africa (Mulder, 2017). In East Africa, Uganda exports chicken meat to DRC, South Sudan, Kenya, Rwanda and Burundi. Uganda has lower production costs compared to neighbouring countries due to relatively low-cost feed inputs (soya beans and maize). Uganda is also uniquely placed as a strong, stable economy bordering Eastern DRC, which has a very large population and minimal development resulting from years of conflict, and South Sudan which likewise is held back. Kenya, the region’s economic powerhouse, and a significant producer of chicken meat, exports to Somalia and sometimes to Uganda. In 2017, Kenya imposed an import ban on Ugandan chicken meat due to an outbreak of Avian Flu, a decision that is currently under review (Nakaweesi, 2019).

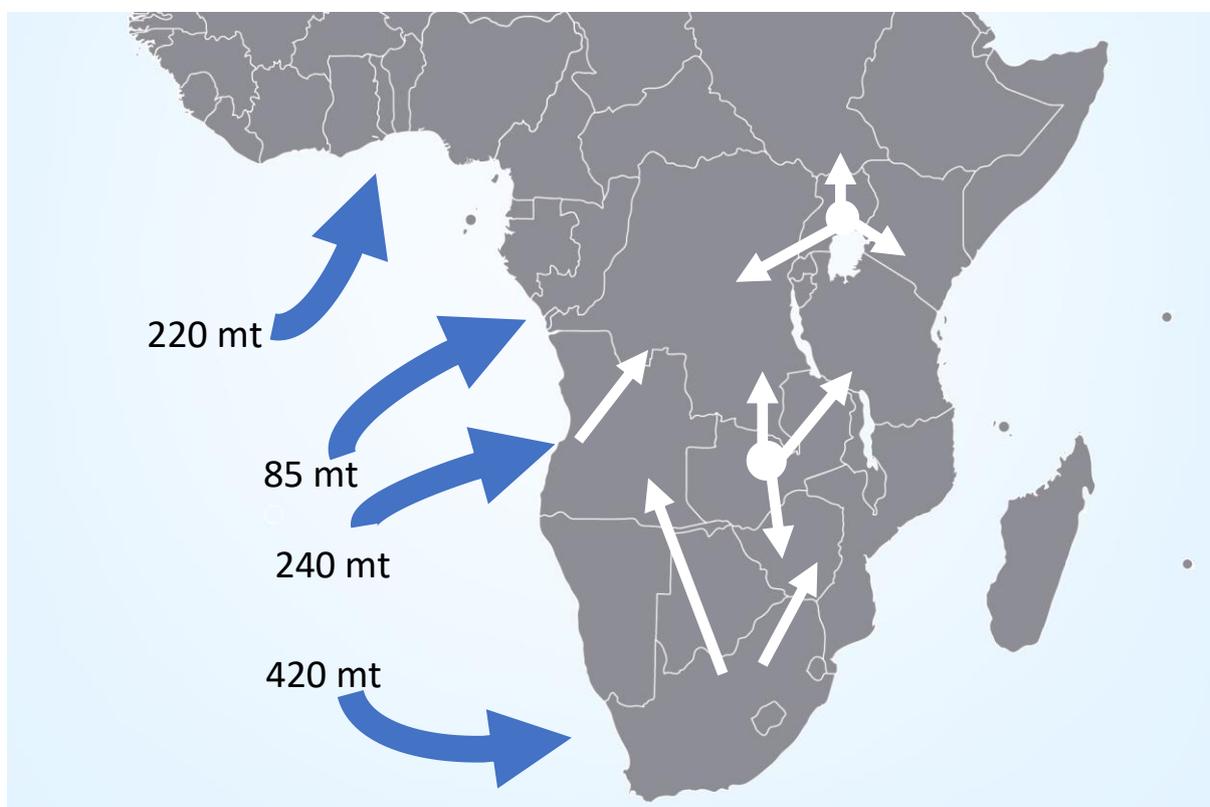


Figure 13 Meat trade flows Sub-Saharan Africa. Source: Rabobank

In Southern Africa, trade is dominated by South Africa and Zambia which export to DRC, Angola, Zimbabwe and Tanzania. Located between the large population centre of southern DRC and Zimbabwe, Zambia has a rapidly developing commercial farm sector helping reduce the cost of feeds. Along with South Africa and Kenya, Zambia is considered to have one of the most developed and competitive poultry industries in SSA (Cheelo, 2018). South Africa, which produces as much poultry meat as the rest of SSA combined, supplies Angola and Zimbabwe (Mulder, 2017), but due to higher domestic consumption rates, only about 5% of production is exported (Mugido, 2017).

#### Sub-Saharan Africa egg production

SSA makes up approximately 13% of the global population and less than 5% of global egg production (Guyonnet, 2017). Egg production data for SSA from 2007 to 2017 shows a sluggish pace of production

growth at 0.8% per year. The top five producers, which are responsible for 70% of recorded egg production, have remained mostly stagnant, with Nigeria showing a dip in production from 2015 which drastically affected the annual growth figures. In the decade from 2004 to 2014, the region’s egg production grew by 39%, so it is unclear if there was a significant change in production or if data collection methods changed in 2015. Other industry reports indicate that egg production in SSA could grow by 750,000 MT by 2025 (Guyonnet, 2017).

Countries in the region that have shown high year-on-year growth include Mozambique (12.6%), Rwanda (10.1%), Cote d'Ivoire (7.7%), Uganda (5.9%) and Sierra Leone (5.3%), though together these five make up only about 8% of total production of SSA.

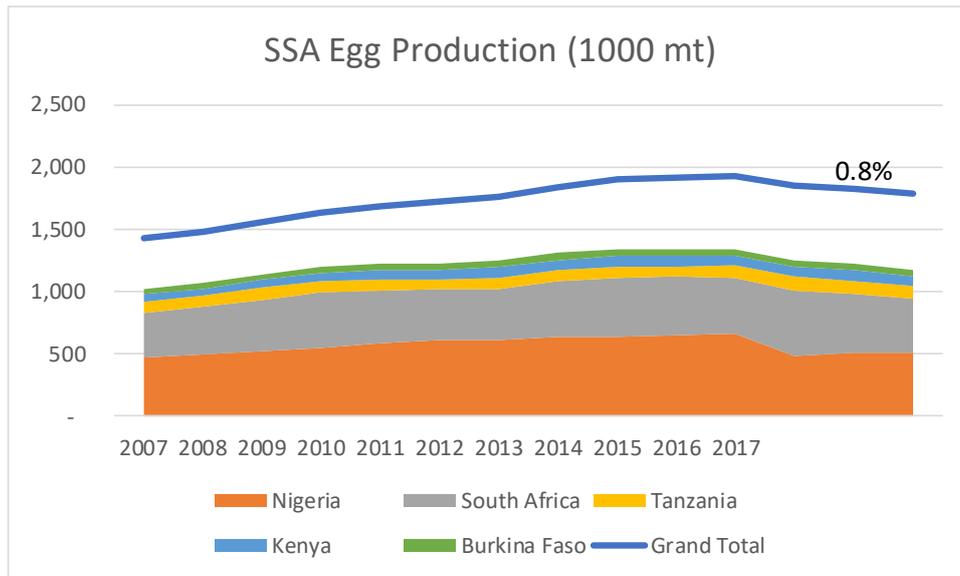


Figure 14 Sub-Saharan Africa egg production 2007-2017. Source: FAOSTAT

### Sub-Saharan Africa egg consumption

Consumption of eggs in SSA is very low compared to developed nations, with 34 African countries consuming less than one egg per person per week; for example, Botswana recorded 32 eggs/person/year in 2014 and, Malawi (45), Mozambique (4), Zambia (48) and Zimbabwe (42) (Guyonnet, 2017). In terms of consumer expenditure on eggs, the largest expenditures are in South Africa, Nigeria, Kenya, Ghana and Cote d'Ivoire (Figure 155).

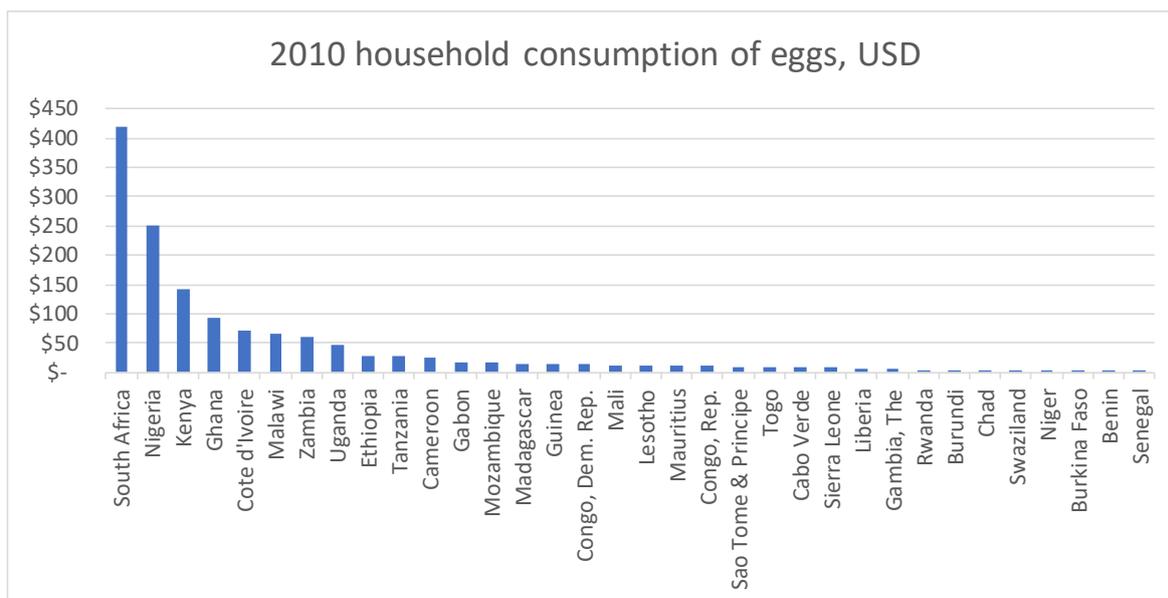


Figure 15: SSA household egg consumption USD 2010 (Source: World Bank)

### Sub-Saharan Africa egg trade

South Africa is ordinarily self-sufficient in eggs, but an outbreak of avian influenza in 2017 caused production declines leading to imports of 50 MT of eggs by June 2018. The decrease in South Africa's output also had an impact on the country's ability to export to other SSA countries, many of whom suspended imports of poultry products including eggs from the country in the wake of the outbreak (Mugido, 2018).

While large datasets on internal egg trade are difficult to come by, it is known that Uganda exports as much as 60% of its eggs to its neighbours including Kenya (Omondi, 2019). It is estimated that at times, Zambia exports as much as 30% of its eggs to the copper-rich and populous Katanga Province of DRC (Cheelo, 2018).

## 2.3 A brief analysis of current and future trends in South Asia poultry

For the purposes of this report, South Asia refers to Pakistan, Nepal and Bangladesh.

### South Asia chicken meat production

Production of meat in the three South Asia countries of focus - Pakistan, Bangladesh and Nepal - differs both in magnitude and importance (Figure 166). Pakistan is by far the largest producer of meat, the two largest categories being chicken and cattle meat at 1.2 million MT and 0.9 million MT respectively. Pakistan is also the only one of the three countries that produces more chicken meat than beef. Though both Bangladesh and Nepal produce nearly equal quantities of the two products, goat meat is produced in higher volumes in both.

In the past decade, the poultry industry in Pakistan has grown rapidly at 7%-8% annually and is now reportedly the country's largest industry after textiles. There were as many as 25,000 commercial poultry farms distributed throughout the country in 2013 served by 150 feed mills. The increasing investment has made poultry the cheapest meat available in the country, and commercial poultry firms are responsible for about 40% of total domestic meat consumption. Both domestic and foreign investment have boosted the sector and banks have begun to offer credit facilities for poultry businesses despite challenges surrounding collateral quality (Memon, 2013).

Of the three countries, Nepal has the most nascent poultry industry with only 1000 broiler farms registered in 2014 (FAO, 2014) compared to some 60,000 in Bangladesh (Raha, 2014). Nepal's commercial poultry sector is growing rapidly at around 17%-18% annually and is moving towards self-sufficiency, though high inputs costs and threats from Avian Influenza are significant challenges (FAO, 2014).

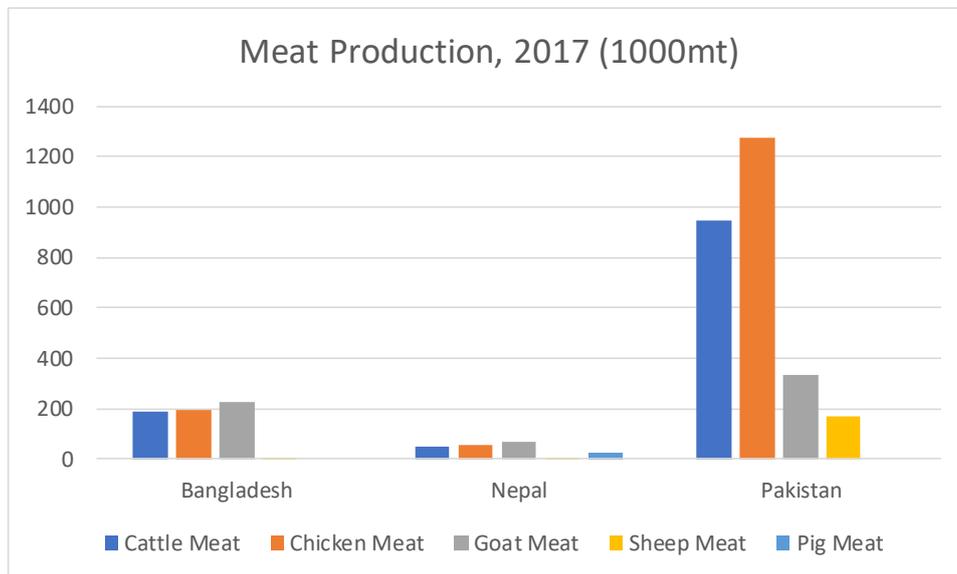


Figure 16: South Asia meat production, 2017. (Source: FAOSTAT)

Combining population growth and chicken meat production indicates that of the three countries, only Pakistan is increasing production in any meaningful way, though the steadiness of the growth curve at about 8.5% per year may indicate that data are desktop estimates not grounded in production data (Figure 177). Nevertheless, if the data is correct in magnitude, if not specifics, it is clear that Pakistan has far more robust chicken production than Bangladesh and Nepal.

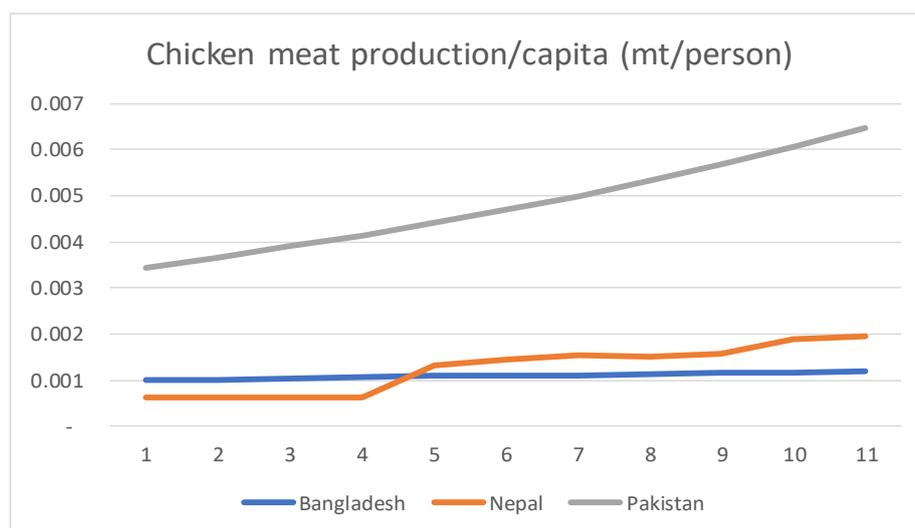


Figure 17: South Asia chicken meat production per capita. (Source: FAOSTAT)

### South Asia Poultry meat consumption

Consumption of poultry meat is highest in Pakistan which reportedly consumes between 4.3 and 6 kg of poultry per person annually (pppa), compared with Nepal at 4.1kg pppa and Bangladesh at 1.4kg per person per year. All three countries fall far below the global average meat consumption at 44 kg

pppa, and reports cite this as one reason for very high levels of stunting and malnutrition (ekantipur, 2016) (Nation, 2016).

In Pakistan, the increase in incomes in rural areas is driving the demand for chicken: ready-to-cook food items and fast food retail outlets are growing in importance. There are both international and local fast food chains scattered throughout the country, and several brands marketing frozen chicken end products of local supply chains (Memon, 2013).

Though Bangladesh consumes the lowest quantities of chicken meat of the three countries, there has been a recent surplus of production with farmers groups complaining of poor coordination leading to the oversupply. The cause is reportedly due to recent entrants of commercial poultry producers doubling production with no corresponding increase in demand. The cause of the discrepancy is due to Bangladesh's population having minimal purchasing power, and cultural preferences for indigenous chicken breeds vs commercial broiler meat (Raha, 2014).

### South Asia Poultry meat trade

If reports highlighting overproduction of chicken meat in Bangladesh are accurate, there should be ample opportunity to export to India, Pakistan and Nepal.

Data on trade in chicken meat in Nepal are incomplete, but Nepal has occasionally exported negligible quantities to India. The poultry sector is working toward meeting its demands but has been held back by Avian Influenza both domestically and in neighbouring countries. During recent years, donors have provided support to smallholder producers for aggregation (e.g. local milk collection hubs) with complementary private sector investment in milk processing, notably dried milk powder products.

Given Nepal's small poultry sector, they are more likely to be importing poultry, but formal imports have been hampered by the outbreak of Avian Influenza in India which reduced official trade but not informal trade. Indigenous chickens do however cross the borders, notably through informal methods such as by bicycle, in the tens of thousands (FAO, 2014).

Pakistan exports poultry to nearby Afghanistan and Iran, and further afield to Bahrain, Turkey and Hong Kong, albeit in relatively small quantities (less than 1000 MT per year) (Memon, 2013).

### South Asia Egg production

Of the three countries, Pakistan produces by far the most eggs at nearly 18 billion eggs in 2017 compared to Bangladesh at just over 10 billion and Nepal at under 2 billion (Figure 188). As with the production figures in the previous section, however, the very steady growth displayed by the data is questionable and should probably best be taken as an indicator of relative magnitude.

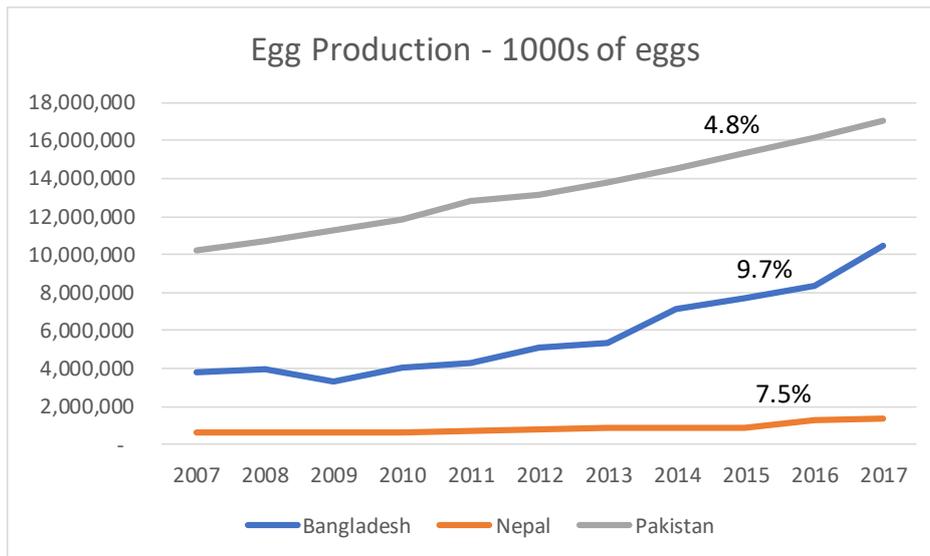


Figure 18: South Asia egg production (Source: FAOSTAT)

In terms of per-capita egg production, there is much less disparity between the three countries. Pakistan continues to lead with nearly 90 eggs produced per person in 2017, compared with about 64 and 42 in Bangladesh and Nepal respectively. However, rapid egg productivity growth compared to population growth in Bangladesh means that this gap is shrinking (Figure 199), and if growth rates continue unchecked in the two countries, Bangladesh would produce as many eggs per capita as Pakistan by 2023.

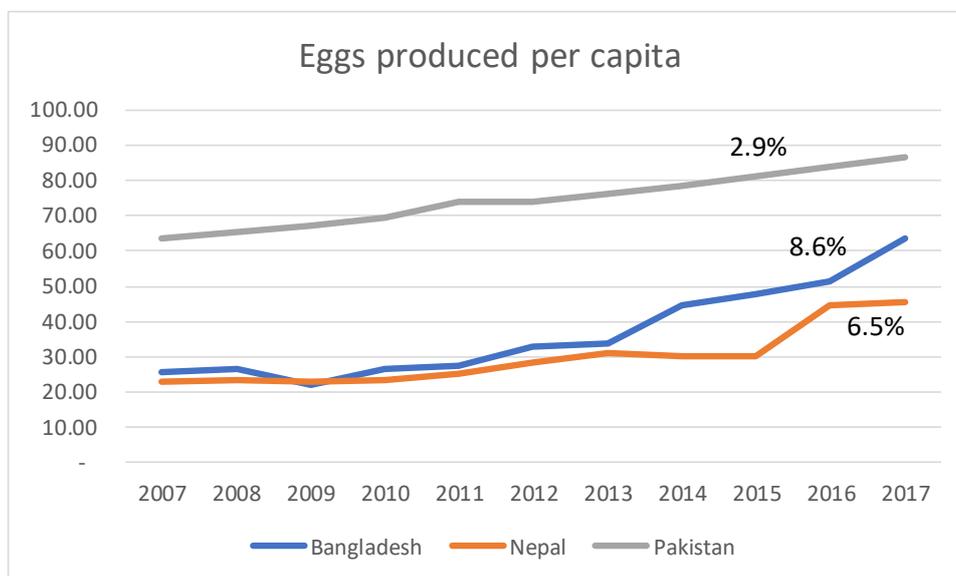


Figure 19: South Asia egg production per capita (Source: FAOSTAT)

### South Asia Egg Consumption

The egg production and availability figures suggest that consumption of eggs in Pakistan is highest, followed by Bangladesh and Nepal. However statistics from the World Bank indicate that Bangladesh spends almost twice as much on eggs and egg products as Pakistan, suggesting that perhaps prices of eggs in Bangladesh are higher. Other reports indicate that Pakistani per-capita consumption of eggs is between 55-70 annually (Nation, 2016), Nepal consumes 44 eggs per capita (ekantipur, 2016) and Bangladesh consumes between 21-48 eggs per year (Raha, 2014) compared with 130-150 globally and as much as 300 in developing nations.

### South Asia egg trade

There is not a great deal of dynamism in egg trade in the region. Pakistan may be exporting some eggs, but Nepal is unable to meet its domestic egg consumption requirements, leaving scope for imports of eggs with large quantities of illegal imports recorded. Since late 2015, formal egg imports to Nepal are banned due to fears of Avian Influenza (FAO, 2014).

### 3. A COMMON FRAMEWORK FOR ASSESSING CHALLENGES AND INTERVENTIONS

#### 3.1 Poultry industry market system

The primary poultry value chain involves many actors and supporting markets. In order to segment and sort the different projects and investments, and to provide advice on approaches for driving growth and impact later in this report, it is important to understand the sector chain. The sector map presented in Figure 2020 highlights the complexity of the chain and provides a relevant reference for the remainder of the report content. Note that it is a general map intended to highlight the actors in the sector and the ways in which they interact. A detailed value chain map would include values at the different levels of the chain and would be developed for a specific region/country.

The chicken supply chain begins with the production of field crops and other animal feed ingredients and production of day-old chicks and veterinary inputs. Chicken producers of various sizes and levels of sophistication make use of these inputs at different levels and take different routes to final market. These are broadly split between the live market and retail outlets, such as supermarkets and restaurants which purchase slaughtered and dressed chickens and chicken pieces. There are complex interactions between the various market actors as noted in this report.

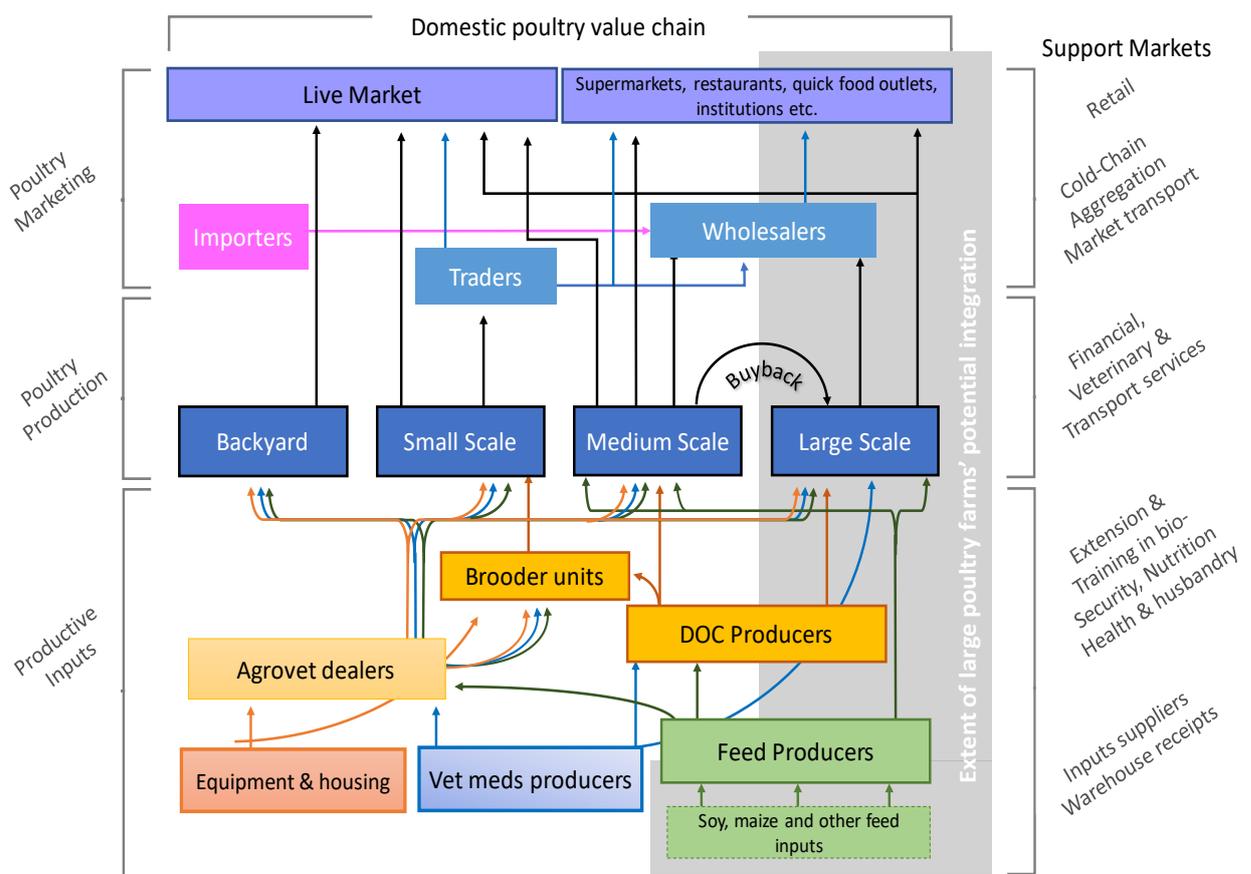


Figure 20: Poultry value chain map

Two aspects critical to the poultry chain that require further definition and scrutiny are chicken genetics and chicken farm types. The two are interrelated, and it is essential to understand which type of genetics matches with each farm system type.

### 3.2 Chicken genetics

All chickens are not created equal. A farmer's choice of genetics impacts greatly on his/her choice of housing, health care needs and feed regimes, and will also impact on his/her ability to sell the bird or eggs at harvest. For many years, there were only indigenous chickens (currently kept by backyard producers) as well as commercial chickens (high-output broilers and layers kept by large commercial farms) available. However, during the past decade, some dual-purpose hybrid<sup>8</sup> chickens have entered the sector enabling smaller producers to raise chickens commercially.

This report refers to three different types of chickens that are appropriate for different farming systems. Broadly speaking, productivity (feed conversion ratio and laying percentage) and hardiness (how well a bird can withstand disease, lower quality feeds and predation) are the two primary factors that determine which genetics are chosen by which farm types.

Indigenous chickens occupy one end of the spectrum, having high disease and predation resistance and ability to survive in a scavenging system, but low productivity. At the other end of the scale, commercial broilers and layers have high productivity but low disease resistance, requiring intensive indoor production systems and complete commercial feed regimes.

Over recent years there has been growth in a third category of chicken, the dual-purpose hybrid. These are breeds that offer a significant new opportunity for farmers 'stepping up' from the backyard or small commercial poultry systems. Dual-purpose hybrid birds balance disease resistance, feed and management requirements and productivity. In the past decade, the number of dual-purpose hybrids has grown dramatically, and they are now no longer uncommon in SSA or S. Asia. The breeds show signs of long-term commercial viability. In Kenya for example, two commercial companies are producing dual-purpose hybrids, Kenchic with the Kenbro, and Kukuchick with the Rainbow Rooster. Both companies produce over 1 million dual-purpose hybrids per year in commercial laying facilities. In India, dual-purpose hybrids have been available for longer and are even more established in the mainstream. For example, Kegg Farms' 'Kuroiler' chicken is now a major feature of the industry, with so much success that it even features as a fascinating short Harvard MBA case study<sup>9</sup>.

Figure 211 below, summarises the three groups of chickens: Indigenous; dual-purpose hybrids; and, commercial broilers/layers hybrid.

	Indigenous	Dual- purpose hybrid	Commercial broilers/layers
Reproduction	On-farm breeding	Commercial hatchery	Commercial hatchery
Day Old Chick availability	Farmer to farmer	Exclusively via hatchery	Exclusively via hatchery
Flock size	5 to 50	5 - 100s	1000 - 100,000s
Disease resistance	High	Medium	Low
Diet	Scavenging	Semi-scavenging	100% Commercial feed
Appearance	Multi-coloured	Multi-coloured	White
Owned IP	No ownership	Sasso, Keggfarms, etc	Cobb, Ross, others

Figure 21: Chicken genetics summary

The commercial development, production and distribution of dual-purpose hybrid varieties is an area that has received significant commercial and developmental funding. It is now at the stage where the

<sup>8</sup> Throughout this report, we refer to indigenous birds, dual-purpose hybrid birds and commercial broilers/layers or commercial birds to differentiate the three main categories of chickens.

<sup>9</sup> [http://www.keggfarms.com/pdf/Harvard%20Business%20School%20Case%20%20Study%20807089%20-%20Keggfarms\\_India-%208-21-07.pdf](http://www.keggfarms.com/pdf/Harvard%20Business%20School%20Case%20%20Study%20807089%20-%20Keggfarms_India-%208-21-07.pdf)

breeds are available sustainably and at scale in many developing countries in SSA and S. Asia. This is a particularly strong focus area for the Bill & Melinda Gates Foundation through partnerships with the World Poultry Foundation and others. However, as subsequent sections show, conditions for widespread adoption are not yet in place to maximise the benefit from this new development.

### Indigenous chickens

Indigenous genetics dominates the backyard farming system. Farmer actors at this level choose hardiness and disease resistance over all else. Keeping the birds alive at zero cash cost is the most important consideration. Features include:

- This type of bird reproduces naturally on the farm and chickens raise the chicks without the need for supplementary feeding, heat or special care.
- Farmers grow their flocks naturally or buy live chickens from neighbours and friends. There are no large-scale Day Old Chick (DOC) providers for indigenous chickens as there are for the other types.
- Flock sizes are generally small, between 5 and 25 birds.
- These birds are extremely hardy and can survive on 100% scavenging diets around rural homesteads where they live with no or minimal housing.
- Somewhat effectively and generally survive in the tough environment of poor rural villages.
- Most people keeping these chickens supplement their feed with household and farm food scraps, but they do not invest in their upkeep.
- The birds are multi-coloured, highly broody<sup>10</sup>, and able to evade common predators better than commercial breeds.
- Varieties of indigenous birds have locally-specific names, and the genetics are not owned by any entity.



Figure 22: Example of indigenous chicken breeds (Zambia). Source: TechnoServe

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<sup>10</sup> Broodiness relates to a hen's instinct to sit on and hatch eggs, and to further care for chicks during their first weeks of life.



Figure 23: Indigenous chickens scavenging around a homestead. (Photo credit: Rod Waddington via Creative Commons)

### Commercial broilers and layers

On the other end of the spectrum, commercial broilers and layers are exclusively utilised by medium and large-scale farms which require high productivity and manage low disease resistance by confining birds and rearing them in sterile environments. Features include:

- Commercial DOCs are produced in large-scale hatcheries and sold in carton boxes to medium and large-scale farmers who farm 1000s to 100,000s of birds each<sup>11</sup>.
- Commercial broilers can grow to slaughter weight in six weeks or less and commercial layers can lay nearly one egg per day at their peak.
- Specially formulated commercial broiler and layer feed provide all the calories and protein these chickens need to grow and produce rapidly.
- Housing for this type of birds is strictly-controlled, indoor facilities, the largest of which include semi-automated feeding and drinking equipment and waste disposal.
- Biosecurity is critical with this type of bird. Contact with the outside is minimised, personnel are sterilised upon entering the sheds, and vaccine and treatment protocols are strictly monitored.
- Commercial broilers are uniformly white in plumage and cannot be confused for indigenous chickens.
- Common sources of commercial broiler genetics are Ross, Cobb, Hubbard, Arbor Acres and Hybro. International poultry genetics firms license the use of their genetics to local hatchery firms and provide wide-ranging support. Most hatcheries will keep a 'parent flock' that produces the hatching eggs, though some will purchase fertilised hatching eggs and incubate from there. In the largest markets/regions, some large-scale players may be keeping grandparent genetics and provide parent stock to various commercial hatcheries in the country. However, most developing markets are too small to sustain this level of operation.

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<sup>11</sup> Which compared to industry giants is quite small. Poultry farms in Brazil and China keep chickens by the millions.



Figure 24: Commercial chickens, Kenya. (Photo credit: The Guardian)

Dual-purpose hybrids fall between commercial broilers and indigenous chickens and are a very dynamic and interesting development for the sector. Birds in this group are bred for characteristics that benefit less-sophisticated farmers.

Firstly though, what is a ‘hybrid’? A hybrid is a chicken that is the offspring of parent stock of different strains selected to bring out desired characteristics<sup>12</sup>. Dual-purpose hybrids are cross-bred for hardiness and improved weight gain and/or egg-laying potential. These breeds are outwardly like indigenous chickens, with colourful plumage that is readily accepted by rural farmers and consumers, but they are more efficient converters of feed than their indigenous counterparts. Additionally, this type of chicken is relatively hardy and able to subsist for some time on scavenging or partial feed rations, unlike the commercial broilers/layers.



Figure 25: Kukuchic dual-purpose hybrids raised in partial confinement. (Source: Authors)

Some varieties are more geared towards meat and others more towards laying. As with the indigenous breeds, they can, however, be used for both, which is why for convenience they are referred to as “dual-purpose” in this report. This dual ability is good for farmers because if a bird is not sold for meat,

<sup>12</sup> Important: This is not the same as genetic modification

a farmer is potentially able to earn income from the sale of eggs (off-setting the cost of continuing to feed the bird). This is in stark contrast to commercial broilers which must be sold at a specific time to maintain profitability and commercial layers which are only sold for meat (at a steep discount) at the end of their productive egg-laying life.



*Figure 26: Kuroiler dual-purpose hybrids on a semi-scavenging diet in Uganda. (Source: Wellspring)*

Features include:

- The first steps in dual-purpose hybrid production are identical to commercial chicken production: parent stock is imported as DOC or hatching eggs from overseas and reared in commercial hatcheries. These parents are then bred to produce the dual-purpose DOC for distribution.
- Dual-purpose chickens can reach market weight by 16 weeks if raised on a semi-scavenging diet, or they can be raised to lay eggs at about an 80-90% efficiency rate. In some areas, this is five times as much eggs and twice the output of meat as indigenous chickens (Wellspring, 2014).
- A variety of housing types are used by farmers for keeping this type of bird. Smaller farmers will construct a basic shelter used only at night while slightly larger farmers may build shelters with a fenced “chicken run” giving birds access to an area outside, but not complete free-range. The level of confinement (and the environment) determines how much of the birds’ nutrition comes from scavenging vs supplemental feed.
- In order to appeal to smaller farmers and live-market consumers, these chickens are bred to have colourful plumage to emulate the look of indigenous chickens. However, most farmers and consumers can readily distinguish between them and a true indigenous chicken.
- Some breeds in SSA are Kuroiler, Sasso, Kenbro and Rainbow Rooster, the genetics for which are owned by firms in Europe and India.

### **3.3 Chicken farming systems**

Chicken farmers vary in a number of important ways. Farm size, financial resources, education levels, availability of other employment opportunities and distance to markets are just some factors that affect their decision-making and ability to participate in different levels of poultry farming. These and other factors influence a farmer’s willingness to adopt new chicken rearing technologies (feed, vaccinations, improved genetics), and these technologies, in turn, affect a farmer’s level of

commercialisation. It is therefore essential to define the different farm segments that are discussed during the remainder of this report. Equally important is the need to highlight the differences in chicken genetics being used in different farms. The farm segments are:

- 1) **Backyard.** In many countries in SSA and S.E. Asia, more than 80% of farming households keep chickens, and most of them fall into this category. They are characterised by having small flocks of indigenous chickens; the chickens primarily subsist on scavenging around the homestead; the chickens do not receive vaccines or other medicines and are housed in rudimentary coops or sleep in the house. Chickens are primarily kept as insurance and are slaughtered either for home consumption or sold locally (to neighbours or local markets) for cash to solve an immediate household need. This system can rarely support a flock of more than five to twenty-five birds. Annual cash income from poultry sales is very low (typically \$0-500 pa) as few birds are sold; this model mainly contributes to household food security and nutrition.
- 2) **Small Commercial.** This group is 'stepping up' from backyard/subsistence farming but are not well integrated into the poultry market structure. The group splits into: a) those rearing dual-purpose hybrid birds (sometimes purchased from intermediary rural 'brooder SMEs' who raise them to adult size and provide initial vaccinations and care); and, b) those keeping small numbers of commercial broilers or layers that they rear from day-old chicks. This is an important and interesting space as it offers opportunities for farmers to step up from backyard farming into the small-commercial production, even on smaller parcels of land or in peri-urban areas. In this group, chickens are reared with sales in mind, but farmers are often not well connected to regular off-takers. Instead, they sell their chickens/eggs to local markets or farm-gate traders. The economics for this group are challenging as they are investing in some inputs yet lack the scale to make significant profits. They also often take on significant risk if the market is not secure, if they do not manage flock health appropriately, and if they over-invest in inputs. A farmer with 100-500 birds could make \$1750 – \$3000 per year gross margin (\$350 – 600 per cycle) in the best-case scenarios.
- 3) **Medium Commercial.** This group keeps 1,000 – 10,000 chickens, mainly commercial broilers or layers. A few are starting to do larger volumes of dual-purpose hybrids, such as Kuroiler growers in Uganda since this allows more room for error in markets where feed quality can be inconsistent, and markets sometimes overstocked. They have more than one chicken house with staggered production to sell consistent volumes into the market. They have off-taking agreements in place to remove finished produce when it is ready, or they have their own marketing and distribution capabilities, especially when based in peri-urban areas. Chickens are kept in larger, built-for-purpose houses that necessitate health and vaccination protocols. The enclosed housing and improved genetics require 100% commercial feed usage with precise nutrient rations. At this level, they must hire in labour compared with small commercial farmers that mostly use family labour. This group of farmers is responsible for a great deal of the output of commercial broiler meat. In Zambia, for example, 65% of the broiler meat is estimated to come from this level of producer (Paul Samboko, 2018). With a ready market, farmers of this scale can make around \$1500-\$2000 per month gross margin (i.e., before finance/depreciation costs) and assuming no major losses to disease<sup>13</sup>.

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<sup>13</sup> Many farmers at this scale will suffer a major loss to disease approximately every 2 years and so need a buffer to withstand this.

- 4) **Large Commercial.** These farms and their contractors keep tens of thousands to hundreds of thousands of chickens in purpose-built, sometimes partially-automated and climate-controlled commercial broiler and layer facilities. They are generally smaller than commercial farms in developed countries<sup>14</sup> but rely on the same principles. High-quality commercial feed, strict control of animal health, and quality genetics are absolute requirements. The largest in this group are either fully vertically integrated (from feed inputs to slaughter, cold-chain and retail), or have close agreements with inputs providers and off-takers such as supermarkets and fast-food chains for their produce. Kenchic, Kenya’s largest commercial broiler company, produces as many as 600,000 broilers per week, grown both in-house and by contract farmers keeping between 10,000-100,000 birds. Large commercial farms notably create jobs in production and feed/chicken processing. They are also often the major feed processors sourcing maize and soy from 100s to 1000s of smallholder farmers and representing the major market opportunity for marketing soy in many geographies. They tend to support the existence of the small and medium commercial segments as they are the major suppliers of DOCs and feeds and make available frozen chicken products to low/middle-income urban consumers who no longer rear their own chickens.

Table 7 provides a quick-glance summary of the different poultry farming systems for reference.

Table 7: Chicken production types

	Backyard	Small Scale	Medium Scale	Large Scale
<b>Type of confinement</b>	Free range	Indoor/outdoor	Indoors	Indoors
<b>Flock size</b>	~1 - 50	~50 - 500	~2000 – 10,000	> 10,000
<b>Housing</b>	Minimal	Closed/open	Closed	Closed / Temperature-controlled
<b>Type of genetics</b>	Indigenous	Hybrid	Commercial/hybrid	Commercial
<b>Biosecurity</b>	Low	Low	Medium	High
<b>Use of inputs</b>	None/Low	Low/Med/High	High	High
<b>Market outputs</b>	Rural/none	Urban/Rural	Urban/Rural	Urban
<b>Contact with other poultry</b>	Yes	Yes	None	None
<b>Veterinary Services</b>	Irregular/none	Irregular/Contract Services	Contract Services	Own services

It should be mentioned that the poultry farming systems across SSA and S. Asia is quite diverse and the discussion above is an attempt to categorise a great deal of variability for ease of discussion and understanding. Individual nations will differ from one another in terms of scale and in terms of what is considered commercial. In Nepal for example, the typical backyard flock is between 3 and 10 chickens, and this level of farming is undertaken by nearly 50% of households in the country. While two government-sponsored breeders are producing dual-purpose hybrid chickens, the distinction between farmers keeping these birds and indigenous birds is not well defined. In the commercial

<sup>14</sup> For perspective, some large European commercial farms can produce over 300 million finished broilers per year (Clements, 2016).

broiler system, 93% of farms keep between 250 and 2000 birds (Small Scale), 5.85% produce between 2000 and 10,000 (Medium Scale), and fewer than 1% produce over 10,000 (Large Scale) (FAO, 2014).

### 3.4 Pathway between segments

While there seems to be a logical pathway from subsistence through to small commercial and medium commercial to the large commercial farmer, in practice, making the transition between segments is extremely challenging. Even with good conditions and support from donor programmes, usually only a fraction of farmers can grow into the next segment. (This mirrors the pattern seen in micro-business and SMEs more generally)<sup>15</sup>. Sometimes, medium scale farmers grow from small commercial farmers, but more often they are also entrepreneurs who come out of paid employment in the private sector (often the large-scale poultry industry) or public sector.

The diagram below lays out the critical enabling factors for farmers to move from one segment into the other. At all levels, aptitude (supported but not created by Technical Assistance) and a strong ambition to work hard and succeed are critical success factors. Dashed arrows indicate that some, but not all farmers transition from level to level.

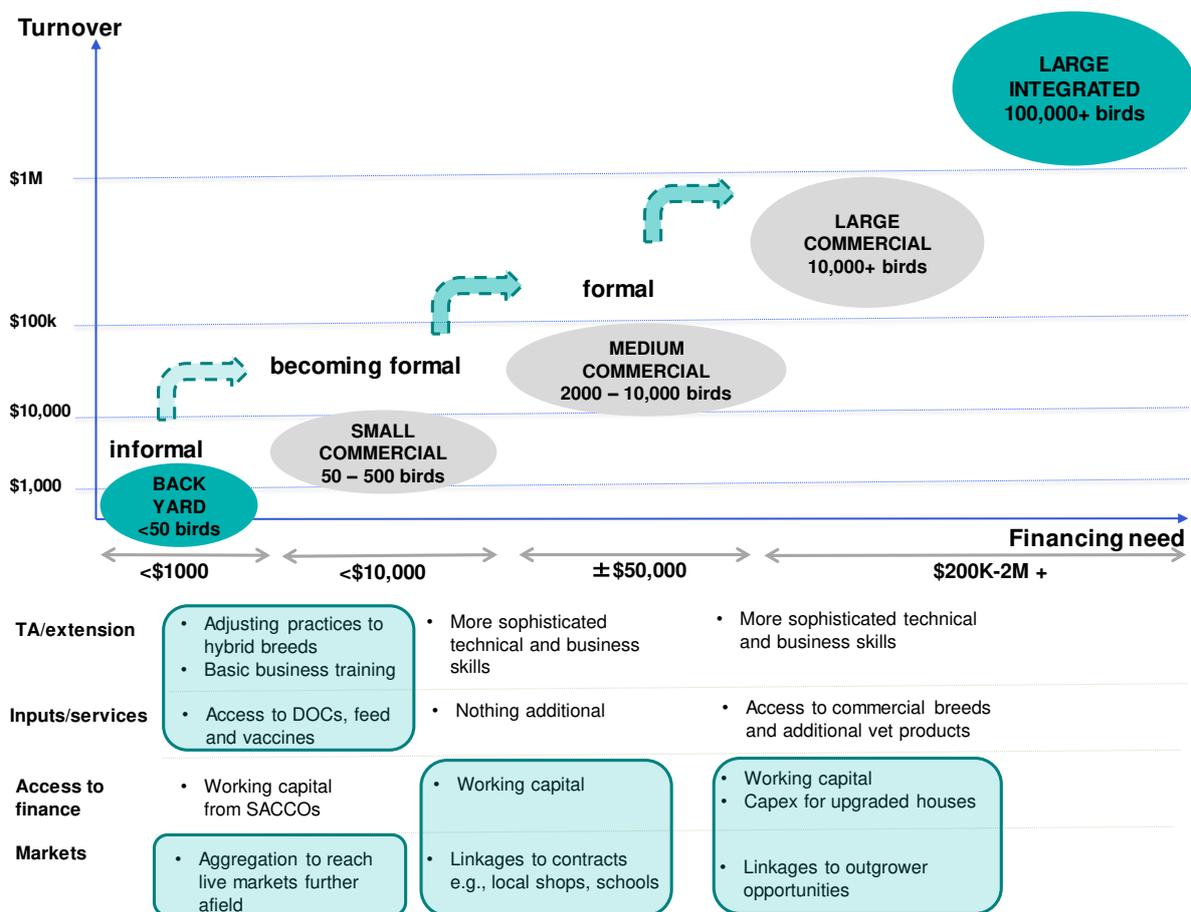


Figure 27 Critical enabling factors flow diagram

Note that *all* segments have a valuable role to play in a national poultry industry and differing developmental impacts: bigger is not always better. However, it is important to ensure that enabling

<sup>15</sup> E.g., a TechnoServe analysis showed that 30-40% small early stage businesses (\$10,000 – 100,000 revenue) typically grow into small businesses (\$100,000 – 500,000), and of those only 25% grow further into medium businesses (\$500,000 - \$2M revenue). These growth rates are much lower in Africa than in Latin America.

systems and support are there for farmers who have the desire and ability to grow their production alongside support to optimise production at any single level for farmers who do not wish to or lack conditions to grow further.

The poultry sector offers some useful pathways out of poverty for smallholders. However, it is critical to consider the different contexts in which the smallholders are based in order to segment these and design/target the most promising opportunities. For those who lack critical growth conditions (including markets and finance), often the best choice is to ‘step out’ or ‘hang in’ for the meantime.

The table below adapts and builds on the Doward et al. ‘hang in, step out, step up’ model by: a) focusing purely on the poultry sector; b) widening the focus to opportunities the sector can create in the supply chain for grain farmers; and, c) opportunities created for on-farm/factory jobs and other supporting functions such as vaccinators, aggregators and marketing agents.

Table 8 - Most appropriate pathways out of poverty from poultry – adapted from Doward et al., 2009

		Local market opportunities		
		Status		
		Low/Stagnant	High/Dynamic	
Natural resource potential	Low	Poor	<b>Hang in</b>  Backyard poultry	<b>Hang in</b> Local employment non-farm
		Less Poor	<b>Step Out</b> (migrate)	<b>Step out</b> (local non-farm)
	High	Poor	<b>Hang in</b>  Backyard – Indigenous poultry	<b>Hang in</b> or <b>Step up</b>  Vaccinator/input trader  Smallscale commercial poultry  Aggregation agents (eggs, meat)  Employment (farm and non-farm)
		Less Poor	<b>Step out</b> (migrate) Or <b>Step up</b>  Maize/soybean producer for feed mills  Small or medium exportin producer to nearby market  Brooder units (hybrids)  Agrovet dealer	<b>Step out</b> (local farm and non farm) Or <b>Step up</b> (local markets)  Small or medium scale producer  Mid-size slaughterhouse  Inputs dealer  Brooder unit  Trainer extension  Aggregation/market meat/eggs

Key:  High potential  Medium potential

## 4. CHALLENGES FACED BY THE POULTRY SECTOR IN SUB SAHARAN AFRICA AND SOUTH ASIA

While each type of poultry farming system has an important role to play in the overall industry and contributes to development impact in different ways, all types face challenges. Understanding that large commercial producers don't face the same issues as smaller producers has implications for the types of donor interventions that might have the most development impact.

This section highlights the main challenges faced by the poultry sector in SSA<sup>16</sup> and S.E. Asia, focusing on the four broad producer groups described above. Challenges relate both to optimising production at each level, and to growing production from one level to the next. These challenges fall into four main categories:

### Inputs

- Feed
- Genetics

### Production

- Health
- Animal welfare and human health

### Market

- Processing
- Marketing
- Production practices

### Finance

### 4.1 Inputs

The two primary categories of inputs for poultry production are feed and genetics.

#### *Feed*

Feed is an area in which commercial poultry producers of all sizes face challenges, largely due to the high cost of carbohydrate and protein inputs. Poor regulation and competition also make identification and access to quality feed challenging.

Proteins are the costliest elements in animal feed, sometimes contributing as much as 70% of the cost of production. There are two primary types of protein: animal-based protein (blood/bone meal, fish meal) and vegetable-based proteins (primarily soya, but also cotton-seed cake and sunflower-seed cake, all by-products from oil extraction). In SSA and S.E. Asia, both types of protein are in overall short supply (though with major regional differences).

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<sup>16</sup> In this section, we exclude South Africa from our discussion. It was included in the earlier background sections to provide context, but discussion here is relevant for less-developed countries in the SSA region.



Figure 28: Commercial feed mill at Silverlands, Tanzania. (Credit: Silverstreet Capital Ltd.)

**Animal-based protein issues:** Feed formulators have long relied on animal-based proteins to provide amino acid profiles that are optimal for poultry growth or laying performance. The sources of these animal proteins are commonly derived from bone and blood meal, taken from large commercial abattoirs and fish meal from the commercial fishing industry. In SSA and S. Asia, however, large abattoirs are uncommon and often unsophisticated. In Kenya and Uganda for example, procuring a steady supply of bone meal in quantities needed for commercial feed production is not possible (Bosibori, 2016), and bans on imported bone/blood meal from overseas have been in place over concerns around bovine spongiform encephalopathy (BSE), commonly known as ‘mad cow disease’ (Nabangi, 2016).

As a result, procurement of small silverfish (Omena) from Lake Victoria has been the primary way East African feed producers acquire animal proteins. This comes with a host of challenges for the feed miller (poor quality or adulterated fish is costly to source and clean), the environment (demand for Omena has led to over-fishing) and for lake-side communities’ nutrition (demand from the feed industry reduces the availability of protein from Omena in local diets).

**Vegetable-based protein issues:** Brazil and the USA dominate the poultry industry partly because of their ready access to low-cost, high-quality genetically modified (GMO) soybeans. In most countries in SSA, GMO crops are neither grown nor imported due to regulatory restrictions, leaving feed manufacturers to source their ingredients locally or regionally at a higher cost. Local sourcing is challenging due to insufficient supply and logistics aggregating produce from many small-scale farmers. Importing at higher cost leads to poultry products being uncompetitive on the shelf vs imported chickens. Ugandan poultry is competitive in East Africa due to its relatively large supply of soya from Northern regions which Kenya does not have. In Pakistan and Nepal, imports of soya contribute to the high cost of chicken feed (FAO, 2014). The only soybean exporter of non-GM soybeans outside SSA is India, though importing soybean from there carries high costs for Africa producers and quality is often a challenge. In Mozambique, feed producers sometimes skirt the GMO restriction by importing soya cake from Argentina, arguing that as a by-product rather than a seed, it does not count as GMO. Other methods to circumvent GMO restrictions used by large feed mills in SSA include re-labelling to change the port of origin, importing soymeal and minerals together as a feed ‘premix’ and or simply not declaring the seed as GMO and using contacts at ports and customs to let the product through.

**Carbohydrate issues:** While protein costs represent the largest hurdle to commercial poultry, in some countries access to the main carbohydrate, maize, is also a challenge. While protein comprises a major cost in feed, maize makes up the bulk of the volume, and in many SSA countries, maize is also the primary human food staple and is often in short supply. This makes maize a highly political crop and leaves it open to volatile prices both from erratic harvests and from government imposition of import/export bans, price floors/ceilings, and politicised supply chains as well as unpredictable behaviour of national grain reserves.

Table 9: Summary of feed challenges

Backyard	Small commercial	Medium commercial	Large commercial
<p>Little or no consumption of commercial feeds. Indigenous chickens scavenge for their sustenance and are supplemented by household food scraps and bi-products from maize grinding.</p> <p>Feeding indigenous chickens commercial feed is uneconomical due to the birds' poor food conversion abilities.</p>	<p>Requires feed and a shift in thinking for farmers: if not done right (timing, quantity and quality of feed) then chickens won't perform.</p> <p>This group is susceptible to the false economy of home-mixing feeds and low-cost/poor quality feeds, often as a result of mis-labelling and poor regulation.</p>	<p>Better understand the need for quality feed and a stable supply.</p> <p>Layer farmers at this level of sophistication notice poor quality feed immediately because laying rates drop in days, but broiler farmers have a harder time to identify quality unless they are closely monitoring FCR (hard to implement week by week).</p>	<p>Able to reduce the cost of feed as much as possible - given systemic national constraints - with vertical integration or close cooperation with high-quality feed providers.</p> <p>Suffer from price and availability of animal and vegetable protein inputs for their feedmills, hence unable to meet import parity in most cases without tariff protection.</p>

### Genetics

As discussed earlier, all chickens are not created equal. Dual-purpose hybrid chickens are a new technology that is increasing in importance in SSA and S. Asia, but with new technology comes new challenges for farmers. Not only must farmers closely monitor the health of dual-purpose hybrid birds, but they must also invest in commercial feed and housing as well to reach the birds' genetic potential. This is a significant change from backyard farming and can be fraught with pitfalls. Similarly, the shift from rearing semi-intensive dual-purpose chickens to using commercial broiler genetics is significant and requires a new level of focus to manage bird health and nutrition profitably.

One of the most important and often misunderstood aspects of hybrid chickens is that, although often marketed to small farmers, they are sophisticated First-Generation or F1 hybrid chickens from imported parent stock that, if bred on the farm, will have offspring with greatly diminished productive potential.

Farmers must buy new chickens from an established and credible DOC producer every time to ensure they have accessed the genetics they require. For farmers who have bred backyard chickens for generations, it is a massive leap to understand this. Often farmers will buy (or be given, via NGO or local government promotion) authentic hybrids initially and then attempt to breed them to save money (or worse for the brand, to sell to neighbours). The result is that subsequent generations lose

the genetic advantages of the F1 hybrids, so farmers who are keeping these birds lose money if they rear them as though they were authentic.

Table 10: Summary of genetics challenges

Backyard	Small commercial	Medium commercial	Large commercial
<p>Indigenous genetics are capable of surviving on pure scavenging diet and are more resistant (though not completely) to disease outbreaks.</p> <p>Birds grow very slowly and lay few eggs. They are not able to convert commercial feed into meat or eggs in a cost-effective way.</p>	<p>Utilising dual-purpose hybrid genetics is an attempt to strike a balance between the hardiness of local birds and the productivity of commercial hybrids.</p> <p>These birds do well on a mix of scavenging and commercial feed but require higher levels of health care than local birds.</p>	<p>May use either dual-purpose hybrids or commercial broiler and layer varieties. The latter particularly require close monitoring for health and must be fed solely on commercial feeds to ensure profitable production.</p> <p>Commercial genetics have very poor resistance to disease, and medium scale farmers must be vigilant to prevent outbreaks.</p>	<p>Exclusively rearing commercial broilers and layers from imported stock in fully enclosed, purpose-built chicken facilities.</p> <p>Broilers are ready for market in 4-6 weeks, and layers consistently produce 95-99 eggs in 100 days.</p>

## 4.2 Production

### Health

Poultry health is handled differently depending on farm size and level of sophistication. The challenges facing the different categories of farmers differ accordingly.

The backyard poultry system is characterised by minimal attention to animal health. Indigenous birds have some resistance to disease and farmers don't view them as a commercial endeavour, so they often don't vaccinate or treat their birds for common illnesses. This is often an unconscious gamble since diseases like Newcastle Disease (ND), and Gumboro have a tremendous adverse impact on backyard chickens in developing countries, where these birds are a significant source of household protein. Morbidity and mortality rates can be up to 90%, and as a result, backyard poultry farmers are rarely able to grow their flocks.

Figure 299 helps to visualise what can happen when a backyard farmer is unable to manage ND and Gumboro. In the figure, the combined effect of the two diseases prevents a farmer's backyard flock from growing. However, this is not the only scenario. In the best case, farmers are spared mortalities for some years, but it is also possible for a farmer to lose all their chickens in the same period. The total yearly cost of Newcastle Disease alone is estimated to be USD 2 billion (GALVmed, 2019).

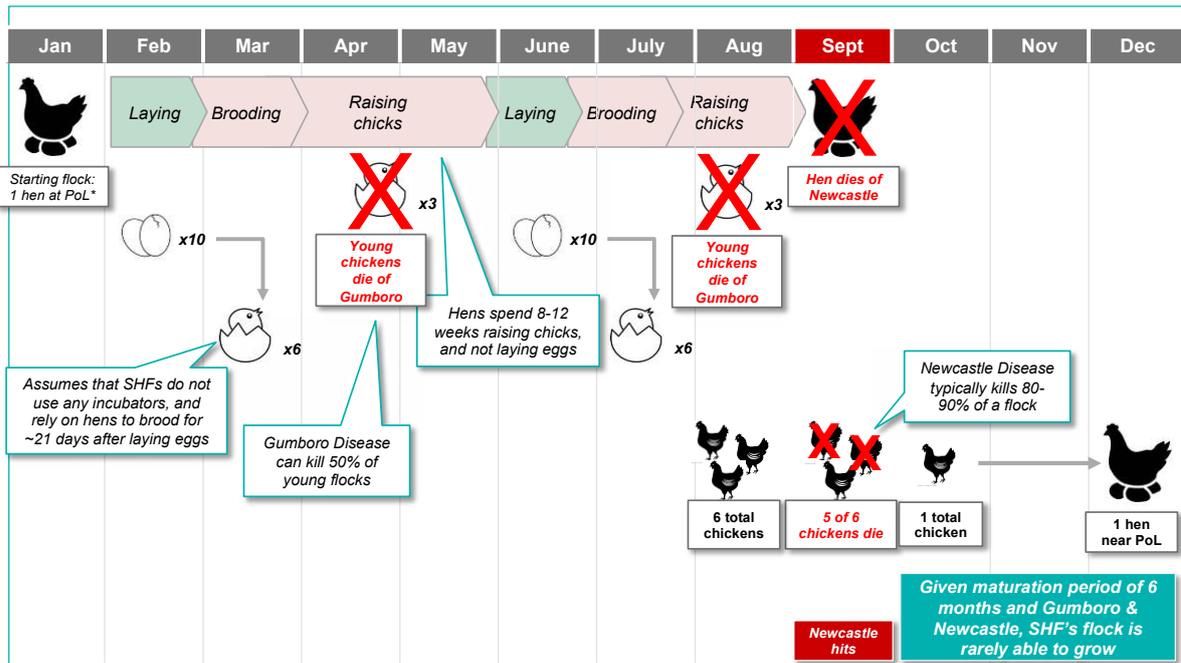


Figure 29: Effect of ND and Gumboro on backyard farms. Source: TechnoServe.

Backyard poultry are usually carrying high levels of worms in their digestive systems, putting increased stress on the animal and its ability to convert feed into proteins. Anthelmintic drugs (de-wormers) are cheap and effective and are beneficial even at this level of poultry production as they improve the bird's appetite: the better the bird eats, the better its health and the greater its resilience to other diseases. Combined with vaccinations, this level of intervention can have profound impacts on family nutrition for backyard 'hanging in' farming households.

Small and medium commercial farmers must take disease seriously, but often struggle to do so due to the veterinary health industry's focus on large commercial farms. Inappropriately large package sizes make vaccinations expensive. The difficulty and cost of "last mile" delivery of small quantities limits some farmers' ability to access the vaccines, most of which must remain refrigerated up to hours before use.

In both SSA and S. Asia, outbreaks of Avian Influenza have had devastating effects on the poultry sector broadly. Trade is disrupted, chickens are destroyed, and some farms do not recover from the effects (FAO, 2014). Large scale outbreaks of this type are an overarching issue that spans all the producer types and have implications for transport, handling and slaughter of chickens in both regions.

Table 11: Summary of health challenges

Backyard	Small commercial	Medium commercial	Large commercial
Generally, backyard poultry are not vaccinated, even though periodic outbreaks of ND or Gumboro can have devastating effects on flocks.	More likely than backyard farmers to seek medicines and vaccines, this group suffers from issues of pack sizes, “last-mile” distribution issues and lack of cold-chain.	Farmers buying commercial breeds receive training on care and feeding.	Supply of high-quality health care for this group is a necessity, but not a major challenge.
Lack of cold-chain for vaccines and some medicines, inappropriately large pack sizes, and “last-mile” delivery challenges all contribute to low uptake by this group.	Often access information and health inputs from their day-old-chick and feed suppliers.	Depending on the size of operation, these farmers are generally able to buy vaccines and medicines in pack sizes appropriate for their needs and know how and when to use them.	Large producers have in-house veterinarians monitoring their flocks and are served by international veterinary supply companies. They keep stocks of meds and vaccines and can quickly identify and deal with issues as they arise, but there is the potential for over-use of antibiotics at this level.

### Human health and animal welfare

High concentrations of chickens in intensive poultry systems can cause health issues in flocks that are often treated with antibiotics. Indiscriminate use of antibiotics, often to improve commercial feed conversion ratio performance, can lead to anti-microbial resistance (AMR). This is a global issue, but one particularly worrying for developing countries.

In developed countries, with a long history of commercial farming, it’s anticipated that antibiotics could be reduced by 50% with negligible effect on productivity, animal health or the profitability of the farm. Reductions in antibiotic use in these areas are already underway. However, in developing countries beginning from a much lower base of overall biosecurity, antibiotics create bigger gains which encourage their heavy use, particularly in countries with weak regulation (OECD/FAO, 2016).

Leading broiler producers in Europe are moving toward antibiotic-free production. There is some indication that these industry leaders are attempting to influence Asia and Africa to move in the same direction, with Cobb<sup>17</sup> representatives urging commercial farmers in developing countries to follow suit (Cassanovas, 2015).

On the other end of the husbandry spectrum, there is some evidence that contact with waste from small commercial and backyard poultry can lead to health consequences such as diarrhoea in children (Conan et al, 2017). The risk of transmitting avian influenza<sup>18</sup> from infected chickens to humans is also most likely if humans handle sick or infected birds without protection, as is done in backyard farming (FAO, 2017). The open slaughtering of chickens in markets with no disposal mechanism for waste material poses another human health hazard (FAO, 2014).

<sup>17</sup> Cobb is an international broiler genetics company. The Cobb 500 is one of the most commonly bred broiler chickens globally.

<sup>18</sup> Not all forms of avian influenza transmit readily between chickens and humans.

Finally, the open markets for live birds also allow easier transmission of disease between farms and households (especially when unsold birds are returned) and make the risks of bird to human transfer of avian influenza more likely in cases of outbreaks.

#### *Production practices*

More sophisticated farming requires more attention to the environment in which the birds live. Backyard poultry farmers rely primarily on the hardiness of their birds' genetics to ensure survival and growth, but small and medium commercial farmers need to be more active in the maintenance of the flock. Husbandry skills, record-keeping and financial knowledge are important for farmers at both levels. If undertaking brooding, extra care needs to be taken to ensure the area is clean and warm. Emphasis on cleanliness in the chicken houses and runs becomes necessary, and this means understanding that the farmer can be a vector. Establishing basic biosecurity protocols for visitors and staff can prevent the spread of disease from farm to farm. Sick birds are inefficient birds, and farmers need the skills to see to it that they remain healthy or FCRs can decline, mortalities can rise, and profits can vanish quite quickly.

### **4.3 Market**

#### *Processing*

At the most basic level, chicken processing refers to the slaughter, de-feathering and removal of head, legs and internal organs and is undertaken by consumers at home, by SMEs attached to live markets or in commercial abattoirs. Further processing involves cutting the carcass into portions, de-boning and chilling or freezing and is typically only done by large abattoirs integrated with commercial broiler companies.

Many farmers who sell to live markets do not have an option. Most are too small to be acceptable outgrowers, and large processors are unwilling to toll-process tiny batches of the type of chickens that smaller farmers produce. Sub-national, mid-sized abattoirs are not common in most places.

It is very rare that backyard and small-scale chicken farmers sell directly to a processor. One example from Kenya highlights why this might be the case. One entrepreneur built a business model in which slaughtering facilities were delivered to groups of farmers. The company would drive to villages where groups of backyard farmers are collected, weigh the chickens and slaughter them on site. They then package the carcasses in cold storage vans for sale to supermarkets in Nairobi. While this system offered an alternative to the live market for some backyard farmers, it is unclear if it is profitable or scalable. The company has struggled to follow through with farmers, creating delays both in service delivery and in payment, and has had difficulty maintaining contracts with supermarket chains.

In South Africa, small-scale mechanised abattoir equipment is available which caters for the medium scale farmer who needs to ensure that chickens are slaughtered at the optimal economic time. The equipment can process from 50-2000 chickens per day depending on the model. In SSA, this equipment is uncommon, so medium-scale farmers do not have the option to process their own birds.

#### *Markets*

Access to various types of markets differs by producer type, with large commercial producers dominating the formal, refrigerated/frozen markets and small and medium producers competing for the much larger informal/live market. While the live market caters reasonably well to backyard and small-scale farmers selling a small number of indigenous birds, developing a strong market opportunity for small to medium commercial farmers with hybrid and commercial breeds is much more challenging.

Most small and medium producers are not able to access the formal market due to the lack of reliable slaughter and off-take agreements. Instead, they primarily supply live bird markets to less formal food and retail outlets. The live markets sell broilers, indigenous chickens, dual-purpose hybrids and spent layers together, and offer customers the ability to see the bird they wish to purchase, touch it and compare it with other birds. Sales are negotiated based on the preference of the customer (colour, sex, perceived healthiness), but birds are not sold by weight. In most places, a separate SME is on hand to slaughter the bird for the customer for a fee.

Access to markets is often the biggest challenge for small commercial farms. Producers living near larger cities and towns will find it slightly easier, but still, regularly cite challenges. Increasingly, urban consumers are looking for the simplicity of a frozen chicken, which limits them to products sold by large commercial producers. Small to medium producers can sometimes access toll processing opportunities at a local abattoir, but larger abattoirs typically do not offer this service while small-medium abattoirs are uncommon in most places, may have low hygiene standards and struggle themselves to make a profit and stay in business. As market preferences shift, **a viable model for chicken processing outside the major large processors needs to be identified/developed. This is a major bottleneck in the value chain** at present, including for production of hybrid birds, and limits this segment's ability as a bridge for farmers to step up from poorer subsistence livelihoods.

There is no doubt that growth in supermarkets and fast-food chains in SSA and S.E. Asia has increased greatly in the past decade as a result of urbanisation and the growing middle classes seeking quicker, more convenient food sources. However, it remains a small share of the total poultry market and is primarily dominated by large commercial farms. Supermarkets and fast-food chains stock pre-slaughtered whole and portioned broiler chickens and compete on price per kg.

Supermarkets and restaurants also carry small amounts of processed indigenous chickens which ordinarily fetch a higher price than broilers. The customer for these indigenous chickens is the wealthier consumer who prefers indigenous birds for special occasions or to entertain visitors, but it is a relatively small market. Supermarkets and restaurants work with traders who attempt to maintain a steady supply, though the nature of indigenous chicken farming complicates this. Traders must identify an area in which many farmers live and negotiate prices with a number of farmers. Due to the nature of indigenous chicken farming (slow growth, poor feed conversion, high mortality), there is not a "one-stop shop" for these traders where they can rely on one or two farmers to provide supply. The challenges faced in collecting enough indigenous birds to fill supermarket cold bins is a large part of the cost premium over broilers.

There is no established formal market for hybrid chicken meat which is noticeably different from indigenous bird meat to consumers. One Kenyan supermarket commented they would buy some and serve them cooked for a few months at a loss to see if they could get people interested in buying them for home use, but they wouldn't try to sell them as true indigenous because they would lose credibility.



Figure 30: Live chicken market in Kitui, Kenya (Source: Authors)



Figure 31: Processed whole chickens in Nairobi Carrefour supermarket, Kenya. (Source: authors)

The pathway from backyard to small commercial to medium commercial is a critical area that could benefit from more action-based research interventions and innovation in business models, market systems, processing models, development programme approach and technology use.

Table 12: Summary of marketing challenges

Backyard	Small commercial	Medium commercial	Large commercial
<p>These farmers are not regular suppliers of chicken.</p> <p>Birds mainly kept for home-consumption of eggs and meat and for celebrations, welcoming visitors etc, but also sold as-needed to neighbours and local markets.</p>	<p>The level of marketing in this group is a challenge. At the lowest level, they will often sell everything locally.</p> <p>As they grow, they face marketing challenges due to lack of market structure of aggregation for these new actors in the market.</p>	<p>Often, market access is the biggest challenge for this type of farmer.</p> <p>To be successful, need organised offtake, and this is challenging for many. There are few abattoirs accepting third-party birds, and frozen poultry is not a major segment in many markets.</p> <p>The cold chain is lacking in many markets, limiting time from slaughter to sale.</p> <p>It is challenging for producers to make the shifts from selling to live market at a higher price to selling to a processor or trying to sell a batch at a much lower price.</p>	<p>Part of vertical integration includes slaughter, refrigeration, transport and sale.</p> <p>Typically, broilers and eggs from large farms go to supermarkets, restaurants and other large off-takers.</p> <p>These major farms will still also sell birds into the live markets, including parent stock at the end of their cycle.</p>

#### 4.4 Finance

Finance for poultry producers is most easily accessible by larger farmers, with large-commercial farms having the least difficulty accessing finance on reasonable commercial terms. This includes term finance for capital expenditure, equity investments and local currency working capital facilities from the banks. Term debt and working capital facilities will generally be secured against assets. However, the larger integrated producers are also able to access trade finance secured against the grain and feed stocks they hold, often up to 70% of the overall value.

Generally, commercial banks and investors view small and medium commercial farms as higher risk, though some agricultural lenders (including SACCOs) are increasingly interested in poultry as a viable agricultural business to serve because of the relatively short turn-around compared to field crops (broilers can be ready for sale in 6 weeks, and layers can demonstrate consistent daily income). However, a lack of reliable offtake or market structure servicing this market segment makes them a higher risk prospect for investors and lenders. The risk is compounded by the disease risk, especially in crowded peri-urban environments, as the use of vaccines and proper biosecurity is more sporadic in these segments. As a result of not being able to access working capital loans, small/medium farmers are often unable to grow, even if they have identified a market opportunity. Moreover, they struggle to manage cash flow, particularly if their customers – who may be fairly small SMEs themselves – fail to pay or pay late, and a profitable enterprise may fail due to lack of liquidity.

Table 13: Summary of finance challenges

Backyard	Small commercial	Medium commercial	Large commercial
<p>Minimal access to finance. However, indigenous flocks do not require commercial feed or housing.</p> <p>Money is required to 'step up' to the next level.</p>	<p>Missing middle – those who have sufficient market could use finance but have minimal access and/or available risk-adjusted finance is too expensive.</p> <p>Less creditworthy, scattered geographically, and higher-risk.</p> <p>A lack of structured off-takers/aggregators at this scale makes it a challenge to recoup loans from this group.</p>	<p>Need finance for housing/brooding units, larger stocks of feed, chick purchases, medicines and vaccines.</p> <p>Some lenders are becoming more interested in this group but generally still lacking sufficient finance for the sector to transform.</p> <p>Some chick and feed providers are extending credit to this group, for example, Silverlands in Tanzania<sup>19</sup>.</p>	<p>Conventional term loans and working capital facilities available. Increasing investment from impact funds (e.g. AgDevCo), DFIs (e.g. CDC) and industry geographical expansion in the sector, especially feed and day-old-chick production and sales (higher margins).</p>

<sup>19</sup> With backing from The Bill and Melinda Gates Foundation – so not commercially sustainable credit facility in the longer term

## 5. LESSONS LEARNED FROM RECENT INTERVENTIONS IN POULTRY SECTOR

The section below discusses approaches that have been adopted to address the challenges detailed in the previous Chapter and grow the industry and its farmers. It highlights lessons learned from projects targeting assistance to poultry actors of different sizes, key success factors where projects have enjoyed successes, and challenges/knowledge gaps which need further focus where projects have struggled. This section draws on experience from a variety of sources including DFID programmes and investments (listed in the Appendix), and the authors' experience with other commercial and donor-funded activities across SSA.

### 5.1 Lessons learned by farming system

#### Backyard poultry

The backyard sector is often what is referred to as “smallholder” by NGOs, donors and governments. Donor programmes logically focus on backyard poultry farmers as the target for interventions because the households in question are poor. Raising incomes and improving nutrition for these households are key development goals.

Backyard poultry using indigenous genetics is highly valuable for household nutrition and as a source of some cash, but this type of chicken farmer is also the most challenging to reach, and the type of poultry system they employ has limitations for development and expansion that are sometimes overlooked. For this group there are two main pathways; for those “hanging in” (i.e. remaining backyard producers), the type of programme that has the most benefit focuses on improving productivity via animal health and basic husbandry skills, maximising household nutrition outcomes and perhaps growing initially small income by a small amount. This is not a pathway to significant income generation for these farmers. Alternatively, the best backyard producers can be supported to “step up” to small commercial production using improved genetics, feed and vaccines.

**Programmes that seek to commercialise backyard farming are unlikely to succeed**, even though indigenous chicken fetches a higher price in many markets than commercial chickens. The slow growth of indigenous chickens combined with necessarily small flock sizes<sup>20</sup> and a large but informal live market collude to keep this sector in its place as a subsistence system. The backyard poultry space is the starting point for poultry farming and improving the health of these birds (supporting “hanging in” / backyard production) could have massive benefits for the farmers, but this is not a commercial system. To support smallholder farmers to move to the next level of production, a complete mindset shift is needed, as well as investment in new genetics, supplementary feed and improved healthcare.

Encouraging farmers to invest in commercial feed for indigenous birds will likely leave them less well off (see figure 32), even if they can sell the birds. If they are unable to sell / unable to sell on time, or if the birds are hit by a disease that is not adequately controlled with vaccines, they will lose more. Backyard farmers are not in a position to take on the risk of significantly increased investment in their flock of indigenous chickens unless there is a strong and proven production model and a good market opportunity.

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<sup>20</sup> If indigenous flocks become too large, birds must be caged and fed commercial feed. However, these birds do not convert feed efficiently, leading to quick profit reduction. Furthermore, birds fed on commercial feed are identifiably different from “true indigenous”, lowering their market value.

Figure 322 illustrates how investment in high levels of feed will leave farmers at a loss if they are rearing indigenous breeds which take 6-8 months to mature. The exact percentages depend on a number of factors including the type of scavenging available, the quality of the feed and the type of chicken, but the takeaway message remains: indigenous chickens do not convert feed to meat efficiently enough to profitably make use of commercial feeds.

What is the profit margin per chicken, under different supplemental feed and maturation periods?							
		% Supplemental feed					
		0%	20%	40%	60%	80%	100%
# of months to maturity	2	68%	66%	63%	61%	59%	56%
	3	68%	63%	57%	52%	46%	41%
	4	68%	60%	51%	43%	34%	Applicable for Redbro and Sasso
	5	68%	57%	45%	33%	22%	10%
	6	68%	53%	39%	24%	10%	-5%
	7	68%	50%	33%	15%	-3%	-20%
	8	68%	47%	27%	6%	-15%	-36%
	9	68%	44%	20%	-3%	-27%	Applicable for indigenous village chickens

*Key assumptions: 50% of nutrition requirements met with commercial feed, at 131 kwacha per 50 kg; Non-feed costs 10 ZMK, includes vaccinations and day-old-chicks*

Figure 32: Example of profitability for dual-purpose and indigenous birds. Source: TechnoServe

**Importance of vaccines and ready adoption:** In this category, farmers regularly lose large numbers of chickens to preventable diseases such as Newcastle Disease, Fowl Pox and Gumboro. Vaccines for all these major diseases exist but are often packaged inappropriately for small farmers. There is also a lack of infrastructure to reach farmers who are widely dispersed and keep very small flocks of birds. There is evidence that farmers of this type who have access to vaccines quickly recognise their value and become long-time users of the products (Gammon, 2019).

**Joined up approach working with CAHWs/Paravets and private sector:** PropCom Mai-Karfi and MADE in Nigeria, both ongoing DFID supported programmes, have learned a great deal working in this space. Both programmes have an animal health focus and are trying to increase adoption of the ND-12 vaccine by backyard and small commercial farmers. They have learned that Community Animal Health Workers (CAHWs) and paravets can spread awareness to farmers, but that they need a range of distribution channels to reach scale. Broader promotion of vaccines cannot be left to CAHWs and paravets alone, so close coordination with the vaccine manufacturer is key. Bulk-breaking vaccines into smaller pack sizes and working with CAHWs and paravets to provide a broader set of services to farmers has deepened the reach of these interventions, and enterprise training for service markets has stimulated lead firms to focus on smaller farmers. In northern Nigeria, the service providers enhance their incomes from a combination of induction services to both poultry and small ruminant feed finishing activities. Women paravets are building clientele by providing DOCs at introduction.

**Reaching the farmers:** Focusing on animal health means developing the last-mile delivery of vaccines and medicines to farmers and convincing them that there is value in investing in their chickens' health. In many areas where these farmers live, the cold-chain needed to reach them ends in a town many kilometres away. Government extension workers often do not have the resources to reach very rural

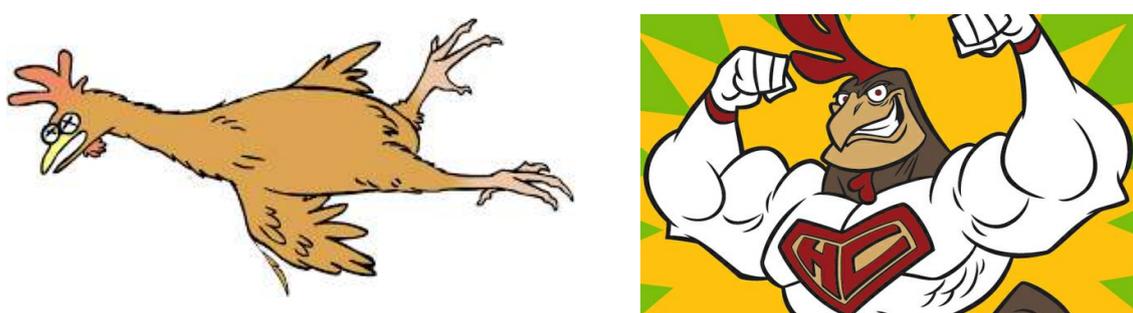
farmers, and many farmers do not see the benefit until they have used the products for some time. While it may be clear this is a product backyard farmers would benefit from and ‘need’, it does not mean it is something they necessarily ‘want’ – and therefore it is important to focus heavily on creating demand and using appropriate marketing mechanisms alongside attempts to kick-start distribution into these markets. Associations of CAHWs/Paravets known in local communities may be well positioned to fill public extension gaps in reaching farmers. Responsive to skills gaps identified, a GEMS4 entrepreneurship training programme for paravets in Nigeria led to the formation of paravet associations to deliver health services and technical support to small poultry and goat farmers as well as the supply of feed concentrate on credit, and in some cases act as offtaker.

**Effective marketing approach:** Preventative medicines like vaccines are a tough sell with this group because they don’t make the chickens look or perform better. Curative medicines, on the other hand, take an ill bird and make it look vigorous again. Combining de-wormer and vaccines is sometimes a way to give farmers the immediate satisfaction of revitalising their chickens (the de-wormer gives a very quick boost) while simultaneously protecting them from serious future diseases, enabling the flock to grow larger.

Marketing to this segment, especially in NGO and government-driven programmes, is often poorly received by farmers. Generally, campaigns focus on the negative element of disease and how vaccines could help avoid mortality, but to an audience with an average age often below 20 years, this is an unappealing message vs the myriad other competing issues for their scarce resources. Programmes make an assumption, ‘we think if people need something then we don’t have to make them want that’ (Melinda Gates, 2011). Evidence from the Bill & Melinda Gates Foundation, GALVmed (part funded by DFID) and AgDevCo input distribution investments programmes show that aspirational marketing generally works better globally, including to the poorest farming households: sell the benefits, not avoidance of the risks.

**Which one would you rather buy?**

Vaccinate, or your chickens die	Kuku Power - more chicken. more money!
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The image contains two illustrations side-by-side. On the left is a brown chicken lying on its back, appearing dead or very ill, with its wings and legs splayed out. On the right is a cartoon superhero chicken named 'Kuku Power'. The chicken is depicted with a very muscular, broad chest, wearing a white superhero suit with a red 'S' on the chest and a red cape. It has its arms raised in a 'strongman' pose, flexing its biceps. The background behind the superhero chicken is a yellow and green starburst pattern.

Figure 33: Sell the benefits. Presentation to BMGF grantees (M Shaw, 2012)

**Addressing cold-chain challenges:** The lack of cold-chain in rural areas makes the safe storage of vaccines almost impossible, but innovations are happening which are encouraging. For example, MKOPA is a Kenyan company that provides solar home systems (lights, TVs etc.) on a rent-to-own basis. They are currently developing and trialling a new solar fridge using the same successful model. MKopa now has investment from CDC Group amongst others. Surechill<sup>21</sup> is a [multi-award winning](#) high

<sup>21</sup> [www.surechill.com](http://www.surechill.com)

innovation, UK-based business with a successful product range of vaccine refrigerators designed for areas with no or intermittent electricity, currently only being used for human health.

For years, development of thermostable vaccines (vaccines that don't require a cold-chain) have been promised, but in reality, it is a very challenging research goal. GALVmed recently compared thermotolerant and ordinary ND vaccines and found that a vaccine's ability to function despite poor cold-chain preservation was a function of the sophistication and capacity of the laboratory producing it, not the process itself (Gammon, 2019). Fortunately, with the innovations mentioned above, and the general increase in rural electrification happening across SSA, the need for true thermotolerance is diminishing.

Table 14: Backyard/subsistence farmer summary challenges & example approaches

Area	Challenge	Approaches
Finance	N/A	
Health	Vaccine pack size, poor rural distribution, no vaccine cold chain	Develop community animal health worker/paravet networks/entrepreneurial associations linked to agrovet dealers; working with vaccine companies to make small pack sizes of 1-2 'thermo tolerant' ND vaccines. Sell/distribute vaccines alongside anthelmintics and other basic services as a farmer 'pack'; support to cold chain innovation (e.g. M-KOPA solar fridges on lease purchase over M-PESA).
Feed	N/A	
Genetics	N/A	
Markets	N/A	
Skills/Info	Farmers live in remote areas and government extension is minimal	Empower last-mile input providers to also deliver essential husbandry skills; use of mobile phone-based extension, radio, schools, churches and local market days for group dissemination; as health above, develop community animal health worker/paravet networks/entrepreneurial associations to also focus on small ruminants/cattle as may be relevant.

### Small commercial poultry

Small commercial poultry farmers face all the same issues in health that backyard farmers do, plus many others. This group works with dual-purpose hybrid chickens or pure commercial chickens on a small scale. These birds require both better feed and closer attention to health care. As farmers must buy the chicks or young birds as well, there is an immediate cost to mortality. Shifting to dual-purpose hybrid genetics and the purchase of feed and other inputs is a significant change that requires farmers to commit to chickens as a source of income rather than a form of insurance and nutrition.

**Transitioning backyard producers to small commercial farmers is challenging and outgrower models have seen limited success:** There have been a number of investments that have attempted to utilise small farmers as outgrowers to supplement large-scale production. The idea is to give small farmers a reliable outlet for their produce and to give DOC producers a broader sales base for their chicks. Unfortunately, these types of investments tend to perform poorly because it is inefficient for companies to organise buy-back from small farmers due to logistics, biosecurity issues and side selling risks (of poultry and or the feed inputs provided). Similarly, the productivity at this scale is often lower than larger producer outgrowers (e.g. growing 5,000 or more) which is a standard model in Europe.

Several DFID-funded AECF investments set out to work with small farmers as outgrowers and later changed their approach and ceased their buy-back plans. Novos Horizontes in Mozambique is perhaps

the most promising project in this regard, as they established many smallholders as outgrowers (starting at 100 birds and growing up to 500 per cycle) but struggled with scale over time. As a result, they no longer work directly with smallholders, opting instead to establish grow-out facilities on their own farm and inviting key medium-scale farmers to manage them as independent entities (ingrowers). Mozambique Fresh Eggs intended to establish smallholders as layer outgrowers, but economies of scale were not achievable, and while the business itself is successful, they have abandoned working with small farmers. Zimbabwe's Livelihoods and Food Security Programme (LFSP) programme aimed to work with poor and very poor farmers via many different entry points. The purpose was to help create regular incomes and build a credit history for farmers, but off-taker models with backyard farmers and farmer groups were unprofitable and not scalable.

While the economics of both broiler and layer outgrower models are attractive for outgrowers, the business case for the larger company remains unclear. While a programme with small-scale outgrowers can be a nice corporate social responsibility "add-on" for some companies, there is no evidence that this model is likely to scale.

**Brooding - getting through the first month is tough:** Brooding refers to the first month of a chicken's life and is by far the most complicated part of a chicken's lifecycle. During this time, the birds must be kept warm as their bodies do not thermoregulate and there is no mother hen there to protect them. They also require clean drinking water, a dry environment and access to appropriate feed. At this stage, chicks should be fed using 100% commercial feeds because the first month of rearing impacts heavily on the productive performance of the bird thereafter, even if the bird will later persist on a semi-scavenging diet. In the first month of life, birds should also receive several vaccinations, some of which are delivered in the drinking water, or via eye-drops while others require injections (Cherutich, 2018).

**Brooder units (also called Mother units) can reduce risk:** DOC producers often offer training on brooding for farmers, but success is varied. Another model is to take the risk of brooding away from the farmers. Buying a 4-week old brooded chick is a safer and easier way to enter poultry farming.

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*"EthioChicken's business model is simple — in theory: breed day-old chicks and sell them to agents who rear them for about 45 days before selling them on. In practice, the venture was, initially, much trickier.*

*Problems ranged from finding the right breed of chicken and recruiting suitable managers [...] and training the agents.*

*The agents' role is crucial. They carry the "last mile" risk of selling the product to the end consumer. By rearing the chickens and vaccinating them for almost seven weeks, agents reduce the mortality rate from the 80 per cent in operations run by smallholders who breed their own stock to well under 5 per cent.*

*EthioChicken's fortunes improved significantly after the Sasso chicken, a French hybrid, was introduced in 2014. Compared with Ethiopia's traditional Habesha breed, the Sasso produces four times as many eggs per year, while those reared for meat take a quarter of the time to reach market weight."*

***www.ft.com - Ethiopia's well-hatched idea – John Aglionby, 2018***

The model was developed by KeggFarms in India and was brought to Africa initially via a Bill & Melinda Gates Foundation-funded programme in Uganda but met with limited success due to programme design issues discussed in a subsequent section. The current flagship in SSA for the brooder model is Ethiochicken (formerly Mekelle) which has received AECF investment alongside funds from impact investors such as Acumen Fund.

Their model has been successful because it reduces the number of customers, they need to serve from the thousands of small commercial farmers in Ethiopia to hundreds of brooder partners. This allows them to concentrate on their core business of DOC production and leaves the sale of chickens to their partners.

Ethiochicken has received a great deal of external funding to implement their work and have been able to establish a quasi-monopoly with government support. This leaves room for concern about the replicability at this scale given the role of government in the Ethiopian economy generally and their support for this project specifically. However, this model has been replicated in Rwanda under Uzima (an Ethiochicken company and an AgDevCo investment), Silverlands and AKM Glitters in Tanzania (CDC and AECF, respectively) and Yelo Egg in Zimbabwe.



*Figure 34: Brooding unit with Kuroiler birds, Uganda (Source: Authors)*

**However, getting brooding right is just the beginning:** The apparent success of Ethiochicken does not imply that delivering brooded chickens to farmers is in itself enough to ensure success. The Agriculture and Food Security Project (AFSP) in Nepal [a Global Agriculture and Food Security Programme (GAFSP) initiative] gave farmer groups brooded chicks which were to be reared semi-intensively with commercial feed for four months and a home-made mix thereafter. Farmers were subsidised 40% for the purchase of birds and were trained on their upkeep. They were given grants for shed construction and were formed into savings groups. The results were that 46% of the birds died or were stolen, some eggs were consumed by the households, but very few were sold.

**To feed or not to feed, and how much:** For the small commercial farmer, the decision whether and how much to feed the chickens will be based on the household's environment, available cash and ability to sell the birds. Farmers at this level are not likely to calculate the cost-benefit of feeding their

chickens in detail, but the degree to which farmers can access quality feed at affordable prices will affect farmers' abilities to grow rapidly and turnover their flocks.

Hybrid dual-purpose birds require feed of a higher quality than indigenous birds but can thrive on a lower grade feed compared to commercial birds.<sup>22</sup> Research suggests, for example, that Kuroilers survive well on a scavenging diet where resources are plentiful, but in the majority of settings scavenging resources were found to be insufficient, especially where farmers keep more than a few birds. In most cases, therefore, Kuroilers require supplementary feed to perform well. During field visits, almost all Kuroiler farmers, even in rural areas, gave some level of feed supplementation, especially during the dry season.

The quality of feed available to poultry farmers is inconsistent and generally geared either towards commercial production or low-quality supplementation for indigenous birds. At the commercial end, the market is supplied by major national brands in 50-70kg packs. Traders either sell in bulk to commercial farmers or sell smaller quantities at higher margins to farmers unable to afford bulk sizes (most smallholders). Some traders engage in feed mixing, using a blend of commercial and other ingredients to create a local feed mix, sold to local farmers on a per-kg basis. Adulteration with cheap bulking agents (from maize bran to sand) is however commonplace – meaning that much of the feed available is of low quality.

There remains a need to optimise the feed mix to balance cost and nutritional requirements with locally available ingredients. Lack of nutritionally-balanced feed to suit the needs of small commercial farmers is limiting the performance in many cases studied. Farmers require both advice on feed mixing and access to ingredients/trusted blends in an affordable quantity. Mother Units/Agents offer a potential distribution channel for feed supply (offering the MU a further opportunity for additional income). This is also an area where targeted applied research can be helpful.

**Addressing small scale poultry health supply is key:** The small commercial group must take poultry health seriously, and interventions that work for backyard farmers are also beneficial for small commercial farmers. Successful marketing of vaccines and medicines in small pack sizes and delivery via last-mile channels such as well-functioning, profitable CAHW/paravet associations is essential for small commercial farmers as the shift to dual-purpose hybrid genetics requires reliable health care. The Livelihood Enhancement Through Agricultural Development (LEAD) programme in Tanzania, like many others including some NGO-run Newcastle vaccine delivery programmes sponsored by GALVmed, made a critical error of placing their own team in the value chain, becoming a provider of missing services and compromising sustainability. Strategies that pull in health providers at all levels in a sustainable way, as in the Propcom and MADE examples, generally yield better results.

DFID backed investments made by CDC and AgDevCo also demonstrate sustainable ways to create vaccine distribution. For example, KELFOODS in Malawi sell feed, chicks and vaccines to small scale commercial farmers as a core area of their business. They have distribution outlets across the country, strengthened by farmer demonstration areas where farmers learn to brood birds and follow vaccine and other management protocols before 'stepping up'.<sup>23</sup>

**Keeping the chickens safe and dry is a must:** Depending on the size of the flock, farmers in this group may need to improve their environment, constructing appropriate shelters and chicken runs for their birds and buying basic feed and watering equipment. For this, loans may be required, and there are a number of avenues to serve farmers of this type, but correct targeting is essential. The LEAD programme in Tanzania worked with BRAC to provide loans to small commercial farmers and

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<sup>22</sup> Dr Timothy N. Gondwe – Wellspring Kuroiler Market Study for BMGF – Uganda, 2014

<sup>23</sup> [www.kelfoods.net](http://www.kelfoods.net)

reportedly had good repayment rates, but there were indications that most of the farmers took loans for purposes other than poultry and paid them back using revenue from side-businesses indicating that poultry was perhaps not the business they primarily sought to pursue. At the smaller end of this segment, SACCOs or MFIs may be able to support farmers to invest in basic housing.

**Offtake is a challenge at this scale:** The Zimbabwe LFSP worked with one company, Molus, that attempted to roll-out an off-taker scheme with 3000 farmers grouped around 500 broilers each. The company would provide technical assistance for farmers and provide off-take. Early on, it was successful, but it quickly declined as the transaction costs of working with scattered groups required a scale-back to a smaller area.

Another programme under LFSP worked with a company called Sondelani which contracted five layer groups working through a local aggregator. The programme supported the procurement of 1000 point of lay chickens per group, as well as inputs and some equipment. The groups constructed chicken runs and Sondelani supplied feed and vaccines on credit, being repaid through off-take agreements.

Reliable broiler offtake resulted in farmer groups increasing flock sizes and incentivised farmers to seek out loans as well. The layer model resulted in regular incomes for participating farmers comparing favourably to the annual incomes realised by crop farming. In both cases, farmers involved have developed a credit history through their improved record keeping. In total, the market development component of the LFSP was GBP 7 million and directly benefitted 2,600 farmers, with 10,000 others potentially benefitting from increased access to the market.

Table 15: Small commercial farmers challenges and example approaches

Area	Challenge	Approaches
Finance	A lack of structured off-takers/aggregators at this scale makes the segment higher risk for lenders. Very few finance products are available for working capital or basic CapEx requirements.	Provide credit facilities through input providers of DOCs and feed, sometimes linked to successful attendance of training. Credit is given to mother units for hybrid distribution; medical and feed firms can leverage local vet service provider associations to deliver inputs and extension support to farmers.
Health	Vaccine pack size, poor rural distribution, no vaccine cold chain. Often unstructured production with a mix of commercial and state/parastatal manufacturers.	Work with vaccine companies to make small pack sizes of I-2 'thermo tolerant' ND vaccines; market via brooder units or DOC and feed stores as well as vet associations.
Feed	Access to feed of appropriate value and quality for the genetics and production management system being used.	Encourage inputs suppliers package quality/appropriate feed alongside DOCs; help government enforce regulation of poor-quality feed and or incentive-based approach by industry associations publishing random feed test results; work on alternative feed inputs and a mix of feed and scavenging in hybrid systems; work with vet service provider associations to sell feed on credit to farmers.
Genetics	Brooding of commercial genetics and hybrid. Access to hybrid dual-purpose birds still limited to certain countries/areas.	Work with DOC providers to establish brooding 'mother units' who train and service emerging small-scale farmers.

<b>Markets</b>	Major problem selling birds or eggs as soon as begin to scale; lack of aggregation or offtaker services at this scale.	This is a major area that has not yet been sufficiently explored or supported but an increasingly major challenge given the rise in hybrid chicken distribution and rearing.
<b>Skills/Info</b>	Access to affordable technical and business skills/training for many SMEs; international experts too expensive except when donor-subsidised.	Develop sustainable in-country training facilities for SMEs including training and leveraging local vet associations; Mother Units for hybrid dual-purpose birds can also offer support and training as part of their business proposition in some cases.

### Medium commercial poultry

Medium commercial farms are an area of growing importance to the poultry value chain because they represent a class of farmer large enough to work at a reasonable scale. They require services and inputs that provide opportunities for up- and down-stream providers and their placement between the highly scattered and small-scale farmers and the very large, vertically integrated farms makes them important players in the system. However, little focus has been placed on this segment despite the opportunity to engage more SMEs in the overall market system, and to develop a viable model at this scale that provides a bridge/pathway from small commercial to larger commercial farmers. There is, therefore, a need and opportunity to invest more in exploring and developing this model.

**Becoming professional requires more care:** This segment of emerging medium scale commercial farm is a step-up from conventional smallholder production in a number of ways. They can keep from 2000 to 10,000 birds, and farming at these levels necessitates professionalisation of procedures in health, housing, feeding and marketing of finished goods. Due to the size and growth of this segment, accessing quality genetics is not a major challenge. DOC producers for broilers, layers and hybrid birds often cater for this group well, offering training on best practices and sometimes private extension. That said, this is context specific. In 2015 in Sierra Leone, there was only one DOC provider in the country who imported birds from the Netherlands in block orders of 10,000 or more, far beyond the reach of most medium-sized farms. The Sierra Leone Opportunities for Business Action (SOBA) programme made investment cases for DOC providers and helped two new companies to invest in DOC delivery in the country. These farmers also need to pay more attention to record-keeping and tracking technical and financial KPIs and may need to build their business skills alongside their technical skills.

**Getting your DOCs:** Large, vertically-integrated poultry producers are happy to deliver DOCs to farmers keeping flocks of this size and often bundle husbandry advice as a complimentary service. For the largest producers, the smaller medium-sized farmer is still too small to have an offtake partnership with<sup>24</sup>, but they are a valuable market for their DOC and feed businesses.

**Bigger farm, bigger needs, including finance:** The sophistication and scale of this type of farming often necessitate access to finance. Although this type of farmer usually has access to some cash and land, often the ability to build quality housing and keep adequate stocks of food and medicine is hampered by working capital shortages and/or inability to scale through this phase with resulting larger CapEx and working capital requirements. This financing gap hampers growth not only in SME poultry but also for the DOC and feed suppliers to this market. When interviewing Silverlands and Kelfoods (both CDC investments) they cited this as the biggest hurdle, alongside access to markets, in growing sales to this segment. Access to finance for this segment, who may require finance of around \$50,000, is notoriously difficult across most agricultural value chains and a key area that would need addressing to unlock wider poultry sector growth in SSA and SE Asia. Impact investors like AgDevCo can invest in

<sup>24</sup> Kenchic in Kenya, for example, requires a minimum of 10,000 chicks per cycle for outgrowers.

the sector once it reaches a certain scale, but there remains a ‘missing middle’ for funding requirements below this level between ~ USD 100,000 – USD 2million.

**Medium scale farmers can brood, but skills and training payoff:** This group of farmers is sophisticated enough to rear their birds from DOC to slaughter, and they are ordinarily able to access medicine and vaccines in appropriate and affordable package sizes. They require more diligence about animal health, but also have the means and information needed to achieve it. Again, Sierra Leone offers an exception. In 2015 at the beginning of the SOBA programme, there was only one veterinarian in the country, and only medicines with a high turnover were kept in stock. The SOBA programme partnered with veterinary inputs suppliers, linking them with suppliers of lower-cost drugs and working with veterinary technicians to train farmers on best practices including the development of a price list and marketing material to attract orders for vet drugs. SOBA worked with a medium-scale farm, Leecon Poultry, to upgrade their production practices and farm management controls. The farmer now uses weight scales to monitor birds and has purchased thermometers and other equipment to standardise their operation.

**More chickens require more manpower:** At the medium commercial level, farmers need outside sources of labour and hire a few farm-workers to assist with operations. Finding, training and retaining quality workers is often a challenge, and can have a big impact on profitability if there is waste or high mortality as a result of poor farm practices.

**Chickens can’t wait – Must have an off-taker:** The biggest challenge is bringing all of the above aspects together efficiently and accessing a reliable offtake market to dispose of their birds and eggs at the correct time. Timing is key because their birds rely 100% on commercial feed and once the birds reach harvest weight, they are consuming large quantities of feed and eating profits if not sold.

Table 16: Medium scale farmer challenges and example approaches

Area	Challenge	Approaches
Finance	Lack of appropriate agriculture finance, especially in this ‘missing middle’ segment. Not specific to poultry.	Innovative finance and larger micro-finance; matching grants and donor guarantees to local commercial banks; supporting service providers (e.g. Growth Africa) and local Investment Promotion Agencies to mentor/facilitate services delivery to SMEs on the preparation of business plans and pitch decks and facilitate pitching to venture/angel investors.
Health	N/A	
Feed	Cost/value, quality, appropriateness, protein input problems.	Work to bring down the cost of feed and increase quality alongside the cost of protein inputs in some countries.
Genetics	Need links to dual-purpose birds or commercial hybrids.	Help develop dual-purpose birds for this segment were unavailable.
Markets	Need reliable offtakers for relatively small lots.	Mobile abattoirs, buy-back programmes/experimentation, new forms of aggregation and cold chain supply/infrastructure.
Skills/Info	Access to affordable technical and business skills/training is still a challenge for many SMEs; international experts too expensive except when donor subsidised.	Developing sustainable in-country training facilities for SMEs – more available for start-up small scale commercial, but less incentive for input providers to support a medium

scale segment as they start to resemble competitors.

### Large commercial poultry

Large commercial poultry agribusinesses are sophisticated operations that require tight operational management systems. The ability of a large farm to maximise production efficiency and limit mortalities is paramount to their success. Due to their size, this group is able to offer large-scale off-takers the quantities of produce they need and are more attractive than smaller farmers as a result. Their markets include the growing number of supermarkets, fast-food chains, large institutions and ready-to-eat sales outlets. However, they also still sell in large volumes to the live bird markets via intermediary traders or mobile trucks. Likewise, many also sell directly to consumers via their own egg outlets or truck sales. Traders are more attracted to these larger suppliers due to their reliability, quality, pricing and convenient locations.

**Large scale farms offer services up and down the value chain:** Investments in large firms such as Silverlands and Zambeef by CDC, AgDevCo and AECF, are important as growing these firms has an important knock-on effect along the value chain. These firms often provide a critical role in the wider market system for poultry since it is often these same firms that produce surplus DOCs and feed to sell to the SMEs. KELFOODS in Malawi is a large-scale producer of table-eggs, selling 18 million table eggs per month through branded Donnas Eggs retail outlets across the country. At the same time, they utilise their hatchery capacity to produce DOC broilers for the small commercial farm sector in the country, and they sell feed for all levels of poultry producer via their Protofeeds brand. Since the broilers are not egg-laying birds, the two business lines do not compete, allowing KELFOODS to work closely with both ends of the market. However, it is notable that their eggs sales are a much larger part of the business than the sale of DOCs and feed to small scale commercial farmers.

**Big opportunity to benefit large integrated producers and small-scale grain farmers structuring off-take agreements and partnerships (but not contract farming):** Large commercial farms often also have the level of management, finance facilities and warehouse/silo storage to offer major off-take opportunities to smallholder maize and soybean producer organisations. Both Silverlands in Tanzania and Zambeef in Zambia work with smallholder farmers to source their grain inputs. Both companies work with ~30,000 smallholders, providing them with a reliable off-taker and often linking this with technical assistance (TA) in farming practice and essential pointers on post-harvest quality requirements. This is a win-win for both sides as it improves the grain conversion rates to quality feed for the miller, reduces aflatoxin levels and wastage of grains and allows the smallholder farmers to access more reliable forward markets for their grains. It is a more successful and sustainable model than contract farming of grains which has largely failed in the region. While maize is generally a smallholder subsistence crop, with surpluses sold into the market, soybean production offers better opportunities for SHFs and emerging medium scale producers to make better returns, especially with increasing competition from stock feed companies helping to stabilise price volatility and create 'floor' prices in the markets. Increasingly this can include quality-based incentives and Warehouse Receipt Systems (WRS) financing, which in turn can create opportunities for input finance better prices and wider marketing opportunities for the grain producers.

Finally, these operators are also likely to be the most effective at incentivising and promoting the establishment of increased slaughter and market cold chain infrastructure (refrigerated lorries, display cabinets, freezers, consumer acceptance and purchasing of processed and frozen chicken, etc). This in turn opens up the market opportunities for the SMEs to access as consumer tastes shift toward this type of market. Kapani, an AgDevCo Investment in Malawi, has expanded its broiler production and is in the process of developing a state-of-the-art abattoir which is expected to cater for Kapani's own

broiler production as well as smaller farmers in the periphery. In Mozambique, Transburban Africa, also an AgDevCo investment, is the first retail business that sells frozen chicken to mid and low-income customers. They are updating a network of SME agents and equipping them with freezers, display cases as well as access to consignment stock, cold-storage and product branding.

**The Silverlands Hub example:** Silverlands in Tanzania is an example of how a large company can connect thousands of smallholders to the commercial value chain. In 2014, Silverlands built the first soya processing plant in Tanzania with 32,000 mt of grain storage. The attached feed mill capable of 40mt/hour is the largest in East Africa and is linked to an in-house poultry breeding operation. Their main products are DOCs and poultry feed. These products are distributed via a network across the country, linking 13 distribution centres, 190 agents and 33,000 poultry farmers.

In order to provide the raw materials for the feed component of the business, Silverlands partnered with various NGOs, including Caritas, who provided TA on soya production and helped group farmers for ease of coordination. The farmers are taught correct farming techniques including conservation farming, mulching and crop rotation. The partnership increased farmer incomes, and surveys indicated that the money was primarily spent on housing, education and re-investing in agricultural production.

By introducing soya into small farm crop rotation, maize yields increased, giving farmers a second income stream. Silverlands purchased over 20,000 mt of maize from over 9,500 farmers in 2017 and will be able to purchase more as demand for feed increases. Complementary to this is the establishment of warehouse receipt programmes which will provide safe and dry storage of grains from smallholder farmers which reduces losses and gives farmers better sale prices. A great deal of technical assistance will be required to achieve their goals, with post-harvest handling, grading and moisture content included along with proper agricultural practices (Silver Street Capital Ltd, 2018).

Table 17: Large scale farm challenges and example approaches

Area	Challenge	Approaches
Finance	CapEx and operating capital for expansion of higher risk inclusive models, including grain storage and handling.	Loans/equity investments from investors looking for impact. Impact investment (e.g. AgDevCo), credit guarantees, returnable grants and unsecured loans (AECF); Innovative partnerships with development programmes that help buy down risk while remaining additional.
Health	Need quality and reliable supply.	Lobbying government to regulate industry/break monopolies from parastatal/state producers; address political economy issues in some countries.
Feed	Quality and reliable supply; maize also a challenge in some countries; stock feed competes with human food (e.g. Kenya maize shortages).	Lobby government to better regulate industry on quality; work to reduce the cost of feed inputs, especially the availability of soybeans/soymeal and animal proteins.
Genetics	N/A	N/A
Markets	Many territories still more than 50% live bird markets: consumer preferences, prices and lack of fridges/freezers drive this.	Supporting firms looking to scale-up models that open-up more organised and structured routes to market.

<b>Skills/Info</b>	Often lacking internal budgets for exploring new technologies or innovations, including in how they could develop win-win models that are more inclusive.	Seeking partnerships that help leverage the resources and capabilities of these large firms, including the provision of high-quality technical assistance/consultancy to senior mgmt. teams and/or their staff to assist with the adoption of new strategies, change management (to embed and scale up new products/processes), measuring impact and sharing lessons.
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## 5.2 Lessons learned on wider systemic challenges

The previous section provided some illustrations of programme approaches and investments that work to support different poultry farmer segments. This section deals with approaches to larger, overarching challenges that affect poultry producers and organisations working to help them, at all levels.

### Political and institutional hurdles

Navigating the broader country political environment is essential for certain types of intervention. Security concerns can delay, or even terminate, programmes such as the AECF-funded project in South Sudan, and politically powerful companies embedded in the value chain can slow progress as MADE Nigeria is facing with the national vaccine producer: “[a] Highly regulated landscape for vaccine products [is] adversely affecting availability and accessibility of products to smallholders – [there is a] single institution responsible for domestic production of vaccines (NVRI) and [there are] loads of regulatory hurdles to import” (Oderinde, 2019).

Another lesson learned from several programmes outside those of DFID is that placing government or parastatal institutions in key value-chain market roles is likely to fail. In many countries, there are national agricultural research institutes, some of which work to develop their own in-country improved hybrid chickens (as in Kenya with the KARI Improved Kienyeji). To the extent that these institutions provide assistance understanding the local climate, or can tackle specific research goals, they can be valuable. However, if a programme outsources a commercial task to these institutions (such as DOC production, vaccine delivery, etc.), there are likely to be problems. Government bodies are not business entities.

One case in point is the introduction of Kuroiler chickens and the Keggfarm brooder model to Uganda<sup>25</sup>. BMGF supported the transfer of parent stock and DOC production of a highly productive dual-purpose hybrid chicken called Kuroiler to Uganda. The National Agricultural Research Centre (NAGRC) in Uganda was a willing partner, and the project team selected them to be the sole producer of the Kuroiler DOCs in the country, possibly because working with the government would mean streamlined registration and approval of the new genetics in Uganda (by that same entity). However, what resulted was unfortunate for the market and the programme since NAGRC was not a credible commercial partner. They were unable to properly promote the new genetics, they could not keep up with demand once Kuroilers caught on, and they created incentives for other commercial players to try and breed “fake” Kuroilers by cross-breeding in an attempt to mimic the distinct plumage of the bird and access the new demand that had been created. The resulting poor-performance of these fakes diluted the Kuroiler brand and set back the uptake of dual-purpose genetics in Uganda greatly.

<sup>25</sup> A nearly identical situation occurred in a USAID sponsored programme in Kenya where the dual-purpose genetics were sourced from the Kenya Agricultural Research Instituted. Production delays and a lack of commercial know-how on the part of the government body hampered ability of the programme to reach its goals.

Partnering with a reputable commercial entity from the outset and avoiding ‘donor capture’ would have been a preferable solution (Wellspring, 2014).

### Day-Old Chick (DOC) production

DOC production of hybrid birds, whether commercial broilers and layers or hybrid birds, is a complex business best suited to large scale companies. Commercial DOC producers serve a critical role in the poultry value chain as the producer of the primary input. These companies require significant CapEx to set-up and working capital to expand and continue operations. Farmers rely on DOC producers not only for the provision of chicks but also often extension advice, vaccines, feeds and other services.

Some DOC producers also have their own substantial chicken-rearing business. The larger of these will try to incorporate as much of the value chain in-house as is possible and will expand to slaughter and input production for full integration. The larger of the medium-scale farmers may be able to take on outgrower roles, taking advantage of the large producer’s links to inputs, extension and ready markets.

There are other models that explicitly target smaller farmers. Kukuchic in Kenya produces one type of chicken, the Rainbow Rooster, which is a dual-purpose hybrid from India. In the past years, they have been able to hatch over 1 million DOC annually, and they have distribution networks country-wide. Their model is very simple: produce and deliver DOCs for rural farmers via partnerships with agrovet shops. Apart from offering group training, this is where their involvement ends. They do not offer feeds, input or buy-back services. This example is interesting as it is a 100% commercial endeavour, but it has many blind-spots. The management does not know who buys their DOCs, nor for what purpose, and have expressed concern about this lack of market intelligence.

Another model centred on small farmers arguably best implemented by Ethiochicken (formerly Mekelle) in SSA, is the DOC producer to brooder-unit model. Ethiochicken sells DOCs to medium-sized farmers who rear the birds for four weeks. They then sell these chickens on to small scale commercial farmers. In Ethiopia, the average sale is less than ten chickens, but Ethiochicken aims to produce 10 million DOC per year. As with Kukuchic, the challenges of working with emerging small-scale commercial farmers is avoided with this model. Ethiochicken’s clients are reasonably savvy medium-scale farms, not the smallholders themselves. This model allows the company to focus on streamlining production of chicks and leaves intermediaries (the brooders) to identify and maintain their market of smallholders at a highly-localized level. Silverlands in Tanzania is following a similar model using the same Sasso hybrid dual-purpose genetics, sold via intermediary brooder ‘mother units’, albeit in a remarkably different market to Ethiopia.

### Feed production

As the sections above have shown, feed is a critical part of commercial poultry production. There are regular attempts by NGOs and governments to have smaller farmers formulate their own feeds in order to save money, but it is likely that these are false economies that leave individuals or small groups to source ingredients (grains, soya and other proteins) on retail markets which is fraught with issues. At small scale, they are price-takers in limited markets and have limited control over quality. Additionally, the unsophisticated nature of the feed they produce is not likely to meet the actual needs of the hybrid and commercial chickens they are feeding; while the cost of feed per kg may be lower, the poorer FCR means higher feed cost overall. For small commercial production, however, there may be scope to research green cover techniques which are easy to grow and nutritious for chickens without the need for processing. There is also more scope for researching and advising on models of mixed feeding and scavenging under different rearing situations and environments for the dual-purpose hybrid birds, though this is often contrary to the interests of the hybrid DOC producers who usually also sell feed (see Annex 1 for technical notes on feed optimisation).

Large scale feed producers struggle to access feed ingredients in quantities and quality that they require in many markets, but in some cases, they have options to import in bulk and make long-term agreements with reliable traders. Any efforts that can increase the availability of ingredients to these firms can have a substantial impact on feed producer's ability to reduce feed costs which has positive ripple effects throughout the commercial poultry chain and ultimately results in more affordable proteins for consumers. Sometimes, however, there can be a trade-off between poultry industry lobbying (e.g., for tax-free imports of feed ingredients) vs development of the local grain industry.

Work with smallholder producer organisations to supply grain inputs have met with mixed results, as in the Tanfeeds investment by AECF in which side-selling led to a halt in the outgrower programme. However, there is potential to link in with the small and medium scale farms that are now becoming highly productive throughout the region. Silverlands in Tanzania has partnered with nearly 30,000 farmers to deliver grains to their feed mill, and Zambeef works with similar numbers. Unga Millers (the largest stock feed company in East and Southern Africa) are looking to Tanzania for supply over 120,000mt grains per annum on a forward agreement, linking directly to producer organisations through partnering firms like Silverlands, and these types of arrangements can be transformative for the markets and deliver significant impact at all levels.

Developing alternative sources of animal proteins is another potential avenue for reducing cost and increasing quality of feed, and there is already some effort to develop black soldier fly larvae as an alternative<sup>26</sup>.

#### Vaccine production and distribution

Access and availability of health products and vaccines is beneficial for farmers of all types. Large scale production of vaccines is undertaken in many countries but often suffers from a combination of poor quality, poor management and disjointed markets and incentives as a result of occasional public procurement or competing interests. In many cases, governments or parastatals are the primary producer of vaccines and lack the business acumen to deliver properly, while simultaneously using their influence to block imports (as in MADE's case in Nigeria or I-2 vaccine import and registrations historically being hampered in Tanzania and Malawi to favour local producers).

Most large drug manufacturers have limited outreach to rural communities and do very little to promote their products beyond the larger-scale market or public/NGO/FAO procurement channels. However, a shift over recent years in strategies of BMGF and GALVmed is increasingly resulting in high-value grants and partnerships with multinational drugs companies to try and incentivise them to increase distribution into SSA and SE Asia. An example is the recent \$14million grant to Zoetis<sup>27</sup>. This is a result of previous failed attempts to solve the problem via grants and programmes supporting local NGOs and quasi-state manufacturers at the national level – for example via the EU funded VACNADA programme delivered through AU-IBAR<sup>28</sup>

Backyard and small farms in rural areas struggle to access the vaccines and medicines they need. Government extension services are often poorly funded and don't reach the more remote areas. Many efforts have been made to organise last mile delivery of vaccines by training Community Animal Health Workers (CAHW), but many times there are high attrition rates due to low profitability relative to the work involved. In some cases, CAHWs lack business skills to appropriately price their products, and they struggle to succeed if they have a limited product/service range as was noted in the PROPCOM

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<sup>26</sup> The pioneer in Southern Africa is Agriprotein: <https://agriprotein.com/>, and Kenya's ICIPE have been researching this technology in East Africa, though commercialization remains a challenge.

<sup>27</sup> <https://www.gatesfoundation.org/How-We-Work/Quick-Links/Grants-Database/Grants/2017/02/OPP1165393> (accessed 5.3.2018)

<sup>28</sup> <http://au-ibar.org/library/publications/173-en/programmes-and-projects/completed-programmes-and-projects/vacnada/about/99-about-vacnada> (accessed 5.3.2018)

programme. Additionally, in some countries, there are prohibitions against individuals charging for more advanced veterinary services (such as injections) unless they have higher-level veterinary certificates or are monitored by a veterinarian.

### Slaughter and processing

At one end of the processing spectrum, individual birds are bought live and slaughtered at home or the market. On the other end, wholly or partly mechanised slaughter, processing and packing facilities attached to commercial poultry operations handle 100,000s of birds at a time, close to large urban markets. What could be developed, however, is mid-level slaughter and processing located at sub-national levels, or mobile slaughter facilities catering for a variety of genetics and commercial needs.

Large commercial processors require scale, which is why they are often vertically integrated with poultry producers. It also means that they are usually concentrated near end-consumers in larger urban areas. This puts a gap between the rural areas where most poultry farmers are based and the processors and may provide an opportunity for a mid-level solution.

Mid-sized processing uncoupled from large processors is rare, possibly because the scale is an important factor, as is a regular supply of live healthy chickens. However, there remains scope for understanding the economics around mid-level slaughtering. There are a number of simple, hygienic slaughtering solutions available on the market which may work in this sector, and companies such as Transgenic Agri have promoted the use of these systems at Africa-wide poultry conferences in recent years<sup>29</sup>. If such processors were established around mid-sized cities near rural production zones, they could potentially link to a network of smaller retail outlets that serve those markets.

This market gap was the most cited challenge by all the new and emerging SME poultry producers engaging in dual-purpose hybrid production, such as customers of Silverlands in Tanzania and new Kuroiler growers in Uganda. Likewise, it is the main constraint for broiler producers using pure commercial genetics too – where a more reliable aggregation or offtake partner would also enable them to more easily access working capital loans from the banks or as credit from the DOC and feed producers.

Although there has been limited focus on this by poultry programs to date, this is an area worth exploring further. This space is perhaps best catalysed with investments from mid-level debt and equity impact investors such as AgDevCo, where there is a compelling enough commercial case for an investment, alongside a clear impact hypothesis. A recent example would be AgDevCo's \$255,000 investment into Kingchick in Tanzania.<sup>30</sup> Kingchick is an SME run by a local entrepreneur on Tanzania's coast. She got her start buying DOCs and feed from Interchick (a large broiler company in Tanzania) on contract farming basis. She has now expanded into her own processing facility and is selling frozen chicken. Her capacity in 2018 was 200,000 birds and she is targeting production of 0.5 million with the expansion of her slaughter house and cold chain distribution infrastructure.

Globally, technologies such as mobile abattoirs are gaining traction as brand/price benefits can be realised from small-medium scale processing vs. large commercial meat processors. While the ability to pay more may be limited in SSA and S Asia, the technologies and business models being developed may be able to be adapted for these contexts. Silverlands are considering an investment into a mobile abattoir to cater for a company installing a new pipeline in Tanzania. The mobile abattoir would follow the pipeline workers as they progressed, brooding units would be established and farmers would

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<sup>29</sup> Transnational Agri: <https://transnationalagri.nl/poultry-slaughter-equipment/pluckers-2/>

This company along with many others promoted their equipment at the Poultry Africa, 2017 conference in Kigali, Rwanda.

<sup>30</sup> <https://www.agdevco.com/our-investments/by-investment/KINGCHICK-POULTRY> (accessed 5.3.2018)

provide supply, thus establishing a core farmer base that can later provide volumes into urban markets or new static abattoirs.

## Finance

Financing options for agriculture are limited at all levels. Smaller players find a gap once they require amounts beyond what VSALs/SACCOs can provide. Micro-finance generally doesn't offer rural loans and, in any case, the interest rates are too high for annual crops. It is estimated that less than 3% of smallholder farmers' demand for finance is met, leaving an annual gap of some \$150 billion per annum; while there is an additional financing gap of \$11 billion annually for expansion of agricultural output (IFC, 2016). A survey of banks in SSA found that just 95 of 900 banks provide financing to smallholder farmers. Private investment from individuals and families, often middle-classes and elite from the urban areas, accounts for a significant percentage of medium-scale investment.

Even for larger players noted below, an apparent range of options often transpires not to be willing or able to invest in agriculture, especially early-stage ventures:

- a) Commercial banks – generally shy of agriculture and it accounts for 3-10% of portfolios in SSA. Banks typically cite factors such as the high costs to serve as the factor that limits their ability to reach the agricultural sector (World Bank, 2016). Interest rates are seen as too high for many forms of agriculture – especially primary production (Meyer, 2015).
- b) CDC – focused on large diversified regional agricultural firms looking for growth capital. Generally seeking risk-adjusted commercial returns or marginally lower in a small number of cases. Minimum deal size generally \$20million or higher, though smaller investments are made via fund intermediaries who include CDC as a Limited Partner/investor.
- c) Other DFIs also seek big-ticket investments (\$8-30million deal size average) and typically only 1 to 2% of their portfolios focus on agriculture. DFIs are avoiding agriculture as a whole because of the perceived risks (climate, disease, commodity prices) and the modest return potential, even though agriculture contributes most to jobs and livelihoods for the poor. DFIs (and the PE Funds they invest in) are also avoiding start-ups and early stage (pre-EBITDA positive) ventures in most sectors because of the risks relative to their internal ROCE targets (Charles Kenny, 2018).
- d) Impact Investors exist in agriculture, for example, AgDevCo. However these still represent very low volumes of overall finance, more debt than equity, and their portfolios are widely performing badly if measured by return on capital employed (ROCE) basis. Furthermore, only 6% of impact investors' assets under management are currently devoted to the food and the agriculture sector (The Global Impact Investing Network, 2018).

This said, in practice, it is not clear that there is an effective financing gap. The main challenge is the lack of commercially viable investment opportunities for investors seeking a risk-reflective return on investment – so both supply and demand sides need to be considered when looking at bridging finance gaps as part of a sector development strategy.

SME finance, often referred to as the “missing middle” is the gap between microfinance and lending by commercial banks to larger enterprises, and it represents a unique challenge. SMEs serving the agricultural sector perform a critical role in the supply chain, and evidence suggests improved access to capital for this segment boosts smallholder farmer productivity, incomes and resilience to shocks (IFC, 2015). However, relatively little is known about their needs as much focus is directed on the direct-to-farmer segment. What evidence there is suggests that the economics of those serving the segment are very challenging. This opens an opportunity for donor and philanthropic interventions to

assist, but identifying where interventions are most urgently required, and which design solutions are best suited to addressing the issues remains an area in need of more research (USAID, 2018).

## 6. RECOMMENDATIONS

As illustrated in the earlier sections of this report, the poultry sectors in SSA and South Asia are going through a period of dynamic change and growth driven by changing demographics, global commodity markets, policy shifts and emerging innovations throughout the value chain.

There is an opportunity for DFID to co-invest and co-create with local private sector and communities in both proven and new models which support new growth pathways for farmers, opportunities for SMEs and job creation throughout the industry.

Different farmer segments and contexts require different approaches. The first step is to be clear about the overriding objective of the project/investment. While of course objectives and approaches occupy overlapping space, a simple categorisation results in three major objectives tied to three major focus areas:

**1. Household food security (in rural subsistence farming families):** The best investments to improve household food security for backyard producers (“hanging in” farmers) are investments in health systems which deliver quality vaccines at affordable prices to backyard producers. Basic productivity training can make a difference to a degree if there are clear information gaps (e.g., how to use vaccines) however, often the gap is one of incentives rather than information.

**2. Widespread provision of low-cost protein (e.g., to poor urban households):** The large-scale integrated players are responsible for delivering protein in most high population formal and informal distribution chains and market segments: frozen chicken to urban supermarket chains; and, live birds to traders at the farm gate and directly via van sales to the urban markets/traders. They also provide most eggs to the shops and supermarkets, in addition to supplying traders and running direct-to-consumer low-cost egg deliveries via outlets and van sales. They play an important role in overall national food security and making fresh, reasonable quality animal protein affordable to poor urban households<sup>31</sup>. Some of these large-scale companies need support to grow. In particular, they often struggle to access sufficient quantity and quality of local soybean (and in some cases maize) for their operations. Investing in supporting soybean production and linking to poultry producers will stimulate the growth of this segment.

**3. Sustainable inclusive growth:** Backyard poultry production does not generate direct jobs or much income, nor do large-scale integrated poultry players that are highly efficient and mechanised. The opportunity to stimulate inclusive growth lies in the SME sector. There is a huge opportunity to invest in support to small and medium commercial producers as well as a range of SMEs providing services to the industry – particularly the SME producers but also to backyard producers in some instances (e.g., vaccine distributors).

While past projects have often focused primarily on small-scale poultry producers, it is important to keep in mind the whole system and job creation at different levels. There is a large opportunity for small-scale maize and soybean farmers created by large feed millers and integrated poultry firms that can connect thousands of households to the poultry supply chain and is possibly the largest opportunity the sector offers to poor, rural farmers. Other parts of the system can also offer opportunities for inclusive growth including mobile slaughter units, mobile vaccinators and traders.

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<sup>31</sup> However, there is a counter argument that in many markets, poultry meat could be provided more cheaply by importing frozen poultry from markets such as Brazil. So national food security issues and industrial policy will be important to consider. Importing would also then free-up productive land and assets for other more competitive uses in some cases.

## 6.1 Guiding principles

### Context is critical

For engagement in the sector to best meet DFID objectives around inclusive, sustainable growth and improved nutrition, the development of strategic recommendations that take into consideration the different local, national and regional contexts across SSA and SE Asia is needed. The discussion above highlights the importance of the environment (markets and agronomic conditions), the technologies and production systems being used (feed, genetics, housing and management) and at which level of the producer segment of the sector is being targeted.

A programme or investment needs first to define what outcomes it intends to achieve and then to examine: a) whether this is viable through poultry sector engagement in that specific geography; and, b) what approaches are most appropriate based on lessons to date. The analysis and suggestions above help guide the fundamental mechanics, opportunities with technology and strengths and weaknesses of different programmes and investments.

However, this review cannot provide any specific blueprint for impact and success in the sector given the number of contextual variables. Therefore, our recommendations also focus on recommended approaches and processes for design, implementation and learning that could help DFID develop more impactful and appropriate strategies in the future.

### Design considerations

It is important at the outset to carry out a detailed diagnostic or ‘pre-feasibility’ study based on the desired impact objectives. Some key elements of this process should include:

- 1) Ensure the ultimate goals are stated very clearly and kept realistic and as simple as possible.**  
With a clear indication of the level of impact being targeted (in numeric values). It is tempting to list multiple impact objectives and focus areas. However this can result in over-complex programmes attempting to influence change in multiple areas of the market (which has high-cost implications) but demonstrating little in terms of embedded sustainable change at scale.
- 2) Try to avoid being overly prescriptive early in the design about which would be the best entry points in the market to achieve the desired impact.** For example, if the goal is to impact smallholders then working directly with smallholders might seem an instinctive place to target most of our resources and funding. However, if that is the brief for programme designers, then they could miss out on the much larger impact that might be achieved working with the large stock feed off-takers who buy from hundreds of thousands of smallholders, and the ability to drive positive impact through changes in their supply chain structure and incentives.
- 3) Find and retain people with the best skills, knowledge and experience to advise on design.**  
It is false economy to save time or money at this stage, and it is recommended advisers include people with the following attributes:
  - a) deep and credible commercial knowledge/experience in the chosen geography and sector;
  - b) appropriate technical poultry expertise for the targeted sector segments and geographies.The term ‘expert’ is over-used, and ‘a little knowledge is a very dangerous thing’ in this area.
- 4) Ensure TOR include a full analysis of chosen geography, including:**
  - a) Comparative advantage/disadvantage relating to import parity with international frozen poultry entering the market. If dependent on tariff protection, to include an evaluation of the security of this and for how long it would likely be necessary for the sector to mature and improve efficiencies.

- b) Availability, price and quality of key inputs at each segment level of the value chain, and understanding the positions of key players (commercial, government and parastatal) involved in:
  - i) Genetics;
  - ii) Feed inputs;
  - iii) Made feed;
  - iv) Vaccines and medicines; and
  - v) Knowledge and training.
- c) Evaluation of the environmental conditions for production in different focus areas – e.g. temperatures, quality scavenging fodder (if being considered), disease prevalence.
- d) Competitive situation in the market for broilers and layers – key players and dynamics, political economy risks, regional trade and competition, the impact of logistics costs and cold chain infrastructure on different production sectors and markets.
- e) Market Research – what is overall size of market for meat and eggs, how competitive is poultry vs other competing proteins (e.g. beef, fish, plant proteins), market segmentation (by geography, urban/rural, live market, restaurant, supermarkets), channels to different market segments and supporting traders/intermediaries and cold chain infrastructure.
- f) Offtakers and downstream dynamism in market – e.g. number and type of slaughterhouses, any firms offering outgrower contracts.
- g) Cultural considerations/preferences.
- h) Other political economy and regulatory factors.

**5) Test options and design hypotheses on key market stakeholders** (e.g. key input providers, of-takers, influencers, investors, banks, development partners)

- a) Do they think it is viable – if not, why not?
- b) How could it be improved or ‘bomb-proofed’ in some areas (ask them most likely ways it would go wrong or who had most ability to derail it – genuinely, rather than a risk matrix exercise).
- c) If there are assumptions in some options that investors would step into certain areas, then test these out with those investors to see if gaps remain.

**6) Carefully consider additionality and sustainability**

- a) What level of leverage should be achievable and how could implementors be incentivised to reach it?
- b) What are pre-conditions to providing any grants or sub-commercial investment into the private sector?
- c) Is the programme/intervention playing a market/commercial role anywhere in the chain? If so, what is the exit plan and how could this be avoided in the first place
- d) What, if any, dependencies are there on regulatory changes or state actors heading over functions to the market?
- e) Carry out down-side scenario assessments against impact figures and sustainability of each option being considered and measure cost/benefit against initial impact objectives set.

Kenya is a useful example of why this kind of clarity and testing is critical in the early stages. For example, if a programme had the objective of increasing incomes of hundreds of thousands of poor smallholders (assume sub-1 hectare), then poultry is probably a sub-optimal sector to focus on because:

- i) It is not possible to commercialise/intensify indigenous poultry production at any scale;

- ii) Small-scale (stepping up) poultry production would impact relatively small numbers and faces intense competition from large integrated producers in Kenya's relatively mature poultry sector; and
- iii) The opportunity for smallholders to provide grains into the feed producers is highly limited because there is virtually no soybean production (poor climate/daylight hours for soybean and it is nascent at present) and maize is highly challenging. There is already a deficit, there are multiple crop disease issues, aflatoxin problems, policy meddling and corruption in national grain reserve purchases and steep competition for maize for human consumption.

However, if the same programme had an objective of engaging the Kenya poultry sector in Kenya to drive growth in regional trade and higher value, more structured export markets for Tanzanian and Ugandan maize and soybean smallholder producers, then large-scale Kenyan feed millers (e.g. Unga or Mombasa Millers) could provide significant offtake markets and help drive regional trade and stability. For example, at present Kenya feed millers are importing over 40% of their grain requirements over the year.

### Implementation considerations

Consider a portfolio approach using several different interventions and partners – allowing some to fail and then increasing resources and support to those showing more signs of sustainable growth.

Avoid developing portfolio via a competition/challenge fund methodology as this will most likely attract the professional grant seekers and NGOs over and above more high-potential businesses that are capable in the market but less so at chasing donor funding. Consider instead co-developing plans alongside high-potential partners (or consortia) in the country and then closely monitoring performance and recording learning alongside them. This is an important lesson learned from the recent learning report from the DFID FTESA programme.

This will take a skilled and hands-on approach from the implementing team since many of the projects will need to be highly adaptive. As such, managers will need very clear objectives and guidelines coupled with considerable freedom to adapt and shift resources within this framework. This has implications for the way the contracting and overall evaluation and governance is handled for the program and project.

Learning from project activities and other projects working in the poultry sector in these regions will be critical and should be built into design and implementation. This method of learning can go beyond program evaluation, log frames and Project Completion Reviews, having more active and live learning built into the programme and commercial partnerships throughout.

## 6.2 Key development objectives and program activities

The following section outlines the approach and interventions that are most appropriate in different contexts based on the benefits they are expected to deliver.

**1. Household food security (in rural subsistence farming families):** Supporting backyard production by scaling up vaccine/medicine supply chain models

Because poultry plays such an important role for rural poor household nutrition, bolstering the backyard flock's ability to fend off disease, avoiding morbidity and mortality, is a valuable objective. However, focusing on building realistic, sustainable channels for backyard farmers to access vaccines and medicines requires careful consideration. NGO approaches that tend to involve non-commercial players in the value chain, or inappropriately subsidise costs to make vaccines "affordable" to farmers

are unsustainable. Developing an effective poultry delivery programme is very challenging and requires thinking carefully about:

- 1) The economics – there must be profit for all market participants from the largest vaccine producer down to the last-mile delivery;
- 2) Logistics – backyard poultry farmers are very spread out and hard to reach. Making delivery efficient is challenging, but essential to ensure profitability;
- 3) Technology – unfortunately, there is no such thing as truly thermostable vaccine, but there are many exciting innovations taking place in the cold chain that could be explored, e.g. solar electricity, efficient fridges, use of mobile payments and mobile marketing/organisation;
- 4) Work exclusively through market participants and avoid wherever possible allowing NGOs or government extension to play a key role that is market critical – as this will not end up with a commercially sustainable or scalable solution; and
- 5) Focus on creating genuine demand and then ensuring supply is sustained afterwards. This will likely involve coordination of a number of actors initially. For example:
  - a. Development partners/NGOs subsidising general awareness, media, demonstration, training of trainers, handling any regulatory barriers to CAHWs/paravets being active in the market for poultry vaccines and medicines;
  - b. Ensuring any campaign as outlined above links directly with credible distributors and agrovet networks (or other distribution mechanisms); and
  - c. Where viable, stock vaccines and medicines as close to farmers as possible and with commercial partners who understand how to use them and handle them. Knowledge of proper storage and handling is usually poor with agrovet shop staff, so addressing this with TA may be needed. If there are brooding units or larger poultry producers nearby, they may be ideal local repositories and dealers for these inputs and including this responsibility into their business can provide them with increased resilience via more diverse product lines. Evaluating the wider market system to find the best route to the farmers is key.

**2. Widespread provision of low-cost protein (e.g. to poor urban households):** Supporting large-scale operations to become more efficient and grow, particularly through investing in improved grain production.

Improving a country's overall access to affordable eggs and chicken meat while reducing prices for consumers can be addressed by working with large commercial entities such as integrated poultry farms or feed inputs providers. Probably the biggest impact the poultry sector can deliver for remote rural small and medium scale producers, is through the offtake the sector provides for maize and soybean. Soybean, in particular, is an attractive cash crop where demand outstrips supply in most or all of the territories being considered. But again, context is important. It may be better to encourage imports of feed inputs rather than support a small or inefficient sector, thereby freeing up land for other, more competitive uses.

The main approach for working with these partners is via larger debt and equity investments (such as from CDC), potentially coupled with complementary policy support to try and ensure business objectives and strategy are well aligned with industrial policy of the country or region. For example, promoting large scale integrated poultry production, boosted by imports of GMO soymeal and animal proteins from South America in a country like Malawi that has industrial policy tied to oilseed sector growth (a by-product from which is oil cake, a protein ingredient in poultry feed), would likely be unsuccessful. A more promising model might include a smart strategy to create a reliable feedmill offtake market for soybeans from producer organisations with all the structured benefits that accrue when interests are properly aligned (such as is being developed with Zambeef and Silverlands).

The report has outlined earlier ways in which firms such as Silverlands Tanzania, Zambeef (poultry businesses) and Golden Lay engage 30,000+ smallholders each in their supply chains for the provision of grains. This is a complex and involved space where multiple models and actors can be tried to create win-win solutions that incentivise both the offtakers to engage more directly and there are lessons that can be learned and carried forward from DFID's Food Trade East and Southern Africa Programme (FTESA) and USAID's regional trade hubs that are focused in different ways on stimulating increased trade and inclusive opportunities for producers.

Lessons from FTESA showed that offtakers with effective structured trade practices were able to improve crop flows in their supply channels and attract the financial services of banks. Examples are:

- East Africa Maltings Ltd (EAML): Through twelve franchise agents, recruited and trained by EAML, the company was able to meet its first-year volume and quality targets for sorghum, which was a new commercial crop for area producers. Also, local banks, who were initially reluctant to provide working capital to EAML aggregators, offered lines of credit to aggregators once they saw the volume of financial transactions taking place.
- Silverlands in Tanzania, after support to Agricultural Marketing Co-Operative Societies AMCOS (registered producer organisations), succeeded in increasing crop volumes from its supply base and getting producers to accept seven-day payment terms in exchange for higher prices (vs trader price delivered to their warehouse/silo).

Role models appear to influence and generate interest among other market actors for more supply channel structured trade practices. This influence suggests that project investments could cost-effectively leverage role models to spur the spread of structured trade among other offtakers. Examples are:

- EAML are now negotiating with Unga Millers in Kenya on how the miller could tap into EAML's agent network to provide Unga with soya beans, an off-season crop to the white sorghum.
- EAML initially thought to provide producers access to threshers through its franchise aggregators. However, the demand for threshing services outstripped the aggregators' capacity, and there emerged independent equipment fabricators to fill the gap. This trend suggests that equipment companies may have an interest in taking a more proactive role ensuring the distribution of machinery and after-sales service to areas with more structured supply channels. Similar opportunities likely exist for suppliers of seeds and crop protection products.

Mobile money programs and supply chain management applications like Farm Force, for example, proved useful tools for off-takers to manage structured trade relations with agents and producers:

- EAML's use of Farm Force enabled it to coordinate with other organisations on support services to its suppliers.
- Although still in the pilot phase, the mobile money services used by RGL and evaluated by Silverlands showed strong potential in streamlining payment between off-takers and producers. The transparency of mobile payments also shows promise in preventing buying agents from purchasing crops at lower-prices than indicated by the off-taker in order to keep the difference. Lastly, the record of transactions also seems to make it easier for off-takers to manage agents' and producers' performance by, for example, extending bonuses for meeting performance targets.

In addition to telecommunications companies with mobile money platforms, some possible opportunities for service providers to catalyse the spread of structured trade include:

- IT firms that for example provide software for financial management, resource planning, or supply chain management.

- Communications firms (including local radio) that can develop strategies for off-takers to communicate value propositions of structured trade to suppliers.

**The importance of medium scale farms:** There is a body of evidence that indicates much of SSA's production is coming from mid-sized farms. This has implications for how we view African agriculture. Many of the mid-sized farms are owned by employed urban dwellers who invested in farms during last decade's high food prices. These farmers bring with them a desire for improved technologies and commercial input use that attracts suppliers of agricultural input and marketing services to the rural areas. The knock-on effect for smallholders is that these services have come closer to their farms and inject cash into the community (Jayne, 2018). These medium-scale farmers are key local actors to be engaged in poultry sector supply chains.

**3. Sustainable inclusive growth:** Support to SMEs throughout the industry: While BMGF and others have made significant investments in the technology required to support a small/medium commercial production model, supporting systems and business models have not yet emerged. This limits the potential of the technology. There is a need to invest in developing, refining and scaling SME models for input provision, brooding, production, aggregation, processing and marketing. Despite some positive investment by AgDevCo investments in Malawi and Tanzania, overall there is a shortage of support and finance into this fast-moving and dynamic medium scale and SME space. There is also an opportunity to research further models from India and Kuroiler/Keggfarm that link SME poultry farmers to markets.

**Developing brooder/mother unit models for local contexts:** The growth of dual-purpose genetics has expanded rapidly in recent years, but there are still many countries in which the indigenous chicken or the commercial broiler are farmers' only options. Working to bring appropriate dual-purpose hybrids into countries that don't yet have them is a way to enhance small commercial farmers' ability to increase incomes. This requires working with many sector players:

- International genetics companies such as Sasso in Europe or Kegg Farms in India - to understand how or if each type of bird fits the country-specific needs;
- Local DOC producers – must identify a commercial entity willing and able to take on a new type of bird, and to work to market it to the small commercial farmers it's designed for;
- Local regulatory authorities such as ministries of agriculture – to ensure that importation of new genetics is acceptable;
- Health and feed inputs companies – to ensure that there are sufficient stocks of affordable and effective health products and feeds to support the new genetics; and
- Brooding unit SMEs will need technical assistance and finance support to establish core operations and expand to offering feed and other inputs/services – even aggregation of grown birds - as a way to increase their reach/importance to farmers and profits.

**Developing middle-level processing and aggregation/marketing solutions:** This is an area where more applied research and testing is required to develop/adapt appropriate models: however, the impact will be significant if this succeeds. These models can be linked to the input market models, e.g., brooder units could also become aggregators and buy back fully-grown chickens or eggs.

In South Africa, small mobile abattoirs are established on medium scale farms to give the farmer control over when and how many birds are slaughtered (Spencer, 2017). The goal for this type of equipment is to allow the farmer to slaughter the chickens that are at their optimal economic weight and to avoid having to wait for slaughtering by a third party. Equipment of this sort, combined with cold-storage facilities located closer to production centres, could be a way to give medium scale farmers more control over their markets. Another model that exists is small abattoirs with cold storage set up in a 20ft container. This allows medium-scale farmers to process their own birds, reducing any

disease risk from filling up capacity by toll processing other people's chickens. However, the ability to slaughter the birds alone is only part of the story, and a wider approach to marketing and on-farm planning would have to be complementary to avoid having a surplus of chilled/frozen chickens.

Small commercial farmers may be able to benefit from this mobile technology as well if it is offered as a mobile service. An SME could be developed around the mobile abattoir, moving it from place to place, possibly following well-established market days, and offering bulk slaughtering. Again, the service alone is not sufficient, but possibly the SME could connect to smaller food outlets (restaurants, shops) in mid-sized markets that have the reliable cold-chain infrastructure.

Supporting peri-urban traders with access to finance solutions can also help them to expand their business and buy more chickens from small/medium scale farmers. In some cases, the cash availability of a small trader limits their ability to buy available chickens and eggs.

## 6.3 Investments

There are many opportunities to build farmer incomes in poultry, but no single silver bullet. A portfolio approach is best suited to dealing with the various needs of farmers and service providers. An intelligently designed set of TA, finance and targeted applied research can make a big difference at all levels, especially the missing middle. Each is outlined in more detail below.

### Technical Assistance

Developing cost-effective, sustainable TA/training models which deliver high quality technical and business training to backyard, small and medium farmers on an ongoing basis is a goal of many programmes. However, much of the support has historically been delivered through short-term training curricula or classroom-style workshops. While these interventions have the potential to successfully deliver sound technical advice, professional business modelling, and ambitious strategic plans, they have consistently proven insufficient for ensuring the growth of sustainable and resilient farms and SMEs.

Training in best practices does not necessarily facilitate farmer adoption. To sustainably improve the processes and systems employed by small farmers, technical assistance must be delivered through embedded, market-driven service providers that can offer responsive and adaptive mentorship and business coaching that:

- Comprehensively evaluates baseline operations and quantifies existing assets;
- Appropriately responds to the unique nature of the business and identifies opportunities for growth;
- Collaboratively develops actionable work plans that mobilise internal resources and investment;
- Strategically solicits short-term expertise to professionalise and scale up operations;
- Constructively leverages improved financial processes/systems to solicit capital from investors and banks; and
- Measurably delivers a return on investment and justifies future resource evaluation.

There are often numerous service providers in the technical assistance space that can help businesses grow. Matching the service provider with the desired objective is important: some may focus primarily on fiscal responsibility and others more on technical aspects of SME development, but there are increasing opportunities to develop models that address both.

## Finance

Access to credit is one of the main constraints facing both small farmer businesses and DOC and feed manufacturers alike. Support for in-country service providers such as small banks, social enterprises and trusts working to build financial deepening is one way to address smaller needs. Another approach is to work with the larger DOC producers to act as an avenue for credit for their smaller farmer partners. For example, Silverlands in Tanzania provides loans for their brooder unit partner farmers. These loans are provided in the form of feed and chick inputs on credit. The customers are given 28 days of finance and must repay the loans before the next placement of DOCs. The farmers must provide an up-front deposit of 33% to enter into the initial training and credit cycle. The average additional working capital loan is \$1,400 with an average of 1,000 birds to start with. Other options to explore could include extending credit through the mother units, partnering banks, creating poultry schools who then give loans in the form of starter houses/chicks as credit to successful people who complete it.

The Private Agricultural Sector Support Trust (PASS) in Tanzania is an initiative attempting to address the gap in agricultural lending and to stimulate investment in the space. PASS provides business development and financial services to small and medium agribusiness entrepreneurs and helps link them to financial institutions that are willing to work in agriculture. Finance for technical equipment, machinery and productive inputs is available through the facility<sup>32</sup>.

Options for financing that meets the needs of different segments are outlined below:

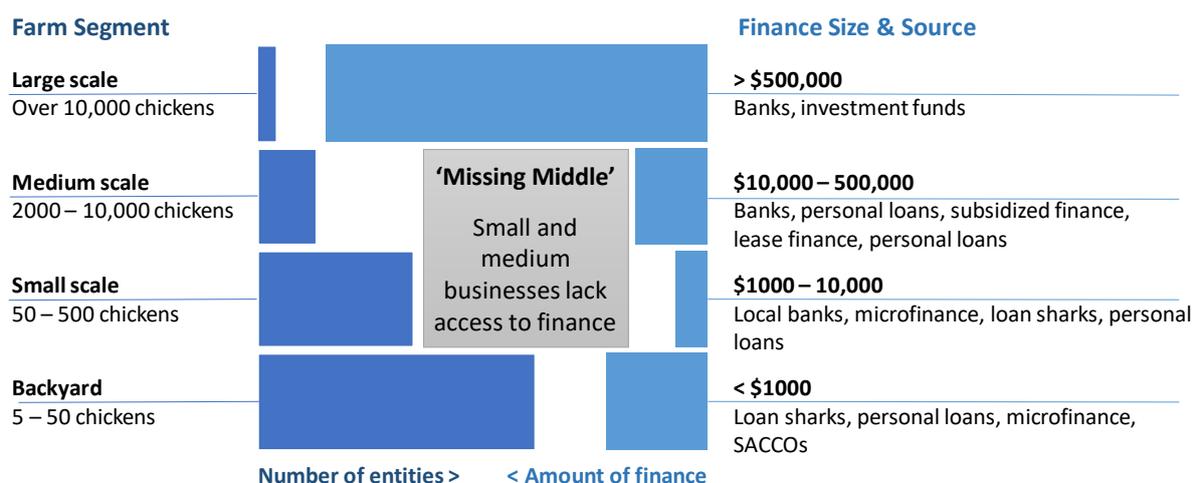


Figure 35: Financing options

In order for lending institutions to see the value and have faith in the viability of various levels of poultry player, programmes could include dedicated support to loan officers to better understand the sector in areas such as:

- Production practices: Estimates of costs of production and yield potential;
- Market trends/profit potential: Banks' assumptions about supply/demand may not reflect reality, deflating expectations about margins and return on investment;
- Cash flow: Terms and conditions for financial products and repayment plans do not always reflect the reality of production cycles, though compared to crop cycles which can be 4-6 from input provision to harvest, poultry can have more rapid turnover; and
- Marketing channels: The challenges encountered by poultry producers to find reliable market limits the potential for structured production financing, but linkages to SMEs and

<sup>32</sup> www.pass.or.tz

other offtakers supported by complementary programmes may kickstart lending by reducing price risks currently factored in by the banks.

The medium commercial producers are a relatively new and highly dynamic sector that can be an entry point for lenders exploring this sector for the first time.

More broadly, the sector needs:

- Patient capital and higher risk finance for agriculture. For example:
  - i) Specialised Ag Investment Banks or Specialist Funds (e.g. AgDevCo or IFAD ABC fund);
  - ii) Generalist International and Development Finance Institutions being given soft pots of money to allow them to take the higher risks in Ag (e.g. CDC's £600million Impact Programme funding facility from DFID); and
  - iii) Blended Finance models in all their different forms – first loss funding, returnable capital funds, grants blended with commercial capital (with all inherent moral hazards managed somehow).
- Finance for Ag and Pre-EBITDA positive projects. Examples of firms filling the gap at present are:
  - i) AgDevCo, Gatsby, PCP (Avocados), AECF, Gates, EFTA, Ford Foundation. Others stepping into, but it is very small volumes, and these are the new pioneers; and
  - ii) National Banks such as in Ethiopia - sticking to a government-led model.
- Linked mechanisms that enable emerging small commercial farmers and SMEs to access appropriate and affordable skills training, technical assistance and finance for growth:
  - i) Provide financial incentives to promote access to segments with low or negative profitability but with high impact potential;
  - ii) Offer partial credit guarantees or “first loss” buffers which may encourage lending in new, underserved (and high-risk) segments such as first-time borrowers or long-term lending;
  - iii) Provide direct concessional funding for lenders to increase risk appetite, freeing-up capital for lending to high-impact segments with higher perceived risks; and
  - iv) Offer advisory support to lenders to help lower operating costs and to borrowers to help reduce their risk profile.
- Coordinated donor actions to improve the attractiveness of agricultural SME loans such as:
  - i) Possibly including funding for disruptive technologies or promoting competition from new actors with innovative business models; and
  - ii) Providing coordinated value chain interventions to lower transactions costs, increase sales or reduce risks.

One danger is that blended and concessional finance becomes a form of subsidy for bad projects. Every project and business that Development Finance Institutions and impact investors support needs to have clear potential for long-term commercial sustainability, usually in competitive markets. So, the focus needs to be on high-potential projects, but which have a lot of risk attached, which means that some will fail in spite of the good business fundamentals.

Any subsidy needs to see development performance in return. DFID used to negotiate this every five years with CDC (i.e. a minimum share of the portfolio in Ag, a minimum share in least developed countries, in return for cheap loans from the Treasury). The risk, in terms of wastage of public funds, is that the “subsidy” is diverted by the Development Finance Institutions to prop up their own balance sheets, because:

- Sometimes they make mediocre/bad investments in market segments where they are competing head-on with the commercial finance sector; and/or
- Their investments come with costly bureaucracy, meaning that they need to offer credit-worthy borrowers further incentives so they will take their finance rather than borrow from banks or other private financial institutions.

#### Targeted applied research to support the adaptation of appropriate models

As outlined above, the SME space, in particular, is ripe for some targeted applied research, both in technical details of optimal feeding/care regimes for hybrid chickens in different conditions, and the broader systemic models that are needed to support small/medium commercial producers of hybrid chickens.

Feed is an area where UK industry and applied research facilities/partnerships could play an important role. For example, there are new facilities developed at research centres across the UK for examining whole production systems (feed, housing, management) in combination, whereas historically they are often looked at in isolation. These applied research consortia are often supported and organised via the UK Centres for Agricultural Innovation and other innovation platforms. The Centres have been funded through Innovate UK as part of the UK AgriTech Strategy. DFID funding of the AgriTech Strategy was for the AgriTech Catalyst in developing countries.

Another potential area is around mid-sized and mobile abattoirs and their ability to service medium and small farmers. The technology is available regionally, but creative attempts to use it to serve these two groups who struggle to connect to market has not been widely attempted. Development of SMEs around this technology, possibly connecting them with large scale companies, could be an avenue to expand slaughter and processing to underserved farmer sectors.

## 6.4. Programme Structure and Implementation Issues

A typical 5-year programme time horizon will generally not be enough to drive large scale inclusive poultry sector transformation in an SSA or S. Asian country. Therefore, DFID should maximise the potential to leverage the financial strength and resources of other partners towards the programme objectives, especially long term embedded and invested local players in the poultry sector or in supporting functions such as finance, training and ICT. This requires not only resource mobilisation but also ensuring that the sector vision of the programme leadership is well aligned with other key stakeholders working in or with the sector.

This also supports the co-development principles and guidelines recommended in earlier sections on engaging the large commercial players.

#### Flexible implementation approach

A flexible implementation approach is effective at handling the range of contextual differences and different ways that activities evolve, especially in such a complex and long value chain such as poultry. A useful part of a flexible approach is to co-develop projects of support with partners, beginning from the preliminary phase when a team is evaluating the value of working with a partner.

#### Implementation team

Staff and organise the implementing project with a senior-level and experienced team who include management consultant skillsets alongside real field experience and commercial credibility in regional poultry and agriculture markets.

For multi-year projects with similar objectives; however, projects need team skills to establish and manage relations with business partners over longer periods and coach and support managers through a variety of business challenges and changing circumstances. Such a team will likely also include people with business change management skills and experience beyond the technical aspects of inclusive commercial agriculture development and market systems work. They will be better able to, for example:

- Conduct due diligence diagnostics of potential partners needs and business systems;
- Co-develop initiatives that align needs with innovations and that include upgrades of business systems;
- Help senior management staff at large commercial and SME level to plan and execute change, including help in making sense of and managing/influencing the complex stakeholder dynamics and political economic analysis factor that are typical in these markets;
- Recognise opportunities for and facilitate business alliances and relations with service providers that strengthen competitiveness and address emergent problems; and
- Develop learning and M&E systems that are well aligned with existing corporate governance or reporting processes, or appropriate and useful for SMEs.

Also, by staffing and organising projects with credible commercial teams, the project presents industry partners with an organisational structure and expertise that is recognisable and credible. Many businesses operating in commercial poultry and grains/feed will have strong preconceived expectations and biases about donor-supported projects that will need to be overcome to achieve full leverage and engagement through these partners. When working with private sector partners, it is also advisable to:

- Allow the implementation team the time at programme inception and budget for human resources needed to cultivate personal relationships with managers and executives in charge of major poultry, veterinary, feedmill and finance provision in the country;
- Blend technical assistance support with limited grant amounts or investments;
- Favour partnerships with actors that routinely invest in upgrading performance, independent of donor funding; and
- Do not let potential partners think you need them more than they need you: be prepared to walk away.

#### Models for joined-up provision of investment and TA

There remains a weakness in the business and financial skills of the SME service providers and small and medium scale producers in the poultry sector that is often linked with their ability to access finance. Programming should take a systemic approach to these two interrelated problems, working with the market to expand and improve existing services and to encourage innovative new ones.

National context is important here, but often there are service providers that help businesses grow in strategic and fiscally responsible ways. Identifying the right partner is important, and there may be several options. Some may be via national microfinance institutions, consulting firms and other purpose-built technical assistance providers, while others may be part of the value chain directly such as DOC providers. For example, the World Poultry Foundation (BMGF grantee) in Tanzania initially set out to work with banks to develop a product for financing brooding units, but the banks did not have the specific skill set necessary to implement it. Instead, the programme provided a grant to Silverlands to set up a loan book for their customers who are provided loans in the form of chick inputs on credit.

There are two main options for the provision of investment and technical assistance, with differing pros/cons:

- 1) Technical assistance and investment can be managed separately or under one roof. Examples of combining the services include:
  - AgDevCo and their Smallholder Development Unit fund (grants);
  - Msingi – able to blend technical assistance, grants and loan investments to drive sector growth in East Africa; and
  - CDC Impact Funds and the “CDC Plus” technical assistance facility that is now managed in-house.
  
- 2) More common at present is when grant funding is managed by separate entities, but with the objective of supporting the impact of Development Finance Institution and Fund investments. For example:
  - DFID’s new Commercial Agriculture for Smallholders and Agri-business (CASA) programme;
  - The previous technical assistance facility linked to the Impact Programme, before it was moved in-house to CDC; and
  - EU Technical Assistance facility linked to Phatisa’s agriculture fund.

Managing technical assistance funds alongside investment funds creates quite clear conflict of interest and moral hazard risks, whereby investment teams may be tempted to use the grant funds to improve returns on their investments, often by using them to subsidise what would otherwise be core overhead costs of investees, or by subsidising due diligence and transaction costs. Another risk area is when Development Finance Institutions competing with commercial investors use these technical assistance facilities as an additional incentive where they are unable to compete with commercial investors on financing terms. In these examples, it questions the value and additionality of the Development Finance Institutions or funds.

However, in the case of technical assistance being managed externally, there are many examples of these performing poorly in practice because the TA fund managers are not embedded with the deal teams, are subject to different internal processes and timelines, and often come from very different backgrounds/cultures that clash with the approach of investment teams. As such, these funds can often be underspent (e.g. CDC impact fund TA facility when managed under a separate programme unit managed by PWC), or they can work sub-optimally with very restricted access to the investment teams or their commercial investees.

## **6.5 What could this mean for Malawi/CASA?**

For DFID’s CASA programme in Malawi, there are several areas which could make meaningful improvements in the poultry value chain, depending on the impact benefits/objectives being targeted. There are large scale integrated commercial egg and broiler producers, the largest being Donna’s Eggs (under Kelfoods, with CDC investment) and Central Poultry (“CP”) who produce broilers primarily. Donna’s Eggs distribute to market via outlets and their own branded vans, but the primary market for chicken meat remains the informal, scattered live market.

Malawi also has a significant number of small and medium scale commercial producers, especially in peri-urban areas or within range of the markets. These producers primarily farm using commercial DOCs purchased from larger integrated firms such as CP and Kelfoods. Kelfoods have a well-known feed brand called Proto Feeds who have developed a wide network of outlets across the country selling feed, chicks and other inputs for small-scale broiler producers. Other firms also sell layer DOCs and different feed brands. Protofeed has been especially active in developing training centres for their small-scale customers to train them in brooding and managing their flocks, then using these trainings and sales of DOCs as a way to help market their feeds.

However, whilst these inputs and services are available to the small and medium scale producer – there are not (to our knowledge) yet any breeders and distributors of dual-purpose hybrid chicks in the country, nor any significant firms on the market side able and willing to purchase, process and distribute broilers and eggs on behalf of the SMEs. As such, this gap may well be worth exploring in more detail.

Similarly, there are no significant commercial attempts yet at distributing and promoting vaccines and medicines to the backyard poultry keepers, nor any structured offtake supply chains in place for linking soybean and maize producers more directly into the stock feed offtakers.

Before embarking on any intervention, it is important to know the Malawi situation and comparative factors in more detail. A thorough market pre-feasibility study as outlined earlier is highly recommended.

Understanding the situation on the ground is critical for determining which avenues should and should not be explored. For example, why does Kelfoods not have buy-back agreements with the farmers they sell broiler DOCs to? This is likely because the informal market for chicken meat in Malawi makes it very difficult to organize, and it is likely to take some time before a substantial quantity of chicken meat flows through a more formal, centralised system for dressed and frozen products. Further, working with small commercial farmers as outgrowers has been shown in several places to be unsustainable due to the scale and levels of efficiency of the farmers. Not until outgrowers produce 5000+ birds per cycle do they become viable partners. However, AgDevCo's recent investment into Kapani<sup>33</sup> has the ambition to develop 1000 smallholder outgrowers around Lilongwe, and so there could be scope to provide support and or learn from this project as it unfolds.

The following are examples of areas DFID could be additional. These should be looked at in more detail only after a Malawi-specific study identifying the country-specific issues and stakeholder incentives has been carried out:

**Facilitate changes to create win-win opportunities for poultry feed mills to create direct incentives through to smallholder producer organisations.** Giving farmers forward off-take signals on volumes, quality and (ideally) market/index linked price floors can help unlock major benefits for large offtakers, aggregators/traders and producers, as detailed earlier. Another avenue may be to work intelligently with intermediate major buyers/processors/aggregators such as Mt. Meru Millers to enable win-win opportunities that open-up credit markets and cashflow opportunities for smallholders. Much can be learned from what has been happening with Silverlands in Tanzania, Zambeef, Unga Feeds, East African Millers Ltd (EAML) and Golden Lay (linked to NWK Grain Handlers).

This approach may be more appropriate for the CASA Lot 2 fund that is working to develop opportunities for smallholders in the supply chains of larger commercial off-takers with Development Finance Institution investments – in this case Kelfoods (CDC) and or Kapani (AgDevCo)<sup>34</sup>.

**Assist in diversifying DOC production to include dual-purpose hybrids and brooding units.** Again, following on experience from Silverlands and Ethiochicken, this could open-up many opportunities for small and medium scale commercial farmers in Malawi. One option is for DFID to work with an existing player, such as Kelfoods which is already a DFID/CDC investment, and help them overcome the challenges or buy down some of the risks (beyond commercial investment risk/reward thresholds) for investing in and development of a dual-purpose hybrid hatchery and system of Mother Units/distributors. This would also likely involve some intensive commercial technical assistance to the firm to evaluate the market, train key people and roll out the supporting market systems/functions

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<sup>33</sup> <https://www.agdevco.com/our-investments/by-investment/Kapani>

to enable a large central firm like this to make the transition into this inclusive market. Lessons from the World Poultry Foundation (Bill & Melinda Gates-funded programme) support to Silverlands, and impact investor engagement with Ethiochicken would be worth looking at in more detail.

However (being speculative), Kelfoods may be hesitant to work in this space because their main business is the production of table eggs, which may be diluted with the introduction of dual-purpose chickens. They purposefully do not sell layer DOCs at present for this reason. This could be a chance for DFID to support a new competitor or a new kind of entrant such as Silverstreet Investments, CP Poultry or AgDevCo investees who would have the appetite to invest in this kind of new market.

**Work to enable distribution of inputs to backyard and small-commercial farmers.** Backyard poultry farmers in Malawi are at constant high risk of major disease outbreaks such as Newcastle Disease, and face all the same issues as in other countries around inappropriate package sizes and last-mile distribution challenges. DFID could work with multiple players including DOC producers, drug companies, paravet associations, solar and fridge companies and mobile money operators to enable distribution of inputs to the poorest poultry keepers. There is scope to introduce rural refrigeration for agrovet dealers following on models like M-KOPA or Surechill (both UK-listed innovative companies) and developing strong networks of profit-making CAHWs/paravets to deliver the services.

**Explore innovative financing mechanisms for unlocking access to capital for small commercial farmers and poultry value chain businesses.** Small farmers and SMEs who are ‘stepping up’ from informal or subsistence systems need access to working capital and equipment to enable them to buy chicks and feed. DFID could work in conjunction with a large DOC distributor such as Kelfoods to manage a credit facility for this level of farmer, similar to the way BMGF is working with Silverlands – or even better they could support banks or other innovative financial institutions similar to EFTA to offer small businesses lease finance against certain conditions that de-risk them (e.g. completed training cycles, proven preparation of land/site). If brooding units are developed along with dual-purpose genetics, this could be an avenue for providing some of these finance functions using new models that have not been tried elsewhere to date. Testing several models with various partners under the portfolio approach discussed previously would provide a measured approach with deep learning possibilities within Malawi and with partners across SSA and SE Asia.

## 6.6 Driving greater integration and synergy between DFID programmes and investments in the poultry sector

There are many opportunities to create synergy between DFID programmes and investments in the poultry sector. There are players working at different levels in the value chain, donors, commercial entities and public institutions. Working with these at appropriate levels will help highlight gaps and underscore where integration can take place. Commercial poultry companies can offer insights to the sector that most other agencies cannot. They may have intimate knowledge of the regulatory/political situation that impacts on a number of areas in the value chain and can identify the most prominent commercial gaps in production or marketing.

With other donors and institutions, sharing lessons and ensuring that they are embedded into future programming (beyond logframes and evaluations) is important. The FTESA model provides a guide for this along with learning suggestions from others. Incentivizing employees and partners to admit to and highlight failures can help cement learnings as noted recently by DFID’s Chief Economist:

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*We should judge our success on a portfolio basis. Not every project will be a success. We work in difficult places tackling intransigent issues. If every project worked we would not be taking enough risk. Much as venture capitalists do, we*

*need to think of our investments as a portfolio. The wins when they come can be very big (for example when we manage to change national policy or help trigger economic transformation) and a few big wins can pay for all the less successful projects. If we change our narrative to explicitly predict failure in a proportion of projects in a portfolio, will that give senior responsible owners (SROs) the license to admit failures when they come and scale back?<sup>35</sup>*

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Engineers Without Borders publishes an annual “Failure Report” in which they publish their mistakes in an effort to learn from them. Their goal is to make discussing failure, and the learning that comes from it, the norm. They do not set out to fail, but recognize that to succeed, there must be failure, and by bringing failures out into the open they can be shared and learned from by others<sup>36</sup>. This is a lesson that is universally applicable.

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<sup>35</sup> [https://medium.com/@DFID\\_Research/lessons-from-a-year-at-dfid-d11d9947f90](https://medium.com/@DFID_Research/lessons-from-a-year-at-dfid-d11d9947f90)

<sup>36</sup> [www.ewb.ca](http://www.ewb.ca)

# APPENDIX 1: APPROACHES AND INNOVATIONS IN POULTRY

This section highlights some of the DFID sponsored programmes and investments in poultry in SSA and SE Asia and incorporates learnings from these and other programmes into a larger discussion around the approaches to addressing the challenges facing the poultry value chain. The final section focuses on recommendations.

## Background and approach

A summary review of a selection of DFID and DFID-related programmes and investments was carried out based on publicly available data including annual reviews, project completion reviews, logframes and business cases. In addition to this, the study team reviewed a range of other active development partner programmes and investments in this sector by the following funders:

- Bill & Melinda Gates Foundation;
- DFI, IFI and Impact fund investments;
- The Wood Foundation Africa;
- Gatsby Africa;
- Aga Khan Foundation;
- Msingi; and
- Wider feed and health sub-sectors, such as DFID's Food Trade East and Southern Africa (FTESA), USAID Trade Hubs, DFID Malawi Oilseed Sector Transformation Programme (MOST) and the Global Alliance for Livestock Veterinary Medicines (GALVmed).

The team also interviewed several large-scale commercial poultry/egg production firms, in addition to commercial vaccine, medicines and feed milling companies to gain clearer insights into their main incentives, challenges and the potential to help drive inclusive growth or transformation in their sector as major buyers of outputs and or providers of key genetics, nutrition, preventative vaccines and curative medicines.

## Summary of the DFID supported programmes reviewed

The tables below provide a high-level summary of DFID-supported programmes in poultry arranged by approach. The differences in programme type, how programmes report impact and the fact that most programmes include a variety of interventions, some in poultry, some in other sectors, makes direct comparison difficult. The tables provide an overview of what has been happening in poultry, and in the subsequent sections, more nuanced learnings from some of the programmes are incorporated into the discussion of approaches to dealing with poultry value chain challenges.

## DFID programmes with M4P approach

Table 18: DFID M4P approach programmes

Project/Country	Market System Focus	Finance type	Approach	Model	Cost	impact primary	impact - secondary
<b>Propcom Mai-Karfi, Nigeria</b>	inputs – health	Grant - TA	T/A M4P / systemic	input distribution to smallholder	GBP 27m	income	
<b>Market Development in the Niger Delta (MADE), Nigeria</b>	inputs – health	Grant - TA	T/A M4P / systemic	input distribution to smallholder	GBP 14m	income	gender
	access to output markets						
<b>Livelihood Enhancement Through Agricultural Development (LEAD) Programme, Tanzania</b>	access to output markets	Grant - TA	T/A M4P / systemic	working with smallholders, trainings, groups	GBP 8.2m	income	SME dev
	access to finance					nutrition - eggs and meat	
<b>NuTec, Uganda</b>	increased production	Grant - TA	T/A M4P / systemic	build agribusiness		income	resilience to climate change
		Debt & Equity					gender

## DFID programmes with grant-TA approach

Table 19: DFID Grant-TA approach programmes

Project/Country	Market System Focus	Finance type	Approach	Model	Cost	impact primary	impact - secondary
<b>CARD-F, Afghanistan</b>	increased production	Grant - TA	T/A direct	establish commercial farms	GBP 26.8m	supply	
<b>South Asian Enterprise Development (SEDF), Bangladesh</b>	access to finance	Grant - TA	T/A direct	working with smallholders, trainings, groups	GBP 5m	income	resilience to climate change
	business skills and information						
<b>SOBA Market Development Programme, Sierra Leone</b>	increased production	Grant - TA	T/A direct	input distribution to smallholder	GBP 9.1m	income	sector growth and transformation indicators
<b>LFSP - Zimbabwe</b>	increased production	challenge fund	T/A direct	working with smallholders, trainings, groups	GBP 45m	income	SME dev
	access to finance	cost share					

## DFID programme value comparison

Table 20: Programme value comparison

Programme	Programme Value (GBP)	Indicators of value		
<b>LEAD Tanzania</b>	8,214,430	Cost per household benefitting = GBP 81.62	Level of private investment achieved = GBP 780,378	Farmers with income increase of 10% = 66643 farmers
<b>MADE, Nigeria</b>	14,000,000	Cost per beneficiary = GBP 78.79	Level of private investment achieved = GBP 5.6 million	Beneficiary income gain per 1 GBP spent = GBP 0.4
<b>Propcom, Nigeria</b>	27,000,000	Cost per farmer reached = GBP 21	Leveraged private sector investment = GBP 3.59 million	Total income increase to 2019 = 523,000
<b>CARD - F, Afghanistan</b>	26,800,000	Net income change = GBP 1.5 million (in whole project)	Afghanistan now 60% self-sufficient in poultry	Helped establish over 60 poultry businesses
<b>SEDF - Bangladesh</b>	5,000,000	32 million GBP increase for 205,000 farmers and SMEs	Leveraged \$900,000 in financing for small farmers	Increased farm income by 6.1%
<b>SOBA - Sierra Leone</b>	9,100,000	Cost per beneficiary = GBP 106	Value of benefits per household = GBP 103	Beneficiary income gain per 1 GBP spent = GBP 2.47
<b>Nutec - Uganda</b>	48,000,000	Not directly a poultry programme, providing agribusiness support for crops		
<b>LFSP - Zimbabwe</b>	45,000,000	Sondelani group produced 600,000 eggs with net farmer payments of \$12,000	Molus company contracted 840 farmers who made broiler purchases of \$200,000	15 farmer groups received matching grants for 1040 incubators

The variety of indicators of value in the table above highlights the challenging nature of quantifying the value of disparate programmes. Each programme was developed to address country-specific needs and there are invariably different measures being used to quantify impact (e.g. cost per farmer vs. cost per beneficiary where some beneficiaries are SMEs and others are farmers). In many cases, poultry is just one portion of a larger programme and the results are not easily disaggregated.

Table 21: AgDevCo Investments with DFID funding

Company/Country	Business Model	Investment committed	Instrument	Projected Jobs (year 6)	Projected income uplift from jobs (year 6)	Projected SHF (year 6)	Projected SHF income uplift (year 6)	Egg production
<b>Transurban – Moz' bique</b>	Egg production	\$1,150,000	Equity	160	1781	0	0	40/000/day
<b>Uzima - Rwanda</b>	DOC Production	\$3,000,000	Debt	191	1416	30000	50	N/A
<b>Kapani - Malawi</b>	Meat production	\$1,800,000	Debt	100	1200	300	1500	N/A
<b>Kingchick - Tanzania</b>	Broiler Production	\$255,000	Debt	24	850	0	0	N/A
<b>BPIL (Biyinzika) -Uganda</b>	Broiler Production	\$3,000,000	Debt and Equity	1000	250	3600	500	N/A

Table 22: AECF with DFID funding

Business	Country	Business model	Loan	Grant	AECF funding (\$)	Total Development Impact (USD)	Cumulative Development Impact (USD)	Number of HH	No. of Jobs Male	Number of Jobs Female
<b>Mekelle Farms PLC</b>	Ethiopia	Improved dual purpose variety + feed to smallholders	625,000	310,000	935,000	91,468,351	115,303,938	360727	550	379
<b>Yelo Egg (Pvt) Ltd</b>	Zimbabwe	Improved dual purpose variety + feed to smallholders			600,000	11,018,011	28,384,245	26,965	77	23
<b>Misenani Agri Services Ltd</b>	Tanzania	Broiler DOC + inputs to outgrowers for integrated production	300,000	220,000	520,000	55,744	1,336,838	1,221	28	32
<b>New Horizons Mozambique Limitada</b>	Mozambique	Broiler DOC + input to outgrowers	225000	200000	425,000	1,148,499	4,543,260	193	329	31
<b>Mozambique Fresh Eggs, Lda</b>	Mozambique	Layer DOC + inputs to outgrowers			500,000					
<b>International Tanfeeds</b>	Tanzania	Soya outgrowers plus feed manufacturing			300,000	<b>Project Closed</b>				
<b>AKM Glitters</b>	Tanzania	Layer DOC + inputs to outgrowers			200,000	903643	1321588	1172	39	33
<b>South Farmers</b>	South Sudan	Layer DOC + feed			830,000	<b>Project Closed</b>	138,044			
<b>Novel Vaccines and Biological Company Limited</b>	Tanzania		0	350000	350,000	0	0	0	0	0

Table 23: CDC poultry investments

Company/Country		Business Model	Investment committed	Instrument	Indications of impact			
CDC	Silverlands, Tanzania	Feed and DOC production	\$ 20 Million	Intermediated Equity	76,000 shf increase income between \$600 - \$1000	Sale of 7.5 million DOC	Sale over 26,000 mt of feed	Direct employment up 4-fold
CDC	Kelfoods, Malawi	Egg & DOC production	\$ 15 Million	Equity	18 million table eggs/month	1.1 million DOC/year	1500 full time employees	training 1000 farmers/year
CDC	Zambeef, Zambia	Eggs, meat and feed	\$65 Million	Debt/Equity	16.9 million DOC/year	12.8 million processed chicken/year	200,000 mt feed per year	6000 full time employees, 30,000 small farmers

## Limitations

These findings are informed by publicly available reports by DFID field partners and by the consultants' experience working directly with other poultry programmes in SSA and SE Asia. It is necessarily high-level and has some limitations. The range of approaches undertaken in the many projects reviewed, between TA/M4P and investments, different focus countries and areas of the value chain and market system makes direct comparisons very challenging. In some cases, data reviewed is ex-ante, and therefore not proven, and even where post-completion reports are available, methodologies in reporting create challenges for interpretation on a direct comparison basis.

Notwithstanding this, the evidence and initial interviews point to a number of key lessons which are developed in this section. In order to structure the discussion, the challenges are centred around the farmer type initially and include experience from DFID and other programmes as points of reference. Following this, approaches to solving challenges faced by the poultry value chain more broadly are discussed.

# ANNEX 1: TECHNICAL NOTES ON FEED OPTIMISATION FOR DUAL-PURPOSE HYBRIDS

Source: Dr Timothy Gondwe and Harry Brainch, Wellspring, 2014 – consultancy for BMGF

## Feed requirements for Kuroiler (a dual-purpose hybrid bird)

Raising Kuroilers under a pure scavenging regime is not recommended due to high mortality rates from nutrient deficiencies, and high levels of predation due to roaming in search of food. Nutritional deficiencies predispose the Kuroiler to other infections that either lower their productivity or kill them. It is therefore deemed necessary for Kuroilers to receive a level of feed supplementation.

The current (successful) practice of feeding Kuroiler a lower protein value feed from day old to 3 weeks at Mother Unit (MU) level shows the capability of a Kuroiler to thrive under lower quality feed and without following a standardized feeding regime. At a farmer level, birds under a semi-scavenging system supplemented by maize bran appear to perform well if good scavenging resources exist, although in most cases feed supplementation was not properly balanced leading to nutritional disorders.

## Optimum feed mix and quantity

All rations used by farmers and MUs whose formulae were availed were tested using calculated values of nutrient contents of their ingredients. It was found that all have values below optimal levels for growing pullets, including rations fed to chicks at MU level. Protein levels are below 16 % and most nutrients are insufficient. In addition, the feed being provided is not necessarily cost-optimised. Further work is required to determine the optimum nutrient/cost balance for MU and farmer level, but the following feed regimes are recommended:

Under normal feeding, Kuroilers can follow closely the regime of laying chickens (see table).

1. Chick Starter from day old to 6 weeks, containing 20 % CP, low calcium
2. Pullet Grower from 6 to 18 weeks, containing 16 % CP, low calcium
3. Layer ration from 18 – 20 to 72 weeks, containing 16 – 17 % CP, high calcium

## Nutrient requirements for feed formulation for commercial poultry

Feed Category	ME (Kcal)/ kg	CP %	CF %	Lys %	Meth %	Ca %	P (tot) %
	opt	min	max	min	min	min	Min
Chicks	2000	20	5	1.0	0.45	1.0	0.7
Growers	2700	16	5	0.8	0.32	1.0	0.6
Layers	2700	16	5	0.7	0.2	2– 3.5	0.8
Layers (HE)	2800	17	5	0.75	0.3	2-3.5	0.8
Broiler Starter	3100	22	3.5	1.2	0.5	1.0	0.8
Broiler Finisher	3200	20	3.5	1.0	0.45	1.0	0.7

## BIBLIOGRAPHY

- Best, P. (2011, 11 24). *Poultry performance improves over past decades*. Retrieved from WATTAgNet.com: <https://web.archive.org/web/20160616092918/http://www.wattagnet.com/articles/10427-poultry-performance-improves-over-past-decades>
- Bosibori, A. (2016, 10 18). Sales Manager, Kenya Meat Commission. (H. Nielson, Interviewer)
- Cassanovas, P. (2015). *Asia set to lead global poultry growth*. Asia: Cobb.
- Charles Kenny, J. K. (2018). *Comparing five bilateral development finance institutions and the IFC*. center for Global Development Policy Paper 116.
- Cheelo, C. (2018). *Affordability of Protein-Rich Foods: Evidence from Zambia*. Southern African Institute for Policay and Research.
- Cherutich, S. (2018, Various interviews). CEO Kukuchic. (H. Nielson, Interviewer)
- Clements, M. (2016, 01 06). *The 5 largest poultry, egg producers in Europe*. Retrieved from WATTAgNet.com: <https://www.wattagnet.com/articles/25398-the---largest-poultry-egg-producers-in-europe>
- Conan et al, A. (2017, 08 04). *PLOS - Neglected Tropical Diseases*. Retrieved from Animal-related factors associated with moderate-to-severe diarrhea in children younger than five years in western Kenya: A matched case-control study: <tps://doi.org/10.1371/journal.pntd.0005795>
- Conway, A. (2018, 11). *Forecast*. Retrieved from Poultry Trends: <http://www.poultrytrends.com/201811/index.php#/22>
- ekantipur. (2016, 07 10). *Nepal's poultry industry worth Rs33.72 billion*. Retrieved from ekantipur: <http://kathmandupost.ekantipur.com/news/2016-07-10/nepals-poultry-industry-worth-rs3372-billion.html>
- FAO. (2013). *Poultry Development Review*. Rome: Fao.
- FAO. (2014). *Poultry Sector Nepal - FAO Animal Production and Health Livestock Country Reviews, No. 8*. Rome: FAO.
- FAO. (2017, April). *H5N8 HPAI in Uganda*. Retrieved from FAO: <http://www.fao.org/3/a-i7105e.pdf>
- FAO. (2019, 01 31). *Livestock Primary Production Data*. Retrieved from FAOSTAT: <http://www.fao.org/faostat/en/#data/QL>
- GALVmed. (2019, 03 04). *Newcastle Disease*. Retrieved from GALVmed: <https://www.galvmed.org/livestock-and-diseases/livestock-diseases/newcastle-disease/>
- Gammon, N. (2019, 02 28). Director, Strategic Development and Impact. (H. Nielson, Interviewer)
- Guyonnet, V. (2017). Opportunities to grow the egg business in Africa. *Poultry Africa 2017*. Kigali: FFI Consulting.

- IFC. (2015). *Innovative Agricultural SME Finance Models, (2012), and Rural Agricultural Finance Learning Lab, Evidence on the Impact of Rural and Agricultural Finance on Clients in Sub-Saharan Africa: a Literature Review*. International Finance Corporation.
- Jayne, T. S. (2018, 16 11). *Medium-scale farms are on the rise in Africa. Why this is good news*. Retrieved from The Conversation: [https://theconversation.com/medium-scale-farms-are-on-the-rise-in-africa-why-this-is-good-news-107629?utm\\_source=linkedin&utm\\_medium=linkedinbutton](https://theconversation.com/medium-scale-farms-are-on-the-rise-in-africa-why-this-is-good-news-107629?utm_source=linkedin&utm_medium=linkedinbutton)
- Memon, D. N. (2013). *Poultry: Pakistan's Fastest Growing Industry*. Food Journal.
- Meyer, R. L. (2015). *Financing Agriculture and Rural Areas in Sub-Saharan Africa: Progress, challenges and the way forward*. IIED Working Paper. London: IIED.
- Mugido, W. (2017, 07 20). *Southern African countries suspend poultry imports from South Africa*. Retrieved from USDA GAIN: [https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Southern%20African%20countries%20suspend%20poultry%20imports%20from%20South%20Africa\\_Pretoria\\_South%20Africa%20-%20Republic%20of\\_7-20-2017.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Southern%20African%20countries%20suspend%20poultry%20imports%20from%20South%20Africa_Pretoria_South%20Africa%20-%20Republic%20of_7-20-2017.pdf)
- Mugido, W. (2018, 07 16). *South Africa Opens Market for US Shell Eggs*. Retrieved from USDA GAIN.
- Mulder, N.-D. (2017). *Global Poultry and Pork Outlook*. Rabobank.
- Mulder, N.-D. (2017, 11). *Time for Africa - Capturing the African Poultry Investment Opportunity*. Rabobank.
- Nabangi, D. J. (2016, 08 12). CEO, Uganda Meat Producers Cooperative Union. (H. Nielson, Interviewer)
- Nakaweesi, D. (2019, 02 05). *Poultry exports ban could soon be lifted*. Retrieved from Daily Monitor: <https://www.monitor.co.ug/Business/Prosper/Poultry-exports-ban-could-soon-be-lifted/688616-4966332-urfer4z/index.html>
- Nation. (2016, 10 15). *Pakistan lags behind world in eggs, poultry meat consumption*. Retrieved from The Nation: <https://nation.com.pk/15-Oct-2016/pakistan-lags-behind-world-in-eggs-poultry-meat-consumption>
- Oderinde, O. (2019). MADE Manager. (H. N.-v. email, Interviewer)
- OECD/FAO. (2016). *OECD/FAO Agricultural Outlook 2016-2025*. Retrieved from [http://dx.doi.org/10.1787/agr\\_outlook-2016-en](http://dx.doi.org/10.1787/agr_outlook-2016-en): [http://dx.doi.org/10.1787/agr\\_outlook-2016-en](http://dx.doi.org/10.1787/agr_outlook-2016-en)
- Omondi, D. (2019, 02 24). How eggs trade went stale thanks to cheap imports. *The Standard*.
- Paul Samboko, O. Z.-M. (2018). *Analysis of the animal feed to poultry value chain in Zambia*. Lusaka: Development Southern Africa.
- Raha, S. K. (2014). *Poultry Industry in Bangladesh: Present Status and Future Potential*. Mymensingh: Bangladesh Agricultural University.
- Silver Street Capital Ltd. (2018). *Annual Impact and ESG Report - The Silverlands Funds*.

- Spencer, J. (2017, 11 05). *Affordable battoir equipment for small-scale poultry producers*. Retrieved from Farmers Weekly: <https://www.farmersweekly.co.za/featured-home-image/affordable-abattoir-equipment-small-scale-poultry-producers/>
- The Global Impact Investing Network. (2018). *Annual Impact Investor Survey*.
- Towers, L. (2016, 06 14). *Opportunities and Challenges for the Sub-Saharan Africa Meat Market*. Retrieved from The Fish Site: <https://thefishsite.com/articles/opportunities-and-challenges-for-the-subsaharan-africa-meat-market>
- USAID. (2018). *CSAF financial benchmarking*.
- Vault. (2018). *Tyson Foods, Inc.* Retrieved from Vault: <http://www.vault.com/company-profiles/food-beverage/tyson-foods,-inc/company-overview.aspx>
- Viljoen, W. (2017). *The South African poultry sector - trade, consumption, production and inputs*. TRALAC Trade Law Centre.
- Wellspring. (2014). *The Kuroiler Chicken in Uganda - Performance and market potential in the backyard poultry sector*. Nairobi.
- Windhorst, H.-W. (2013). *Atlas of the Global Egg Industry*. Retrieved from [http://www.internationalegg.com/wp-content/uploads/2015/08/atlas\\_2013\\_web.pdf](http://www.internationalegg.com/wp-content/uploads/2015/08/atlas_2013_web.pdf)
- Wonde, D. (2017, 09 22). Ethiopia Poultry Producers and Processors Association member. (H. Nielson, Interviewer)
- World Bank. (2013, 10 16). *Cross-border Trade in Zambia: a Path to Growth and jobs*. Retrieved from The World Bank: <http://www.worldbank.org/en/news/feature/2013/10/16/cross-border-trade-in-zambia-a-path-to-growth-and-jobs>
- World Bank. (2016). *Financing Agribusiness in Sub-Saharan Africa: Opportunities, Challenges and Investment Models*.
- World Bank. (2018). *Mozambique: Smallholder Inclusion in Agri-Food Value Chains; Insights from the Maize, Poultry and Sesame Subsectors*. Washington DC: World Bank Group.