Regionalization in Poultry Development in Eastern Africa

A study into interdependency between East African countries in poultry production

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Executive Summary

This regional study of East Africa's (EA) poultry sector was commissioned by the Food and Business Knowledge platform in 2017 with deference to the growing interest of Dutch companies in East Africa. The poultry sector in EA has been growing rapidly for the past 5 years driven by: rapid urbanization; the growth of the middle class in EA; rise in number of quick services restaurants in urban areas in EA; and growing need for animal protein. Of the 4 EA economies Kenya's poultry sector is the most mature. However, all the other 3 economies have in the past 5 years made significant strides towards developing and growing their own poultry sector.

In order to justify the case for regional approach to poultry development in EA 3 key issues were addressed. First the availability and production of good quality feed at competitive prices. Governments in the region have made conscious policy changes to incentivize the import of raw materials and ingredients for feed into the region. In addition to this certain countries in EA such as Tanzania and Rwanda have made poultry specific strategies to catalyse growth of their poultry sectors. Whereas collective initiatives are in principal good for sectoral development at a regional level, history shows that there are the significant challenges to overcome. For instance clarity on cross border trade in maize, oil seeds and oil seed cake is necessary for a sound regional approach to feed. The disparity in terms of available land for maize cultivation, the cost price and eventual market price for maize differs significantly per country in EA. Each county in EA has a competitive advantage that could complement the others. However finding these complementarities and capitalising them for the greater good of the region will give rise to significant benefits for each EA member state.

Secondly the availability of DOCs across EA is a challenge. Kenya trades with Uganda and Uganda trades with Rwanda when it comes to DOCs. There is a shortage of DOCs in EA and there is a seasonality both in availability and price that makes it difficult for farmers to plan ahead and manage their costs.

Lastly access to markets, the East African Community (EAC) is both an economic and political block. Citizens of the member states are in principal allowed to work, do business and trade with one another freely. Though the EAC is the most advanced regional economic block in Africa it still faces certain challenges to implementing certain policies collectively. For instance in February of 2018 all EA member states agreed to remove VAT on all raw materials imported for feed manufacturing. Of the 4 member states 3 have already tabled this policy in parliament and 1 has not. Free access to a market of approximately 140 million people will drive investments in the sector across the entire value chain. Such initiatives should be given priority and expedited in order to catalyse investments and growth in the EA poultry sector.

Complimentary to the 3 issues above is knowledge and training at vocational and tertiary levels in EA. There is need for better more specific training and education in the poultry sector. A case in point is in EA veterinary doctors are in principal experts for all livestock and poultry is one amongst many of the courses they would take during their 4 to 6 years study. Upon completion most are not equipped to immediately enter into the poultry sector. Most farms and companies

in the sector have been forced to develop on job training programs that allow high performers to learn poultry specific knowledge. In addition to knowledge and training collective investment in regulation and enforcement of good biosecurity and animal health practices would go a long way to reduce and or manage disease outbreaks in the region.

In the context of this study it is observed that in EA a majority of poultry farmers are either small or medium scale farmers. Collective investments in feed, DOCs, animal health, knowledge transfer, capacity building, training and access to markets will greatly assist them become better farmers. In recognition of the increased significance of the poultry sector various financing and financial institutions have become interested in poultry farmers and other poultry sector value chain actors. These developments coupled with increasing demand for animal protein make the sector very attractive not only for local actors but also for the Dutch private sector.

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List of Acronyms

AfCFTA	Africa Continental Free Trade Agreement
AI	Avian Influenza
APOKA	Arusha Poultry Keepers Association
ASSP	Agriculture Sector Strategic Plan
AWAN	African Women Agro- Network
CBPP	Contagious Bovine Pleuropneumonia
CBT	Cross-border trade
CEMAC	Economic and Monetary Community of Central Africa
CEPGL	Economic Community of the Countries of the Great Lakes
CMP	Common Market Scorecard
COMESA	Common Market for Eastern and Southern Africa
DOCs	Day Old Chicks
DRC	Democratic Republic of Congo
EA	East Africa
EAC	East African Community
EAFF	East Africa Farmers Federation
ECCAS	Economic Community of Central Africa States
ECOWAS	Economic Community of west Africa States
ESA	Eastern and Southern Africa
FAO	Food and Agriculture Organization
FCR	Feed Conversion Ratio
FMD	Foot and Mouth Disease
GDP	Gross Domestic Product
HAPP	Holland Africa Poultry Partners
ILRI	International Livestock Research Institute
KES	Kenya Shillings
KFC	Kentucky Fried Chicken
KIPOCOSO	Kisutu Poultry Co-operative Society
MASP	Multi Annual Strategic Plans
MOLFD	Ministry of Livestock and Development
NABC	Netherlands Africa Business Council
NGO’s	Non-Governmental Organizations
PAT	Poultry Association of Tanzania
RVF	Rift Valley Fever
RVO	Netherland Enterprise Agency
SACU	South Africa Customs Union
SADC	Southern Africa development Community
SMEs	Small and Medium Enterprises
SSA	Sub-Sahara Africa
TABROFA	Tanzania Broiler Farmers Association
TADs	Transboundary Animal Diseases
TAFMA	Tanzania Feed Manufacturers Association
TALFA	Tanzania Layer Farmers Association
TAVEPA	Tanzania Veterinary Para Professionals
TCPA	Tanzania Commercial Poultry Association
TFTA	Tripartite Free Trade Area
TMEA	TradeMark East Africa
TPBA	Tanzania Poultry Breeders Association
TPBA	Tanzania Poultry Breeders Association

UDEAC	Central Africa Customs and Economic Union
UEMOA	West Africa Economic and Monetary Union
UFUKUDA	Umoja wa Wafugaji Kuku Dar es Salaam
USAID	United States Agency for International Development
UWAFUKUMO	Ushirika wa kufuga Kuku Morogoro
VAT	Value Added Tax

1. Introduction

1.1 Background

The Netherlands is very active in poultry development in Africa. Private companies, educational and research institutes, NGO's and the Dutch government are all involved in various aspects of developing the poultry sector in many countries in Africa. The private sector is united in the Dutch Poultry Centre (http://www.dutchpoultrycentre.nl/) and is strongly represented in Africa through the activities of the Netherlands Africa Business Council (NABC), responsible for organising business contacts in the sector and representing the sector though various events. Education institutes such as the Aeres Group and Wageningen University and Research are implementing various researches and training activities, in several Eastern and Southern African countries. Public-private initiatives such as the Holland Africa Poultry Partners (HAPP) (www.hollandafricapoultrypartners.nl) in Ethiopia have also received Dutch Government support.

1.2 Developments in poultry value chains in Africa.

Poultry production in the Eastern and Southern African countries has gradually grown over the past decades from a mainly backyard keeping system to a more professional and commercial poultry value chain. This includes the establishment of hatcheries; feed input suppliers, housing equipment, veterinary services and slaughtering facilities. The growth of the poultry value chain has differed strongly from country to country. Countries like South Africa, Zambia, Kenya, Uganda and previously also Zimbabwe, have been the leading countries. Nevertheless, also in countries such as Malawi and Tanzania and, the poultry sectors have shown a strong growth over the past decade. In some case the growth has been strong only on e.g. broilers (Mozambique), in other countries both layers and broilers have shown comparable growth (Ethiopia).

In general it can be stated that the growth of the poultry industry has accelerated in Sub Saharan Africa over the past ten years, as a result of the high growth in demand for animal proteins, of which poultry products are the main providers.

1.3 The study

This study, which was funded by the Food and Business Knowledge Platform, aims at making an initial assessment of consequences of regional interdependency on the position of smallholders and SME's in the poultry value chain.

To harmonize the country-oriented Dutch development and economic diplomacy policies with increasing regional influences in poultry value chain developments, better insight is needed in the interdependency of the poultry sectors of different countries. Whilst the issues of interdependency can be recognised across the whole of Africa, the initial focus is on Eastern and Southern Africa for practical reasons.

In order to establish the various competitive and or comparative advantages for each of the 4 east African countries deference was given to the following areas: production systems and processes; Policy and Regulatory environment; Capacity, knowledge, technology, training and education gaps; and Market. As such the objective of this study is to make an initial assessment of **consequences of regional interdependency on the position of SME's and smallholders in the poultry value chain**. In light of the role small holders and SMEs play in the poultry sector, the outcomes of this assessment will eventually be translated, where relevant, into clear market opportunities for the Dutch private sector. The outcome of the study will be an analysis on the way in which national poultry value chains are influenced by the dependency on inputs from and other countries in the region and will serve as an input for rephrasing poultry value chain support strategies across Africa.

In making this assessment both layers and broilers and by extension poultry meat and eggs as major poultry products were included. It is important to note that given that this is an initial assessment it was imperative that we included both broilers and layers in this study. The outcome of this assessment will then be leveraged to focus on one of the two for a particular country or countries in the East African region. The themes were carefully selected in order to cover the entire spectrum of the poultry value chains whilst offering a clear basis for substantive comparison for the 2 stakeholder groups i.e. SMEs and small holders. That said, this study does also include an assessment of the role and effect "large scale" poultry producers have in the national and regional economies. Table 1 below gives a detailed description of the sub themes selected.

Table 1: Research themes

No.	Theme	Description
1.	Production systems and processes	The objective here is to identify current practice and how it would relate to the available technology and knowledge available in Holland. It includes the identification of not only location of all major stakeholders with regards to production of poultry related products in East and Southern Africa.
2.	Policy and Regulatory environment	This question extends to import regulation and all duties due to any imported goods required for production and processing of poultry products. The challenge is to also identify what regulation exists and how it is enforced amongst the various economic blocks in both East and Southern Africa. At national and regional level regulation plays a significant role as it can make or break a business.
3.	Capacity, knowledge, technology, training and education gaps	Better insight on these issues i.e. available capacity, levels of skills across the value chain, technology currently in use etc. are a good indicator as to the maturity of the market and the opportunities that exist for both developing the sector.
4.	Market	The question on markets extends from inputs to consumer i.e. from farm to fork. There needs to be more reliable information on this to enable the Dutch private sector better strategize its activities across Africa.

1.4 Growing interdependency between countries

The pace of growth of the poultry in various East African countries has not been and is not equal. The economy of some countries (South Africa, Kenya and previously also Zimbabwe) is much stronger than the economy of the surrounding countries and this is also reflected in the pace, growth and development of the poultry sector. This has inevitably led to a situation whereby the poultry sector in some countries depends on the development of the poultry sector in other countries, e.g. for inputs (day old chicks, vaccines) or for market outlets of eggs and poultry meat. Several aspects of interdependency can be recognised:

- Animal feed to poultry value chain;
- Poultry health and veterinary issues;
- Various technical inputs;
- Markets;
- Poultry value chain innovations; and
- National and regional trade policies.

East Africa defined as Kenya, Tanzania, Uganda and Rwanda is home to approximately 145 million people (2017 Estimates). Through the East African Community (EAC) there is a trade agreement in place that allows for the free movement of goods and services throughout the region. EAC is a predominantly agri-based economic region. Agriculture is also the region's main employer with over 60% of the population is dependent on agriculture for the livelihoods. Nationally the livestock sector contributes approximately 20 to 30% of gross domestic product and plays a crucial role in regional trade. At farmer level, as much as 70% of cash income is generated from livestock. Livestock loosely used to describe cattle, sheep, goat, poultry and pigs.

Nearly 60% of the value of edible livestock products is generated by cattle in the form of meat and milk, while small ruminants (meat and milk) and poultry (meat and eggs) generate around 20% each[1]. There is a thriving regional poultry sector fuelled by active trading in both inputs and products. As such given the dynamics of trade in the region and the increased significance of the poultry sector in the region it is imperative to make a comparison across the region.

1.5 Methodology

The study was carried out over a period of 1 ½ years and consisted of several parts. The first phase of data gathering was carried out in the period October 2016 to March 2017 by one of the authors during a stay in several Eastern African countries. During this period, data on production and major players were gathered in the countries involved. This was followed by discussions with stakeholders in the Netherlands and further literature research.

Gathering the relevant data in a consistent and reliable manner proved to be a tedious exercise. Lots of information is available with various stakeholder, public as well as private, but this is rather sketchy and scattered. Reliability of general

[1] Source: East Africa Livestock Strategy Eastern Africa Farmers Federation (EAFF), August, 2012.

statistics is often questionable and when comparing data from different sources, contradicting information can often be found. Whilst private companies were not always willing to share all their information for understandable reasons, the willingness to cooperate in general was rather positive.

After approval of the proposal by the FBKP, the set-up of the study was discussed with the Dutch Africa Poultry Partners (DAPP, the poultry sector platform of NABC) on May 10th, 2017.

The preliminary findings were presented at the Poultry East Africa Day of NABC and the Dutch Poultry Centre on Jun 21st, 2017; at the Poultry Africa Exhibition and Conference in Kigali, Rwanda on October 10th, 2017 and again to the DAPP on February 28th, 2018.

2. East African Poultry Sector

Africa as a continent currently hosts 15 % of the global population, and this percentage is expected to grow to 25% by 2025 (World Bank estimates). Meanwhile, Africa only accounts for 5% of global poultry meat and 5% of the worldwide egg production. Production of poultry products in Africa differs strongly per country: approx. 80% of both poultry meat and egg production is realised in ten countries, with South Africa taking the lead producing 25% of all poultry meat on the continent. Most eggs are produced in Nigeria.

The demand for poultry products, which according to some estimates, already contribute to 50% of total meat consumption in Africa, is expected to rise strongly (https://www.africa.com/top-countries-for-chicken-investment-in-africa/). Africa only accounts for 4 % of total global agricultural exports, to which main contributors are: South Africa (18%); Ghana (10%); Egypt (10%); Kenya (5%); Tanzania (2.5%); and Uganda (2.5%) as at 2016 (Jensen, 2015).

Biggest importers of agricultural products are Egypt (18 % of total of the continent), Algeria (12%), South Africa (8%), and Kenya (2.5%). Of the total export volume from African countries, 22 % consist of intra-African trade to which South Africa contributes by 30%, Egypt 8%, Uganda 6.5% and Kenya 5%.

Of the total import volume into African countries, 21 % consists of intra-African trade, whereby South Africa is the biggest importer of products from other African countries (15 % of total trade volume).

As a sector, livestock contributes significantly to the welfare and social economic development of the region. Livestock contributes approximately 20% to 30% of agricultural GDP across East Africa. Poultry farming consists of three different production systems namely the traditional, which refers to back yard rearing of chicken for both eggs and meat; an intermediary system with dual purpose breed producing both eggs and meat and non-traditional system which refers to the commercial farming practice that is relatively modernized. Indigenous birds still account for a larger proportion of the birds kept see table 2 below for figure from 2016.

Table 2: Poultry population in millions (2016)

Country	Broilers	Layers	Indigenous	Total	No. of Eggs produced
Kenya[2]	5,1	1,7	33,3	40,4	1.529.680.000
Tanzania	24,0	6,0	37,0	67,0	1.780.000.000
Uganda[3]	8,4	3,6	26,6	40,0	856.000.000
Rwanda	2,3	1,8		4,1	82.370.000

Source: World Animal Protection (WAP) Africa, 2017; FAOstats; and NABC Analysis 2017

Despite the bias for indigenous birds, that also command a markedly higher price in the market across East Africa, the number of exotic birds reared has been growing steadily over the past 5 years driven by a number of factors. Table 3 below shows the steady growth in consumption of poultry meat across East

[2] There are approximately 300,000 breeders counted in the total sum of birds in Kenya.
[3] In addition to the count presented here there are 1.4 million improved chicken included in the count.

Africa. In comparison to global average and the SSA average it is clear that there is room for growth. Consumption in East Africa is driven by a number of factors including: rapid urbanization; growing middle class in East Africa; increase in disposable incomes; increased number of quick service restaurants e.g. KFC; and improvements made in farming techniques i.e. modernization of farms which has led to improved yields.

Table 3: Poultry meat Consumption (kg/person/year)[4]

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017
Kenya	0,600	0,700	0,500						
Rwanda	0,200	0,200	0,200						
Tanzania	1,572	1,581	1,793	1,556	1,560	1,528	1,498	1,468	1,469
Uganda	1,600	1,800	1,800						
Ethiopia	0,516	0,593	0,529	0,573	0,577	0,563	0,549	0,536	0,534
Ghana	4,231	5,392	6,495	7,166	7,702	6,406	5,683	5,933	6,124
Nigeria	1,554	1,352	0,779	0,816	0,866	0,893	0,918	0,904	0,906
SSA[5] average	2,060	2,254	2,312	2,395	2,390	2,433	2,249	2,135	2,132
Global average	12,398	12,822	13,147	13,239	13,227	13,313	13,667	13,787	13,860

Source: OECD Data, FAO Data and NABC Analysis

Despite the marked improvement in poultry farming the increased number of commercial farmers and the improvements made on the availability of inputs for poultry farming there is still room for growth and improvement. A study conducted by the East Africa Farmers Federation (EAFF) in 2012 as input for an East African wide livestock strategy on how best to improve competitiveness of the livestock sector concluded that the region should strive towards improving production and productivity; marketing and market access; and processing and value addition (EAFF, 2012) table 4 below outlines the themes and sub themes outlined in their report.

Table 4: Foundation for a regional strategy for growth in the poultry sector

No.	Theme	Sub themes
1.	Improving production and productivity	1.1. Improving feed resources. 1.2. Preventing and controlling epidemic diseases. 1.3. Improve adoption of technologies and innovations for improved production. 1.4. Improve utilization of indigenous breeds.
2.	Improving and facilitating marketing and market access	2.1. Strengthening policies and regulations to improve market access. 2.2. Developing strategies to enhance access to market information. 2.3. Strengthening producers' organizational capacities to enhance their bargaining power in input and output markets. 2.4. Market analysis to inform policy and investment options. 2.5. Support development and harmonization of standards and regulations in EA region that affect market access.
3.	Improving processing and value addition.	3.1. Promoting innovative value addition technologies. 3.2. Improving efficiency and value addition in input

[4] Figures for 2012 to 2017 for Kenya, Rwanda and Uganda were unavailable.
[5] Sub-Sahara Africa

		and output market chains through policy and institutional arrangements. 3.3. Improving utilization of value addition innovations to enhance market opportunities.

Source: Adapted from EAFF, 2012 study on strategies for developing EA's livestock sector.

2.2 Kenyan Poultry sector

Kenya has an estimated poultry population of 31 million birds. Of these, 75% consist of indigenous chicken, 22% of broilers and layers and 1% of breeding stock. Other poultry species like ducks, geese, turkeys, pigeons, ostriches, guinea fowls and quails make up 2 % of the poultry production (MOLFD, 2012). While indigenous chicken are mainly found in rural areas, broilers and layers are kept in urban areas. The commercial poultry sector is producing over one million chicks per week,(Dr. Humpreys, Head Breeders Association, 2012). The features of the commercial market are a growing urban population and growing retail sector (fast food branches, supermarket branches and restaurants). The demand of commercial chicken (whole, half, parts, grilled and fried chicken) and eggs is high and growing.

Table 5: Issues facing the sector

No.	Issue	Description
1.	Poultry Associations	There are several poultry associations, but they are connected with each other and organize meetings. In Kenya there are at least four poultry associations. The overall cooperation between the associations could be improved and would improve the development in the poultry sector in East Africa.
2.	Marketing	Word by mouth stronger than other marketing channels. The marketing of poultry is changing. The pattern of meat consumption is changing from beef to chicken and pork. The price of poultry meat is a challenge for the majority of the population of East-Africa. The access of smallholders to the market is too weak. The middlemen take the advantage of bad marketing channels. This causes the low costs for chicken at the farm gate and high prices at retail.
3.	Transportation and logistics	The transport/infrastructure can be a hassle to reach the contracted farms. The roads to the farms are of a very poor quality (in all the countries of East-Africa). Also for layer farms this causes problems, which have to transport their commercial eggs. The transport of heavy feed trucks needs to be possible in rural areas.
4.	Hygiene ad biosecurity	The levels of hygiene are strictly monitored at larger farms (for example Farmers' Choice) by an independent veterinary department of the government. The education and visiting of farmers is an important aspect of daily business. This is also important for feedback, transport problems and to have an indication of the quality and quantity of animals. At the small farms there is no biosecurity, but there is a certain level at most of the larger farms (e.g. Kenchic, Kuku Chic).
5.	Feed	The farmers are complaining about **feed**. The right standards have to be taken into account, which is the task of the Kenya Bureau of Standards. A forum of the manufacturers association could be used to present the problems regarding feed standards. A standard modality has to be formed, because at the moment there are many manufacturers and many mashes and types of

No.	Issue	Description
		composition. The larger farms have feed mills and only produce for their own and the contracted farms. The quantity of maize is at the moment low which makes the prices of feed high. The price per bag is at the moment 3,000 Ksh. The efficiency of feed conversion is still low especially for backyard farmers with indigenous chicken. The large scale farms make sure to pelletize their feed and sell it to the (contracted) farms in the region.
6.	Processing	The larger farms have their own processing units, but smaller farms come together to process the birds at public abattoirs. The packaging also happens at the same units. Advanced techniques of poultry processing are available at some large scale farms, but the small scale farms need to gather and visit public processing units. For example Kiambu county is in need of a public poultry processing facility according to the local ministry of Agriculture, department Livestock.
7.	Kuroilers	The small scale farmers are in favor of kuroilers, because of the taste. The purchase of kuroilers is increasing in East-Africa. Many companies in Kenya are already focusing on kuroilers (e.g. Nature kuku, Kuku Chic). Estimated poultry population of 31 million birds (75% indigenous, 22% broilers and 1% breeding stock and 2% is other birds).
8.	Parentstock	The large scale poultry companies in Kenya keep parentstock and sell day old chicks to outgrower farms. These large scale farms have distributors/agents and shops throughout the country. The availability of raw materials, medication, vaccines and other equipment is limited. To decrease the import of chicken meat, the local producers have to increase output and supply good quality chicken to limit the import of chicken meat.

2.3 Rwandan Poultry Sector

The Rwandan has grown in leaps and bounds for the past 5 years. Confidence in Rwanda's poultry sector was confirmed by AgDevco's USD 3 million investment in Uzima Chick[6] currently owned by EthioChicken[7] an Ethiopian poultry company. The government of Rwanda privatized the national hatchery (now Uzima Chicks), in line with its policy to reduce dependency on imported DOCs and reverse the trend from November 2017 onwards. The poultry sector is well supported by the national government. DR Congo is big market for poultry products produced from Rwanda. In view of the fact that Uganda's poultry sector is more mature, it acts as a source market for inputs. Due to the commitments and investments made by the Rwandan government its dependency on Uganda is set to reduce.

Significant investments in the sector have set Rwanda apart as a future net exporter of poultry in the region. The challenge for Rwanda will be the support system it sets up to facilitate the medium scale farmers transition into large and/ or more professional/ commercial poultry farmers.

[6] http://ktpress.rw/2017/10/rwanda-to-phase-out-chicks-import/
[7] https://www.ft.com/content/54b45d84-e4e2-11e7-a685-5634466a6915

Table 6: Issues facing the sector

No.	Issue	Description
1.	DOCs	The availability and cost of DOCs is a significant barrier in view of the fact that Rwanda is dependent on imports.
2.	Feed	Currently a majority of the farmers prepare mix their own feeds. The quality of feed is also a big issue throughout the country.
3.	Indigenous chicken	Indigenous chicken are quite popular in both urban and peri-urban areas, though the meat is slightly tougher compared to broilers.
4.	Biosecurity	Due to lack of knowledge or ignorance of the importance of bio-security at farm level many small and medium scale farmers are not strict on biosecurity on farm. Existing laws and regulations are also not strictly enforced.
5.	Knowledge and training	Predominantly at producer level and for small holder and medium scale farmers, lack of knowledge and poor training negatively affects their production capabilities. There is minimal to no practical poultry specific training institutions. Tertiary education institutions do not specifically offer training in poultry but general veterinary training in livestock.

2.4 Tanzanian Poultry sector

The Ministry of Livestock and Fisheries Development described Tanzania as the 3rd largest livestock production country of Africa. The current estimated population of chicken in Tanzania is 69 million. Poultry production has plummeted in 2017 due to high feed prices owing to the introduction of Value Added Tax (VAT) on feeds by the government of Tanzania. Many poultry producers have failed to cope with this reality and have chosen to stop poultry farming. The other negative effect is that Zanzibar imports a lot of poultry products that finally land into the Tanzania mainland affecting the market. Stakeholders appealed to the Government to stop charging VAT on feeds.

In East Africa Tanzania is by significant margin the largest producer of plant protein used as input for feed manufacturing. Despite this production of for instance Soya is still below government's aspirations in that regard.

Table 7: Issues facing the sector

No.	Issue	Description
1.	Multiplicity of poultry Associations	In Tanzania there are multiple poultry sector associations. By the last count in January of 2018 there were approximately 14 different associations. The Poultry Association of Tanzania (PAT) formed in February of 2018 seeks to address the issue of multiplicity as it operates as the umbrella association for all associations.
2.	Middlemen	Middlemen play a major role in the poultry value chain in Tanzania. Middlemen (aggregators) play a role in both inputs and sale of produce i.e. DOCs, sale of birds etc.
3.	Feed	Currently a majority of the farmers prepare their feeds manually. The quality of feed is also a big issue throughout the country.
4.	Market	For many Tanzanians' poultry meat is a luxury product consumed mostly during auspicious occasions. The fact that poultry meat per kilo is more expensive than beef is a barrier to ubiquitous consumption of poultry meat. Eggs do well in both urban and rural areas whereas there are significantly larger consumption disparities between urban and rural areas for poultry meat.

No.	Issue	Description
5.	Indigenous chicken	Indigenous chicken are quite popular in both urban and peri-urban areas, though the meat is slightly tougher compared to broilers.
6.	Biosecurity	Due to lack of knowledge or ignorance of the importance of bio-security at farm level many small and medium scale farmers are not strict on biosecurity on farm. Existing laws and regulations are also not strictly enforced.
7.	Knowledge and training	Predominantly at producer level and for small holder and medium scale farmers, lack of knowledge and poor training negatively affects their production capabilities. There is minimal to no practical poultry specific training institutions. Tertiary education institutions do not specifically offer training in poultry but general veterinary training in livestock.

2.5 Ugandan Poultry Sector

Uganda's Agriculture Sector Strategic Plan (2015, ASSP) published by the Ministry of Agriculture, Animal Industry and Fisheries indicates that the agricultural sector average annual growth rate was 2.2% between 2010 and 2015. The growth in the agricultural sector was 2.9% in 2014. It was lower than the average annual GDP growth rate of 5.2% and the average annual population growth rate of 3% over the same period. The contribution of the agricultural sector to GDP declined from 25.4% in 2010 to 23% in 2014.

The average contribution for the different sub-sectors was 1.7% of GDP for cash crops, 12.7% of GDP for food crops, 4.2% of GDP for livestock, 0.03% of GDP for Agriculture Support Services, 4.0% of GDP for Forestry and 1.2% of GDP for fisheries (2015, ASSP). The poultry population in Uganda grew from 26 to 40 million birds between 2006 and 2012 according to the Ministry of agriculture, animal industry and fisheries. The egg production was 4.15 billion in 2015. The export of poultry products is mainly to Kenya, Ethiopia, DRC and Rwanda.

Table 8: Issues facing the sector

No.	Issue	Description
1.	Arable land for feed production	A major input for poultry is feed for which maize is a significant proportion of. In view of intensified poultry keeping the amount of land under cultivation is specifically for feed in Uganda is less and less and is in competition for both food and feed for other livestock.
2.	Power black outs	A consistent reliable and affordable source of energy is difficult to come by. The mains system fails regularly and the high price of diesel makes running generators expensive. This makes hatching eggs difficult for companies such as Biyinzika. Biyinzika now sells eggs instead of Day Old Chicks (DOCs).
3.	Vaccines	Most of the medicines and vaccines have to be imported making them expensive. Distribution is not extensive or optimally organised as such making access an issue as well for most farmers.
4.	Hatcheries and fertile eggs	Uganda's poultry sector is more developed than that of its immediate neighbour Rwanda. As such there is a thriving export business of DOCs, feed and hatcheries from Uganda to Rwanda. Due to attractive prices these exports distort local markets as local demand is not fully met.

No.	Issue	Description
5.	Sector association	The local poultry sector associations are not well organized and as such cannot leverage their weight in numbers. There is disparity in representation as a bulk of the membership is drawn from small holder farmers and the large scale farmers are often not involved.
6.	Infrastructure	The road network to and from farms to major markets located in urban or peri-urban areas are not fully tarmacked and not optimal. Hence access to markets or sources for inputs is made cumbersome.
7.	Feed	Lack of knowledge presents itself prominently in the manner/ mix in which farmers compose their feed. It is not optimal and is often not informed by what's best for the birds at a particular stage of growth.
8.	Knowledge and training	Predominantly at producer level and for small holder and medium scale farmers, lack of knowledge and poor training negatively affects their production capabilities. There is minimal to no practical poultry specific training institutions. Tertiary education institutions do not specifically offer training in poultry but general veterinary training in livestock.

3. Inputs

The growing market demand for poultry products in Africa is being driven by: rapid urbanization; a growing middle class; and increase in disposable incomes. This increase in demand has in turn given rise to commercial poultry production systems and the need for a dual purpose bird (kuroiler[8]) production system. Poultry farming is still predominantly traditional and inputs remain a challenge or non-existent for a majority of small holders in East Africa. As for medium and large scale farmers inputs are often imported. Access, availability and the cost of DOCs and feeds are the main challenges across the East African region, with regards to inputs for poultry keeping.

Transition from backyard production to more commercial production will in the coming few years increase rapidly in view of demand and market forces. In addition to market forces biosecurity and other public health issues are compelling governments across the region to enforce strict regulation with regards to poultry keeping. The commercial production and dual-purpose systems equally depend on the same four major inputs:

- Some form of improved housing system which allow for efficient daily management;
- Control (prevention and cure) of disease;
- Day old chicks; and
- Provision of good quality feed.

External factors such as rules and regulations, the availability of (quality) inputs and the knowledge and skills strongly influence the possibilities to produce god quality poultry products in any country. International breeding companies provide parent stock to producers of hatching eggs (for layers and broilers). Eggs are hatched and either sold to broiler producers who raise broilers usually in an average growing period of six weeks or to egg producers who raise layers to approximately 18 weeks old when they start laying eggs for a period of 12 to 14 months. Average egg production in the life time of a commercial hen is 300 to 320 eggs. Dual purpose breeds reach maturity for slaughter in 2 to 3 months (depending on intensity of providing additional feed on top of scavenging) and 150 to 200 eggs annually. In principle there are 7 different commercial breeds of chicken commonly found in EA i.e.:

- Kari Improved Kienyeji;
- Kenbro chicken;
- Kuroiler (dual purpose);
- Sasso; and
- Rainbow rooster.

This report therefore looks into the effects of the main contributors to cost price, i.e. feed and day old chicks across East Africa. Furthermore, some aspects of influences of veterinary control measures and other government policies will be

[8] Kuroilers, is a dual-purpose breed that produces both meat and eggs. It can live on a diet of kitchen and agricultural waste. It produces around 150 eggs per year (much higher than the average for indigenous breeds in Eat Africa). The meat yield per bird of Kuroilers is also greater than that of indigenous breeds, males weigh approximately 3.5 kg and females about 2.5 kg. It was first introduced in India in the 1990s and was created by Vinod Kapur of Kegg Farms Private Ltd.

described, as these also can in some cases become a strong factor affecting local market prices for poultry products. The prices of raw material for feed largely determine the cost price (and by extension the market price) for poultry products and subsequently also the competitiveness of a country to produce poultry products.

3.1 Feed

Animal feed quality is another major issue when discussing feed; it is measured in terms of energy, protein, minerals, vitamins and absence of contamination with bacteria and other hazardous elements such as mycotoxins. The right amount of ingredients needs to be included in appropriate ratio for each different type of animal, ruminant or non-ruminant and depend on body maintenance and production needs. The effectiveness of growth is calculated as the Feed Conversion Ratio (FCR): kg's of feed needed for one kg of broiler growth or one kg of eggs.

Feed costs account for approximately 80% of a farmers total production costs. Dependent on the weight, age, rate of growth, rate of egg production, weather and other factors different birds have different nutritional requirements for optimal performance. Getting the right mix of carbohydrates, proteins and vitamins is a precise science and is the difference between good and bad farmers as well as good and poor quality poultry products. In east Africa there is a significant gap between commercial poultry farmers and medium and small scale farmers when it comes to the constitution and management of feed. In general across the East African region there is a lack of knowledge amongst a majority of the farmers on the importance and influence good quality feed has on their yields and by extension incomes.

Increasingly, for the past 5 to 10 years, feed ingredients such us corn (for energy). Soybean meal (for protein) and phosphorus are becoming more expensive and less accessible for most farmers. In addition to the price impediment access to some ingredients is not possible in certain East African countries. As such finding the right ingredients to supplement or replace the inaccessible ingredients is a necessity for any poultry farmer that seeks to be profitable and competitive in the sector in East Africa at a national and regional level. The question is what the optimal price to quality feed formulation is using ingredients that are readily or easily accessible in the country or region. In view of the significant disparity between different types of farmers there are 2 unique routes to market for most feed producers in East Africa (shown in table 9 below) each with its own characteristics.

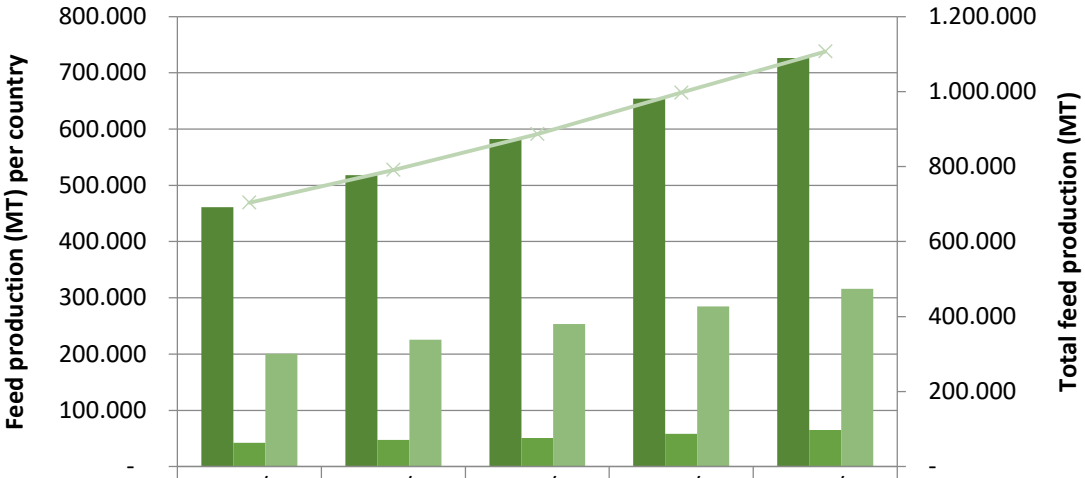
Table 9: Route to market for feed companies

Large Scale farmers	**Small and Medium Scale farmers**
• Direct to consumers (B2B) as most farmers are commercial farms. • Relatively cheaper prices per kg and larger volumes. • Of the total volume of feed produced commercial farms	• Works through networks of whole sellers and distributors often with local coverage and very rarely national coverage. • Characterised by smaller volumes i.e. 5kg to 20kg units. Often the per kg price is much higher than when bought in bulk. • Approximately 70% to 80% of feed is

Large Scale farmers	Small and Medium Scale farmers
consume approximately 20% to 30%[9]. • Supply is often arranged by the feed producer who also then caters for logistics and can supply country wide. • Quality is consistent and un-adulterated.	distributed through shops, agro-vets and other types of re-sellers located closer to the producers. • Producers have to arrange their own logistics to source the feed. • There are no guarantees to the quality of feed produced though the source might be good there are cases of feed adulteration across the region.

The livestock industry is growing due to increased demand for animal protein as the population increases. Livestock production systems will inevitably become intensive and thus increase demand for good quality feeds across East Africa. Demand for feed in East Africa is expected to increase 60% by 2022 from the 6 million tonnes in 2014, according to Kilimo Trust[10]. Steady growth has been recorded for the past 5 years (see figure 1 below) and this trend is expected to continue.

Figure 1: Feed Production volumes (MT) in EA



	2012/13	2013/14	2014/15	2015/16	2016/17
Kenya	461.236	518.243	582.295	654.264	726.233
Tanzania	42.186	47.400	50.900	58.400	64.824
Uganda	200.578	225.368	253.223	284.520	315.817
Total	704.000	791.011	886.418	997.184	1.106.874

Source: NABC analysis based on FAO, USDA and World Animal Protection data, 2017

East Africa's governments (Kenya, Rwanda, Tanzania and Uganda) have recently passed into law policy changes targeted towards incentivizing the growth of the feed sector in EA. EA's government have removed tax on the raw materials used in the production of animal feed[11]. Import of raw materials such as cereal bran, premixes, concentrates, soybean meal amongst other supplement local

[9] These are estimates tabulated from the 2014/15 and 2016/17 feed manufacturers with deference to the ratio between commercial and backyard production systems in Tanzania, Uganda and Kenya. The primary data sources were ILRI and the World Animal Protection data.
[10] Kilimo Trust is an East African organization that supports the growth of key agricultural value chains in East Africa. https://www.kilimotrust.org/
[11] http://www.blackseagrain.net/novosti/east-african-states-remove-animal-feed-tax-1

production and zero rating them makes the final product slightly cheaper. These saving are then supposed to be passed on to consumers in the form of more affordable animal protein.

3.1.1 Feed Ingredients

The biggest parts of the feed ingredients consist of contribution to energy, which in most poultry feeds mainly comes from maize. Maize is a major staple food crop grown in diverse agro-ecological zones and farming systems, and consumed by people with varying food preferences and socio-economic backgrounds in sub-Saharan Africa (SSA). The central role of maize as a staple food in SSA is comparable to that of rice or wheat in Asia, with consumption rates being the highest in eastern and southern Africa (ESA). Of the 22 countries in the world where maize forms the highest percentage of calorie intake in the national diet, 16 are in Africa.

Maize accounts for almost half of the calories and protein consumed in ESA, and one-fifth of the calories and protein consumed in West Africa. An estimated 208 million people in SSA depend on maize as a source of food security and economic wellbeing. Maize occupies more than 33 million ha of SSA's estimated 200 million ha of cultivated land. Considering the low average maize grain yields that are still pervasive in farmers' fields, meeting the projected increase demand for maize grain in Africa presents a challenge. Source: Macauley, 2015.

Maize is a staple crop in EA and as indicated above a major source for energy for animal feed. Across the continent (Africa), see table 10 below, maize is the main crop grown predominantly for human consumption.

Table 10: Major crops grown in Africa

No.	Crop	Area (ha)	Production (t)	% of total production
1.	Maize	34.075.972	70.076.591	43%
2.	Millet	19.998.008	16.008.838	10%
3.	Rice, paddy	11.206.813	28.798.202	18%
4.	Sorghum	23.142.595	23.350.064	14%
5.	Wheat	10.224.952	24704.201	15%
	Total	**98.648.340**	**162.937.896**	**100%**

Source: FAO stats, FAO Statistics Division, 04 October 2015

In EA, the agricultural area available to grow crops differs strongly between the four countries. Therefore, the potential to grow each country's own maize and not being dependent on imports from other countries differs just as much between the EA countries, see table 11 below.

Table 11: Arable land in EA under cereal cultivation

	Agricultural land (ha)	Arable land (ha)	Area under cereals (ha)
Tanzania	37.300.000	13.500.00	6.369.902
Kenya	27.450.000	5.800.000	2.669.643
Uganda	14.062.000	6.900.000	1.762.000
Rwanda	1.920.000	1.149.500	438.958

Source: World Bank, (from www.tradingeconomics.com)

These figures require some further clarification. Cereals grown include maize, rice, wheat, barley, sorghum. The acreage cultivated per crop differs from year

to year, depending on market prices, governments subsidies etc. Tanzania is by far the biggest producer of arable crops in the region (see table 12 below), and maize taking about 40 % of the area under cultivation by arable crops.

Table 12: Split of cereal crop harvest in Tanzania in 2013

No.	Cereal	Area Harvested	As % of total harvest
1.	Cassava	950.000	9,1%
2.	Maize	4.000.000	38,2%
3.	Sweet Potatoes	675.000	6,4%
4.	Sugar Cane	30.000	0,3%
5.	Rice, Paddy	900.000	8,6%
6.	Potatoes	175.000	1,7%
7.	Beans, dry	1.300.000	12,4%
8.	Sunflower seed	810.000	7,7%
9.	Sorghum	900.000	8,6%
10.	Groundnuts, with shell	740.000	7,1%
	Total	**10.480.000**	**100,0%**

Source: http://www.fao.org/countryprofiles/index/en/?iso3=TZA

The situation in the other three countries is comparable, with maize in some countries only increasing in acreage under cultivation at the cost of other crops, such as wheat in Kenya. (https://www.businessdailyafrica.com/economy/Kenya-faces-wheat-shortage-as-farmers-abandon-crop/3946234-3949506-f88b7r/index.html)

The real production potential of total acreage mentioned in the statistics to produce the required crops differs from country to country. Only 20 % of the land in Kenya is cultivated. The acreage of arable land in Kenya has grown from 4.000.000 ha in 2000 to 5.800.000 ha in 2014[12]. This growth however is only taking place on the marginal land extending from the high potential areas. The latest addition of 1 million ha to the land under cultivation has not led to any increase in volume of production, meaning that production per ha is only dropping due to increased utilization of dry and low fertile areas.

Tanzania's potential to grow maize is high. Large parts of the country receive good rainfall and population pressure is much lower than in Kenya. Though Uganda has only slightly more ha's of land available for cultivation compared to Kenya, the potential is double or triple that of Kenya due to the good rainfall and fertile soils allowing for two to three crops annually as compared to only one crop per year in Kenya.

Rwanda has the lowest area possible for cultivation and the ratio humans/ha is the highest in the region. Although also most of Rwanda is fairly fertile and receives good rainfall, dependency on imports will remain rather high.

It is important to note is that the EAC maize context is partially disconnected from global trends. This stems from maize's status as a staple food crop in East Africa, where it accounts for nearly half of the calories and protein consumed (Macauley, 2015). Kenya, in particular, knows a high maize consumption per capita. Unable to satisfy its demand with domestic supply, the country imported the second highest volume of maize in Sub-Saharan Africa behind Zimbabwe in

[12] Kenyan National Bureau of Statistics

the period from 2004 to 2013. Kenya's millers serve as lead firms in the regional chain, exerting their power by demanding traders and other suppliers deliver high-quality maize that adheres to EAC or Kenyan standards.

While maize is not as significant a component of the Ugandan diet—a cash crop instead of a food crop—the country is still a prominent regional producer and exporter of maize to Kenya and other markets.

In addition to Kenyan demand and Ugandan supply, a second significant characteristic that shapes the EAC maize market is the prominence of maize flour exports. Depending on the year, Africa generally accounts for 1.5 to 3.5% of global exports of maize; by comparison, the value of the continent's exports of maize flour represented 20% of worldwide trade in 2013. Much of the maize flour flows from more technologically advanced processing nations (e.g. South Africa, Kenya) to countries that do not have extensive milling infrastructure.

This report has laid emphasis on maize with due respect to all other raw material inputs for feed production. Granted soya, sunflower seed cake and other raw materials are also regionally available. However none of the other raw materials stirs as much controversy as maize. It's used for both food and feed and this is a major source of conflict for both policy makers and livestock farmers.

3.1.2 Quality of feeds

Quality is broadly defined in terms of the nutritional content and the lack of harmful substances and or adulteration to the feed. It is important to note that the feed industry in EA is not well regulated and the regulation especially concerning quality of feed is not actively enforced. Poor quality feed and adulteration is compounded by EA farmers' lack of knowledge with regards to the association between feed and performance.

Poor quality raw materials result in poor quality feed. Checks and balances from source of raw materials to the factory gate would contribute positively to improving the quality of feeds in general.

Despite its relatively low potential to grow its own feed, Kenya is still the highest producer of good quality commercial feeds in the region. Kenya is however dependent on maize imports from other countries in the region. Tanzania has a strict enforcement policy of maize export to Kenya[13], but large volumes of Tanzanian maize reach Kenya via Uganda (Bettagrains statistics)[14]. This is often very good quality maize that goes into the production of poultry feed.

[13] See e.g.: http://www.thecitizen.co.tz/News/30-maize-trucks-seized-in-Moshi/1840340-3990376-ihbrxu/index.html

[14] See e.g. comments in statistics overview of grain trade in week ending September 1st, 2017: There was very little trade between Kenya and Tanzania (148MT), in comparison to Tanzania – Uganda (2,539 MT), and Tanzania – Rwanda (665MT). Most of the commodities traded in the East Africa region end up in Kenya, it is therefore safe to conclude various reports of Tanzania imposing trade barriers on Kenya as probably true, based on the flow of commodities moving from Tanzania to Uganda then Kenya. This is something the region's trade policy experts need to look at.

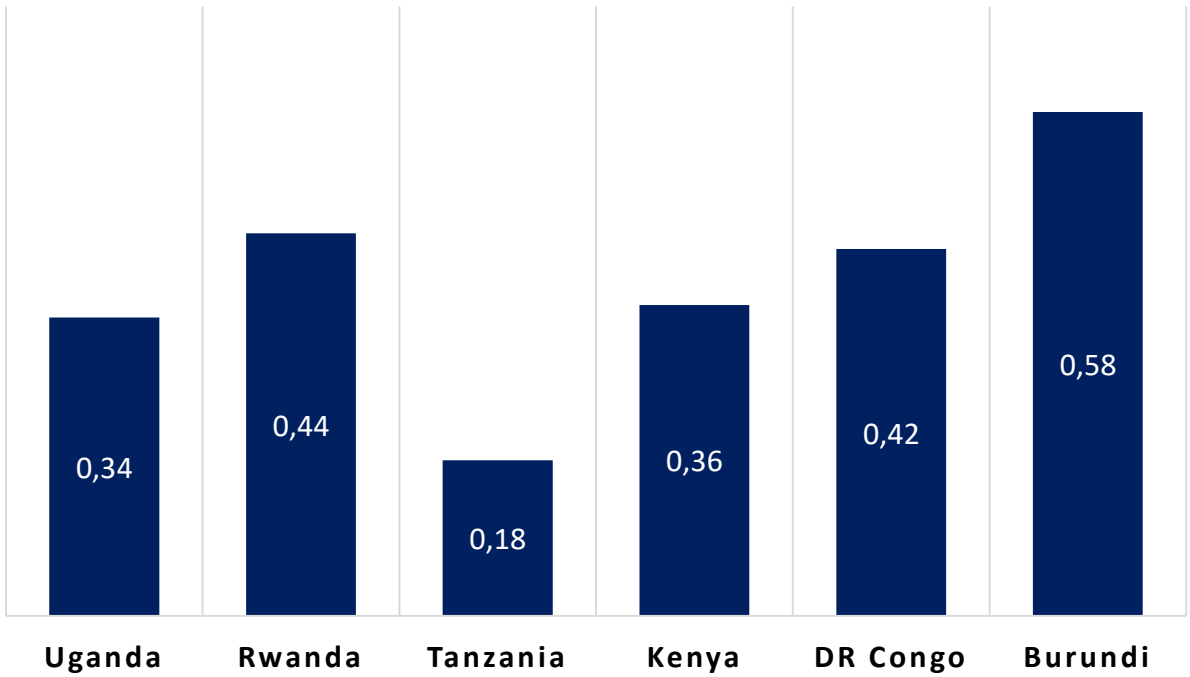
The dependency of countries like Kenya and Rwanda on imports of raw material for feed from neighboring countries has a strong influence on the cost price of the final poultry products.

3.1.3 Cost of feed

Rwanda, the country with the lowest potential to grow arable crops, has the highest cost price for poultry feed, followed by Kenya. Despite its lower potential to grow crops, cost price for feed in Kenya is only slightly higher than in Uganda. This is caused by the fact that milling industry in Kenya is better developed (more efficient, economies of scale) than in Uganda and also by a higher purchasing power of people in Kenya where average incomes are the highest in the region. For Rwanda and Uganda specifically (both land locked countries) access to good quality feeds is expensive in view of the additional logistics costs.

A wider regional view on cost price for maize shows South Sudan having the highest cost price (0,82 $/kg), followed by Burundi (0.58 $/kg) and also the Democratic Republic of Congo which has a cost price comparable to Rwanda (0.42 $/kg), although the DRC undoubtedly has the highest potential (both in terms of acreage and climate) to grow maize in the region.

Figure 2: Feed prices per country (prices of June, 2015)



Source: FAO

This FAO overview includes prices of also DRC and Burundi. Whilst DRC certainly has the potential to grow large volumes of maize, currently production is low, resulting in high prices. The situation in Burundi is comparable to Rwanda in the sense that is a small but densely populated country with limited possibilities to grow ingredients for animal feed.

Due to large fluctuations of prices due to seasonal factors, trade barriers etc. we have not been able to picture a good and consistent overview of feed prices in the region. This will be worked out in future research proposals.

3.2 Opportunities and challenges in the feed sector

Regulatory incentives; growth of intensive poultry farming; increased demand for animal protein and the growing demand for good quality feed means it is a growing sector in EA. Table 14 below shows some of the challenges and opportunities existent in the feed sector in EA.

Table 14: Opportunities and challenge sin EA's feed sector

Challenges	Opportunities
• **Arable land:** Due to the increasing production of the livestock sector in East-Africa, there is a growing deficit of animal feed in the region. In East-Africa plenty of arable land to grow grains is available, but most farmers are having trouble to find investors or to receiving loans from banks. Furthermore, because of the expanding urbanization the arable land is decreasing. • **Livestock management systems**: a growing number of farms are focusing on management systems (feed, growing broilers or layers). • **Weak market**: the local market for animal feeds is weak. The supply of uneven quality and quantities of raw materials and finished products causes variations in prices. The costs of production increase because this uncertainty. • **Regional markets are getting more interesting**: specifically Rwanda and Kenya are interesting for export, but the lack of quality and limited capacity provide constraints. • **Financial market**: there is still limited access to credit facilities for farmers. This retains the feed sector from growing faster. The larger feed manufacturers need arrangements with credit facilities to provide farmers with feed (and other inputs). • **More information and trainings** are needed in Uganda to upscale the level of livestock production. A basic training about animal nutrition and feed milling technology is needed.	• Agro-ecological conditions: due to the good climate and natural resources, there is a substantial potential for an increasing livestock sector in Uganda. • **Adulteration and transport**. The feed quality is affected along the chain: mode of transport, traders store feed in (unclean) silos, feed adulteration (conscious or unconscious) during repackaging. • **Feed processing.** The future for farmers would be in-house feed processing, but this will take some years. The farmers have to be educated/ trained well and the equipment will be a large investment. In the meantime the animal feed producers will increase the volume of production. Uganda will be interesting for investments in feed processing. • **Power black outs.** Another challenge is the power black outs and the high price of diesel for the generators. The power black outs also make it harder to hatch eggs, which mean that companies like Biyinzika have to sell the eggs instead of the one-day-chicks. • **Vaccines.** Importing vaccines and medicines is expensive. The local distributors • **Certification**. The feed quality should be monitored more carefully. In Uganda there is a lack of regulation policy regarding feed quality. Also companies and farmers do not have the right certificates for their products. A consequence is that farmers start in-house feed mixing and feed formulation. • **Feed formulation**. The technical skills to process and formulate the feed are not often available. This means the compounded feed will be of a low quality. • **Feed testing**. This is mainly available in the larger companies like Ugachick and in Rwanda PEAL.

For Dutch companies keen on engaging with feed producers in the region, finding the right partner locally is paramount to the success of any venture. Below, in Table 15, is a list of a selection of EA companies active in the feed sector.

Table 15: Feed sector players in EA

Kenya	Rwanda	Tanzania	Uganda
• Unga feeds • Pembe feeds • Isinya feeds • Nakumodern feeds • Jubillee feeds • Chania feeds • Pioneer feeds • Faida feeds • Sigma feeds • Pwani feeds • Mach feeds • Silmark feeds • Treasure feeds • Newday feeds • Peak feeds • Kays feeds • Universal feeds • Formula feeds • Trust feeds • Dola feeds • Bewa feeds • Bidco feeds • Hakika feeds • Aroma feeds • Everbest feeds • Hussein feeds • Nairobi feeds • Banga feeds • Ruiru feeds	• Agrotech Ltd. • Premier Animal feeds Industry Ltd (PAFI) • Zamura feeds • Gorilla feeds • Havuga holding Group Ltd. • MNIMAX Ltd. (ProDev group Holding)	• Falcon Feeds • Interchick • Hill feeds • Energy Animal feeds • CP • Harsho feeds • Kijenge Animal Products • Brand Animal feeds • A and H feeds • Farmers Centre • Kibo feeds • Kilitan Animal feeds • Twiga aAnimal feeds • Kerege Animal feeds • Jadide Animal feeds • A to Z Animal feeds • Amadori feeds	• Ugachic poultry • Kagode feeds • Hill top feeds • Yokuku feeds • Nuvita feeds • Bukomo feeds • Kinuma feeds • Kyaterekera feeds • Tekuwa feeds • Dembe feeds • Mutima best • Byinzika feeds • Kapiko feeds • Nsava feeds • Victoria feeds • Kisa a Mukama feeds • Kuku feeds • CBJ • Naija

3.3 Hatcheries and Day old Chicks (DOCs)

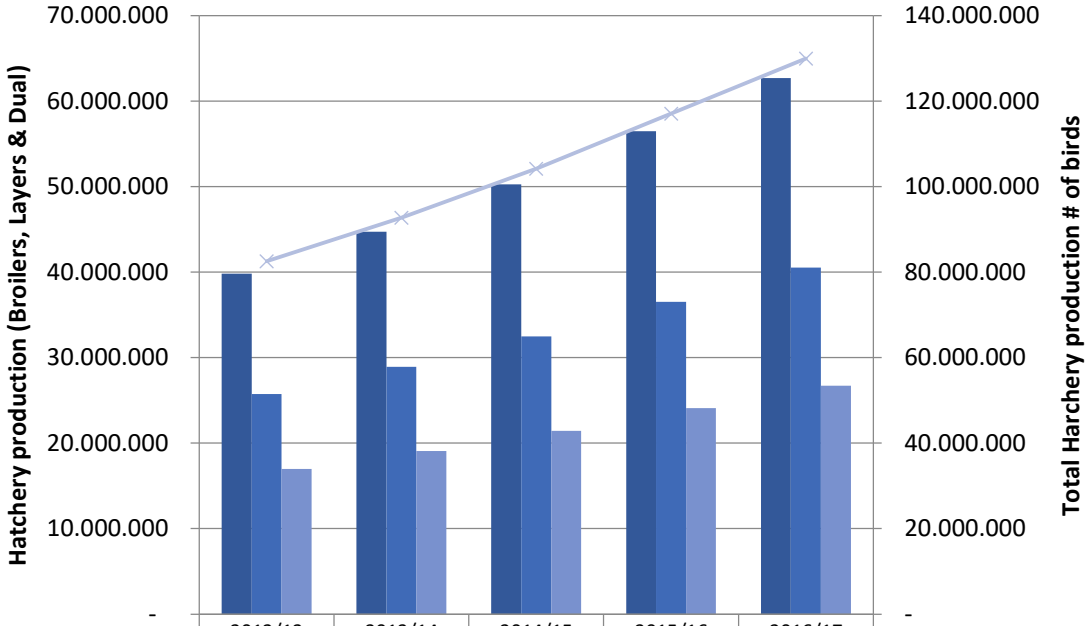
Apart from feed, the most important other input is day old chicks, both for broilers and for layers. As mentioned before, price of day old chicks to a large extent depends on the cost price of feed consumed by parent stock. Feed is approximately 50% to 60% of the cost price of DOCs. To illustrate this correlation, in July of 2011 Kenchic (Kenya's leading poultry company) reported a 50% drop in sales of DOCs compared to sales in February of 2011. They attributed this drop in sales to the price of maize that had gone up 250% to KES 4,200 in July compared to KES 1,200 in February for a 90kg bag of maize. Due to the increase in price of maize the feed became expensive which meant that the price of DOCs rose which resulted in farmers halving or completely cancelling order for DOCs[15].

Production of day old chicks locally also depends on the available hatching capacity in the country.

[15] https://www.businessdailyafrica.com/corporate/Hatcheries-feel-the-heat-as-orders-for-day-old-chicks-drop/539550-1204210-12il3hn/index.html

A number of hatcheries active in EA are mostly catering for national demand and hardly exporting any of their products as local demand is quite high. Most hatcheries in EA have a high cost of production largely due the high cost of electricity in EA. In addition to the high costs it is unreliable forcing most hatcheries to also invest in backup systems, such as diesel powered generators. Most hatcheries in EA have medium to low tech machinery and equipment and have issues achieving the efficiency in terms of production and costs to make them competitive in an open market space. Given that Kenya is the most mature poultry market in the region it also accounts for the highest number of birds hatched, see figure below.

Figure 3: Hatchery production in EA (broilers, layers and dual purpose birds)



	2012/13	2013/14	2014/15	2015/16	2016/17
Kenya	39.811.009	44.731.471	50.260.080	56.472.000	62.683.920
Tanzania	25.734.188	28.914.818	32.488.560	36.504.000	40.519.440
Uganda	16.972.834	19.070.600	21.427.640	24.076.000	26.724.360
Total	82.518.031	92.716.889	104.176.280	117.052.000	129.927.720

Source: NABC analysis based on FAO, USDA and World Animal Protection data, 2017

The figure above represents only 60% to 70% of the market capacity as production of cocks; and imports into the country have not been counted. The count above is representative of the largest players in terms of volume and value of business within each country. Information on Hatcheries in Rwanda was not available and has such has not been included in this graph. However given recent investments in Rwanda's poultry sector it's expected that more information will become readily available in due course.

Above figure reflects the average prices of day old chicks. In all four countries, day old chicks are also imported from European countries (Belgium, Netherlands are large suppliers), Rwanda imports day old chicks from Uganda which also raises prices. An exact picture of total number of day old chicks produced in a country itself versus imported day old chicks is hard to get by as statistics for egg trade to not differentiate between hatching and consumption eggs.

4. Production systems

The poultry sector in Africa was until recently dominated by two production systems: local backyard system (low input – low output) and a commercial production system (high input – high output) based on use of hybrid birds from international breeding companies and using professional housing, feeding and veterinary control systems. The ratio of backyard versus commercial differs from country to country, but the biggest volume of both poultry meat and eggs is still produced by the local backyard system in all four countries.

Due to the strongly growing demand for poultry products, the contribution of more commercially oriented production system is growing in all African countries though. This growth is expected to accelerate even stronger in the coming decades with growing population and urbanisation and rising income.

Recently, since 5 to 10 years ago, a more intermediate production system has come up in Eastern Africa (medium input – medium output) based on the use of dual purpose breeds. The introduction of this production system started with the import of birds of the Kuroiler breed from India, where this intermediate production system has become popular in several parts of the country over the past decades (Vinod Kapur, personal communication). Other breeding companies have started exporting dual purpose breeds to countries in East Africa as well.

This production system offers good opportunities for smallholders to gradually grow from an extensive backyard production system to a more market oriented approach using dual purpose animals that require less intensive management than the commercial hybrid breeds. Whilst local backyard animals only find their feed through scavenging, dual purpose animals can thrive on a combination of some scavenging supplemented by commercial feed and the commercial hybrid animals need to be fed with commercial feed only.

Poultry, irrespective of the production system, offers good opportunities for small, even virtually landless farmers, to get engaged in market oriented poultry production providing additional income. A poultry unit with commercial birds can be started with minor investments in (simple) housing systems and some feed and drinking utensils already from a small number of birds. Minimum number to make even the smallest investment viable differs from situation to situation, but a start with at least 100 birds (layers or broilers) can already be made profitable in most African countries.

Table 16: FAO definitions of poultry production systems

Sectors (FAO/ definition)	**Systems**			
	Industrial and integrated	**Commercial poultry production**		**Village or backyard**
		Bio-security		
		High	**Low**	
	Sector 1	**Sector 2**	**Sector 3**	**Sector 4**
Biosecurity	High	Mod-High	Low	Low
Market outputs	Export and urban	Urban/rural	Live urban/rural	Rural/urban

Dependence on market for inputs	High	High	High	Low
Dependence on goods roads	High	High	High	Low
Location	Near capital and major cities	Near capital and major cities	Smaller towns and rural areas	Everywhere. Dominates in remote areas
Birds kept	Indoors	Indoors	Indoors/Part-time outdoors	Out most of the day
Shed	Closed	Closed	Closed/Open	Open
Contact with other chicken	None	None	Yes	Yes
Contact with ducks	None	None	Yes	Yes
Contact with other domestic birds	None	None	Yes	Yes
Contact with wildlife	None	None	Yes	Yes
Veterinary service	Own Veterinarian	Pays for veterinary service	Pays for veterinary service	Irregular, depends on govt vet service
Source of medicine and vaccine	Market	Market	Market	Government and market
Source of technical information	Company and associates	Sellers of inputs	Sellers of inputs	Government extension service
Source of finance				
Breed of poultry	Commercial	Commercial	Commercial	Native
Food security of owner	High	Ok	Ok	From ok to bad

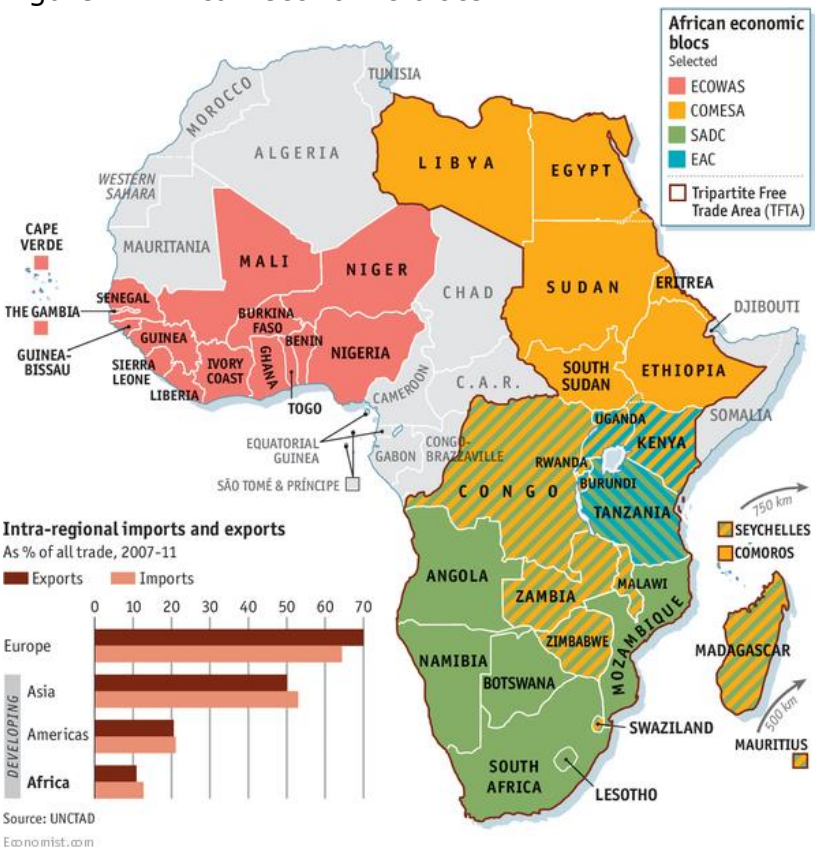
- ***Sector 1*:** Industrial integrated system with high level biosecurity and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity).
- ***Sector 2*:** Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).
- ***Sector 3*:** Commercial dual purpose poultry production system with low to minimal biosecurity and birds/products entering live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl).
- ***Sector 4*:** Village or backyard production with minimal biosecurity and birds/products consumed locally.

The sectors 1 and 2 characterise the commercial production system; sector describe the more intermediate dual purpose production system and sector 4 the local backyard system.

5. Policy and regulatory environment

"Trade provides the potential for improving consumer welfare and producer incomes, boosting economic growth and reducing poverty" (Brussels Policy Briefing n. 47). Further regional integration of trade has been high on the African political agenda for several decades already, with various trade agreements as a result. Main emphasis is on a renewed increasing role for the private sector after many years of strong government influence on economic developments. Efforts are undertaken to reduce and preferably eliminate trade barriers to encourage more trade and growth and to boost economic growth.

Figure 4: African economic blocs



Source: UNCTAD

The African continent knows a large number of regional trade agreements, 17 in total. These are mainly dealing with trade, but sometimes also related to security through more intensive military collaboration. The most relevant trade agreements in East Africa are as shown in the table 17 below.

Table 17: African trade agreements

No.	Trade Agreement acronym	Description	Signatories to the agreement	Nature
1.	COMESA	Common Market for Eastern and Southern Africa	Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Arab Republic of Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius,	Economic

No.	Trade Agreement acronym	Description	Signatories to the agreement	Nature
			Namibia, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Tanzania, Zambia & Zimbabwe	
2.	SADC	Southern Africa development Community	Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia & Zimbabwe	Economic
3.	SACU	South Africa Customs Union	Botswana, Lesotho, Namibia, South Africa & Swaziland	Economic
4.	UEMOA	West Africa Economic and Monetary Union	Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal & Togo	Economic
5.	ECOWAS	Economic Community of west Africa States	Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone & Togo	Economic
6.	UDEAC	Central Africa Customs and Economic Union	Cameroon, the Central Africa Republic, Chad, the Republic of Congo, Equatorial Guinea & Gabon	Economic
7.	ECCAS	Economic Community of Central Africa States	Angola, Burundi, Cameroon, the Central Africa Republic, Democratic Republic of Congo, the Republic of Congo, Equatorial Guinea, Gabon, Rwanda and Sao Tome & Principe	Economic
8.	EAC	East Africa Community	Kenya, Tanzania, Uganda, South Sudan, Burundi, Rwanda.	Economic & Political
9.	CEPGL	Economic Community of the Countries of the Great Lakes	Burundi, the Democratic Republic of Congo & Rwanda	Economic
10.	CEMAC	Economic and Monetary Community of Central Africa	Cameroon, the Central Africa Republic, Chad, the Republic of Congo, Equatorial Guinea, Gabon and Sao Tome & Principe;	Economic
11.	AfCFTA	Africa Continental Free Trade Agreement	Niger, Rwanda, Tchad, Angola Central Africa Republic, Comoros, The Republic of Congo, Djibouti, Ghana, Gambia, Gabon, Kenya, Mozambique, Senegal, South Africa, Sudan, Mauritania, Zimbabwe, Cote Dívoire, Seychelles, Algeria, Equatorial Guinea, Lesotho, Morocco, Swaziland, Tanzania, Tunisia, Benin, Burkina Faso, Democtratic Republic of Congo, Guinea, Liberia, Mali, Somalia, South Sudan, Uganda, Sao Tome and Principe, Togo, Malawi, Cameroon Cape Verde, Libya, Madagascar, Zambia, Egypt, Mauritius, Ethiopia, Namibia and Botswana	Economic
12.	TFTA	Tripartite Free	Kenya, Tanzania, Uganda, South	Economic

No.	Trade Agreement acronym	Description	Signatories to the agreement	Nature
		Trade Area	Sudan, Burundi, Rwanda, Comoros, Democratic Republic of Congo, Djibouti, Arab Republic of Egypt, Eritrea, Ethiopia, Madagascar, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Sudan, Swaziland, Zambia & Zimbabwe, Angola, Botswana, Lesotho, Mozambique	

5.1 The East African Community

In the views of many, the Eastern African Community is still the most successful of the regional trade blocks, despite the fact that also the implementation of this agreement has known several setbacks in the course of time. The EAC has a well-developed Common Market Protocol, which is monitored through a Common Market Scorecard (The World Bank / East African Community Secretariat, 2016). The Common Market Scorecard (CMP) tracks progress in fulfilling their commitments to liberalization under the Common Market Protocol. The Scorecard examines selected commitments made by Partner States, outlines progress in removing East African legislative and regulatory restrictions to complying with the Protocol, and recommends reform measures. In doing so, it allows Partner States to identify key areas for improvement and, along with the EAC Secretariat and development partners, chart a path to eliminate remaining barriers to a fuller regional market.

Results from the Scorecard exercise have been mixed. On the positive side, Partner States have undertaken a number of reforms in each of the areas covered by the Scorecard – Capital, Services, and Goods. Cause for concern remains however, as numerous barriers remain in all three areas. Even more worrying is the fact that new measures have been introduced that hinder regional trade and investment (World Bank, East African Community Secretariat, 2016). Four most persistent non-tariff barriers in EAC are:

- The lack of harmonization of the working hours for customs authorities;
- Lack of coordination among institutions involved in testing goods;
- Lack of harmonization of road user charges/ road tolls; and
- Numerous monetary charges required by various agencies in the EAC Partner States for exports of milk[16].

The Netherlands also supports Trade Mark East Africa[17], an organisation funded by a range of development agencies with the aim of growing prosperity in East Africa through trade. We believe that enhanced trade contributes to economic growth, a reduction in poverty and subsequently increased prosperity. TradeMark East Africa (TMEA) works closely with East African Community (EAC) institutions,

[16] With support of the EU, COMESA is working on developing a joint regulatory framework for dairy product quality and safety as well as feed and fodder quality; a market information system for dairy products and capacity development for dairy value operators and regulators.
[17] https://www.trademarkea.com/

national governments, the private sector and civil society organisations to increase trade by unlocking economic potential through:

- Increased physical access to markets;
- Enhanced trade environment; and
- Improved business competitiveness.

5.2 EAC Policy and regulatory landscape

Of all the African economic blocks the EAC is the most advanced with regards to its efforts for integration and realisation of a functional economic block. To date the EAC members have collaborated on cross border efforts to: control transboundary animal diseases; zero rate taxes on raw material for feed production; allow for the free movement of people/ knowledge across borders; align quality standards by initially defining what quality for animal inputs, and products are; and monitoring of out breaks. Though faced with implementation hiccups some of the cross border initiatives have born fruits for both the public and private sector actors active in the poultry sector.

One hindrances to increased animal production in the EAC is the occurrence of animal disease especially transboundary animal diseases (TADs). In the past, the region has recorded occurrences of Foot and Mouth Disease (FMD). Key stakeholders in disease control in the EAC region include AU-IBAR, EAFF, FAO, USAID, GIZ, ILRI, etc. These organizations in collaboration with the various public and private sector stakeholders have identified the following diseases as priority strategic and tactical transboundary animal diseases to be addressed collectively as a block (please note that not all are related to poultry):

- Highly Pathogenic Avian Influenza (AI);
- Rift Valley Fever (RVF);
- Foot and Mouth Disease (FMD);
- Contagious Bovine Pleuropneumonia (CBPP);
- Newcastle Disease;
- Trypanosomoses;
- Pestes des Petit Ruminants;
- Contagious Caprine Pleuropneumonia;
- Lumpy Skin Disease;
- Rabies;
- African Swine Fever;
- Tick-borne diseases (East Coast Fever, Babesiosis, Anaplasmosis);
- Bovine Spongiform Encephalopathy;
- Blue Tongue;
- Nairobi Sheep Disease;
- Canine Distemper; and
- Gumboro.

Some examples of concrete steps taken by the EAC member countries towards effective animal and disease control include efforts to harmonise and improve coordination of disease prevention and control. The EAC Steering and Technical Management Committee on Disease Control have developed the instruments shown in the table 18 below.

Table 18: Animal and Disease management control instruments

No.	Instrument	Description
1.	EAC Strategy on Transboundary Disease Control and Zoonosis	• An EAC Disease Control Strategy is in place. It emphasises early detection-early response to disease situations. It also emphasises the need for one world one health approach. • The Strategy also provides for coordination mechanism through the regional Steering and Technical Management Committees and expert groups.
2.	EAC Contingency Plan	• A draft EAC contingency on Avian Influenza and other TADs are in place. • The contingency plan is based on the WHO scenarios of a pandemic situation. • The contingency is supposed to guide regional response to a transboundary disease outbreak.
3.	EAC Communication Strategy on Avian Influenza and other TADs	• The Communication Strategy calls for dissemination of appropriate targeted information at the right time to the right people.
4.	EAC Regional Plans against Transboundary Animal Diseases	• Plan of Action for an Integrated Regional Emergency Preparedness and Response to RVF, AI and other Transboundary Human and Animal Diseases in East Africa - focusing on AI, RVF and other TADs.

6. Training, education and knowledge gaps

Capacity development is a core concept in development cooperation. It can be viewed as a broadening of a development focus from catering to direct needs and provision of technical assistance, to the inclusion of addressing more structural causes of poverty and establishing sustainable development prerequisites (Wigboldus et al., 2014).

Capacity development encompasses all aspects that are needed to develop a poultry value chain. This requires strengthening skills and management of individual farmers, but also from the suppliers they depend upon and the institutions that make them function, such as (poultry) farmers associations, feed millers associations etc. At government level, good insight in the needs of developing a poultry value chain is equally necessary (policy development to create an enabling environment, responding to training needs of farmers and suppliers, ensuring a food safe poultry value chain).

All these elements need to be addressed in a coordinated holistic manner to allow a value chain to grow in a well organised manner. In most of the four countries concerned, several scattered poultry project have been implemented throughout the years, with varying results. Main support from the Netherlands governments has come through support to educational institutes, partially through Nuffic NICHE support to curriculum strengthening

6.1 Current Status of poultry training and education.

In order to establish a thriving poultry sector (or any other sector), a sound knowledge base of education and training is necessary at four different levels:

- Practical, hands on training, also called informal training.
- Vocational training (Certificate / Diploma level)
- Higher Agricultural Education (BSc)
- University Education (MSc, PhD).

The practical hands-on training can be carried out in different ways: in courses of different course lengths; on-farm or on a training station; by separate institutions or as part of the work of vocational training institutes or colleges; and for different target groups: farmers, farm workers, extension officers, students, and teachers.

Duration of courses can be anything from one day up to several weeks, usually depending on the level of previous education of the trainees, the type of technology introduced, and the possibilities of farmers or advisors to be involved in longer term training courses.

Vocational training leads to certificate or diploma levels, usually in training programmes of 2 or 3 years. It provides students with a broad base for a mid-level career in the poultry industry.

College level training usually prepares students for a future life in advisory or extension services, either with government, in the private sector or with NGOs.

Graduate education at the university (2nd degree, PhD) leads to specialist functions at research organisations, government services, private sector, or NGOs.

Levels of training provided on most educational institutes is poor, with often focus only on theoretical aspects of poultry production as a minor component of livestock curricula which concentrate on small and large ruminants.

6.2 Existing Gaps

Most existing gaps can be summarized as follows:

- Lack of trained and skilled workforce;
- Inconsistent supply of feed ingredients, both in terms of quantity and quality with heavily fluctuating prices;
- Supply of other inputs such as day old chicks and equipment depends on import mainly from Europe;
- Slaughtering and processing poorly organised with in most countries a large preference for wet market; and
- Marketing of both eggs and poultry meat is poorly developed with too many transactions which also lead to ineffective market systems with negative effects on human health due to poor storage facilities.

Dutch training support throughout the past decades has mainly focussed on practical skill training, usually provided by PTC+, now known as Aeres Training Centre International https://www.aerestrainingcentre.com/

Several Nuffic/NICHE projects have been carried out in the four countries but none of them addressed poultry training and education as a specialised subject.

6.3 Poultry research in the region

Many of the technical underperformance of poultry production both on farms as well as in the supply chain can be addressed through research activities in the countries concerned.
Main poultry research organisations are:

- Kenya: KALRO, Kenya Agriculture and Livestock Research Organisation; http://www.kalro.org/Non-Ruminant_Research_Institute
- Uganda: NARO, National Agriculture Research Organisation; http://www.naro.go.ug/data/smenu/29/Livestock.html
- Tanzania: Tanzania Livestock Research Institute Centre in Naliendele focusses on poultry production; http://www.taliri.go.tz/
- The research in Rwanda is still in a process of re-organisation, but mainly implemented by the College of Agriculture, Animal Sciences and Veterinary Medicine in Butare, which belongs to the University of Rwanda.

In all countries, various poultry research activities are also implemented by Universities. Livestock research, and most certainly poultry research is actually only a minor part of the total research activities and budgets in the four countries. The IFPRI analysis (IFPRI 2017 1, 2, 3, 4) of agricultural research reveals the following insights:

Table 19: Percentage of research funds spent on specialised poultry research

	Kenya	Uganda	Rwanda	Tanzania
Agriculture research spending as part of agriculture Agricultural GDP	0.79	0.97	0.67	0.29
Percentage of researchers (FTE) in livestock research	18	19	12	9
Percentage or researchers (FTE) in poultry research	0.3	1	2	0.9

7. Market

Poultry consumption in EA is considerably lower than the African and global average, see table below. This is partly attributed to the cost of poultry products which are comparatively more expensive. Within the region there are marked differences with Kenya registering the highest consumption figures and is also the most advanced poultry sector in the region. It is important to note that poultry meat consumption is often associated with special events or occasions i.e. a special treat which means for most it's a luxurious product.

Table 20: Consumption of poultry products per country

	Kenya		**Uganda**		**Tanzania**		**Rwanda**		**Avg. Africa**	
	2000	2011	2000	2011	2000	2011	2000	2011	2000	2011
Eggs per capita (kg)[18]	1.6	1.9	0.6	1.0	0.9	0.6	0.2	0.3	2.1	2.5
Poultry meat per capita (kg)	0.5	0.5	1.8	1.8	1.3	1.2	0.2	0.2	4.3	6.2

Source: NABC analysis based on FAO, USDA and World Animal Protection data, 2017

The past 5 years has seen an increased number of international quick service restaurants such as KFC, Domino's Pizza, Steers and Sub Way set up shop in various East African Countries. Local sourcing is still a challenge for most of these franchises largely due to strict quality standards that must much their global quality requirements.

This has created some form of specialisation amongst producers with some commercial producers changing their production systems in order to meet the demands set by these quick service restaurants. There are a number of factors driving the growth in consumption of poultry products including the rise in number of quick service restaurants i.e.:

- East Africa's growing middle class;
- Increased urbanisation that's led to the culture of eating out for most East Africans leaving in urban areas;
- Better supply of inputs such as feed and DOCs;
- Entry of quick service restaurants in East Africa; and
- Access to regional markets.

7.1 Poultry Value chain

"Increases in the demand for animal-sourced foods are estimated extraordinarily high in Africa over the coming decades" (Livestock Data Innovation in Africa Project, 2013). The reality of sub-Saharan Africa (SSA) is that meat consumption, particularly chicken consumption, is growing so fast that capacity is not meeting demand. Since 2000, chicken consumption has skyrocketed across the continent by more than 55 percent (more than 32 million tons) to around 92 million tons in 2012. This growth is being driven by a rapidly modernizing value chain. The figure below shows the characteristics of the value chain in each EA country.

[18] Average weight of one egg is 60 grams.

Figure 5: Characteristics of East Africa's poultry sector value chain

Value Chain	Kenya	Rwanda	Tanzania	Uganda
Grains and Oils Seeds	Dependency on imports; Conflict in grain use for feed or food; & limited capacity to grow own supply.	Has sufficient supply of grains; & low supply of oil seeds with room to grow.	Highest potential for grain and oil seed supply; & a lot of room to increase supply; & comparatively cheaper cost price in EA.	Has most arable land in EA; Conflict in use of grain for feed or food;
Feed	Expensive feed; most developed feed market; multiple millers' active; & feed millers cater for various livestock.	Young feed market; Not so many active players; & growing rapidly.	Active feed market; Multiple players active; input costs comparatively cheaper; & growing rapidly.	Growing feed market; & Multiple players active in the sector.
Breeding/ Hatchery	Most mature breeding and hatchery market in EA; High hatching costs due relatively expensive and unreliable electricity; & breeding is plagues with system inefficiencies.	Dependent on Uganda imports; & is currently investing heavily into its own breeding and hatching sector.	A growing hatchery and breeding sector; & Also faced with high hatching costs due in part to high energy costs.	Thriving hatchery and breeding sector; serves the Rwandan market as well; Still has room for growth.
Farming	Has highest number of commercial farmers; production in deep litter, battery cages, semi free range and free range; large number of medium and small scale farmers practicing backyard poultry keeping.	Has a very small number of commercial farmers; a bulk of the farmers are small and medium scale farmers that have deep litter housing or practice semi free range farming.	Has a high number of large scale commercial farms; & production in deep litter, battery cages, semi free range and free range.	Has a relatively small number of commercial farmers; & production in deep litter, battery cages, semi free range and free range.
Traders	Traders act as aggregators mostly for small and medium scale farmers; traders have a high bur gaining power; & Often source directly from the farm and arrange logistics to market.	Traders play a big role in providing access to market for most small and medium scale farmers; & there is a large informal market where traders sell directly to consumers.	Traders act mainly as aggregators; Traders provide access to markets and also organize the logistics to bring the products to market; and have a high bargaining power.	Active informal sector where traders act as aggregators as well both whole sellers and retailers.
Wet markets/ Processing	c.a. 70% of meat produced is sold in wet markets; there is a lot of variety in for frozen products; inefficiency in slaughter houses; & machinery is often medium to low tech.	Over 80% of met produced sol through wet markets; growing processing business; largely medium to low tech slaughtering machinery.	c.a. 80% of poultry meat produced sold through wet markets; processing is mostly with medium to low tech machinery; & it is modernizing and growing rapidly.	c.a. 80% of meat produced is sold through wet markets; & processing is with medium to low tech machinery.
Customer	60% informal trade 40% formal trade; most customers buy from informal traders; & thriving B2B sector with local and international quick service restaurants.	90% informal trade 10% formal trade; most customers buy from informal traders; active restaurant business (B2B).	80% informal trade 20% formal trade; customers serviced through informal trade; Thriving B2B business in view of all restaurants etc.	80% informal trade 20% formal trade; & customers serviced through informal trade.

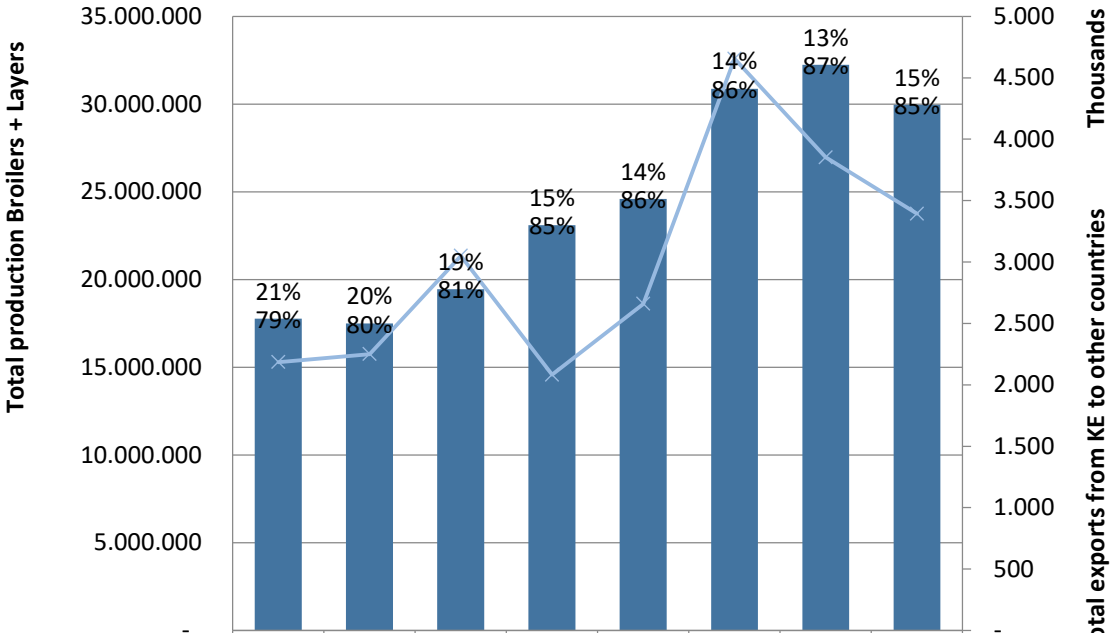
Across EA various section of the value are developing rapidly with the most growth being realized at the beginning and end of the value chain i.e. inputs such as feed, DOCs and in processing and better access to markets. A recurring theme across EA is challenges with regards to access to finance, or most players across the poultry vale chain in EA. For larger integrations and commercial farms with significant capital assets the issue of financing is often resolved by attaching their assets. This is not the case for a majority of the small and medium scale farmers.

All in all poultry sector is rapidly urbanising and in view of the size of the market and volume of business a number of banks and financial institutions are beginning to pay attention to the sector and are developing specific products targeting farmers and other value chain actors.

7.2 Regional trade in poultry inputs and end-products

According to USDA (United States Department of Agriculture) import of poultry products into Sub Saharan Africa has tripled between 2004 and 2014[19]. It is virtually impossible to establish how intra-continental trade in poultry product has grown in the same period, information is simply too scattered and unreliable. However the figure below shows a snapshot of EA regional trade with data being sourced from the largest players in Kenya and Tanzania.

Figure 6: Exports of DOCs from Kenya to the EA region



	2010	2011	2012	2013	2014	2015	2016	2017
% exports of total sales	12%	13%	16%	9%	11%	15%	12%	11%
% Layers	21%	20%	19%	15%	14%	14%	13%	15%
% Broilers	79%	80%	81%	85%	86%	86%	87%	85%
Total	17.768.022	17.493.563	19.445.043	23.103.753	24.601.838	30.877.733	32.235.764	29.963.679
Total Exports	2.185.556	2.250.276	3.050.730	2.082.727	2.659.419	4.655.027	3.851.244	3.393.194

Source: NABC analysis based on FAO, USDA and World Animal Protection data, 2017

[19] http://www.bbc.com/news/world-africa-37617379

The figures above are indicative of the trade between Kenya and its neighbours. Ugandan exports to Kenya accounts in total for c.a. 92% of total exports. The other countries include DRC, Ethiopia and Tanzania. These figures account for only the largest producer in Kenya and does not include export figures from cross border posts such as that of Busia, in Kenya, where a number of the medium scale farmers also actively export to Uganda.

Rwanda reportedly imports 150.000 hatching eggs monthly from Uganda, Belgium and the Netherlands[20]. Rwanda is heavily dependent on imports of feed ingredients as well, mainly from Tanzania. However, the Rwanda Agriculture Development Board (RADB) expects poultry meat production to grow from the current 30.000 tons annually to 100.000 tons in the next five years[21].

EA as a region is making conscious steps to incentivize development and growth of the sector with the long term objective of becoming competitive in price both the cost price and price at market. This is being done by incentivizing inter-regional trade and trade in raw materials whilst dis-incentivizing import and trade in finished products from outside the region. This comes with some challenges as for example Tanzania started importing from Russia in 2016[22] (Russia's largest poultry integration was expected to export 500 tons of halal poultry meat to Tanzania in 2016). This is due largely to the fact that the EA region cannot meet the growing demand for poultry products. Tyson Foods from the USA is expected to start their fourth biggest investment in Africa in Tanzania in the near future in a joint venture with Irvines Tanzania Limited. The joint venture will start with a production of 250.000 day old chicks but has the ambition to expand its volume rapidly in the near future.

Inter-regional trade also has its challenges a case in point; Tanzania froze imports from Kenya in February 2018 due to disease outbreak in Kenya. Not all trade is registered which is lost income for governments in the region that are trying to regulate the trade better. Regulation and enforcement is not only being driven by the expected income tax gains but also as a means for better management of diseases across the EA region[23].

Cross-border trade is important for Rwanda for a number of socioeconomic reasons. First and foremost, neighbouring countries are important trading partners accounting for 20% of Rwanda's total trade. Official trade data from both the formal and informal sectors indicate that informal exports to neighbouring countries in 2011 were 51% higher than formal exports (see table). Over the same period informal imports were significantly lower than formal imports. The following table summarizes the importance of informal trade for Rwanda (in billion Rw Sh).

[20] http://www.theeastafrican.co.ke/rwanda/Business/Uganda-poultry-imports-ban-hurting-Rwanda/1433224-3854608-13swatt/index.html
[21] http://www.newtimes.co.rw/section/read/226469/
[22] http://cherkizovo.com/en/press/company-news/6800/
http://www.thepoultrysite.com/poultrynews/37609/african-poultry-wrap-tanzania-opens-up-for-russian-imports/
[23] http://www.theeastafrican.co.ke/news/Kenya-protests-against-Tanzania-hostilities/2558-4176114-ptduxr/index.html

The existence of a border can lead to significant price differences in markets that are often within walking distance of each other and where goods would otherwise not be expected to differ greatly in price. Trading across borders increase prices and higher prices reduce demand, which in turn, reduces exports. Prices for goods in Rwanda's largest cross-border market, the DRC, are on average 24% more expensive for goods traded informally while formally the difference can be even greater (Republic of Rwanda, Ministry of Trade and Industry, 2012).

Whilst it is difficult to establish in exact detail the volume and value of trade within the EA region, it is important to understand the significance of it. The interdependencies between the EA countries from inputs all the way to processed or finished goods clearly underscore the role of inter-regional trade to the development and growth of the poultry sector in EA. All EA countries have purposed to become self-sufficient with regards to poultry products. This objective can only be met by working together to benefit from each country's comparative advantage be it in production of raw materials or processing capacity.

7.3 Position of smallholders

Average farm size of poultry producers varies from country to country, but in all four countries, the vast majority of farms belong to the category small farmers. FAO uses the classification system shown in the table below.

Table 21: Classification system

Sector	Description
1.	Industrial integrated system with high level of biosecurity and birds/products marketed commercially (e.g. farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity).
2.	Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e.g. farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).
3.	Commercial poultry production system with low to minimal biosecurity and birds/products entering live bird markets (e.g. a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl).
4.	Village or backyard production with minimal biosecurity and birds/products consumed locally.

Source: FAO 2007, Kenya poultry review.

In all four countries, the commercial sector is led by a few large integrations such as Kenchic in Kenya and Ugachick in Uganda (sector 1 companies). They supply day old chicks and sometimes feed and other inputs to poultry producers, broiler and layer keeper, large and small.

The vast majority of chickens kept in all four countries still belong to sector four, the backyard production. These are kept for self-sufficiency, sometimes barter trade and appear in all parts of all four countries, both rural and urban. From nutritional point of view, this system is rather important; although it is unclear how many birds are eaten on an annual basis and how many eggs consumed.

The system is rather vulnerable to infectious diseases such as New Castle Disease, which often decimates chickens in large areas and numbers at one time.

Most of the chicken kept in all four countries in East Africa will fall under category 3 and to a lesser extent 2: poultry farms keeping commercial broilers or layers in small, medium or large numbers.

The average farm size is not established in any of the four countries for these types of production systems. These figures are sometimes collected, but highly unreliable due to the quality of data collection, but also due to the fact that smallholders can easily change their farm set up. Units built for broilers can also be used for rearing layers. Or even for other aspects such as grain storage. Farmers sometimes abandon poultry keeping due to the poor en irregular availability of day old chicks. All these aspects make it difficult to establish what percentage of poultry products in the four countries are produced by e.g. farmers with < 100 birds, 100-500 birds and >500 birds. As fixed costs in housing and utensils are a relatively low part of the cost price, smallholdings can easily be made profitable under most circumstances. Results of course also depend on management levels, biosecurity measures taken etc.

7.4 Opportunities in poultry

The strongly growing demand for poultry products offers opportunities for producers and input suppliers the like. There will be a growing demand for day old chicks, therefore a growing need for more parent stock and hatcheries. The feed industry will be growing strongly, raising the need to look at alternative feed ingredients as well as the major crops being used for poultry feed (maize and soya) are also growing in demand for human consumption. In East Africa there is high demand for maize as staple food, especially in Kenya and Tanzania.

Additional feed production will not only mean more factories and feed for sale, but also investments in agricultural production: seeds, mechanisation for medium and large scale farms.

To further develop the poultry sector in the countries concerned, there is need to invest more both in public as well as the private sector. In the **public sector**, there is a need for more investments in a strong veterinary sector to improve the capacity for diagnosing and treating diseases and to monitor and prevent disease outbreaks at national or regional level (disease spread does not stop at borders). Food safety issues need to be guaranteed better through a stricter enforcement of existing rules and regulations.

There is need for more public investments in training, demonstration and education. It would require further assessment to determine the theoretical and practical skills of local training institutes on poultry production to be able to assess their supportive role or the support they need to build up their capacity. A follow up study into the effectiveness of present poultry training and education in the country would be of great importance. This can determine which institutes to work with for further training in future, e.g. in at ToT (Training of Trainers) approach or which steps to take to support government extension service.

An interesting option would be to investigate the current activities of advisors or extension staff of private companies, who are in touch with the poultry producers. As producers often indicate that their main advisory contacts stem from private companies' source, it may useful to investigate the mode of operation of the advisory services and the level of knowledge of the advisors, which can possibly be improved through collective training, specific masterclasses etc.

To grow production will require more educated and skilled personnel at all levels i.e.: farm workers and managers capable of efficiently managing production farms; nutritionist formulating ratios for feed companies; and breeding and hatchery specialists producing the required day old chicks of the right quality[24].

Training activities need to be given at different levels: hands-on day to day practical management, which can be provided by organisations such as PTC+ from Barneveld (www.ptcplus.com). These can be organised as short term trainings for interested managers and poultry farm staff. Furthermore, capacity needs to be built for specialised poultry teaching staff at TVETs and Universities, for which PTC+ can play a role, complemented by input from Universities of Applied Science. Wageningen University and Research can play a role in training specialist executives on poultry feeding, breeding, feed and food safety etc. Such combined approaches have been followed in other countries as well and could receive support through the Nuffic Orange Knowledge Programme (OKP).

Private sector investments needed are wide and varied. Slaughtering and processing facilities will be needed in future, especially to feed the growing urban population. Wet markets and unregulated slaughtering are still the norm in many parts of EA now, but pressure to professionalise the processing industry for improved food safety will certainly push up the demand for professional slaughtering and processing equipment.

As the study has shown, there still is a dependency on import of parent stock and day old chicks: in some cases obtainable from other countries in the region; otherwise they have to be imported from European countries. Investments in more parent stock farms and hatcheries are highly needed.

There will be growing need also for private veterinary services on top of the regulatory public services, which does not only include vaccines and medicines, but also diagnostic laboratory services and training of veterinarians in diagnostics and epidemiology.

Investing in Eastern African countries is "*challenging, but the rewards can be big*" (Mulder, 2017). The author lists land ownership, lack of farm inputs, farm skills, power cuts, cold storage, water availability, corruption, foreign exchange volatility and infrastructure as the biggest challenges for investors in the poultry industry in Africa.

[24] Different climates may require e.g. broilers that area adapted to either a hot humid climate at the coast or a relatively cool climate in the highlands in the region.

8. Regional Approach to poultry development

The Netherlands has concentrated its development cooperation on fifteen countries. These fifteen countries are divided in countries receiving development aid (aid relationships: Afghanistan, Burundi, Mali, Yemen, Rwanda, Zuid-Sudan and the Palestine Territories) and countries in transition from receiving development aid to a relationship more based on trade and investments (transational relationships: Bangladesh, Benin, Ethiopia, Ghana, Indonesia, Kenia, Mozambique and Uganda).

For each of these countries, the policies on which the relationship is based are laid down in Multi Annual Strategic Plans (MASP). The country MASPs describe the concretisation per country of the directions laid down in the policy paper, A World to Gain (Een Wereld te Winnen). Focus of A World to Gain is on three ambitions: poverty eradication in one generation ("*getting to zero*"); sustainable and inclusive growth and success for Dutch private sector abroad.

On top of the individual country MASPs, there are two regional MASPs: for the Great Lake region (Democratic Republic of Congo, Uganda, Rwanda and Burundi) and the Horn of Africa (Sudan, South Sudan, Eritrea, Ethiopia, Djibouti and Somalia). The aim of the regional MASPs is to work where possible from a regional perspective, as a focus on individual countries is not always sufficient. Problems in one country can have effects on developments in other countries, e.g. regarding refugees. Also fragile states can have a destabilising effect on neighbouring countries. It is also recognised that there are positive cross border activities with positive consequences, such as regional trade. Trade can contribute to social and individual development in individual countries and to improvement of the stability in a region[25].

Main focus of these regional MASPs lies on security and legal systems; sexual reproductive health and women's rights; support to economic development and regional trade including interventions improving food security; cross border collaboration on water (lake issues) where possible in combination with development of market oriented agriculture.

8.1 MASPs for the region East Africa.

For the four countries of this study, three are included in either and aid relationship (Rwanda), or a transitional relationship (Kenya and Uganda). There is no specific relationship with Tanzania. On top of these individual country MASPs, also the Great Lakes MASP is applicable.

For Rwanda, it was foreseen *that most of the programs will be executed on a bilateral basis but certain aspects, as described in the Regional MASP, are considered for more regional cooperation/projects. The ongoing bilateral programs will further improve the security and justice sector, as well as support important elements of an inclusive democratic society, such as media, civil society and human rights. Additionally, Rwanda country-specific tensions will*

[25]Ministerie van Buitenlandse Zaken, 2014: Aanbiedingsbrief Meerjarige Strategische Plannen 2014 - 2017

continue to be addressed bilaterally. The regional program itself will thereby focus on a) specific cross-border issues and on b) opportunities to strengthen the bilateral interventions[26]

A regional perspective therefore is included in the Rwanda MASP, but with main focus on bilateral programmes.

The interventions described in the Great Lakes regional MASP *will focus on enhancing peace and stability by investing in poverty reduction, access to rights and justice and sustainable management of natural resources.*

Both policy documents clarify that the regional approach is mainly on security related issues. This is confirmed by discussions with representatives of the Netherlands Embassy in Rwanda who explain that indeed the focus of the regional programme is on support to improving security and regional stability (discussions held during visit in October 2017).

The Uganda MASP is also related to the Great Lakes region, but is clear on the interlinkages with the region: *Uganda being part of the Great Lakes Region, the main intervention rationale for the Dutch embassy in Uganda is derived from the underlying goal of the regional policy of the Netherlands for the Great Lakes region: to contribute to the improvement of stability in the Great Lakes Region. The Dutch interventions through different programs aim to directly and indirectly address the underlying drivers of conflict and instability in the Region.*

Moreover, the Uganda MASP food security *outline is in coherence with the regional Great Lakes MASP on food security* (page 17).

Food security is an important issue in the Great Lakes regional MASP: "*To this new regional MASP a budget of EUR 79 mln was allocated, with the largest amount of the funding going to Food Security. The other half is almost equally distributed between Security and Rule of Law and Integrated Water Management Great Lakes regional MASP: The food security program will focus on sustainable and climate smart agriculture, land governance, cross-border trade and economic cooperation*."(page 5).

The Kenya MASP focusses on the transition from aid to trade: 2020 will be the last year of the aid relationship. In the 2014-2017 MASP, focus is on security and rule of law; agriculture and food security; water and environment and transitional support for other sectors (infrastructure and logistics, energy).

The agriculture and food security paragraph of the Kenya MASP hints towards a number of regional aspects:

- Increased agricultural productivity and better access to local and international markets (page 11);
- In dairy the KMDP will be linked to regional dairy initiatives building on SNV Kenya's strength as a public private partnership facilitator (page 11), and:
- At the same time, the regional role that the embassy already plays, with several attachés accredited for the region, will become more prominent (page 2).

[26] MASP Rwanda, 2014-2017

The MASP does not make clear how the regional role of the Embassy will be further implemented; project experiences will be shared in the region (KMDP for dairy) and better access to local markets will be supported. There is no recognition of the dependency on other countries of the Kenyan options to improve production and better access to local markets.

8.2 Further regionalisation in Africa

The Netherlands Ministry of Foreign Affairs is currently exploring ways to support African integration. The active involvement of the Dutch business and academic community with these developments will therefore by hugely important. (Dietz, 2018).

A scoping study has been carried out in 2016 aiming *to contribute a more contextualized comprehensive picture of the Dutch government's ongoing cooper-ation with West Africa and the perspective in terms of policy options for strengthening its effectiveness and coherence by giving more emphasis to the promotion of intraregional trade and investment* (Lange et al, 2016). The study lists a large number of recommendations, but advises to focus on geographical scope; sectoral focus; thematic approach; and a clear local counterpart. The chosen focus should connect the regional player (ECOWAS), but recognise that the Netherlands is a small donor who should choose for added value. A gap between regional agreements, national legislation and actual implementation and enforcement on the ground is also recognised as a major concern. Political economy analysis could help to provide insight into the divergence between paper and practice. The importance of informal trade is acknowledged, which needs more studying to develop into a relevant policy objective and stimulus for trade.

9. Conclusions, recommendations

The main aim of this study was *to make an initial assessment of consequences of regional interdependency on the position of SME's and smallholders in the poultry value chain.* From existing information on regional trade augmented with additional information from discussions with stakeholders in the field, it has become clear that there is indeed a clear interdependency between countries. This interdependency is most evident in the two major cost components (feed, day old chicks), as well as on markets for eggs and poultry meat.

On the other hand, there is very little information to confirm that the vast majority of poultry producers and input suppliers (especially feed, equipment) are small-scale entrepreneurs, who however due to their large numbers still produce the largest volume of poultry products and their required inputs. Official statistics either hardly exist or are difficult to rely on.

Major inputs affecting cost price of poultry products are maize as the major source of energy in poultry feed and day old chicks, which' cost price is also largely determined by the feed parent stock consume. This in turn affects the competiveness of poultry production per country. Maize is a major input to animal feed and countries such as Kenya and Rwanda highly depend on the surplus production of their neighbours Tanzania and Uganda, and in some cases on imports from countries even further away, such as Zambia. Larger distances to maize sources add to transport and other transaction costs, the latter often aggravated by still unsupportive and often incoherent regional trade policies. The situation is comparable with the availability of day old chicks, which is also strongly affected by feed prices and differences in the availability of hatcheries. Markets for end-products differ per country, with e.g. Ugandan poultry products often exported to Kenya and Rwanda.

The demand for animal proteins in general, including proteins from poultry sources, is growing in the region, whilst on the other hand the opportunities to become independent or self-sufficient for these products differ strongly between countries, leading to different cost prices per country. Affordability of poultry products therefore differs strongly per country. The picture is made more complicated because affordability does not depend on selling price of poultry products only: the efficiency of the whole value chain matters for cost prices. Affordability is also strongly influenced by income levels in each country.

Food security depends on the above-mentioned factors and food security policies need to take regional interdependence more into consideration than they have done so far at country level as well as at donor level. At country level, self-sufficiency and independence for food security are often determining factors for support policies to producers and processors in a particular value chain. Donors however often only respond to national policies and decide to support these or not. Donor policy plans such as the Multi Annual Strategic Plans only focus on individual countries and are not based on analyses or dependencies on other countries, with all consequences involved for effectiveness and competiveness of production in a particular country. Simply put: poultry production in Kenya could

possibly be made cheaper by support to stimulate more efficient maize production in Tanzania.

For a more efficient food security system, food security or sectoral policies need to be based more on regional economic reality or interdependence than has been the case to date. This study confirms this situation for the poultry sector in East African countries.

The analysis however is only based on a snapshot, which does not take fluctuations such as seasonal differences in prices for inputs and demand for poultry. Therefore, to get a longer, more comprehensive and reliable overview, which incorporates e.g. periodic fluctuations; it would be advisable **to monitor price developments over a longer period to even out seasonal variations**. Such longitudinal and more detailed analysis will proved a more consistent and reliable picture of the competiveness of poultry production per country.

A system to monitor prices on a fortnightly bases has been tested in the period July - September 2017. In this system, prices can be monitored on a regular basis; it can be validated with market leaders in the feed industry but is also subject to rules and regulations and sometimes to additional taxation. The two months summary for Uganda looks as follows (exchange rate Euro-Ugandan Shilling was 4164 in August 2017).

Figure 7: Prices of broiler feed and broiler day old chicks in Uganda (July-August 2017).

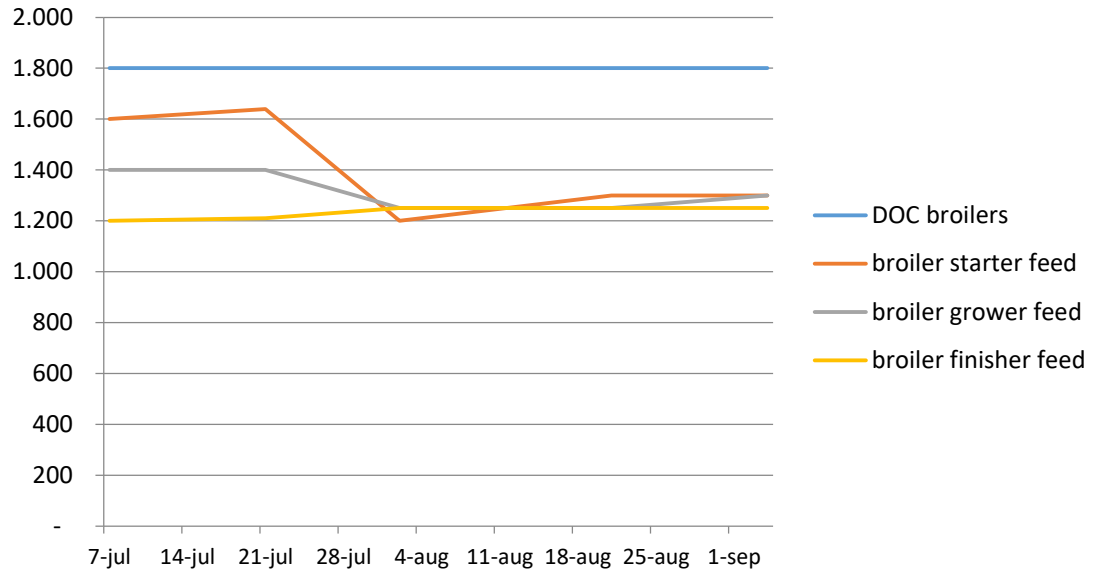
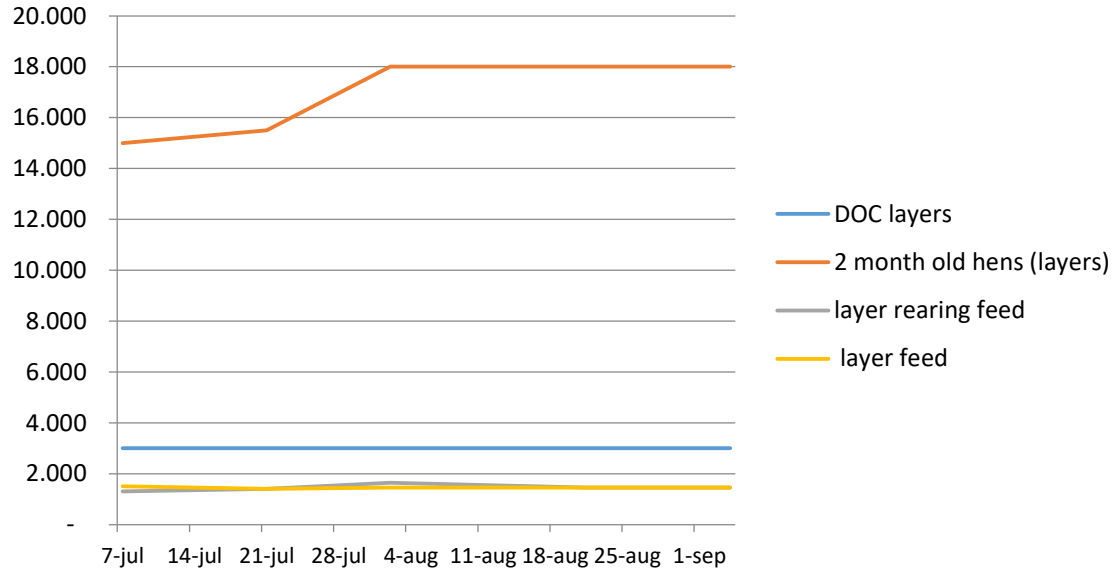


Figure 8: Prices of layer feed, layer day old chicks and two month old hens in Uganda (July-August 2017).

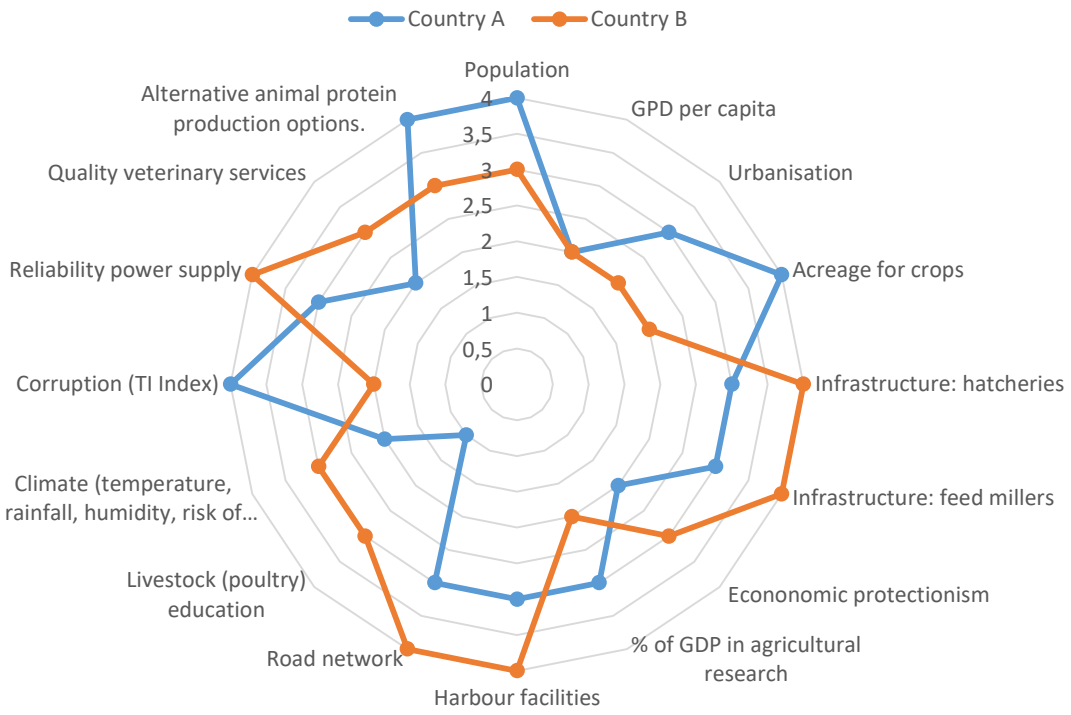


Absolute feed and end product prices do not yet determine affordability. Affordability also depends **on purchasing power parity**. When the prices for a specific volume of poultry products are compared to the basic income for a specific job group, the purchasing power parity can be determined. *The purchasing power of a currency refers to the quantity of the currency needed to purchase a given unit of a good, or common basket of goods and services. Purchasing power is determined by the relative cost of living and inflation rates in different countries. Purchasing power parity means equalising the purchasing power of two currencies by taking into account these cost of living and inflation differences*[27]. A comparable exercise was carried out for the dairy sector earlier on.

Eventually, this could lead to the elaboration of **a competiveness index** for poultry production per country which is based on an assessment and a weighing of various criteria such as indicators on producing feed ingredients, economic indicators (GDP per capita or preferably purchasing power parity), sector infrastructure, government policies, social criteria such as education, strength of the veterinary services, cross country trade etc. Competitiveness constitutes the factors, institutions, and policies that determine a country's level of productivity[28]. Such an index will be a useful tool for policy makers and investors to determine whether to support or invest in the poultry sector or not. A graphic representation of such a competitiveness index looks as is shown below in figure 8.

[27] http://www.economicsonline.co.uk/Global_economics/Purchasing_power_parity.html
[28] World Economic Forum, 2017: The Africa Competitiveness Report 2017.

Figure 8: An example of a competitiveness index for the poultry sector.



A competitiveness index is built on a set of indicators; some of the possible indicators are included in this example but need to be sorted in further consultations with representatives from the poultry sector, both from public as well as from private background.

Annexes

Annex 1: Kenyan Poultry Stakeholders

No.	Company	Contact	Email
1.	Breedtech ltd	Dr. Mwangale	info@breedtechltd.com
2.	Yegen Farms	Rop Maiyo	ropmaiyo2008@yahoo.co.uk or yegenfarms@gmail.com
3.	Muguku Poultry FARM	Daniel Muguku	ngongmugukufarm@gmail.com
4.	Kenchick	Jonathan Bovard	jbovard@kenchic.com
5.	Sigma Supplies LTD	Dipak Shah	dipak@sigma.co.ke
6.	Kenya Poultry Farmers Ltd	Hezron Opiyo	holuoch@kenyapoultryfarmers.com
7.	Brade Gate Poultry Solutions	Thuo Mathenge	info@bradegatepoultry.com
8.	Kulamawe Poultry Farm	Denis Marangu	marambade@gmail.com
9.	Kenya Meat Commission	Mumbi Mwilaria	pa@kenyameat.co.ke, mumbimwilaria@gmail.com
10.	Neochicks Poultry Limited		info@neochickspoultry.com
11.	Ecochicks		info@ecochickspoultry.com
12.	Nakuru County Poultry Farmers'Cooperative Union	Patrick Kiogora Itonga	nakurupoultrycoopunion@gmail.com
13.	Farmers Choice company	Dr. Gateru	
14.	Kenya Livestock Producers Association (KLPA)	Patrick N. Kimani	klpakenya@yahoo.com / ceo@klpakenya.org
15.	Kenya Poultry Farmers Association (KPFA)	Wairimu Kariuki	wairimukariuki59@gmail.com
16.	Association Of Kenya Feed Manufacturers (AKEFEMA)	Martin Kinoti	mkinoti@nutrimix.co.ke
17.	Kenya Poultry Breeders Association (KPBA)	Dr Humphrey Mbugua	hcwmbugua@yahoo.com
18.	Kenbrid		
19.	Kim Hatchery	Mr Kihwan Kim	nakurukim@gmail.com
20.	Kuku chic	Appolo Ngugi	info@kukuchic.com appologatua@yahoo.com
21.	Nature Kuku	Tony Kiragu	tonykiragu@gmail.com or admin@naturekuku.co.ke
22.	Kenya Bixa Limited		info@kenyabixa.com
23.	Unga Feed	Jawichre Dickson	djawichre@unga.com

Annex 2: Tanzanian Poultry Stakeholders

No.	Company	Name	Contact details	Phone number
1.	Mkuza Chicks	Florence and Maxingo Maximambali	maxingom@yahoo.co.uk or fmaximambali@mkuzachicksltd.co.tz	+255717033420
2.	Interchick	Orson Taylor	md@interchicktz.com	+25522262 7855/7218, +255788242473
3.	KingsChick	Rose Sweya	rosesweya@hotmail.com	+255787264400
4.	Silverlands Tanzania	Sheryl Bradnick	sheryl@silverlandstanzania.com	+255766283926
5.	Kibo Poultry Products or Mama Kuku	Faye Cran or Joseph Maina	fayecran@habari.co.tz or muigai10@gmail.com	+255682331087 or +255713330106
6.	Kijenge Animal Products Ltd	Kevin Mollel or Monica Lyimo	kevin.mollel@kijenge.co.tz or monicalyimo@hotmail.com	+255762777735, +255757057685
7.	Organia	Amr Taher		+255222110272
8.	TPBA	Vintan W. Mbiro or Dr. Vallery M. Kessy (Chairman)	vintan.mbiro@gmail.com	+255784763933
9.	TALIRI	Upendo Mapunda	upendomapunda@gmail.com	+225222861925
10.	African Chicken Genetic Gains	Ezekial Goromela	egoromela2013@gmail.com	+255676141934
11.	African Chicken Genetic Gains	Said Mbaga	mbagash@yahoo.com	+25578454628
12.	Arusha Poultry Keepers Association (APOKA)	Harold Mally Ida Makawia	Apoka.poultry@gmail.com Anethk.ej@gmail.com	+255783298075 +255 754 298 075 +255 754 306 465
13.	Tanzania Agricultural and Livestock Promotion Association	Ali Mose		+2557177554488
14.	Nzua Enterprises	Ally Mlinga Angelo Mwilawa	nzuaenterprises@gmail.com or Ajmwilawa1@yahoo.com	+255712705839
15.	Kiluvya Poultry Products	Dr W Zulu		+255222116657
16.	Wilsa Chick	Rose Mbala		+255715089966
17.	CPF-Tz LTD	Fadhili Tumbi	fadhilitumbi@yahoo.com	+255713432102

18.	Tanzania Feed Manufacturers Association (TAFMA)	Cassian Ngamilo, Hilary Shoo, & Sufian Kyarua	info@tafma.or.tz cngamillo@gmail.com hillshoo@yahoo.com	+255 754 782 447 +255 784 617 565 & +255 732 921 249 & +255 754 396 634 & +255 655 396 634
19.	Hill Animal Feeds	Mr Hillary E Shoo	info@hillgroup.co.tz	+255784617565
20.	Falcon Animal Feeds	Sufian Z Kyaru	sufian.kyarua@yahoo.com	+255712444850 / +255754396634
21.	Ideal Chicks			+255222862719
22.	Tanzania Poultry			+255272553812
23.	Twiga Feeds	Dr. Herman Moshi		+255713223126/ +255767223127
24.	Tanfeeds	Faustin Lekule	lekulefp@yahoo.com	+255657707777
25.	Tanzania Poultry Breeders Association (TPBA) Website. www.tpba.or.tz	Dr Msafiri Kyesi, & Manase Mrindwa	msafirikyesi@gmail.com & mmrindwa@hotmail.com & info@tpba.or.tz	+255 787 939 555 +255 767 939 555 +255 784 646 381
26.	Tanzania Commercial Poultry Association (TCPA)	Harko Bhagat, & Thabit Batenga	bhagat@baharibountry .com & tbatenga@yahoo.com	+255 784 780 633 +255 715 314 392
27.	African Women Agro-Network (Awan Tanzania Chapter)	Rose Rumanus, & Olipa Bulayi	rosensajigwa@gmail.com Olipabulayi65@yahoo.com	+255 713 524 298 +255 678 285 228 +255 784 999 150
28.	Umoja wa Wafugaji Kuku Dar es Salaam (UFUKUDA)	(1) Presidea Bambaza (2) Michael Nyembele	placidiapmb@gmail.com znyambele@hotmail.com	+ 255-715-269-679 +255-786-076-529 +255 717 076 527
29.	Mwanza Multipurpose Cooperative Society Limited	Charles Ndariro, & Mwanajum be Tamba	ndarirocharles@gmail.com	+255 767 000 876 +255 786 000876 +255 757 607 422
30.	Tanzania Veterinary Para Professionals (TAVEPA)	Salim Mselem, Ephrahim Massawe, & Hassan Ayubu	info@farmerscentre.com massaweephrahim@gmail.com ayubusempoi@yahoo.com	+255 773 200 200 + 255 719 045 556 +255 754 398 118 +255 784 378 366 +255 655 378 366
31.	Ushirika wa	Prince	Princeelly1982@gmail.com	+255 716 777 966

	kufuga Kuku Morogoro (UWAFUKUMO)	Moshy, & Elisa Ndeyatabula	& erugachwa.ndyetabula@gmail.com	+255 764 047 268
32.	Tanzania Layer Farmers Association (TALFA) Website: www.layers.or.tz	Geofrey Kidindima, Willy Mndeme, Lucy Mmbaga, & Mwajuma Massamba	gkidindima@gmail.com wievalu@yahoo.co.uk	+255 753 469 241 +255 715 691 863
33.	Tanzania Broiler Farmers Association (TABROFA) Website. www.tabrofa.or.tz	Kosta Mrema, Alloyce Makoye, & Yukunda Moshi	costamrema@yahoo.com alloycemakoye@yahoo.com	+255 713 317 262 +255 754 024 830
34.	Kisutu Poultry Co-operative Society (KIPOCOSO)	Hamisi Malamla, Zuberi Luono, & Hassani Sozigwa		+255 713 472 150 +255 682 472 150 +255 718 509 328 + 255 713 687 536 +255 787 687 536
35.	Tanzania Poultry Breeders Association (TPBA) Website. www.tpba.or.tz	Dr Msafiri Kyesi, & Manase Mrindwa	msafirikyesi@gmail.com mmrindwa@hotmail.com info@tpba.or.tz	+255 787 939 555 +255 767 939 555 +255 784 646 381

Annex 3: Ugandan Poultry Stakeholders

No.	Company	Name	Contact details
1.	Ugachick	Aga Sekalala Jr.	E: aga@sekalala.com T: +256 772 700 800
2.	Biyinzika	Moses Ngiela (CFO)	E: mngiela@biyinzika.co.ug T: +256 791 112 227
3.	Biyinzika	Samuel Mukasa (CEO)	E: bpil@biyinzika.com T: +256 414 259 519
4.	Butenga Farmers	Christopher Magezi	E: magezichris@ymail.com T: +256 775 966 801
5.	Asiima	Dr. Okoth Ochola (CEO)	E: asiimaagriconcern@yahoo.com T: +256 772 464 780 or +256 701 849 428
6.	Hudani Manji Processing Farm/Yo Kuku	Rahim Manji	E: info@yokuku.com T: +256 792 780 780 or +256 792 782 782
7.	GLS Ranchers	Mr. Lwanga	E: aruzen@gmail.com or sales@glsranchers.com T: +256 759 966 600
8.	Kagodo	Fred Kabanda and Esther Genza	T: +256 782 360 782
9.	MM Holdings	Mr. Mukuye Siraje	T: +256 712574407
10.	Quantum foods (before Bokomo)	Selaledi Amos	E: info@quantumfoods.co.za T: +27 (0) 21 864 8600
11.	SR Afro Chicks & Breeders Ltd.		E: srafrochicksandbreedersltd@gmail.com T: +256 414 567945/566055
12.	Jade commodities	James Mugisha	T: +256 414 344959
13.	Kyaterekera feeds		T: +256 753 943159
14.	Genesis East Africa Ltd.	Andrew Lubanga	E: lubsandry@gmail.com
15.	Genesis East Africa	Samuel Ssewagudde	E: sewagood@gmail.com T: +256 782 843 490
16.	Nsava Feeds		E: nsavafeeds@yahoo.com T: +256 772 452 637
17.	NutriMix FeedsLtd		E: nutrimixltd@gmail.com T: +256 751 550 025
18.	Sight Farm International	Henry Sight Lugoloobi (Chairman Poultry Association)	E: sighthl@gmail.com T: +256 772 508 275
19.	Feed Merchants		E: tonniemu@gmail.com T: +256 772 044 575
20.	Farmrite Agro-Vet Enterprises	Ms Rehma Musawo	+256 701 300 726
21.	Bulemeezi Agro-Vet Ltd	Joseph Kizito	jokizito@yahoo.com +256 783 294 653
22.	Bora Agro-Technologies LTD	Jonathan Bukenya	boraagrotech@gmail.com +256 775 608 755
23.	Agrarian systems	Robert Serwanga	serob2002@yahoo.com +256 772 495 309
24.	Afrimex Foods	Moses Abigaba	afrimexfoodz@yahoo.com

	(U)		+256 414 237 072
25.	Nutrinova	Peter Ssenkunga	nutrinova1@gmail.com +256 775 879 264
26.	Association of Uganda Poultry Industry		aoupil@gmail.com +256 772 495 309
27.	Kisakye broiler farm	Samuel Kisakye s.w.kisakye@gmail.com	s.w.kisakye@gmail.com +256774829993

Annex 4: Rwandan Poultry Stakeholders

No.	Company	Name	Contacts Details	Description
1.	Rwanda Best	Jean Claude Ruzibiza (Chairman poultry association)	E: jclauderuzibiza@gmail.com T: 0025788302406 or 0025781190087	16.000 layers farm
2.	Aroma Poultry Farm	Louis Kaamanzi	E: kamanzil@yahoo.com T: 0025788301453	Layer farm
3.	PEAL	Neil Roper	E: neal.roper@peal.rw T: 0025784963347	Broiler farm
4.	Abusol	Jean Baptiste Musabyimana	E: jeanbapti@yahoo.fr T: 0025782235566	Layer farm
5.	Kigali Golden Farm	Channy Kalisa	E: kigaligf@gmail.com T: 0025788385715	Broiler farm
6.	Eden Farm	Mr. Onesiphore	E: T: 0025788503292	Layer farm
7.	Isimbi Farm	Emmanuel Havugimana	E: havugimanaemma63@gmail.com T: 0025788599738	Layer farm
8.	Mugisha Farm	Lionel & Odette	E: kamanzil@yahoo.com T: 0025728302552	Layer and Broiler Farm
9.	Lala Farm	Scovia Ngarambe	E: scovia2005@gmail.com T: 0025788764668	Layer farm
10.		Dr. Abel	E: T: 00257788596253	
11.		Dr. Gasana	E: T: 0025788414345	
12.		Mrs. Odette	E: T: 0025787062358	
13.	MD Zamura Feed	Matthew Karugarama	E: T: 0025782023093	
14.	Gorilla Feed		E: T: 0025783347969	
15.	IRBC	Deo Rutayisire	E: T: 0025788503773	
16.	M.N SOPICAKI Ltd	Vincent de Gaulle Nzamwita	E: T: 0025782752031	
17.	Premier Animal Feed (PAFI)	Herbert Kwizera	E: T: 0025788307841	

Annex 5: Literature list.

World Animal Protection Organization, 2017
EAFF 2012 (page 12 and 13), study on strategies for developing EA's livestock sector. What is proper title of document?
MOLDF, 2012
Uganda's Agriculture Sector Strategic Plan (2015, ASSP) published by the Ministry of Agriculture, Animal Industry (page 16)
Livestock Data Innovation in Africa Project, 2013) (Page 40)
FAO 2007, Kenya poultry review.
Jensen, H.G., 2015: African agricultural trade: Recent and the future. African Journal of Agricultural and Resource Economics Volume 10 Number 2 pages 146-157, 2015
Macauley, 2015: Cereal Crops: Rice, Maize, Millet, Sorghum, Wheat. Background paper Feeding Africa Conference, 21-23 October, 2015. Dakar, Senegal.
Wigboldus, S., Brouwer, H., Lee, J. van der, 2010: Making Sense of Capacity Development - Discussion paper for the seminar on International Capacity Building – Recipes for Success, 28 January 2010, The Hague, Technical Report, January 2010.