Arab Republic of Egypt

Broiler poultry industry: investment challenges and opportunities (Draft for discussion)

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Foreword

In recent years, the Egyptian poultry production has become an industry, rather than an agricultural activity. Growing consumer demand for affordable animal protein has prompted an increase of broiler chicken meat production in Arabic Republic of Egypt. At the same time, lack of Government's involvement in outlining the rules for the industry development, or better to say absence of National strategy for poultry industry development, has resulted in numerous issues due to HPAI outbreak, massive live bird market, inefficient production practices, etc. Despite its improved self-sufficiency in the broiler meat sector, the country will remain dependent on imports of feed ingredients, as well as primary genetic material (GPS), vet medications, vaccines. The threat of feed grain price increases or decreased import tariffs protection put pressure on local poultry producers to become more competitive. To do so, they will need to invest in the efficiency of primary production and higher food quality and safety standards.

This review of the Egyptian broiler industry, conducted by the Food and Agriculture Organization of the United Nations (FAO) under the TCP/EGYAB003TTAS01, aims to inform policy makers and investors both about challenges and opportunities and promote a more efficient and inclusive poultry industry development. The review presents international comparisons on poultry meat production efficiency, sector concentration and support measures. It also provides information on key sector constraints and opportunities.

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Acronyms and abbreviations

AI	avian influenza
ARR	accounting rate of return
D	discount rate
DOC	day old chicks
DPB	discounted Pay-Back Period
EBRD	European Bank for Reconstruction and Development
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCR	feed conversion ratio
FOB	free on board
GDP	gross domestic product
GOE	Government of Egypt
GPS	grand parent stock
HACCP	hazard analysis and critical control points
HORECA	retail, hotel, restaurant and catering services
HPAI	Highly pathogenic avian influenza
IRR	internal rate of return ,
LBM	live bird market
LE	Egyptian pound
LSE	London Stock Exchange
MALR	Ministry of Agriculture and Land Reclamation
MIRR	modified Internal Rate Of Return ,
MPS	market price support
NLQP	national lab for quality control on poultry production

NPV	net present value
NPVD	net present value discounted
OECD	Organization for Economic Co-operation and Development
OIE	World Organization for Animal Health
OJSC	open joint-stock company
PI	profitability Index ,
PB	pay-Back Period,
PS	parent stock
TCI	Investment Centre Division of the Food and Agricultural Organization
USDA	United States Department of Agriculture
USD	US dollar
VAT	value added tax
WB	World Bank
WTO	World Trade Organization

Executive summary

Egyptian broiler poultry industry: current situation

Egyptian poultry industry has evolved into a very significant sector of Egyptian agricultural production. The times when growing poultry in the backyard farms was only a traditional activity that supported the well being of particular household are gone. That does not necessarily mean that backyard poultry production disappeared rather then the role of backyard poultry production for household consumption in the overall national poultry production became minimal. Since middle of the 20th century there have been various vectors and conditions for poultry sector development in Egypt. The socialist era is known for its generous subsidies and support. Today the poultry industry in Egypt is predominantly market driven and has to find its way in the turbulent waters of global market.

By the broiler poultry industry the authors of this report mean predominantly “exotic” or “white feathered birds” production with use of genetics from global suppliers for commercial purposes by 1, 2 and 3 type of farm unit according to FAO categorization. The vast majority of broiler production (close to 70%) is small-scale production (FAO sector 3) with a few fully integrated poultry enterprises (FAO sector 1). Recently there is a general trend towards more vertical integration and the establishment of scale production multinationals (for instance, Cairo Poultry Company or Al Wataneya Group). In general the overall broiler poultry industry in Egypt in general has the traits of FAO sector 3 farms – underutilization of production capacity (normally 5 rather than 7 or even 8 cycles per year), old and very basic production equipment and intensive use of hand labor, poor biosecurity, high FCR, high mortality, ununiformed stock. At the same time, vertically integrated companies execute good management practices and comply with world safety and quality standards which allow to achieve key performance indexes that match those in the main poultry producing countries.

Current structure of industrial broiler poultry production in general is very vulnerable and can barely resist different market unrests that can happen due to numerous factors like AI consumer scare, poultry meat import policy change, etc. This can result in tremendous price fluctuations and availability of poultry meat to final consumers.

Lack of slaughtering capacity

The total number of poultry slaughterhouses was reported to be 309 units in 2015, according to the data and statistics of The General Organization for Veterinary Services at the Ministry of Agriculture. These slaughterhouses are divided into manual, semi-automatic and fully automated slaughterhouses. Manual slaughterhouses are the most common throughout the country, totaling 200 units, i.e. 65% of the total number of poultry slaughterhouses in Egypt. There are also 62 semi-automated slaughterhouses, 20% of the total number of poultry slaughterhouses. As for modern automated slaughterhouses, there are only 47 slaughterhouses, 15% of the total number of poultry slaughterhouses in Egypt. The slaughtering capacity of all slaughterhouses is indicated to be around 2 million birds per day at two shift operating schedule according to the Egyptian Poultry Association. The location of the slaughterhouses nationwide does not match growing capacity locations. This creates another constraint on the way of eliminating LBM.

According to statistical report of Economic Affairs Sector of MALR, in 2015 out of 589 million broiler chicken produced only 86,7 million have been slaughtered by the slaughterhouses. The rest was consumed by the LBM. For example, the utilization of slaughtering capacity by Al Wataneya Group has been close to 15%.

Assuming that at some point all broiler growing units/farms are utilized at 100% of their capacity and the annual number of broiler chickens produced will exceed 900 million, LBM is minimal, the industry will face at least 35% slaughtering capacity deficit that equals around 1 million birds per day. Not to mention the inferior equipment standard of manual and semi-automatic slaughterhouses that also lack cold storage capacity tremendously.

Feed milling capacity

Out of all broiler chicken industry value chain this link seems to be in the best shape. The number of fully functional poultry feed mills has reached 236 units throughout the country in 2015. Egg laying hens consume around 18% of the total amount of feed produced, while the rest is consumed by broiler chickens. The actual utilization of feed milling capacity has been 1,12 million tons out of 4,14 million so the capacity utilization was close to 27%. Assuming that at some point all broiler growing units/farms are utilized at 100% of their capacity and the annual number of broiler chickens produced will exceed 900 million at average live slaughter weight of 1,8 kg per bird with FCR running close to 1,7 kg of feed per 1 kg of live weight gained there will be still around 33% feed milling capacity reserve for layers of all kind. In addition, there have been non functional 91 feed mills with production capacity slightly over 0,5 million tons of feed per year according to the statistical report of Economic Affairs Sector of MALR in 2015.

Hatching capacity

According to the statistical report of Economic Affairs Sector of MALR in 2015 broiler production is supported by 360 hatcheries that are operational. The total hatching capacity of these hatcheries reaches 2279 million eggs per year. In addition, there are 65 hatcheries that are not operational with annual hatching capacity of 245 million eggs. There are also 549 operational municipal hatcheries that support back yard farmers and partially sector 3 farms with annual hatching capacity of 247 million eggs. In addition there are 413 municipal hatcheries that are not operational with annual hatching capacity of 136 million eggs.

Cost of production

The current cost of production reported by the vertically integrated companies is around USD 1,35 – 1,37 per kg of dressed meat. This production cost is comparable with Argentina and the US average cost of production and higher than Brazilian average cost of production which is around USD 1,16 per kg of dressed meat (according to RaboBank analysis based on WRU 2017). Brazil is the biggest current supplier of imported poultry meat with its share of close to 90% and it is clear that there are producers in Brazil that achieve cost of production around USD 1,00 per kg of dressed meat. The current delivery cost (sea freight only) will not exceed USD 0,17 per kg. By adding handling cost, internal logistics cost (transport and cold storage) in the country of origin and in Egypt of another USD 0,10 – 0,15 per kg the cost of Brazilian chicken delivered to Egypt to some particular cold storage (under the current market conditions) will be close to

USD 1,27 – 1,32 per kg of frozen poultry. This means that vertically integrated Egyptian poultry producers are theoretically competitive on the domestic market with the most efficient global poultry producers even under the free market conditions. At the same time the cost of production on the farms of 2 and 3 categories that account for over 70% of broiler industry is at least 15 – 20% higher than on the farms of the 1 category. In addition farms of the 2 and 3 categories predominantly work with LBM. This means that they avoid any cold chain which adds to the operational cost of final product not counting additional investment cost into the slaughtering capacities and cold chain that will be required during the transformation of LBM sales into the chilled poultry meat marketing.

Global outlook for poultry production

Global outlook for the meat market remains relatively favorable for producers. Feed grain prices have declined and assuming stable weather are set to remain low for the projection period (OECD-FAO Agricultural Outlook 2017-2026). Meat prices are expected to fall in real terms driven by production expansion through larger herds and heavier slaughter weights in key producing countries. Demand growth is limited given the slowdown in demand from China, and the absence of other developing countries as alternative sources of demand growth. This means additional pressure from the global poultry producing countries that will act more aggressively on the international markets.

Market development

GDP growth, middle class growth and population growth are the key contributing factors to the poultry meat consumption increase. In particular GDP growth in Egypt is expected to average 6% per annum in 2017-2026. According to OECD-FAO Agricultural outlook for 2017-2026, the total poultry consumption in Egypt will increase from 993 thousand tons in 2017 to 1 156 thousand tons in 2026 with per capita consumption staying around 9,2 kg during the whole period. This means that the total volume of poultry meat consumed in 2026 will be 14% more than the volume consumed in 2017. This forecast is very reserved and according to other experts' opinion annual consumption can easily grow between 3 and 7 per cent. Current estimate of Egypt's annual consumption of poultry provided by the Egyptian Poultry Association is around 1,2 billion birds, the equivalent of around 1125 million tons of poultry meat.

On the marketing side in the coming years it will be vitally important for the broiler poultry industry to introduce major changes into the poultry market transformation and development. The main highlight has to be the transformation of LBM into the chilled poultry meat market. Such transformation will require additional significant investment into slaughtering capacities and cold chain. In addition the category 2 and 3 farms will have to change their production practices and greatly improve biosecurity. This way category 2 and 3 farms will be able to fit into the new system offering to the market more uniformed healthy flocks that will not be rejected by the slaughterhouses. One of the biggest challenges that will be faced by the industry is becoming more cost efficient so that significant shrinkage of LBM will not affect the consumer prices by adding additional cost with slaughtering and cold chain. Egypt's WTO commitment will put additional pressure on the broiler poultry industry that will have to benchmark its cost of production and final price offered to consumer against the global poultry producing countries. National marketing campaign targeted at promoting consumption of domestically produced and industrially slaughtered chilled poultry meat (this will mean consumer category development) will help to protect Egyptian broiler industry using pure marketing tools.

Role of the growing supermarket chains in promoting chilled poultry consumption has to be addressed through awareness building campaigns targeted at handling chilled poultry by the stores and explaining the important role of poultry meat as key value item for the supermarket chains and traffic building category.

Government role in broiler poultry industry development

It is now for the government to make a clear statement through the National Poultry Sector Development Policy and Strategy how it sees these development itself, keeping in mind its responsibility for all of Egypt's people's interests. On the shoulder of the government rests the responsibility for the livelihood of especially the less privileged and vulnerable people in the country. Where the recent unrest was probably mainly urban disillusioned people it would be a prudent policy to avoid creating also a large contingent of rural disillusioned and disowned people starting to demand further change. The policy and strategy should have a number of key principles, which shows clearly the intention of the government:

a) It is acknowledged that poultry production in Egypt is diverse and serves both production and socio-economic purposes, whereby also cultural traditions cannot be ignored

b) Only through full involvement and participation of the private sector will it be possible to implement a national poultry development policy and strategy, of which disease control is only one of the aspects the policy and strategy tackles

c) There should be clear division of public and private responsibilities and tasks, whereby the government wholeheartedly delegates certain tasks to the private sector and concentrates on its regulatory and monitoring tasks.

The National Poultry Sector Development Policy and Strategy should also outline GOE short term and long term support to the industrial broiler meat production.

Investment opportunities and challenges

Egyptian broiler poultry industry is an attractive sector of agriculture for the investment mainly because the internal market for poultry meat consumption is very big and has great expansion potential due to population growth and per capita consumption growth influenced by general improvement of the country's economy. For instance, according to the World Bank statistics for 2016 Ukraine's GDP per capita was 2185 USD, while Egypt's GDP per capita was 3514 USD. At the same time, poultry per capita consumption in Ukraine was close to 22 kg, while in Egypt it was around 9 kg. Because of current HPAI issues and high dependency of the broiler poultry industry on imported inputs (primarily feed components) the export prospective is unclear in the nearest future. Because of the high (over 80%) hard currency share in the cost of broiler meat production in Egypt and absence of hard currency revenues since export operations are unlikely in the nearest future the investment into broiler meat production in Egypt has high currency risk. Biological risks as well as consumer attitude risks are among the most relevant ones as well.

General investment opportunities can be roughly divided into investment into existing operations and investment into new operations.

Investment into existing operations should be aimed at improving cost of production and making the business model more stress resistant. In addition, such investment should facilitate adoption of the market

transformation (for instance, LBM shrinkage). The most vulnerable link in the broiler poultry industry value chain is slaughterhouse capacities and cold chain. Category 3 farms and most of category 2 operations do not own the slaughterhouses and primarily sell to LBM. Manual and semi-automated slaughterhouses do not usually provide descent quality of slaughter services as well as descent quality chilling/storing capacity at the slaughterhouse itself.

The cold chain apart from the slaughterhouse cold chain is another important link. The cold chain apart from the slaughterhouse includes climatized delivery trucks, climatized storages/distribution centers and retail outlets equipped to handle chilled and frozen meat products. Another very important investment has to be made into dedicated specialized retail outlets that hopefully will replace LBM stores.

The investment required for the existing growing units improvement from categories 2 and 3 is almost impossible to assume due to the lack of relevant information that would clearly indicate the need of one or another farm for investment.

For the new operations investment vertically integrated ventures are the most viable and market-stress resilient (price changes of feed or meat, biosecurity, etc.). Vertically integrated operation depending on its scale and size normally consists of a hatchery, growing facility, feed mill, slaughterhouse with chilling/storing capacity, slaughter waste processing, fleet of climatized trucks. It can also include a PS farm and a network of retail outlets. Such vertically integrated models with proper technology and equipment selection can benefit the investor with lowest possible in given market conditions cost of production. As an example, an investment model into the green field vertically integrated operation with annual output capacity of 12 000 tons of dressed meat has been proposed to simulate the investment volume and main integrated indicators of the project (like NPV, IRR, etc.). This business model consists of growing area, feed mill, slaughterhouse, retail chain, waste water treatment and slaughter waste processing equipment. With the required amount of capital investment the payback period is estimated to be around 66 months, but when the business model is stress tested, the payback period exceeds 77 months, although the cost of production equals $1,35 which is a good indicator. The main reason for that are low current LBM prices and low consumers' purchasing power that will unlikely allow raising the selling prices above those that are offered by current LBM.
No matter how efficient and modern the equipment is on the poultry farm good management practices are the important integrated part of any vertically or horizontally integrated ventures to assure the best production cost. Unfortunately, lack of good management practices and descent execution seem to be a typical issue for the Egyptian poultry producing companies.

In the nearest ten years the predicted growth of poultry meat consumption in Egypt will be over 500 000 tons per year. The necessary transformation change of existing poultry industry as well as requirements for new green field projects in the next ten years will require **well above 1,5 billion USD of investment.**

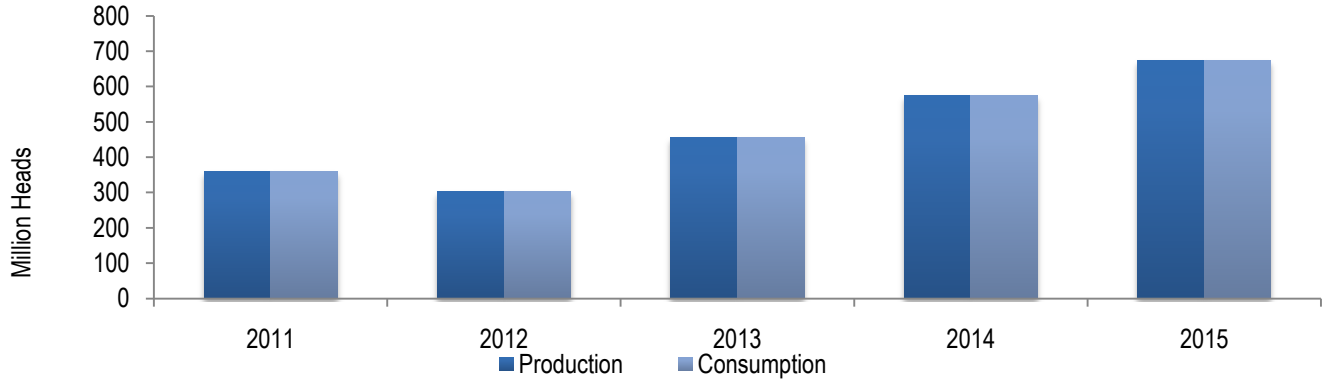
Egyptian broiler poultry market – current situation

Egypt's annual consumption of poultry is around 1,2 billion birds, the equivalent of around 1125 million tons of poultry meat. According to OECD-FAO Agricultural outlook for 2017-2026, the total poultry consumption in Egypt will increase from 993 thousand tons in 2017 to 1 156 thousand tons in 2026 with per capita consumption staying around 9,2 kg during the whole period. This means that the total volume of poultry meat consumed in 2026 will be 14% more than the volume consumed in 2017.

This forecast is very reserved and according to other experts' opinion annual consumption can easily grow between 5 and 7 per cent. It is very significant that imports barely account for 5% of the total poultry consumption in Egypt. This means that at the current poultry meat per capita consumption level Egypt has become almost self sufficient with internal production. Exports of the poultry meat are insignificant due to HPAI outbreaks in the country.

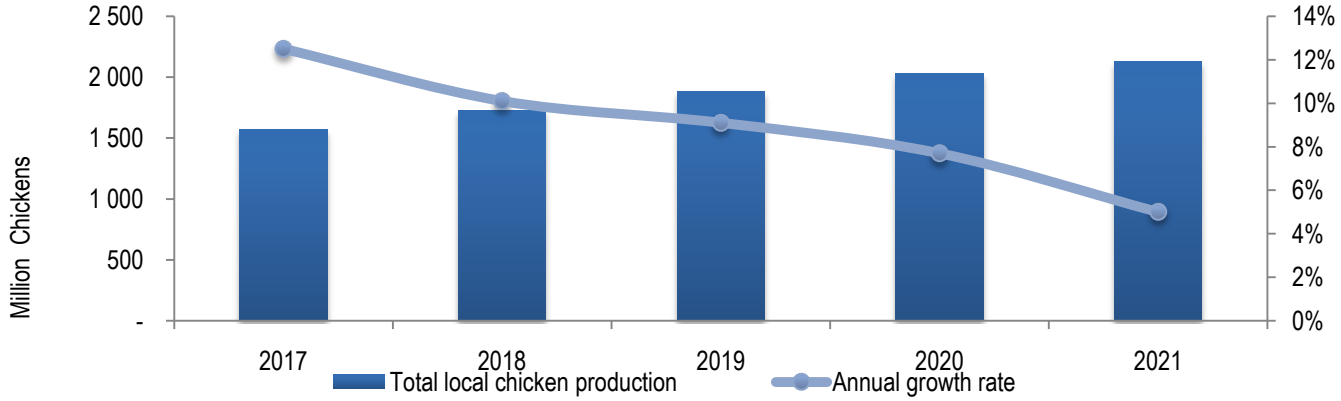
According to the interviews carried out with a number of experts at the Egyptian Poultry Association, poultry meat that is sold at LBM is the most common type on the Egyptian market. The consumption of poultry meat from live poultry vendors reached around 720 thousand tons in 2016, with a relative share of 64% followed by frozen poultry, part of which is imported, with Egypt's total consumption of it reaching around 327 thousand tons, 29% of the total consumption of poultry meat in 2016. As for chilled poultry and poultry meat products, their relative share has reached around 7%, with a total consumption of 78 thousand tons which points to the small size of the chilled poultry market in Egypt.

Figure 1 - Development of the size of the LBM in Egypt



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 2 - The expected size of total chicken production in Egypt from 2017 until 2021



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

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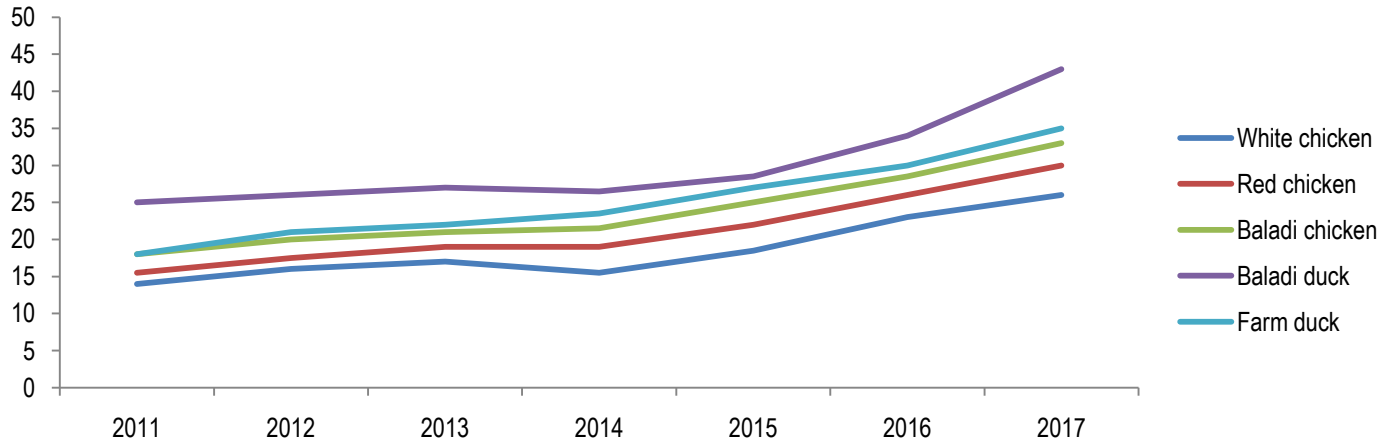
The cheapest poultry meat comes from the “exotic” or “white feathered” broilers of the industrial crosses due to their excellent performance capabilities.

Figure 3 – Live poultry prices, LE



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

The market structure described above gives a clear conclusion that for a number of reasons that will be explored in depth further in the report the Egyptian poultry market is dominated by the LBM followed by the frozen poultry sales. Chilled poultry stays undeveloped as a category. The biggest challenge that the market will have to face is the transformation from LBM to chilled poultry meat market. Such transformation will take time and effort spent to change consumers’ attitude and habits as well as the investment which is needed for marketing structure development. The trick is also to maintain the current correlation of prices for the final consumers because they will always benchmark chilled poultry prices against the price of freshly dressed poultry meat at LBM. To achieve this goal it is critically important to improve the industry average production cost, because the cold chain introduction with chilled meat marketing will definitely add to the final price.

Structure of Egyptian broiler poultry industry value chain

Poultry production systems in Egypt are quite diverse, ranging from rural very small-scale, extensive poultry production to highly intensive systems with over 70,000 birds per house in industrial commercial systems. Commercial poultry farms of various sizes provide about 90 percent of chicken produced in Egypt, with the remaining 10 percent provided by the small-scale household poultry farms that are abundant in villages and cities.

The meat production or broiler sector of the poultry industry has a pyramid structure with grandparents (GPS) at the top of the pyramid, the actual meat production birds (broilers) at the bottom and the broiler breeders (PS) in between the two. Broiler production is by far the largest element of Egypt's poultry industry. The commercial broiler farms vary in production technology and size.

Broiler production in Egypt starts at the grandparent level (GPS), with six poultry companies (Al Wataneya, two for CPC, Al Wadi, Al Aasema and Tiba) having GPS capacity of 560 000. In the last two years the actual number of GPS has increased. The GPS is imported into Egypt from different parts of the world as DOC under supply contracts with major genetics companies. These GPS farms have world standard production equipment, management practices and biosecurity measures.

Total broiler parent stock (PS) has decreased from 7.3 million birds in 2012 to 5.5 million in 2013. In 2016 there was a significant increase in PS numbers reaching a figure of 8 million parents. According to the Egyptian Poultry Association, in 2017 the number of broiler parents has reached 10 million heads. According to interviews conducted with industry experts in Egypt the PS farms capacity is underutilized and can be easily increased by 10 – 15%. In addition, the use of hatching eggs for hatching purposes is around 130 per parent head per year. The world standard is 150 – 160 hatching eggs per broiler parent per year. Even additional 20 hatching eggs per broiler parent per year mean extra 200 000 000 hatching eggs annually with current PS flock that equals 10 000 000 heads. With 80% hatchability this means additional 160 000 000 DOC annually which equals roughly to 160 000 tons of meat with 10% mortality rate and average dressed carcass weight of 1,3 kg. These facts bring us to conclusion that in the next ten years Egyptian broiler poultry industry will not lack PS production capacity and availability of broiler DOC will match the growing market demand.

The annual production of 700 million broilers in 2013 has increased to around 800 million in 2016. 88% of the total broiler production is located in Delta region. Farms located in Cairo-Alexandria desert road and Dakahlia governorate produce 125 and 120 million respectively, followed by Sharkia and Qalyubia with 80 million. Giza governorate produces about 50 million birds per year. The total number of broiler chicken farms is around 21097 units throughout the country with the full capacity reaching 892 million chickens produced annually. The industrial broiler farms are divided into three categories according to statistical report of the Economic Sector of MALR, depending on the number of birds in each farm:

Type of farm	No. of farms
Farms with 5 thousand to less than 25 thousand bird spaces	6,317
Farms with 25,000 to less than 100,000 bird spaces	13,664
Farms with 100,000 bird spaces or more	1,116
Total	**21,097**

Source: The Economic Affairs Sector at Ministry of Agriculture and Land Reclamation, Statistical bulletin on poultry production, 2015

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This poultry production scale based classification matches FAO poultry farm classification that divides industrial poultry into three sectors (1, 2, and 3).

- ✓ 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 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).

About 74 % of the broilers are produced on farms with less than 15 000 birds per cycle. These farms normally market their poultry live since the only part of value chain that they own is the farm itself. Live broilers are the cheapest poultry meat and according to various estimates between 60 and 80 percent of broiler production is marketed alive through live bird markets (LBMs) and poultry shops. Poultry trading is an important part of the cycle and brokers are very important players over the chain, for producer to obtain their chicks and sell their products and for trader to know the daily broiler price and sources. There is a countrywide system of poultry brokers, who match supply and demand. Some brokers are specialized in chicks and others in fattened broilers. Most of DOC brokers are feed and/or medicine suppliers. Broiler brokers have a network of traders interested to buy and a network of farmers at times interested to sell their birds when they are ready for sale.

Broiler traders have a network of buyers and get informed by a broker where they can get birds at what price per kg live weight. The price stated by the broker is usually the price followed as it is widely known among traders, so there is little room for negotiations.

The brokers form a “telephone circle”: twice per day they ring one another to assess how supply and demand is and accordingly adjust the last price upwards in case of undersupply and downwards in case of oversupply. Their price and supply exchange circle is between 10 and 20 brokers. This is a job requiring great impartiality and integrity. Some are better in this than others. The “better ones” are even used as arbiters in conflicts between e.g. a slaughterhouse and a producer about the price: these brokers all maintain records of the morning and afternoon prices and the amount of birds they have negotiated for. Their payment is usually a fixed amount per 1000 birds traded from both seller and buyer.

There are some specialized traders who actually profit from the disease by purchasing birds known to be infected at very low prices and reselling them via door-to-door peddlers or slaughterhouses, which in turn sells frozen birds to fast food outlets, these represent risky practice for transmission and spread of AI.

Veterinary medicine and vaccine companies as well as feed mills give the inputs on credit to trusted distributer, who gives again the inputs on credit to trusted farmers; this is the case for most of the farms of

2 and 3 categories. Transactions on live bird marketing take place directly or within a few days on a cash basis between consumers, retailers, wholesalers and producers. Cash transactions are very important for producers which permit them to repay debts incurred in purchasing feed and medicines, and to start new batches. On the other hand, slaughterhouses purchase birds with payment delay up to 45 days both from small size and from large commercial producers and sell frozen birds on credit to markets, which puts slaughterhouses under great pressure to operate with full capacity and causes lower rate of production especially at times of increased farm gate prices. Very often, small and medium size producers are not willing to deal with slaughterhouses in their live bird marketing efforts due to long payment delays and lack of cash.

According to the statistical report of Economic Affairs Sector of MALR in 2015 broiler production is supported by 360 hatcheries that are operational. The total hatching capacity of these hatcheries reaches 2279 million eggs per year. In addition, there are 65 hatcheries that are not operational with annual hatching capacity of 245 million eggs. There are also 549 operational municipal hatcheries that support back yard farmers and partially sector 2 and 3 farms with annual hatching capacity of 247 million eggs. In addition there are 413 municipal hatcheries that are not operational with annual hatching capacity of 136 million eggs. In the next ten year period the hatching capacity will not be a limiting factor for growing broiler poultry industry. The equipment of existing hatching operations will require technical improvement.

The number of fully functional poultry feed mills has reached 236 units throughout the country in 2015. Egg laying hens consume around 18% of the total amount of feed produced, while the rest is consumed by broiler chickens. The actual utilization of feed milling capacity has been 1,12 million tons out of 4,14 million so the utilization percent was close to 27%. Since many feed mills don't operate at their full capacity the cost of feed production is not optimal. Assuming that at some point all broiler growing units/farms are utilized at 100% of their capacity and the annual number of broiler chickens produced will exceed 900 million at average live slaughter weight of 1,8 kg per bird with FCR running close to 1,7 kg of feed per 1 kg of live weight gained there will be still around 33% feed milling capacity reserve for layers of all kind. In addition, there have been non functional 91 feed mills with production capacity slightly over 0,5 million tons of feed per year according to the statistical report of Economic Affairs Sector of MALR in 2015. In the next ten year period the feed milling capacity will not be a limiting factor for growing broiler poultry industry. The equipment of existing feed milling operations will require technical improvement.

The total number of poultry slaughterhouses was reported to be 309 units in 2015, according to the data and statistics of The General Organization for Veterinary Services at the Ministry of Agriculture. These slaughterhouses are divided into manual, semi-automatic and fully automated slaughterhouses. Manual slaughterhouses are the most common throughout the country, totaling 200 units, i.e. 65% of the total number of poultry slaughterhouses in Egypt. There are also 62 semi-automated slaughterhouses, 20% of the total number of poultry slaughterhouses. As for modern automated slaughterhouses, there are only 47 slaughterhouses, 15% of the total number of poultry slaughterhouses in Egypt. The slaughtering capacity of all slaughterhouses is indicated to be around 2 million birds per day at two shift operating schedule according to the Egyptian Poultry Association. The location of the slaughterhouses nationwide does not match growing capacity locations. This creates another constraint on the way of eliminating LBM.

According to statistical report of Economic Affairs Sector of MALR, in 2015 out of 589 million broiler chicken produced only 86,7 million have been slaughtered by the slaughterhouses. The rest was consumed by the LBM. In addition to consumer preference that still leans to LBM, the payment delay for the live poultry could be a reasonable point which may limit the growth of the role of slaughterhouses along the value chain. For example, Al Watania slaughterhouses process about 100,000 - 120,000 broiler chickens every day for five days a week, out of a total slaughtering capacity of one million broilers a day. One of the issues that arise from high volume of sales through LBMs is lack of traceability of final meat products. In most countries of the world exactly in the slaughterhouse the bird turns into meat and if the country lacks traceability from the farm to the table the slaughterhouse is a good starting point. In the slaughterhouse the vets can reject sick and dead birds and assure the safety of the meat products to the final consumer. Without transferring most of poultry sales from LBM to slaughterhouse introduction of reliable traceability system is highly unlikely.

Assuming that at some point all broiler growing units/farms are utilized at 100% of their capacity and the annual number of broiler chickens produced will exceed 900 million, LBM is minimal, the industry will face at least 35% slaughtering capacity deficit that equals around 1 million birds per day. Not to mention the equipment standard of manual and semi-automatic slaughterhouses that also lack cold storage capacity tremendously. Chicken litter is normally marketed by farmers themselves. Broiler farmers benefit from selling litter as it is to agricultural lands or fish farms.

A few words to mention regarding the Egyptian Poultry Association. It is not obvious that this association can represent the overall poultry sector in an equitable way as most of the board members are representatives of the large commercial companies. It functions as public private platform for government and the sector operators cooperation and dealing with problematic issues. It can be an excellent tool in the attempt of building awareness among consumers of high quality and safety standard of chilled poultry that has been produced by Egyptian poultry companies and their slaughterhouses.

Egypt Government's policy related to broiler poultry industry

Egypt's poultry industry enjoys GOE protection through high import tax of 30% imposed on fresh or frozen poultry. In addition there is a display fee of 5%. Poultry parts and poultry byproducts, in particular frozen chicken leg quarters are not allowed for importation.

According to the VAT law #67 that came into force in 2016, there is a list of 57 commodities and services that are exempted from the VAT, whether imported or locally produced. Live and freshly slaughtered animals or birds, chilled or frozen are on this list.

At the same time, GOE protection policy lacks constancy. For example, the decision to exempt imported poultry from custom duties for a period of nearly seven months, which was passed in November 2016 but got cancelled after a few days in December 2016, has caused major concern among the industry players.

Following is a list of the most important decisions that were made in relation to the poultry industry in Egypt and their effect:

Decision to move poultry farms out of the Delta area (June 2009)

The Ministry of Agriculture decided to stop issuing licenses for establishing new poultry farms in the Nile Delta and Valley areas while encouraging the companies that have operations in Delta area to move to

designated desert area. This decision was aimed to reduce the field viruses pressure by starting new operations in the «clean» areas.

Forbidding the transportation and handling of live poultry (2006 until 2011)

The Ex-Minister of Agriculture & Land Reclamation issued a decree criminalizing the transportation and handling of live poultry in 2006, allowing farms a transitional period to stop operating before the implementation of that law. The penalties for the violators included up to 6 months of imprisonment and the payment of a fine that exceeded 10 000 LE.

Later in 2009, the GOE issued a law forbidding the trading of live poultry in the main cities (Cairo, Alexandria and Giza) to minimize HPAI spread. According to that law, live poultry shops weren't allowed to operate. The poultry was to be slaughtered in specialized slaughterhouses for further distribution of chilled or frozen meat to retail outlets. Live poultry shops were given a transition period of one year to adjust.

However, the GOE failed to implement this law for the following reasons:

- A deficit on the poultry market.
- The absence of a clear strategy for the transition/adjustment of the live poultry shops to new rules.

In 2010, the President of the Public Authority for Veterinary Services announced that the transportation and handling of live poultry in all Egyptian governorates is to be banned starting July 2010 to preserve poultry industry in Egypt and to limit the transmission of the HPAI virus from one place to another.

The first transitional government in 2011, after the 25th of January Revolution, allowed live poultry shops to re-open.

New initiatives for investment regulation

For regulating investment in the animal, poultry and fish production sector, in 2017 the MALR issued a decree #773 limiting the establishment of livestock, poultry and fish production projects to desert and recently reclaimed lands.

The law entails that the Department for developing livestock and poultry at the MALR issues and renews operation licenses for poultry operations.

In September 2017, The Minister of Agriculture, Abdel Meneim Al Bana, initially approved moving 13 of the largest farms in the poultry industry to the desert areas of 7 governorates.

The MALR had announced last July the receipt of 14 requests for investing in poultry production projects in desert areas, with a capacity that reaches 8.4 million broiler parent chicks annually as well as 18 requests for investments in middle sized projects for commercial broilers production.

The Ministry of Agriculture and Land Reclamation allocated 39 thousand feddans in 8 governorates for 13 companies operating in the poultry production field and is awaiting the Cabinet's approval to deliver the land to investors, with a usufruct of 25 years.

Review of the key factors affecting broiler poultry industry efficiency

Genetics availability

Since the first outbreak of HPAI in 2006 Egypt has become self sufficient in broiler PS production. PS is not imported into Egypt. PS production starts at the grandparent level (GPS), with six poultry companies (Al Wataneya, two for CPC, Al Wadi, Al Aasema and Tiba) having GPS capacity of 560 000 bird spaces. In the last two years the actual number of GPS has increased. The GPS is imported into Egypt from different parts of the world as DOC under supply contracts with major genetics companies. Most of commercially traded "exotic" broiler crosses are available on the Egyptian market from widely used ROSS and Cobb to Arbor Acres, Indian River and Hubbard. The quality of course varies but since there are many players on the market the choice is always there.

Feed quality and availability

The availability of good quality feed does not seem to be an issue for the Egyptian broiler poultry industry. All vertically integrated companies own and run their own feed mills and also sell poultry feed to the farms from categories 2 and 3. The main concern that was brought up during numerous meetings and visits was related to the quality of imported yellow corn. This particular ingredient can be one of the main sources of micotoxins in poultry feed. Apparently the quality of imported yellow corn depends directly on the price the importer is willing to pay. The micotoxins issue can be fixed by the adsorbent introduction into the feed which is commonly practiced.

Access to best management and veterinarian practices

Egyptian broiler poultry industry enjoys broad access to world best management and veterinarian practices. Global manufacturers of the equipment, vet medications and vaccines, feed additives, etc. are present on the Egyptian market. NLQP and its field divisions are well equipped and the staff is well trained. At the same time it seems that the execution is the biggest issue on most of the poultry operations. Even some category 1 companies have room for improvement concerning management and veterinarian practices.

Biosecurity issues

The biggest issue related to biosecurity in Egyptian poultry industry is the situation with AI. As the small scale commercial broiler farms represent the major element of poultry industry in the country, most fattened broilers marketed alive, with weak biosecurity practices in these farms, one dose with no booster and variable vaccination programs of inactivated H5 vaccines, with lack of sentinel chickens, mask and facilitate silent transmission which coupled by weak monitoring and surveillance of these farms, most of broiler farms are located near to or even in villages and close to each other, make the broiler farms the riskiest node for disease transmission and considered a critical control point. On the other hand, even large scale commercial operations have room for biosecurity improvement. It is scientifically proven that even low pathogen avian influenza strain H9N1 can cause severe mortality when acting in association with other infections like Mycoplasma, NDV, IBV etc. This means that the farms with low biosecurity level suffer a great deal not only from HPAI but from co-action of LPAI and other infections which leads to high mortality and significant increase in cost of production.

LBMs and poultry shops absorb from 60 to 80 percent of total poultry commercial production in the country. The live bird market is one of most critical points in the poultry value chain. It links commercial

and small-scale household producers, traders and consumers; the estimated volume of daily live chicken traded ranges from 1.3 to 1.6 million birds in the summer and winter seasons, respectively. Lack of notification, bird tracing systems, registration of intermediaries, traders, peddlers transporters and retailers, in addition to minimal, if any, veterinary inspection in traditional LBMs facilitates movements of diseased and low quality birds from commercial farms to small-scale household production units and among small-scale household producers, which provide ample conditions for virus amplification and may therefore be important reservoirs for HPAI or "hubs" of circulation.

Another issue with vaccinating against HPAI is related to the extreme ability of the virus to mutate. Maximum vaccination efficiency can be achieved with vaccines produced from the circulating strains (Chinese experience). Western vaccine companies are reluctant to make vaccines targeted to local markets because of cost. In this regard Egypt has been taking a considerable effort to track the circulating strains and update the vaccines against AI accordingly. It is important to remember that vaccination that poorly matches the circulating strains is likely to create an endemic situation. If vaccines are used they must greatly reduce virus shedding. Also it is important to remember about zoonotic potential of AI virus.

Since Egyptian poultry industry has taken a strategy to vaccinate since the first outbreak of AI (an alternative strategy could have been eradication) it is important to remember that using vaccination in AI control significantly if not completely reduces the ability to export. Most countries will ban imports of poultry from the country with HPAI outbreaks and use the situation as non-tariff trade barrier to protect the local poultry production. At the moment the potential of the internal Egyptian market for poultry meat consumption is tremendous but to address the export potential in the future eradication strategy has to be considered.

In addition to AI pressure the common viral and bacterial infections contribute to high mortality and cost increase especially in sector 3 farms. Since sector 3 farms account for over 70% of the broiler production in Egypt they have to be strongly encouraged to adopt GMP principles and at least very basic bio security measure (all in – all out, foot basins, fence or single entry point, showers and working clothes for personnel, etc.)

Slaughterhouse/cold chain capacity and evaluation

The total number of poultry slaughterhouses was reported to be 309 units in 2015, according to the data and statistics of The General Organization for Veterinary Services at the Ministry of Agriculture. These slaughterhouses are divided into manual, semi-automatic and fully automated slaughterhouses. Manual slaughterhouses are the most common throughout the country, totaling 200 units, i.e. 65% of the total number of poultry slaughterhouses in Egypt. There are also 62 semi-automated slaughterhouses, 20% of the total number of poultry slaughterhouses. As for modern automated slaughterhouses, there are only 47 slaughterhouses, 15% of the total number of poultry slaughterhouses in Egypt. The slaughtering capacity of all slaughterhouses is indicated to be around 2 million birds per day at two shift operating schedule according to the Egyptian Poultry Association. The location of the slaughterhouses nationwide does not match growing capacity locations.

Governorates	Total annual chicken production (finishing) capacity, heads	Total actual chicken production (finishing) capacity, heads	Manual slaughterhouses	Semi-automatic slaughterhouses	Automated slaughter-houses	Chickens slaughtered in the slaughterhouses, heads
Alexandria	20 655 050	15 479 400	3	8	2	785 044
Behera	91 091 430	68 844 350	3	2	7	21 990 564
Gharbia	89 673 900	54 137 100	5	1	2	579 700
Kafr El_sheikh	53 740 120	25 658 947	1	2	-	-
Dakahlia	80 997 655	61 901 740	2	3	2	2 893 656
Damietta	23 058 500	13 819 585	2	2	1	4 098 468
Sharkia	158 852 170	108 574 450	8	9	7	21 884 719
Ismailia	30 266 300	17 849 000	6	4	5	3 958 583
Port Said	1 052 150	159 000	2	-	-	-
Suez	900 900	330 398	1	1	1	247 129
Menoufia	20 355 700	10 486 000	8	2	2	447 355
Kalyoubia	57 062 500	46 802 000	24	4	5	6 976 453
Cairo	3 604 000	3 253 000	52	-	1	7 830 233
Lower Egypt	631 310 375	427 294 970	117	38	35	71 691 904
Giza	23 963 750	14 860 130	59	5	3	12 984 364
Beni Suef	11 042 000	5 924 000	2	2	3	640 535
Fayoum	25 960 600	16 691 500	2	4	1	306 971
Menia	46 239 000	31 584 000	3	4	-	487 267
Middle Egypt	107 205 350	69 059 630	66	15	7	14 419 137
Assiut	17 255 100	11 733 000	6	3	-	185 200
Suhag	12 012 340	7 593 942	-	1	3	123 027
Qena	4 078 140	2 080 123	2	1	1	244 424
Luxor	1 854 000	1 168 000	1	-	-	300
Aswan	124 000	52 500	1	-	-	8 352
Upper Egypt	35 323 580	22 627 565	10	5	4	561 303
Matrouh	15 831 850	8 833 550	-	1	-	-
Noubaria	72 971 500	52 349 600	-	-	-	-

North Sinai	27 892 000	7 191 160	2	1	-	1 294
South Sinai	183 350	164 000	-	1	-	-
New Valley	1 645 500	1 251 200	3	1	-	-
Red Sea	275 745	229 000	2	-	1	34 124
Out of Valley	118 799 945	70 018 510	7	4	1	35 418
General Total	892 639 250	589 000 675	200	62	47	86 707 762

Source: The Economic Affairs Sector at Ministry of Agriculture and Land Reclamation, Statistical bulletin on poultry production, 2015

This situation creates another constraint on the way of eliminating LBM. The slaughterhouse capacity utilization is also very low. According to statistical report of Economic Affairs Sector of MALR, in 2015 out of 589 million broiler chicken produced only 86,7 million have been slaughtered by the slaughterhouses. The rest was consumed by the LBM. For instance, the utilization of slaughtering capacity by Al Wataneya Group has been close to 15%.

Assuming that at some point all broiler growing units/farms are utilized at 100% of their capacity and the annual number of broiler chickens produced will exceed 900 million, LBM is minimal, the industry will face at least 35% slaughtering capacity deficit that equals around 1 million birds per day. Not to mention the inferior equipment standard of manual and semi-automatic slaughterhouses that also lack cold storage capacity tremendously. This results in poor quality of slaughtered poultry products which increases the chance of transmitting zoonotic food borne disease agents e.g. Campylobacter, Listeriosis, Salmonella which will lead to loss of public confidence and marketing disasters.

Cold storages that are capable of maintaining 0 - +4 and -18 degrees Celsius temperature range and belong to the private and investment sectors are commonly found in Egypt. Very often their premises are being rented to store poultry, meat, fish, meat products, fruits and vegetables by both private companies and GOE entities. Other than such cold storages there are other facilities located at the poultry slaughter plants.

The number of cold storages that are licensed by the GOE increased from 1328 units in 2007 to 1843 units in 2016 with an increase of around 39% within nine years.

The following table shows the number of cold storages from 2007 until 2016, their size and their storing capacity.

Table 1 - Number of cold storages and their capacity

Year	Number of cold storages	Size in cubic meters	Actual storing capacity in tons
2007	1328	2,607,204	2,052,605
2008	1386	2,647,718	1,883,063
2009	1475	2,679,494	1,670,702
2010	1572	2,587,819	1,837,518
2011	1607	2,665,611	1,977,471
2012	1650	2,752,304	2,734,599
2013	1560	2,380,261	2,328,310
2014	1667	2,365,710	2,214,436
2015	1739	2,151,529	2,153,448
2016	1843	2,474,974	2,170,525

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

An increase in cold storage capacities was due to the increased demand for them by poultry, meat and fish importers as well as vegetable and fruit producers and exporters. However, the year 2013 which is the year of the revolution, is considered to be the year when cold storages have been mostly harmed and some of them have stopped operating.

75% of the total number of cold storages (1376 units) are capable of functioning in the temperature range above freezing. 25% of the total number of cold storages (467 units) are capable of functioning in the temperature ranges above and below freezing.

According to data and statistics of the MALR, Egypt had 467 cold storages in 2016 capable of functioning in the temperature ranges above and below freezing. They have been mostly used for poultry and red meat storage. The cold storages that are capable of functioning in the temperature range above freezing have been mostly used for fruits and vegetables.

It is important to note that with chilled poultry market development the need for cold storages that are capable of functioning in the temperature range above freezing will increase. The poultry producers will be competing with fruits and vegetable producers for the cold storage space.

Marketing approach

It has been pointed out previously that Egypt's consumption of poultry is around 1200 million birds, the equivalent of around 1125 million tons of poultry meat.

According to the interviews carried out with a number of experts at the Egyptian Poultry Association, poultry meat that is sold at LBM is the most common type on the Egyptian market. The consumption of poultry meat from live poultry vendors reached around 720 thousand tons in 2016, with a relative share of 64% followed by frozen poultry, part of which is imported, with Egypt's total consumption of it reaching around 327 thousand tons, 29% of the total consumption of poultry meat in 2016. As for chilled poultry and poultry meat products, their relative share has reached around 7%, with a total consumption of 78

thousand tons which points to the small size of the chilled poultry market in Egypt. In general the Egyptian poultry market is volume not value driven which is very common for the developing markets.

Table 2 - Consumption of different types of poultry meat in 2015 and their relative share

Live Chicken (Fresh)	720	64%
Frozen Chicken	327	29%
Chicken Products	36	3%
Chilled Chicken	42	4%
Total	**1,125**	**100%**

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Types of poultry purchased by Egyptians

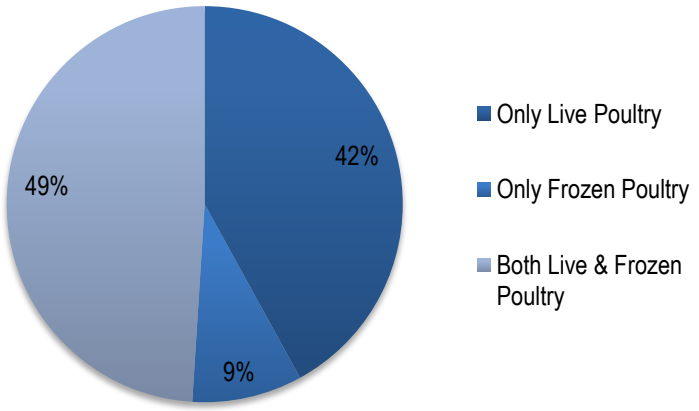
A study carried out by Al Gammal for Research in 2016, covering a target group of poultry consumers in Egyptian cities in Greater Cairo, Alexandria and the Delta has showed that 49% of the families purchase both live and frozen poultry, while 42% purchase only live poultry and 9% purchase only frozen poultry.

Table 3 - Types of whole poultry purchased by consumers

Types of whole poultry purchased by consumers	Number of answers	%
Only live Poultry	84	42%
Only Frozen Poultry	19	9%
Both live and Frozen Poultry	99	49%
Total	**202**	**100%**

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 4 - Types of whole poultry purchased by consumers (based on sales)



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

The inclination for purchase for various types of poultry differs across the different governorates. In Greater Cairo 46% of the respondents purchase both fresh (live) and frozen poultry together, compared to 80% in Alexandria and 40% in Delta. These results indicate that the consumption of live poultry is still generally the main habit of people in the Delta area, as the market size of frozen poultry is 43% in

Gharbeya and 37% in Behera. The market size of frozen poultry is higher in Alexandria at 83%, compared to 62% in Greater Cairo area.

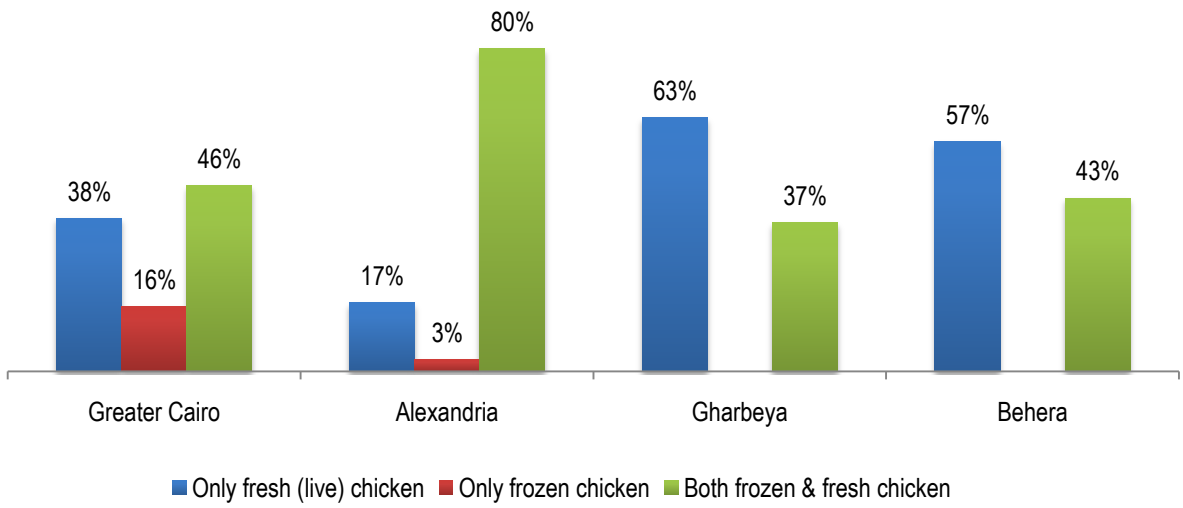
As for buying live poultry only, it is purchased by 57% in Gharbeya, 63% in Behera, 38% in Greater Cairo and 17% in Alexandria. Frozen poultry is purchased only by 16% in Cairo and Giza, 3% in Alexandria and it isn't purchased by anyone in Gharbeya or Behera.

Table 4 - Types of whole chicken purchased by consumers, according to the geographical area

Types of purchased poultry	Greater Cairo	Alexandria	Gharbeya	Behera
Only live chicken	%38	%17	%63	%57
Only frozen chicken	%16	%3	-	-
Both frozen and live chicken	%46	%80	%37	%43
Total	**%100**	**%100**	**%100**	**%100**
	(112)	**(30)**	**(30)**	**(30)**

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 5 - Types of whole chicken purchased by consumers, according to the geographical area



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

The consumers' behavior of purchasing live poultry

97% of consumers who purchase live poultry buy it from live poultry shops, while the rest buy directly from farms. The majority (95%) of these respondents get the poultry slaughtered and cleaned at the live poultry shop and sometimes cut it into parts as well. On the other hand, 4% of the respondents take the poultry alive from the fresh poultry shop and slaughter it themselves.

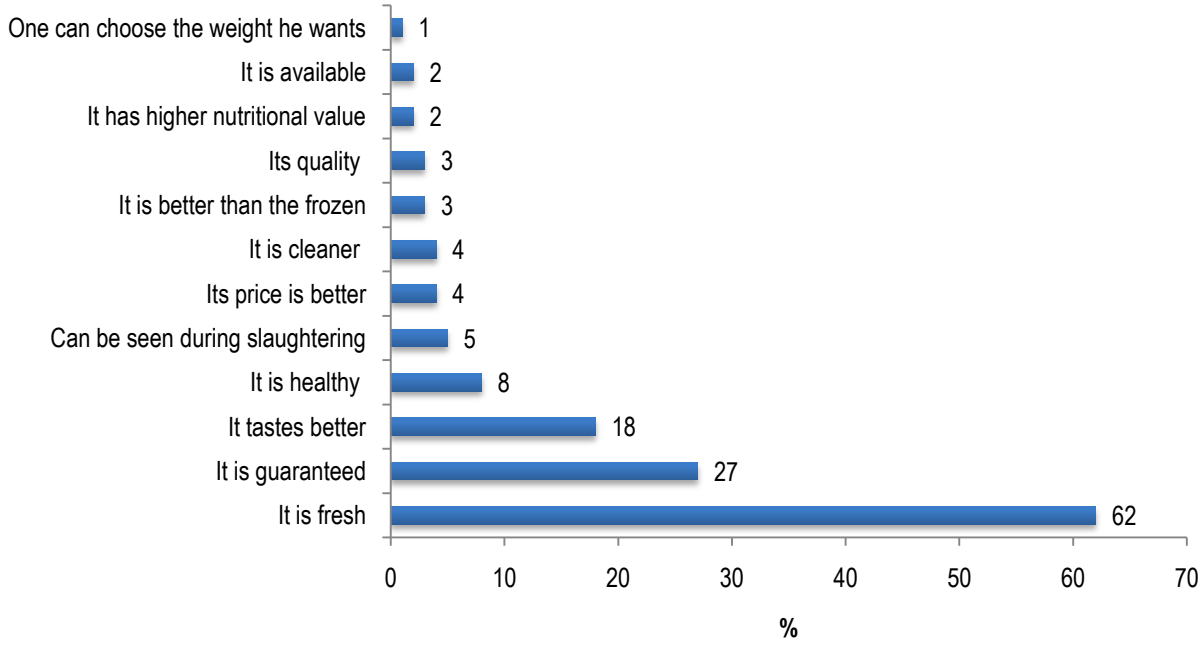
The reasons for preferring fresh poultry are the following: because it is fresh (62%), they have confidence in it (27%), it tastes better than frozen poultry (18%), it is healthy (8%), they see it while it is being slaughtered (5%), the price of fresh poultry is better (4%), it is cleaner (4%), it is generally better than frozen poultry (3%). The total count is more than 100%, because the respondents used to mention more than one reason for their preference.

Table 5 - Reasons for purchasing live poultry

Reasons for purchasing live poultry	Number of answers	%
It is fresh	113	62
It is guaranteed	50	27
It tastes better	32	18
It is healthy	15	8
Can be seen during slaughtering	9	5
Its price is better	8	4
It is cleaner	7	4
It is better than the frozen	6	3
Its quality	6	3
It has higher nutritional value	4	2
It is available	3	2
One can choose the weight he/she wants	2	1
Total number of those who purchase live poultry	**183**	

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 6 - Reasons for purchasing live poultry



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Past purchase experience of frozen poultry by those who only purchase live poultry

57% of the respondents, who currently only purchase live poultry, pointed out that they had purchased frozen poultry in the past while 43% of the respondents, who only purchase live poultry, pointed out that they have never purchased frozen poultry before.

The reasons behind not purchasing frozen poultry anymore in the opinion of these respondents were that it couldn't be guaranteed 20%, it tasted different 20%, it was of inferior quality 14%, it was greasy 13%, it

was too soft 11% and its broth was bad 11%. In addition to some answers that were repeated only once or twice there were the following answers: it looked bad, the chicken was different, it was rotten, it was full of ice and that it was unavailable.

As for the respondents who have never purchased frozen poultry before, their insights were: that they believed it was not guaranteed 87%, they did not like it 19%, it was unhealthy 17%, they found it disgusting 3% and it did not spend enough time in the ice 3%.

When the respondents who stopped purchasing frozen poultry were asked what would make then consume frozen poultry again, 25% said they would if it was cheaper, 16% said if its general appearance was appealing, 14% said if it was clean, 15% said if it was guaranteed, 9.5% said if it was fresh, 9.5% said if it was of a high quality, 5% said if it was available, 3% said if its validity was suitable, 2% said if it was not soft meat and 1% said if it was monitored by the Ministry of Health.

Reasons for Purchasing Frozen or Chilled Poultry

The reasons why respondents purchase frozen or chilled poultry, whether those who only purchase one kind only or who purchase both frozen and chilled poultry, as well as live poultry were: that it was cheaper 51% which shows that the main factor for purchasing frozen or chilled poultry is the price; that it was quick to prepare in the opinion of 33% of the respondents; that it was readily available 15%; it tasted good 9% and that it was easy to store 6%.

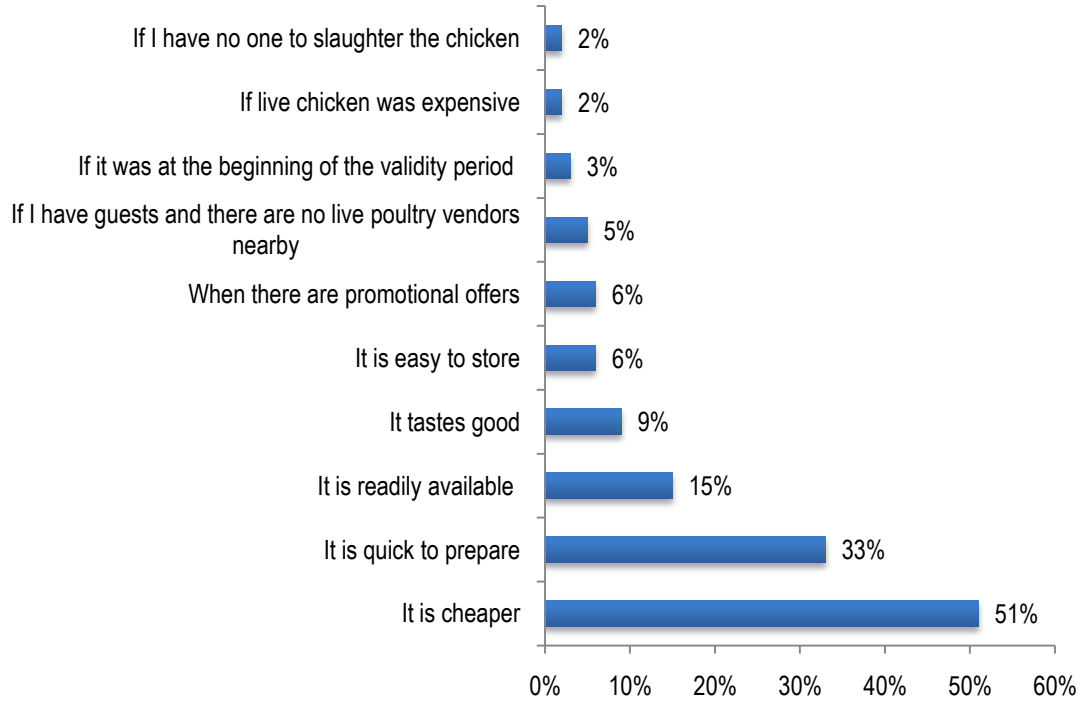
Moreover, 6% of the respondents purchase frozen poultry if there was a price offer on it. Of course, the percentage exceeds 100% in the following table, because the respondents mentioned more than one reason for purchasing frozen or chilled poultry.

Table 6 - Reasons for Purchasing Frozen or Chilled Poultry

Reasons for purchasing frozen or chilled poultry	Number of answers	%
It is cheaper	60	%51
It is quick to prepare	39	%33
It is readily available	18	%15
It tastes good	11	%9
It is easy to store	7	%6
When there are promotional offers	7	%6
If I have guests and there are no live poultry vendors nearby	6	%5
If it was at the beginning of the validity period	4	%3
If live chicken was expensive	2	%2
If I have no one to slaughter the chicken	2	%2
Total number of respondents	**118**	

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 7 - Reasons for purchasing frozen or chilled poultry



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

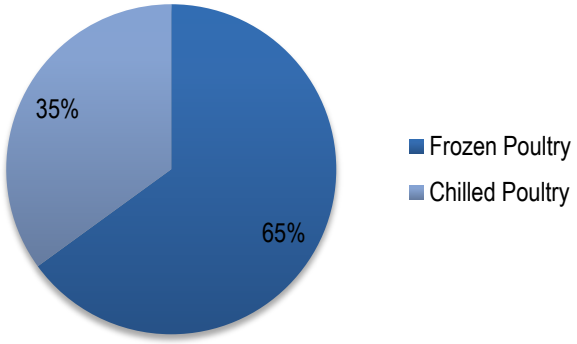
Preferring frozen vs. chilled poultry

65% of the respondents preferred frozen poultry, while 35% preferred chilled poultry

Preferring frozen vs. chilled poultry	Number of answers	%
Frozen Poultry	66	%65
Chilled Poultry	36	%35
Total	**102**	**%100**

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 8 - Preferring frozen vs. chilled poultry (based on sales)



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Reasons for preferring frozen poultry

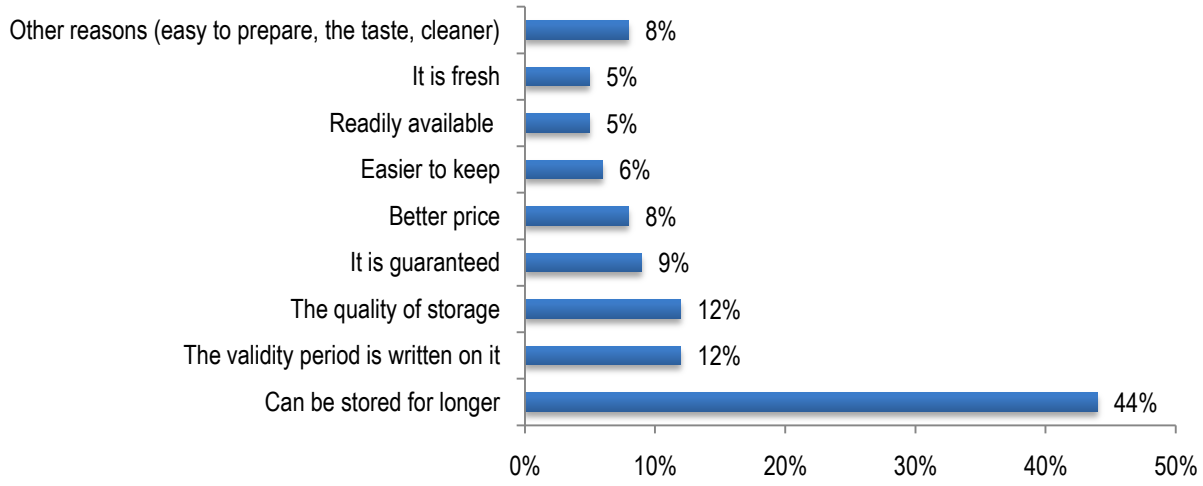
The reasons for preferring frozen poultry were related to intention to store the poultry for a longer period in home fridges 44%, the production date and validity period were written on it 12%, the quality of its storage 12%, it was guaranteed 9%, the price was suitable 8%, it was easier to store 6% and it was readily available 5%.

Table 7 - Reasons for preferring frozen poultry

Reasons for preferring frozen poultry	Number of answers	%
Can be stored for longer	29	%44
The validity period is written on it	8	%12
The quality of storage	8	%12
It is guaranteed	6	%9
Better price	5	%8
Easier to keep	4	%6
Readily available	3	%5
It is fresh	3	%5
Other reasons (easy to prepare, the taste, cleaner)	5	%8
Total number of respondents who preferred frozen poultry	**66**	

Source: El Gammal for Research and Marketing & Business Consultancy, 2017

Figure 9 - Reasons for preferring frozen poultry



Source: El Gammal for Research and Marketing & Business Consultancy, 2017

The most important reasons for preferring chilled poultry were the freshness 56%, there were no preservatives in it and had a short validity period 28%, it has not been frozen 8%, it was more guaranteed 8% and the taste was better 6%.

Moving from a LBM based to a slaughterhouse dominant poultry production system would require changing consumer habits, which necessitates the ongoing of a long term tailored, well planed public awareness, marketing, and effective communication campaign as well as significant investment of the industry in such marketing tools as slaughtering capacity and cold chain. At the moment organized retail (supermarket chains) play insignificant role in poultry meat marketing. Role of the growing supermarket chains in promoting chilled poultry consumption has to be addressed through awareness building campaigns targeted at handling chilled poultry by the stores and explaining the important role of poultry meat as key value item for the supermarket chains and traffic building category.

Benchmarking of broiler industry performance indicators in Egypt against other countries

The current cost of production reported by the vertically integrated companies is around USD 1,35 – 1,37 per kg of dressed meat. This production cost is comparable with Argentina and the US average cost of production and higher than Brazilian average cost of production which is around USD 1,16 per kg of dressed meat (according to RaboBank analysis based on WRU 2017). Brazil is the biggest current supplier of imported poultry meat with its share of close to 90% and it is clear that there are producers in Brazil that achieve cost of production around USD 1,00 per kg of dressed meat. The current delivery cost (sea freight only) will not exceed USD 0,17 per kg. By adding handling cost, internal logistics cost (transport and cold storage) in the country of origin and in Egypt of another USD 0,10 – 0,15 per kg the cost of Brazilian chicken delivered to Egypt to some particular cold storage (under the current market conditions) will be close to USD 1,27 – 1,32 per kg of frozen poultry. This means that vertically integrated Egyptian poultry producers are theoretically competitive on the domestic market with the most efficient global poultry producers even under the free market conditions. At the same time the cost of production on the farms of 2 and 3 categories that account for over 70% of broiler industry is at least 15 – 20% higher than on the farms of the

1 category. In addition farms of the 2 and 3 categories predominantly work with LBM. This means that they avoid any cold chain which adds to the operational cost of final product not counting additional investment cost into the slaughtering capacities and cold chain that will be required during the transformation of LBM sales into the chilled poultry meat marketing.

In the table below there are some key performance indicators for the large poultry producing countries.

	Compound feed price (USD/100 kg)	DOC Price (USD/100 heads)	FCR	Live weight	Wages USD/hr	Total cost whole chicken
Egypt	**36,0**	**28,0**	**1,80**	**1,8**	**2,0**	**157,0**
Netherlands	36,0	34,7	1,61	2,3	24,2	168,3
Poland	35,9	35,2	1,65	2,3	6,6	152,9
Thailand	34,7	31,8	1,68	2,4	2,2	155,1
Russia	31,8	35,8	1,75	2,1	3,85	149,6
US	28,9	27,6	1,86	2,7	15,4	135,3
Argentina	28,6	28,1	1,83	2,1	6,6	135,3
Ukraine	24,0	35,2	1,80	2,5	2,2	123,2
Brazil	26,0	27,0	1,79	2,6	3,3	116,6

Source: Nan-Dirk Mulder, Senior Animal Protein Analyst of Rabobank, May 2017; Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

Egypt has Netherlands cost of feed which is around 36 USD/100kg. The cost of DOC is close to 28 USD/100 heads for the industry average. Egyptian poultry performs at 1,7 to 1,9 FCR delivering 1,8 – 2,0 kg birds to the market. The average wage does not exceed 2 USD per hour per person. It is obvious that industry average for each given country doesn't show the performance indicators of the best poultry producing companies. Egyptian vertically integrated enterprises are the most efficient ones with lowest cost of production that can be compared with one in Argentina and the USA. Yet, over 70% of the total broiler meat production in Egypt is done by the companies with 15 000 birds within a given cycle with the production cost that will not allow the Egyptian broiler industry to survive in free market conditions.

SWOT analysis

Strengths

- Egypt has access to the sea ports
- GOE policy aimed at protection of domestic producer
- Large internal market with consumption growth that will be stimulated by GDP growth, population growth, individual income growth, urbanization and middle class development
- Access to best management practices, quality inputs and modern technologies
- Very competitive DOC price due to the system of GP and PS management and production

Weaknesses

- Supply chain (cold chain in particular, especially in relationship to marketing side)
- Cost of production that deviates from poor efficiency (high mortality, high FCR, etc.)
- The industry is not consolidated (top 10 largest producers barely account for 20% of the total industrial broiler production)

- Difficult to reduce/control LBM
- Access to capital at reasonable interest rate
- Quality of management
- Slaughter capacities are not sufficient to take all the poultry from LBM; most of the slaughterhouses are manual
- Biosecurity issues related to HPAI outbreaks; limited export possibilities

Opportunities

- Poultry meat representing 43% of the total local consumption of animal protein in Egypt; big internal consumption potential
- Through marketing/awareness building campaign develop a loyal consumer of CHILLED poultry meat that would switch from LBM (campaign that will be developing a consumers' category – chilled poultry meat locally produced)
- Potential exports to Gulf countries and African countries
- Shift from volume driven to product/demand driven market
- Horizontal integration for small and medium scale farmers; vertical integration for large operations
- Develop compartmentalization on new Desert area farms

Threats

- Imports of cheap poultry without taxation (to address inflation pressure by government agencies)
- Continuation of HPAI spreading
- Government support policy is not consistent
- Cost of investment and cost of production on the Desert area farms (infrastructural development and logistics cost)
- Without National transition strategy of shifting from LBM to chilled poultry market price increase for the final consumer is inevitable; social indignation

Assessment of investment requirements for Egyptian poultry industry

General investment opportunities can be roughly divided into investment into existing operations and investment into new operations. Below is the poultry market experts' assumption of minimal investment volume required to upgrade the existing industry and to match the market growth in the next ten years.

Investment into existing operations should be aimed at improving cost of production and making the business model more stress resistant. In addition, such investment should facilitate adoption of the market transformation (for instance, LBM shrinkage). The most vulnerable link in the broiler poultry industry value chain is slaughterhouse capacities and cold chain. Category 3 farms and most of category 2 operations do not own the slaughterhouses and primarily sell to LBM. Manual and semi-automated slaughterhouses do not usually provide descent quality of slaughter services as well as descent quality chilling/storing capacity at the slaughterhouse itself. Greenfield investment into the new slaughterhouse construction with

chilling/storing capacity can easily reach 1 million USD for every 1000 birds per hour slaughter capacity NOT COUNTING INFRASTRUCTURAL INVESTMENT AND PURCHASE OF LAND. For example, a 9000 birds per hour slaughterhouse with necessary chilling, freezing and storing capacity will require investment of roughly 10 million USD. Such slaughterhouse if run properly can utilize 45 million birds per year. The industry requires at least 10 slaughterhouses of such scale which comes to **100 million USD** investments into buildings and equipment only just to match existing production volumes. In the next ten years 10 more slaughterhouses of such processing capacity will be needed. But in real life it is highly unlikely to introduce standardized solutions for the existing businesses. Some companies will require 6000 birds per hour line and some will require even smaller slaughter capacity. The total investment into slaughter capacities in the next ten years is estimated to be **over 200 million USD**.

The cold chain apart from the slaughterhouse cold chain is another important link. The cold chain apart from the slaughterhouse includes climatized delivery trucks, climatized storages/distribution centers and retail outlets equipped to handle chilled and frozen meat products. The investment into climatized transport can easily reach 30 USD per every 1000 birds transported per year. In other words, if current LBM is estimated to be more that 700 million birds per year, the investment into climatized trucks will cost **over 20 million USD** for the industry just to match the current production volumes. In the next ten years the same amount to be invested into climatized trucks to match the growing production volumes and address the needs of a more developed market which will require having more delivery points with smaller volumes delivered to one single delivery point. The total investment into climatized vehicles in the next ten years will be **over 40 million USD.**

Another very important investment has to be dedicated to the specialized retail outlets that hopefully will replace LBM stores. From the practical experience such outlet will be capable of selling approximately 15 000 birds per year. To replace LBM sales with chilled meat marketing there will be a need for approximately 46 000 of such outlets. Each outlet requires approximately 2 000 USD worth of equipment and repair cost (assuming that no investment to purchase the premises will NOT be required). In this case, dedicated retail development will require approximately **100 million USD investments** to match existing production capacities and replace LBMs sales. In the next ten years the influence of organized retail will become stronger and the numbers of new dedicated retail outlets to be developed will unlikely exceed 20 000 units to facilitate marketing of the poultry meat produced by new poultry facilities. This will require over 40 million USD investments. The total investment into dedicated retail outlets that will facilitate the transformation of LBMs in the next ten years will **exceed 140 million USD**.

The investment required for the existing growing units improvement from categories 2 and 3 is almost impossible to assume due to the lack of relevant information that would clearly indicate the need of one or another farm for investment.

For the new operations investment vertically integrated ventures are the most viable and market-stress resilient (price changes of feed or meat, biosecurity, etc.). Vertically integrated operation depending on its scale and size normally consists of a hatchery, growing facility, feed mill, and slaughterhouse with chilling/storing capacity, and slaughter waste processing, fleet of climatized trucks. It can also include a PS farm and a network of retail outlets. Depending on the size and scale the investment for every annual 1000 tons of dressed meat produced can reach **2,5 – 3,0 million USD**. In the nearest ten years the predicted

growth of poultry meat consumption in Egypt will be over 500 000 tons per year. This will require **over 1,2 billion USD investments** into buildings and equipment only. The investment into infrastructure (primarily roads and power supply to the production units) will have to be made as well.

Investment model for the green field vertically integrated operation

Description of production model and size

For the investment model a vertically integrated broiler poultry farm with annual output of about 12 000 tons of dressed meat has been taken. The enterprise is to be built greenfield. The main production units of the enterprise include growing farm, feed mill, slaughterhouse with cold storage, waste water treatment facility, slaughter waste rendering plant, litter accumulating and storing facility. A significant part of investment will be made into important marketing tools – a fleet of climatized trucks and 400 dedicated retail outlets (equipment and renovations only, no premises purchases). If necessity arises the hatchery construction and equipment can be added to the production model at very reasonable cost within 6 to 8 months. The model does not have the hatchery because there are plenty of hatching capacities throughout the country many of them are related to PS farms. The quality of DOC differs but the choice is always there. The feed mill construction was part of the investment due to potential location of the farm itself in the desert area to avoid high logistics cost and have a control over feed quality.

All the buildings on the farm are pre manufactured sandwich panel structure over galvanized carcass. Equipment suppliers that have been selected for this model are mainly of European origin.

The growing facility will have 6 production units built on at list 500 meters distance from each other that will consist of five buildings each with on the floor production system. Each production unit will work with one age DOC under “all in- all out principle”. DOC will be delivered by specialized company trucks from a reliable supplier. Each production unit will be fenced, have disinfection basin at the entrance as well as dedicated building for the personnel to shower and change clothes. The facility will be practicing best biosecurity measures. Chickens will be slaughtered at 34-35 days of age with average live slaughter weight of 1,9 kg. The expected mortality will be 5%. The bird space annual turnover is calculated to be 7,5 times. Vaccination program and vet medication treatment program will be developed according to the field situation and necessary requirements.

At the age of 34-35 days the chicks will be transported by specialized company trucks to the company slaughterhouse. The slaughter will be performed according to HALAL requirements. The chilling will be done by water. The slaughter plant will be capable of cutting 50% of the slaughtered quantity but this model is calculated at whole bird sales only. The slaughter plant will have a capacity of freezing the day production volume but the goal is to market primarily chilled products. The slaughter waste will be processed into the meat meal that will be added back to the feed. The litter will be composted on dedicated grounds and later on sold to the farmers. The waste water will be mechanically and chemically treated before leaving the slaughter plant.

The size of the investment model that was selected for calculation requires significant investment which can be financed by local financial institutions. Yet, this is the size that allows for the vertical integration

(without PS unit). The model of this size can serve as an umbrella that will help transformation of category 2 and partially category 3 farms to fit the new regulations and marketing conditions.

Required investment and working capital

The project requires slightly over 24,5 million USD which means that for every 1000 tons of produced meat the investment will be slightly above 2 million USD. This figure is very optimistic because depending on the manufacturers selected to supply equipment to different production sectors the investment for every 1000 tons of meat produced annually can be easily above 2,5 million USD. The investment plan does not include the infrastructural investment like roads to the farm and power supply provided to the farm gate. The requirement for working capital will be close to 6 million USD.

Marketing plan

Under the marketing plan of this model the goal is to sell 80 % of chilled poultry carcasses through the network of dedicated retail outlets that will be located at “suks” where the live bird vendors normally a based. This network will count 400 dedicated retail outlets that will be renovated and equipped at the cost of the company. The workers of these retail outlets will be the company workers as well. Estimated volume of meat to be sold daily by the outlet is between 50 and 70 kg which is practically possible to achieve from past experiences of other developing countries (like Ukraine and Russia). The sales of cut ups are technically possible and will add value to the business model in the future. In the meantime, some cutting can be done at retail outlets.

20% of the products can be sold to HORECA, wholesalers and supermarkets. In the financial model the payment cycle for the meat delivered to the retail is calculated 14 days which is more than enough when 80 % of the products will be marketed through dedicated retail outlets.

Results of the project and risk resistance

Main project financial results can be found in the table below.

	1q. 2019	2q. 2019	3q. 2019	4q. 2019	1q. 2020	2q. 2020	3q. 2020	4q. 2020	1q. 2021	2q. 2021
Gross sales	6 069 588	6 114 607	6 159 959	6 205 648	6 251 676	6 298 045	6 344 758	6 391 817	6 439 226	6 486 986
Losses	30 348	30 573	30 800	31 028	31 258	31 490	31 724	31 959	32 196	32 435
Net sales	6 039 240	6 084 034	6 129 159	6 174 620	6 220 417	6 266 555	6 313 034	6 359 858	6 407 030	6 454 551
Gross profit	6 039 240	6 084 034	6 129 159	6 174 620	6 220 417	6 266 555	6 313 034	6 359 858	6 407 030	6 454 551
Administrative costs	18 195	18 240	18 286	18 331	18 377	18 423	18 469	18 515	18 561	18 607
Production costs	3 830 573	3 840 114	3 849 678	3 910 145	3 868 879	3 878 515	3 888 175	3 949 247	3 907 568	3 917 300
Marketing costs	84 910	85 122	85 334	85 546	85 760	85 973	86 187	86 402	86 617	86 833
Salary of the administrative personnel	18 750	18 750	18 750	18 750	18 750	18 750	18 750	18 750	18 750	18 750
Salary of production personnel	126 018	126 018	126 018	126 018	126 018	126 018	126 018	126 018	126 018	126 018
Salary of marketing personnel	243 000	243 000	243 000	243 000	243 000	243 000	243 000	243 000	243 000	243 000
Total fixed costs	4 321 447	4 331 244	4 341 066	4 401 791	4 360 784	4 370 679	4 380 599	4 441 931	4 400 514	4 410 508
Depriciation	548 966	548 966	548 966	548 966	548 966	548 966	548 966	548 966	548 966	548 966
Interest rates	572 579	551 994	530 423	508 742	485 144	460 489	434 753	408 821	380 864	351 750
Total non-production costs	1 121 544	1 100 960	1 079 388	1 057 708	1 034 110	1 009 455	983 718	957 786	929 829	900 716
Past losses	5 293 009	4 696 760	4 044 931	3 336 226	2 621 105	1 795 581	909 160			
Profit before tax	-4 696 760	-4 044 931	-3 336 226	-2 621 105	-1 795 581	-909 160	39 556	960 141	1 076 687	1 143 327
Taxable profit	-4 696 760	-4 044 931	-3 336 226	-2 621 105	-1 795 581	-909 160	39 556	960 141	1 076 687	1 143 327
Net profit	-4 696 760	-4 044 931	-3 336 226	-2 621 105	-1 795 581	-909 160	39 556	960 141	1 076 687	1 143 327
TOTAL costs	5 442 991	5 432 204	5 420 454	5 459 499	5 394 894	5 380 134	5 364 317	5 399 717	5 330 343	5 311 224
TOTAL sales, kg	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987
Cost of production, $/kg	1,40	1,40	1,40	1,41	1,39	1,39	1,38	1,39	1,37	1,37

	3q. 2021	4q. 2021	1q. 2022	2q. 2022	3q. 2022	4q. 2022	1q. 2023	2q. 2023	3q. 2023	4q. 2023
Gross sales	6 535 101	6 583 572	6 632 403	6 681 596	6 731 154	6 781 079	6 831 375	6 882 044	6 933 088	6 984 511
Losses	32 676	32 918	33 162	33 408	33 656	33 905	34 157	34 410	34 665	34 923
Net sales	6 502 425	6 550 654	6 599 241	6 648 188	6 697 498	6 747 174	6 797 218	6 847 633	6 898 423	6 949 589
Gross profit	6 502 425	6 550 654	6 599 241	6 648 188	6 697 498	6 747 174	6 797 218	6 847 633	6 898 423	6 949 589
Administrative costs	18 653	18 700	18 746	18 793	18 840	18 887	18 934	18 981	19 028	19 076
Production costs	3 927 057	3 988 739	3 946 643	3 956 473	3 966 328	4 028 626	3 986 110	3 996 038	4 005 991	4 068 913
Marketing costs	87 049	87 266	87 483	87 701	87 920	88 139	88 358	88 578	88 799	89 020
Salary of the administrative personnel	18 750	18 750	18 750	18 750	18 750	18 750	18 750	18 750	18 750	18 750
Salary of production personnel	126 018	126 018	126 018	126 018	126 018	126 018	126 018	126 018	126 018	126 018
Salary of marketing personnel	243 000	243 000	243 000	243 000	243 000	243 000	243 000	243 000	243 000	243 000
Total fixed costs	4 420 528	4 482 473	4 440 641	4 450 736	4 460 855	4 523 420	4 481 170	4 491 365	4 501 586	4 564 776
Depriciation	548 966	548 966	548 966	548 966	548 966	548 966	548 966	548 966	548 966	548 966
Interest rates	321 454	290 867	258 140	224 149	188 865	153 188	115 025	75 824	63 261	42 174
Total non-production costs	870 419	839 832	807 106	773 115	737 831	702 154	663 991	624 789	612 227	591 140
Past losses										
Profit before tax	1 211 478	1 228 349	1 351 494	1 424 337	1 498 812	1 521 600	1 652 057	1 731 479	1 784 610	1 793 672
Taxable profit	1 211 478	1 228 349	1 351 494	1 424 337	1 498 812	1 521 600	1 652 057	1 731 479	1 784 610	1 793 672
Net profit	1 211 478	1 228 349	1 351 494	1 424 337	1 498 812	1 521 600	1 652 057	1 731 479	1 784 610	1 793 672
TOTAL costs	5 290 947	5 322 305	5 247 747	5 223 851	5 198 686	5 225 574	5 145 161	5 116 154	5 113 813	5 155 916
TOTAL sales, kg	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987	3 881 987
Cost of production, $/kg	1,36	1,37	1,35	1,35	1,34	1,35	1,33	1,32	1,32	1,33

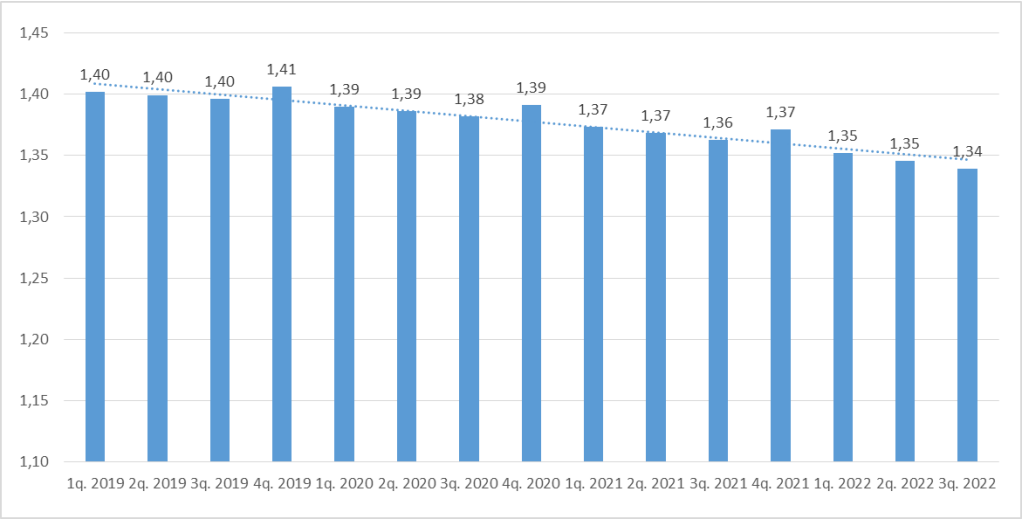
Source: Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

It is important to note that this financial model assumes 0% VAT and Profit tax. The annual interest rate used for the calculation is 7%. The discount rate used for calculation is 3,5% which roughly equals deposit rates in USD in main commercial banks of Egypt. The selling price calculated in the model is equal to 1,60 USD for the kg of chilled carcass. This wholesale price will allow for only 10 – 12% retail mark up if we want to maintain the LBM prices for the chilled meat that was industrially produced. This goal is achievable with current model because the marketing plan assumes 80% sales through dedicated own retail outlets. This particular point is very important for the success of transformation process from LBM to chilled industrially slaughtered poultry sales since the consumers will always benchmark the price of the chilled poultry meat against the price of “fresh” poultry meat from LBM. From the consumer research described earlier in the

report it is clear that price is one out of two important triggers that influence the decision whether to buy chilled or frozen industrially slaughtered poultry or “fresh” poultry meat from LBM. The issue is whether the supermarkets are willing to work with 10 – 12% retail markup on the poultry? And the answer is probably not. Their minimal target will be 20 – 25% and this is the challenge to be faced by poultry producers in the future with increasing role of supermarkets in marketing of poultry.

The current business model also demonstrates that earlier assumptions regarding cost of poultry production in Egypt are realistic and possible to achieve.

Below is the cost of production table, $/kg of meat.



Source: Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

Below is the table with integrated indicators of the project.

Indicator	Value
Project horizon, **T**	72 months
Discount rate, **D**	3,50 %
Pay-Back Period, **PB**	66 months
Discounted Pay-Back Period, **DPB**	71 months
Accounting rate of return, **ARR**	19,27 %
Net present value for 72 months of the project, **NPV**	4 731 704 USD
Net present value discounted for 72 months of the project, **NPVD**	1 019 229 USD
Profitability Index , **PI**	1,03
Internal rate of return , **IRR**	4,60 %
Modified Internal Rate Of Return , **MIRR**	3,93 %

Source: Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

It is obvious from the table above that 5,5 year payback period reduces the attractiveness of broiler poultry industry for the investment. Below is the table of indicators used in Monte-Carlo method to stress test current investment model. These indicators reflect the biggest risks that poultry industry as a whole and current business model in particular is likely to face.

Indicator	Deviation	
	- %	+ %
Change of production volume	-15	0
Change of selling prices	-15	10
Change of general production costs	-10	100
Change of electricity cost	0	30
Change of electricity consumption	-10	25
Change of feed cost	-10	25
Change of DOC cost	0	30
Change of packaging and labeling cost	0	50
Change of fuel cost	0	25
Change of marketing cost	0	50
Change of labor cost	-10	30

Source: Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

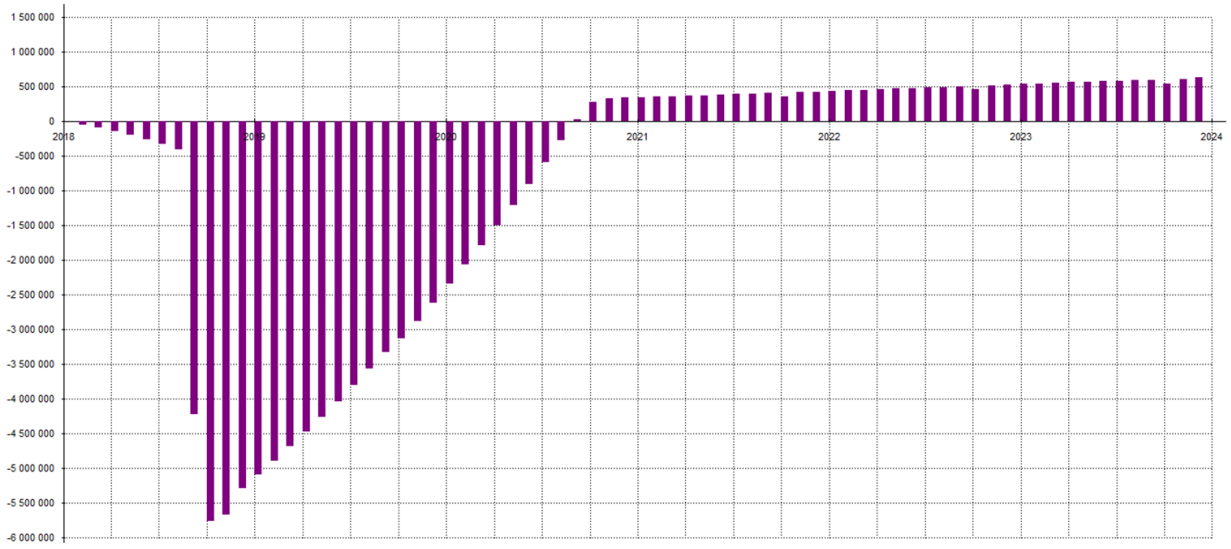
Below is the table with Risk-based integrated indicators of the project calculated with Monte-Carlo method. The payback period has significantly deteriorated.

Indicator	Value
Discount rate, **D**	3,50 %
Pay-Back Period, **PB**	77 months
Discounted Pay-Back Period, **DPB**	83 months
Accounting rate of return, **ARR**	17,39 %
Net present value for 72 months of the project, **NPV**	1 679 276 USD
Profitability Index , **PI**	1,00
Internal rate of return , **IRR**	3,93 %
Modified Internal Rate Of Return , **MIRR**	2,78 %

Source: Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

Below is the chart with net profit of the project, $

Although the project generates the net profit and shows the ability of paying off the debt, under current market conditions the model of poultry meat production is very vulnerable to negative market trends and main integrated indicator in the tables above prove this assumption.



Source: Yevgen Shatokhin, International Poultry and Livestock Consultant, Investment Centre Division, FAO

Conclusions and recommendations

Conclusions

- The Egyptian poultry industry is not consolidated; top 10 largest producers barely account for 20% of the total industrial broiler production. Over 70% of the total industrial broiler meat production is done by the farms with less than 15 000 birds per cycle with poor biosecurity level and high cost of production. Policy changes are difficult to implement.
- Vertically integrated well managed companies are capable of competing on the Egyptian domestic market with main poultry producing countries even under free market conditions.
- The internal poultry market in Egypt is substantial and will likely grow by more than 30% in the next 10 years. It is protected by 30% import tax for poultry. It is currently dominated by live poultry sales. When buying at LBM the consumers are looking for fresh, properly (according to HALAL principles) slaughtered poultry at reasonable price. Consumers will benchmark the cost of purchased chilled or frozen poultry against the cost of "fresh" meat from LBM.
- Prospective of poultry export from Egypt is doubtful in the nearest future due to HPAI situation and average high cost of production in the industry.
- The poultry industry in Egypt will remain dependent on import of main production inputs (mainly feed components).
- GOE is not consistent in its support of the domestic poultry industry.
- Substantial investment will be needed into the poultry sector in the nearest future both into existing operations (primarily into slaughter capacities and cold chain) and into new ventures (primarily green field vertical integrations).

Recommendations

- National Poultry Sector Development Policy and Strategy needs to be developed – the GOE has to make a clear statement how it sees the development of the poultry industry itself and what are the changes and input expected from all players of the supply chain. Poultry production in Egypt is diverse and serves both production and socio-economic purposes, whereby also cultural traditions cannot be ignored. There should be clear division of public and private responsibilities and tasks, whereby the government wholeheartedly delegates certain tasks to the private sector and concentrates on its regulatory and monitoring tasks. GOE also needs to outline its support to the industry in one clear document.
- GOE could set the payment delay periods for live birds delivered to the slaughter plant and for the poultry meat delivered to retail. These measures will help LBM reduction and improve the cash flow of the poultry companies.
- Massive national awareness building campaign has to be developed and launched to promote chilled industrially slaughtered poultry meat as equal alternative to "fresh" poultry from LBMs. This can be also one of the instruments to protect national poultry industry from imported poultry since chilled poultry cannot be imported. The role of Egyptian Poultry Association can be significant in this process.
- Awareness building campaign for supermarkets needs to be developed by the industry to promote chilled poultry meat proper handling and its role as key value item that facilitates customer traffic building.
- Outreach programs and educational events have to be developed and delivered to sector 2 and 3 farms to promote good management practices implementation and improvement of biosecurity.

Through these outreach programs the transformation and development scenarios can be communicated as well.

- GOE needs to consider development of programs that will help financing LBM transferring strategy by providing payable loans to the poultry companies for development of dedicated retail outlets that will be selling chilled and frozen poultry meat not the live birds. Another GOE initiative can be partial compensation from the State budget of interest rate to the companies that are building new vertically integrated poultry facilities in the Desert areas.

List of sources

1. «The Structure and Importance of the Commercial and Village Based Poultry Systems in Egypt», Dr. Farid A. Hosny, M.R.C.V.S, 24.11.2006
2. «Characterization of the poultry production sectors and identification of policy gaps for HPAI control in Egypt», Consultancy Report by Dr. Farid A. Hosny for Food and Agriculture Organization of the United Nations, ECTAD, Egypt, January 2009
3. «A PRELIMINARY STUDY INTO EGYPT'S POULTRY VALUE CHAINS, THEIR ORGANISATION AND THE ROLE THEY CAN PLAY IN THE CONTROL OF HPAI
   FOR FAO/AGAH and FAO-ECTAD», Anton van Engelen, February FOR FAO/AGAH and FAO-ECTAD, February 2011
4. «Poultry Consumer Needs and Preferences In Egypt» Emergency Centre for Transboundary Animal Diseases (ECTAD) Food and Agriculture Organization of the United Nations, June, 2011 Cairo, Egypt
5. «Dataset: OECD-FAO Agricultural Outlook 2017-2026» , data extracted on 16 Jul 2017 20:44 UTC (GMT) from OECD.Stat
6. «Russian Federation Meat sector review» Dmitry Prikhodko Economist, Investment Centre Division, FAO, Albert Davleyev National Meat Consultant, Investment Centre Division, FAO, country highlights prepared under the FAO/EBRD Cooperation, Rome 2014
7. «OECD‑FAO Agricultural Outlook 2017‑2026» Special focus: Southeast Asia
8. «Research report on Poultry Market in Egypt» presented to Food and Agriculture Organization, prepared by: El Gammal for Research and Marketing & Business Consultancy, October 2017
9. «From local to global - Shaping Russia's export potential in poultry», Nan-Dirk Mulder, 23 May 2017
10. « Time for Africa», Capturing the African Poultry Investment Opportunity, Nan-Dirk Mulder, Senior Animal Protein Analyst of Rabobank, February 2017
11. «From local to global: shaping Russia's export potential in poultry», Nan-Dirk Mulder, Senior Animal Protein Analyst of Rabobank, May 2017
12. «An updated overview on poultry value chains and associated public and animal health risks, in Egypt» Emergency Centre for Transboundary Animal Diseases (ECTAD) Food and Agriculture Organization of the United Nations, September, 2016
13. «Avian Influenza in Africa» David L. Suarez D.V.M., PhD. A.C.V.M., Southeast Poultry Research Laboratory, United States National Poultry Research Center
14. The Economic Affairs Sector at Ministry of Agriculture and Land Reclamation, Statistical bulletin on poultry production, 2015
15. World Bank Open Data; www.worldbank.org
16. Index Mundi Country Facts; www.indexmundi.com
17. USDA Foreign Agricultural Service; www.fas.usda.gov
18. Personal interviews with GOE and Egypt poultry industry representatives