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รายงานอุตสาหกรรม

F R O S T & S U L L I V A N

Independent Market Research on the Animal Farming Industry in Thailand

Final Report

November 17, 2014

The market research process for this study has been undertaken through secondary/desktop research as well as primary research, which involves discussing the status of the market with leading participants and experts. The research methodology used is the Expert Opinion Consensus Methodology. Quantitative market information was sourced from interviews by way of primary research, and therefore, the information is subject to fluctuations due to possible changes in the business and market climate. Frost & Sullivan's estimates and assumptions are based on varying levels of quantitative and qualitative analyses, including industry journals, company reports and information in the public domain.

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Frost & Sullivan has prepared this study in an independent and objective manner, and it has taken adequate care to ensure its accuracy and completeness. We believe that this study presents a true and fair view of animal farming industry in Thailand, within the limitations of, among others, secondary statistics and primary research, and it does not purport to be exhaustive. Our research has been conducted with an "overall industry" perspective, and it may not necessarily reflect the performance of individual companies in the industry. Frost & Sullivan shall not be liable for any loss suffered because of reliance on the information contained in this study. This study should also not be considered as a recommendation to buy or not to buy the shares of any company or companies as mentioned in it or otherwise.

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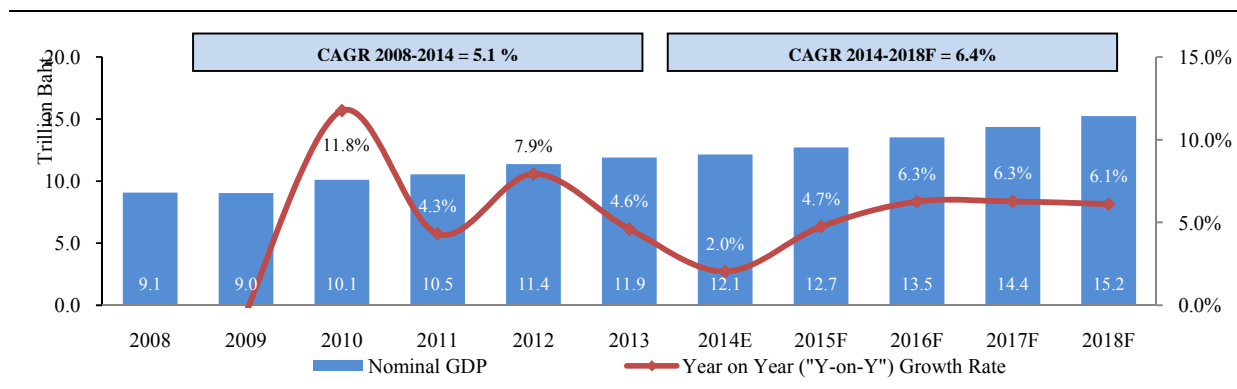
1. OVERVIEW OF MACRO ECONOMIC FACTORS AFFECTING THE ECONOMY

1.1. ANALYSIS OF THAILAND’S GROSS DOMESTIC PRODUCT (“GDP”) GROWTH

Asian economies play an increasingly important role in the global economy, as many have not only shown high GDP growth rates, but are also among the largest markets in the world demographically. Some of these economies have proven resilient against the economic slow-down that followed the global financial crisis and recession of 2008. The International Monetary Fund (“IMF”) has forecasted a steady and rapid economic growth of the emerging and developing Asia. Data from the IMF suggests that Asia’s nominal GDP will increase at a Compound Annual Growth Rate (“CAGR”) of 8.5% from 2013 to 2018, which is significantly higher than 5.3% CAGR of the world’s aggregate nominal GDP across to the same period. Asia’s strong economic growth is expected to bring mutual benefits to countries within its territory, a result of an increase in trading activity and inter-dependence amongst Asian economies.

Thailand’s nominal GDP grew from Baht 9.1 trillion (USD 281.1 billion) in 2008 to Baht 12.4trillion (USD 381.4billion) in 2014 at a CAGR of 5.0%. In May 2014, the Royal Thai Armed Forces came to power in Thailand and established the National Council for Peace and Order (“NCPO”) to govern the nation. With increasing political stability, the NCPO approved a state budget plan of Baht 2.6 trillion (USD 80.3 billion) for the fiscal year 2015 with a deficit of Baht 250.0 billion(USD 7.7 billion), expecting to boost domestic consumption and restore consumer confidence in the country. According to the IMF, Thailand’s nominal GDP is forecast to reach Baht 15.2trillion (USD 467.6.0billion) in 2018, growing at a CAGR of 5.8%.

Figure 1.1 Thailand’s Nominal GDP in Local Currency, 2008 to 2018F



Source: IMF, Frost & Sullivan analysis

Note: The GDP of the country is based on constant prices in the national currency denominated in trillions.

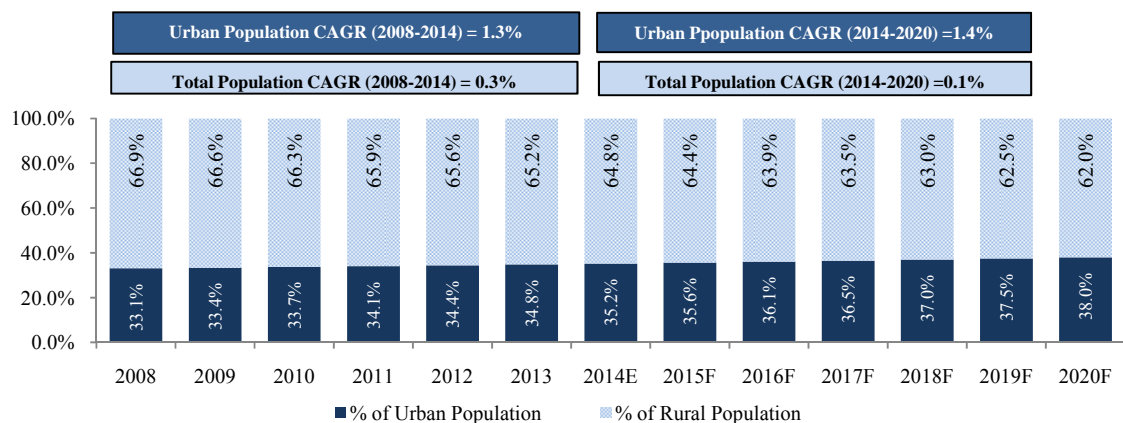
1.2. POPULATION GROWTH AND URBANIZATION

As of 2014, Thailand is home to 68.9 million people, the seventh largest country by population among emerging Asian countries¹. According to the IMF, Thailand is expected to add another 1.5 million people to its population by 2019 at a five-year CAGR of 0.4%. Growth in population is expected to lead to a growing demand for resources and basic needs like food, clean water, energy, and healthcare, among others. Frost & Sullivan believes that the scale of Thailand’s population and its expansion will continue to serve as a strong driver for the growth of the food industry.

According to the Food and Agriculture Organization (“FAO”), Thailand’s urbanization rate was 33.1% in 2008 (22.0 million people lived in urban areas of a total population of 66.3 million) and has increased to 35.2% in 2014 (23.7 million urban population of a total population of 68.2 million). Thailand’s urbanization rate is expected to reach 35.6% by 2015 and 38.0% by 2020, according to data from the FAO.

Bangkok is the national capital and the most populous city of Thailand, with a population of approximately 14.0 million, accounting for 20.4% of the country’s population. It generates the highest demand for food and consumer products, in terms of both quantity and quality. Frost & Sullivan expects Thailand’s growth in population coupled with continuous urbanization to contribute to the expansion of the consumer goods and food industries.

Figure 1.2 Thailand’s Urban and Rural Population, 2008 to 2020F



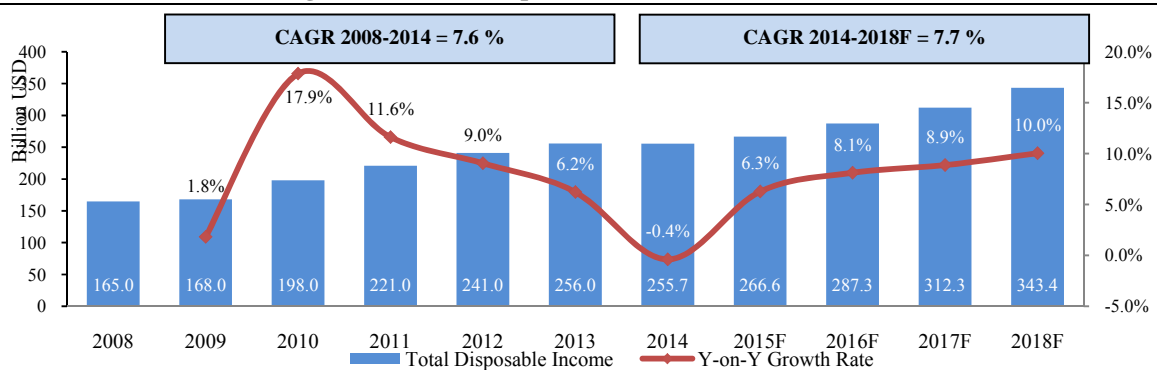
Source: Food and Agriculture Organization Estimates and Projections

¹The concept of Emerging Asian countries is adopted by IMF as an aggregation of 29 countries, which include but are not limited to Bangladesh, Cambodia, China, India, Indonesia Malaysia, Myanmar, Philippines, Thailand, Vietnam, in alphabetical order.

1.3. CONSUMER TRENDS AND FORECASTS

The growth of Thailand’s economy has led to an increase in household income and living standards, which translates into a higher disposable income and higher consumer expenditure. According to the Economic Intelligence Unit (“EIU”) and the National Economic and Social Development Board of Thailand, the total annual disposable income of Thailand has increased from USD 165.0 billion in 2008 to USD 255.7 billion in 2014, at a CAGR of 7.6%. In 2014, the annual disposable income fell by 0.4% compared to the previous year. This is mainly due to the accumulated effect of increasing household debt. Relative to disposable income, household debt has risen to 120% in 2013 from 90% in 2010. Driven by improving economic situation, the EIU expects it to reach USD 343.4 billion by 2018, as illustrated in the following chart.

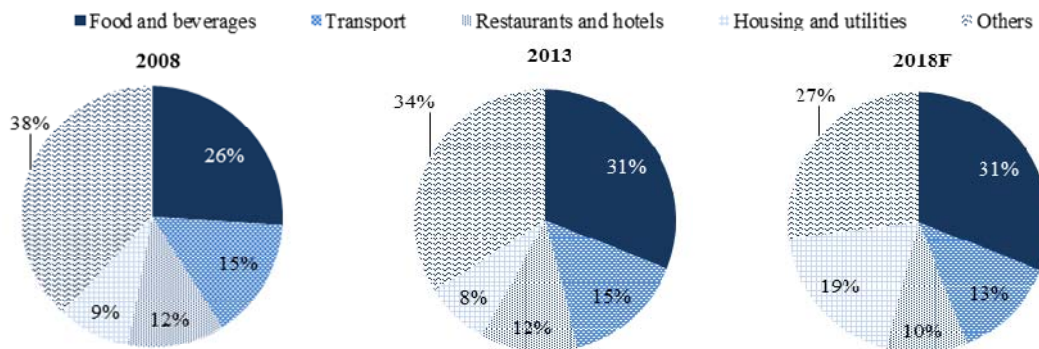
Figure 1.3 Annual disposable income in Thailand, 2008–2018F



Source: EIU, National Economic and Social Development Board of Thailand.

The increase in earning capacity of the Thai population has increased their spending on food and beverages. In 2008, consumers spent approximately 26.0% of their total expenditure on food and beverages and this has increased to 31.0% in 2013. The percentage expenditure on food and beverages is expected to remain the same until 2018, but it is expected to increase in dollar terms. The country has seen rapid development of its modern retail channels and food refrigeration system, especially in the Bangkok metropolitan region. This has increased the shelf life of fresh food and assisted the sale of unprocessed meat products (fresh, frozen, chilled, etc.). As consumers gain more knowledge about food safety and food quality standards, food products that are free of artificial additives are expected to see an increase in demand, which is favorable for food companies with proven food quality and safety standards.

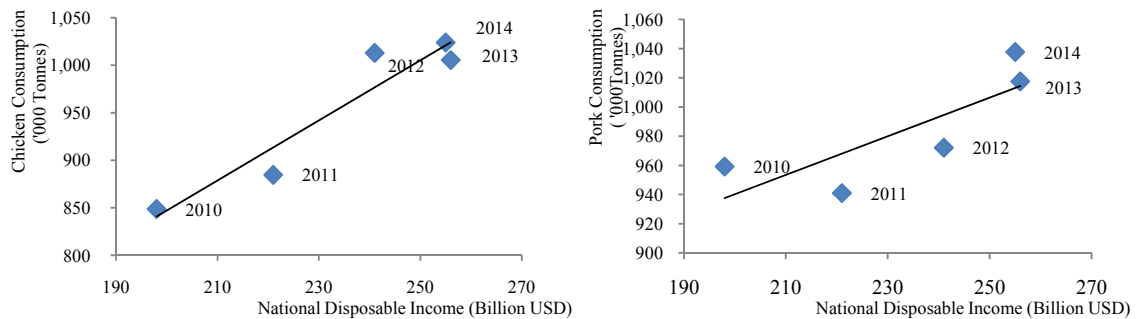
Figure 1.4 Thailand's Household Expenditure by Category, 2008, 2013, and 2018F



Source: Business Monitor International ("BMI"), Frost & Sullivan analysis

A high positive correlation has been observed between Thailand's total disposable income and domestic consumption of chicken and pork, with their 2010-2014 Pearson correlation² being 0.95 and 0.80 respectively. The graph below exhibits linear simulation between disposable income and chicken/pork consumption respectively.

Figure 1.5 Linear Regression between Thailand's Total Disposable income and Domestic Consumption of Chicken and Pork, 2010 to 2014



Source: National Economic and Social Development Board of Thailand, Frost & Sullivan Analysis

The growth in Thailand's food industry mirrors the growth in macroeconomic factors and Frost & Sullivan expects this trend to continue in the near future. Factors such as continuous urbanization, growth of modern retail channels, and increasing penetration of quick service restaurants are likely to stimulate the demand for all animal proteins, including chicken and pork, in the daily diet of the Thai population.

²Pearson correlation is a measure of linear correlation between two data series, giving a value between +1 and -1 inclusive, where 1 is total positive correlation, 0 is no correlation, and -1 is total negative correlation.

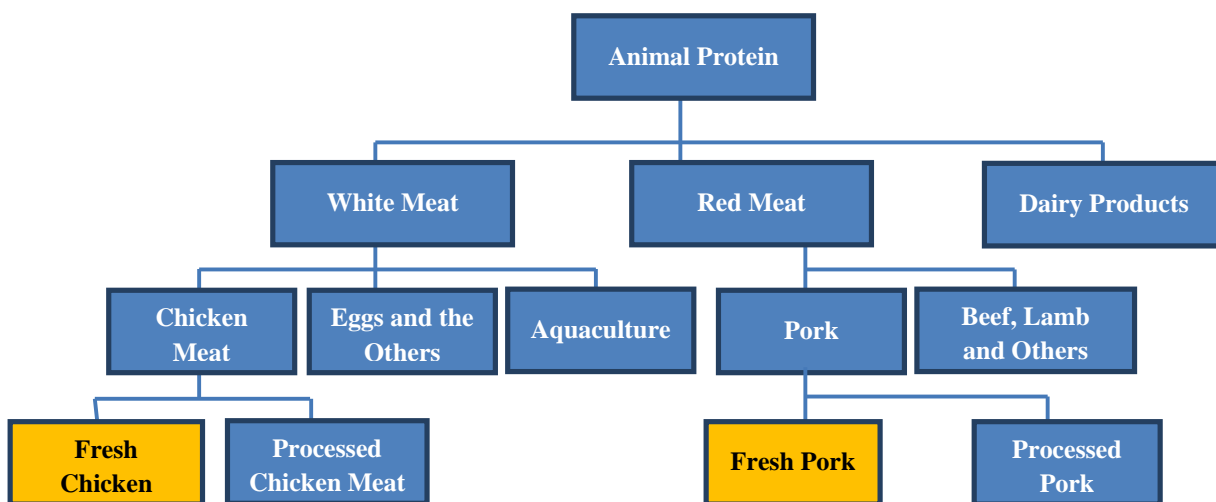
2. MARKET DEFINITION AND BRIEF OVERVIEW

2.1. DEFINITION AND SEGMENTATION OF THE ANIMAL PROTEIN INDUSTRY


Animal protein refers to dietary components derived from red meat (beef, pork, and lamb), fish, poultry, eggs and dairy products. Also known as complete proteins, animal proteins contain all the amino acids required to build new proteins in the human body. Plant protein sources such as fruits, vegetables, grains and nuts are called incomplete proteins as they lack one or more essential amino acids, which the body can neither make from scratch nor create by modifying another amino acid.

Animal protein can be further classified as red meat and white meat. According to the United States Department of Agriculture (“USDA”), red meat primarily comes from livestock such as pig, cattle, and lamb; and white meat primarily comes from fish, chicken and other poultry products. Red meat is an important source of essential nutrients such as zinc, iron, vitamin B12, and B6 which is lacking in white meat. However, people tend to prefer white meat as it is rich in protein and low in fat and calories. Adequate intake of both meat types is associated with good health. The animal protein market can be structured in the following manner:

Figure 2.1 Market Segmentation by Product Offering



Source: Frost & Sullivan Analysis

 to the market segment for detailed analysis.


2.2. OVERVIEW OF THE ANIMAL PROTEIN INDUSTRY IN THAILAND

In Thailand, the animal protein industry includes feed processing, breeding, farming, slaughtering, and processing, sales and distribution. The chart below illustrates the value chain of the animal protein industry in Thailand:

Figure 2.2 Value Chain of Animal Protein Industry, Thailand



Source: Frost & Sullivan Analysis

 to the market segment for detailed analysis.

Feed Processing involves supply of feed for livestock. Key feed ingredients include corn, broken rice and soybean meal. The feed content varies to provide optimum nutrition to different types of livestock, such as broiler chickens, layer chickens, piglets, parent pigs and fattening pigs. Most large-scale farms have their own feed mills, which gives them the advantage of absorbing the cost of feed supply internally.

Breeding involves raising parent stock to supply feeder animals³. Thailand started its poultry breeding by importing grandparent stock from the United States (“U.S.”) and the United Kingdom (“UK”). Now some commercial farms are capable of managing their own hatcheries which supply day-old-chicks.

Farming involves raising feeder animals for meat production. Chicken are raised until they reach a carcass weight of 2.3 kg to 2.4 kg, which generally requires 42 days. Pigs are grown until they reach a carcass weight of 100.0 kg to 120.0 kg, which generally requires about 5 to 6 months.

Slaughtering involves carcass segmentation, acid discharging, and boning. According to Department of Livestock Development, in 2012, there were approximately 2,420 slaughterhouses for all types of livestock in Thailand.

Processing, Sales & Distribution involves processing the fresh meat into packaged food and processed meat products. Processed meat is a key product for export. Some large-scale farms have their own meat processing facility and packaged food brands. The fresh meat and packaged food products are then distributed across the country through traditional (wet market) and modern channels (supermarkets and restaurants).

Brief Overview of the Livestock Feed Industry

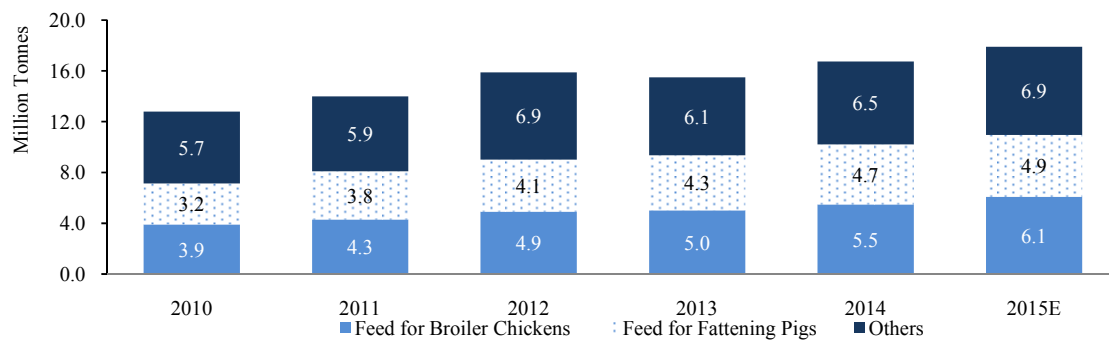
Due to the expanding animal farming industry, the animal feed industry in Thailand has shown a positive growth. Thailand’s total feed consumption volume, including feed for all livestock and aquaculture, grew from 12.8 million tonnes in 2010 to 15.5 million tonnes in 2013, at a CAGR of 6.6%.

³Feeder animals are the young animals being raised for meat production

According to Thai Feed Mill Association, the total feed consumption is expected to reach approximately 17.9 million tonnes in 2015, an 6.9% year-on-year increase.

The feed for broiler chickens and fattening pigs cumulatively accounted for 55.9% of total feed consumption volume in 2010 and is expected to reach 61.2% in 2014. Given that the feed consumption is directly correlated to the growth in livestock population, Frost & Sullivan believes that feed for chickens and fattening pigs will continue to lead the livestock feed industry in Thailand.

Figure 2.3 Feed Consumption Volume by Broiler Chickens, Fattening Pigs and Others, Thailand, 2010 to 2015E

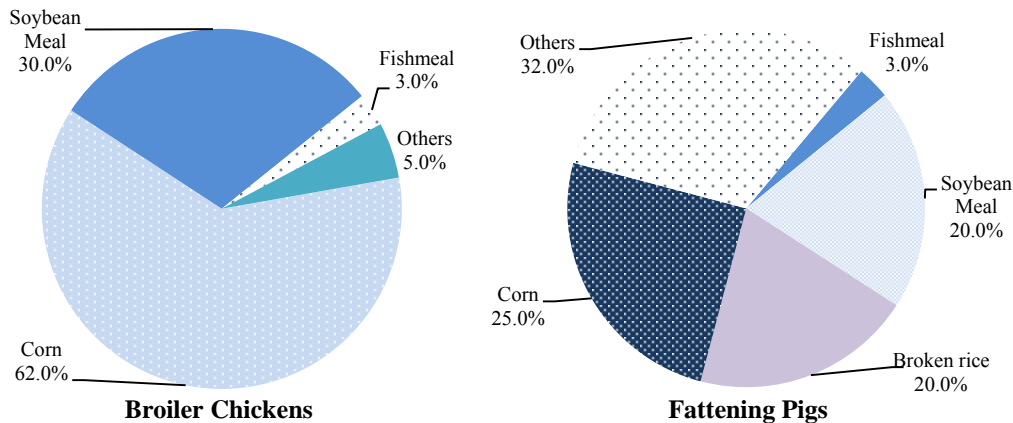


Source: Thai Feed Mill Association, 2014

Note: Others include feed for parent stock of pigs and chickens, layer chicken, breeder pigs, other livestock and aquaculture.

Corn and soybean meal are important ingredients for broiler chickens and fattening pigs, mainly due to corn's high energy content and soybean meal's high protein content. In 2014, chicken feed consisted of corn (62.0%), soybean meal (30.0%), fishmeal (3.0%) and others (5.0%). In 2013, fattening pig feed consisted of corn (25.0%), broken rice (20.0%), soybean meal (20.0%), fishmeal (3.0%) and others (32.0%). Broken rice is an additional feed ingredient for fattening pigs as it is a good source of carbohydrates. Broken rice is sometimes substituted by wheat when the rice prices are high. Owing to the high price of fish meal, recent trends suggest that a proportion of fishmeal is being replaced with larger quantities of soybean meal and grains. The charts below show the composition of feed for broiler chickens and fattening pigs, respectively.

Figure 2.4 Feed Compositions of Broiler Chickens and Fattening Pigs in Thailand, 2014



Source: Thai Feed Mill Association

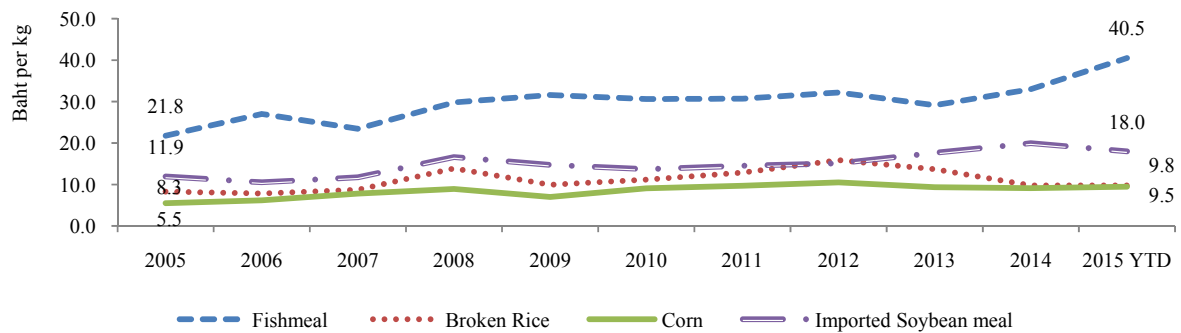
While Thailand has achieved self-sufficiency in rice production, it lacks adequate domestic supply of several other livestock feed ingredients. The most under-supplied feed ingredient is soybean meal. In 2013, Thailand produced 1.3 million tonnes of soybean meal and imported approximately 3.1 million tonnes of soybean meal, which is more than twice its production volume. The price of fishmeal and soybean meal grew from Baht 27.0 per kg (USD 713.3 per tonne) and Baht 10.5 per kg (USD 277.46 per tonne) in 2006, to Baht 32.98 per kg (USD 1,004.4 per tonne) and Baht 19.96 per kg (USD 607.70 per tonne) in 2014, at a CAGR of 2.5% and 8.3% respectively. Price of broken rice increased between 2006 and 2008, before decreasing from Baht 13.9 per kg (USD 423.2 per tonne) to Baht 9.77 per kg (USD 297.4 per tonne) in 2014, mainly due to the Government's efforts to sell rice stocks to stabilize escalating rice prices through its Rice Paddy Pledging Program. This has encouraged backyard farmers to replace soybean meal with broken rice, which however resulted in a shortfall of necessary proteins in the livestock's diet.

Thailand produces a significant amount of corn and imports a small quantity to manage the shortfall. The price of corn has increased from Baht 6.2 per kg (USD 191.5 per tonne) in 2006 to Baht 9.1 per kg (USD 277.1 per tonne) in 2014. This is mainly due to the Government's corn subsidy program which guarantees a stabilization of domestic corn prices at Baht 6.9 per kg (USD 213.2 per tonne) to Baht 8.9 per kg (USD 274.9 per tonne), when the global corn price is low.

In Thailand, feed ingredients exhibit extreme price variations. During the period 2006 to 2014, the average deviation⁴ for prices of fish meal, soybean meal and broken rice were Baht 1.6 per kg (USD 49.4 per tonne), Baht 2.6 per kg (USD 80.3 per tonne) and Baht 1.9 per kg (USD 58.7 per tonne), respectively, mostly showing disparate prices and fluctuations. Such price fluctuation plays an important role in cost planning, procurement, inventory and pricing.

⁴ Average deviation returns the average of the absolute deviations of data points from their mean. It is a measure of the variability in a data set. The time frame for the data concerning average deviation of prices is between 2006 and September 2014.

Figure 2.5 Fluctuations in Feed Ingredient Price in Thailand, 2005 to 2015YTD



Source: Thai Feed Mill Association

Note: Price of all commodities in 2015 is as of April, 2015.

Note: Price is at factory gate as per Thai Feed Mill Association,

Frost & Sullivan observes that large livestock producers have demonstrated capabilities in purchasing vast quantities of feed at lower prices, as well as storing and processing, to hedge price changes. Several conglomerates and large corporations in Thailand that specialize in animal farming have expanded vertically into feed production, the upstream segment of the value chain. These companies supply feed internally to their animal farms and contract farms, to save cost and manage feed cost fluctuations. Such companies include Thai Foods Group Public Company Limited (“Thai Foods Group”), Charoen Pokphand Foods Public Company Limited (“CP Foods Group”), Betagro, Sun Feed, Top Feed Mills and Lee Feed Mill. In the case of smaller scale participants, the price fluctuations have affected their financial performance adversely.

Brief Overview of the Animal Farming Industry

In 2013, the animal farming industry accounted for approximately 2.4% of Thailand’s nominal GDP. In Thailand, the two most widely consumed meat products are pork and poultry. Poultry comprises all domesticated birds bred for consumption purposes, which include chicken, turkey, geese and duck. According to the Thai Feed Mill Association, chicken contributed approximately 97.0% of the total poultry flock in 2013 and can be taken as a good representation of the overall poultry industry. Other poultry meat, such as duck, turkey and goose, are rarely raised locally for consumption. According to the Food and Agricultural Policy Research Institute (“FAPRI”), in 2012, chicken meat accounted for 54.0% of the total meat production in Thailand, while pork accounted for approximately 29.0%.

The animal farming industry receives regulatory support from the Government to boost the performance of the sector. A key initiative was the Notification on Livestock Farm Standards issued by the Ministry of Agriculture and Cooperatives to enforce quality measures pertaining to farm management, animal health and the environment to produce safe and hygienic meat for consumption. The notification is mandatory for those who want to send their birds to slaughterhouses approved for export and adhere to the standards adopted by importing markets such as the European Union (“EU”) and Japan. As a result of these measures, the commercialization of livestock production has rapidly progressed in Thailand.

The Government's strict bio-security measures for animal farming, primarily in poultry production, has safeguarded the health and safety standards of Thailand's animal products, and also has been instrumental in reopening the export markets. In 2002, Thailand initiated the *Thai: Kitchen of the World* project with an aim to promote its food products. Since the initiation of the project, the Government has been trying to create awareness on food security and to produce high quality food complying with international standards. This has affirmed Thailand as a major food export country.

Thailand has benefited from the positive economic atmosphere in the region. In 2007, the ASEAN Economic Community ("AEC") was formed with ten ASEAN member countries with the goal of regional economic integration and to create a single market and production base, and a highly competitive economic region by 2015. AEC is expected to create smoother trade relationships between the member countries by means of tariff reduction, trade facilitation and investment liberalisation. This is expected to lower trade barriers and increase trade flow between Thailand and other AEC countries. Companies in the export business and which are in a business expansion mode are likely to benefit from the free trade agreements.

The region has been plagued with endemic animal diseases that spread from one country to its neighbours. By 2015, AEC also aims to harmonise the animal health control to attain food safety through a common bio-security management standards scheme, in accordance with international standards/guidelines. The food industry and the commercial farms are set to benefit from this development. As of July 2014, ASEAN has implemented approximately 80.0% of the goals mapped out in AEC 2015 blueprint. Since becoming a member of the AEC, Thailand's exports to AEC member countries have been on an increasing trend.

3. ANALYSIS OF THE POULTRY FARMING INDUSTRY IN THAILAND

Thailand has an industrialized and commercialized poultry farming industry. Chicken is the most significant source of meat protein in Thai diet. According to the data compiled by Frost & Sullivan, Thailand's per capita consumption of chicken meat was estimated to be 15.3 kg in 2014, higher than per capita consumption of pork (13.8 kg) and beef (6.6 kg). The Thai population's dietary preference for chicken is mainly due to it being the affordable and healthier (rich in protein and low in fat) source of animal protein. In 2013, the market price of whole chicken with entrails was Baht 69.3 per kg (USD 2.14 per kg) while pork was sold at Baht 122.6 per kg (USD 3.79 per kg), beef at Baht 179.6 per kg (USD 5.55 per kg) and catfish at Baht 145.0 per kg (USD 4.48 per kg), each considerably higher than chicken.

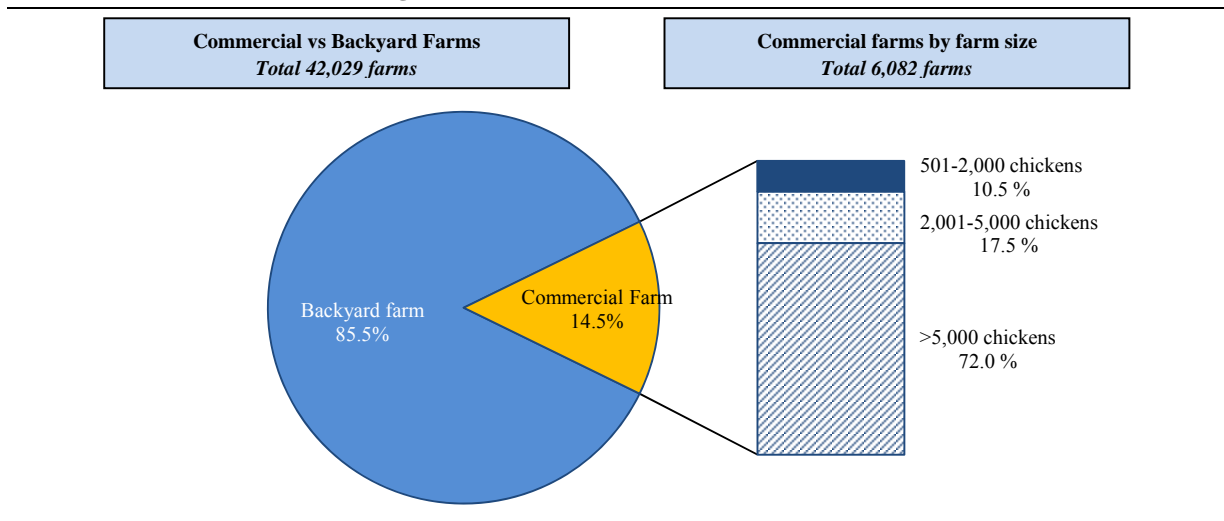
The poultry farming industry in Thailand has shown continuous growing trends by achieving self-efficiency in its domestic market and generating surplus quantity for exports. According to the USDA estimates, in 2014, Thailand contributed 5.2% to global chicken exports and is the fourth largest exporter of chicken products, after Brazil (34.4% of global chicken exports), the U.S. (31.5%) and the EU (10.5%). Leading poultry companies continue to supply to the rapidly expanding domestic and international markets with improved farming management techniques and farming technologies. To ensure the safety and quality of the end-product (fresh and processed chicken), these companies are

expanding operations in the vertically-integrated value chain to include feed manufacturing, farming, slaughtering, processing and distribution.

Like other developing countries, a majority of Thailand’s broiler chicken farms are made up of many small backyard farms. In 2012, there were a total of 42,029 broiler chicken farms in Thailand, out of which 35,947 were backyard farms (8% of total), and 6,082 were commercial farms (14.0% of total). Commercial farms can be further classified into three segments based on farm size:

- small farms with chicken population between 500 and 2,000 chickens, accounting for 10.5%
- middle farms with 2,001 to 5,000chickens, accounting for 17.5%, and
- large farms with over 5,000chickens, accounting for 72.0% of the commercial farms in Thailand.

Figure 3.1 Broiler Farm Classification, 2012



Source: Department of Livestock Development, Ministry of Agriculture and Cooperatives

Note: Farms with less than 500 broilers are considered backyard farms (non-commercial farms)

However, due to the low input from backyard farms, chicken production is led by commercial farms. According to Ministry of Commerce, commercial farms contributed to 95.7% of total broiler chicken population in 2013, while backyard farms contributed to only 4.3%. The industry has seen continuous commercialization with the number of broiler chicken farms dropping from 46,754 in 2010 to 42,029 in 2012, primarily due to the exit of backyard farms. The number of backyard farms decreased from 42,073 in 2010 to 35,947 in 2012, at a negative CAGR of 7.6%. On the contrary, commercial farms increased from 4,681 in 2010 to 6,082 in 2012, at a CAGR of 14.0% mainly due to the advantages of the economies of scale and ability to manage feed cost through internal production, which is increasingly difficult for backyard farms to compete with.

Contract farming is a commonly practiced business model in Thailand, especially in the poultry farming industry. Large livestock producing companies engage smaller commercial farms (“contract farmers”) to carry out farming activities, from whom they can harvest the livestock at an agreed time,

standard and price. The contract farmers are provided with feed, feeder animals and closed system⁵ farm management techniques to ensure enhanced performance and medication controls. This business model protects contract farmers from the risk of price fluctuation, provide them access to farming technologies and improve their productivity. In 2013, more than half of commercial poultry farms were contract farms under large poultry-producing companies. Frost & Sullivan believes such a trend is due to the following reasons:

- contract farms are provided with genetically-advanced chicken breeds and knowledge of farm management techniques to enhance production and quality.
- large poultry producers have invested in extensive research and development activities to enable better performance, which cannot be achieved by local farms with native chicken breeds and less-calculated feed quantity and feeding frequency;
- leading poultry producers dominate the supply quantity and price; they also provide assurance to contract farms to purchase the chicken at the appropriate slaughtering age at an appealing price.

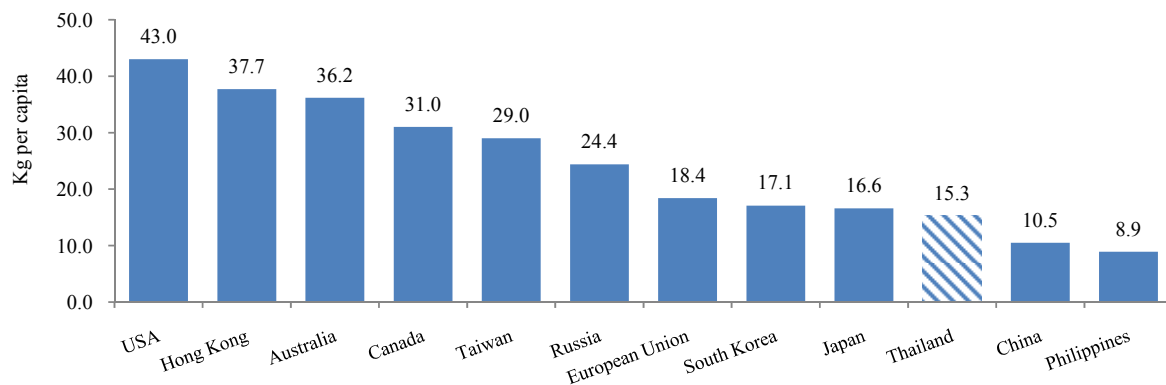
With benefits such as committed selling price, better performance and reduced risks from possible poultry disease outbreaks, Frost & Sullivan expects the contract farming system to remain a popular business model for the poultry farming industry in Thailand.

3.1. DOMESTIC DEMAND DYNAMICS

In Thailand, per capita chicken meat consumption grew from 12.6 kg in 2010 to 15.3 kg in 2014 at a CAGR of 5.0%. Chicken meat refers to chicken parts excluding entrails (intestines, internal organs) and blood. Thailand's per capita consumption of chicken is lower compared to developed countries, as illustrated in the figure below. Domestic consumption of chicken meat is projected to gradually increase due to its affordability and changing dietary preferences for a low-fat, protein-rich option. The implementation of strict quality assurance systems at large poultry farms has increased consumer confidence.

⁵Closed system is the farming system that doesn't allow certain transfers of livestock in or out of the system. Closed systems also involve controlling the environmental conditions, i.e, the temperature, humidity ventilation, wind speeding and lighting. The key associated advantage is efficient disease and pest prevention

Figure 3.2 Per Capita Chicken Consumption, 2014



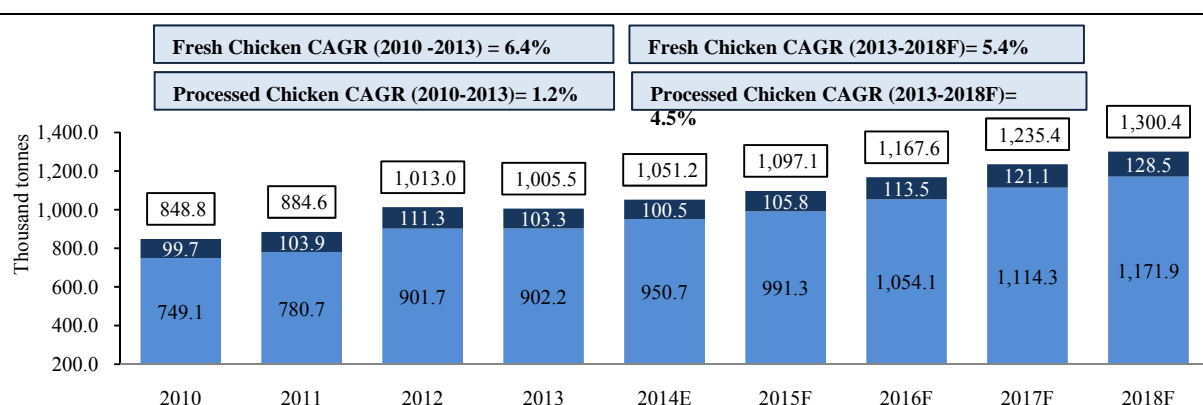
Source: Food and Agricultural Policy Research Institute, Frost & Sullivan analysis

Note: Thailand data is estimated using a combination of primary interviews with industry experts and thorough secondary research

Thai people consume more fresh (frozen, chilled and normal-temperature) chicken than processed chicken meat products. In 2013, nearly 90.0% of the chicken consumed in Thailand was fresh chicken. This is mainly because some consumers prefer fresh chicken as they hold the belief that fresh chicken is free of preservatives and other additives. Fresh chicken is widely available across the country at wet markets, convenience stores, supermarkets, and hypermarkets. The modern retail stores play an important role as they are open for longer hours compared to wet markets and provide refrigeration facilities that increase the shelf life of chilled and frozen chicken. Thailand's fresh chicken also saw a growing demand from institutional buyers, such as McDonalds, KFC and others, due to their growing popularity in Thailand's urban cities. Frost & Sullivan expects fresh chicken to continue its dominance in the domestic meat market.

Processed chicken meat is mostly found in Greater Bangkok metropolitan area and major cities where ready-to-eat chicken meals and chicken nuggets can be purchased at hypermarkets and convenience stores. Thailand manufactured a variety of processed chicken meat product, to serve the export market as well as the domestic demand from urban cities. Thailand's processed chicken mainly comprises of: (i) products which are popular in Thailand, Japan and other Asian countries, such as meat balls, grilled chicken leg/thigh, baked stringed chicken meat, boneless leg kara-age, and (ii) western products such as chicken burger, chicken nugget, fried breast, and boneless breast with cheese.

Figure 3.3 Domestic Chicken Meat Consumption Volume in Thailand, 2010 to 2018F



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives; Customs Facility, Department of International Trade, Ministry of Commerce; Office of Industrial Economics; and Frost & Sullivan Analysis.

Note: Domestic chicken meat consumption volume includes both domestic production (minus export) and import; other chicken meat products refer to processed chicken meat products. Chicken meat refers to chicken main part, excluding consumption of entrails, blood etc.

Note: Consumption of processed chicken is estimated by the net weight of fresh chicken used to produce processed chicken products, rather than the weight of the end-products.

3.2. SUPPLY DYNAMICS

Thailand supplies two-thirds of its chicken meat domestically with the remaining primarily for export purposes. From 1999 to 2014, Thailand’s poultry farming industry has developed sound capabilities and efficiencies to mitigate food safety challenges and animal health concerns.

Prior to 1999, the majority of the poultry farms adopted open farming systems, under which the livestock are raised in a compromised environment with lack of adequate cooling mechanism and hygiene standards. Such a farming mechanism has been deemed as vulnerable to endemic diseases. In 1999, the Department of Livestock Development issued farm standards which required farms to adopt the closed farming system. However, most backyard farms failed to follow the rules stringently. In 2004, Highly Pathogenic Avian Influenza (“HPAI”) virus broke out in Thailand and affected 60 out of 76 Thai provinces. According to the United States Center for Disease Control and Prevention, nearly 83.0% of infected poultry flock was from backyard farms. Given the adherence to stringent bio-security measures, the commercial poultry producers exhibited relatively stronger immunity against widespread diseases.

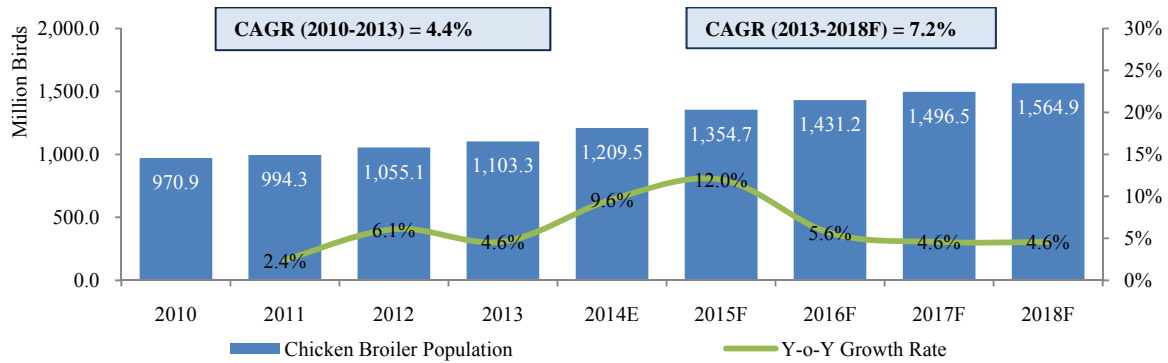
In addition, the industry also utilizes new technologies to improve genetics, farm management, and feed nutrition. This has improved average bird weight. In 2013, the average weight of fully-grown broilers at harvest was reported at about 2.3 kg to 2.4 kg, up from 2.0 kg to 2.1 kg per bird in 2008. During the same period, the number of days it takes to raise day-old-chicks decreased to 42 days from 49 days.

The broiler chicken population increased from about 970.9 million chickens in 2010 to about 1,103.3 million chickens in 2013, at a CAGR of 4.4%. During the same period, chicken meat supply grew

from 1.3 million tonnes to 1.5 million tonnes, at a CAGR of 5.4%. The Saha Farm Group (“Saha Farm”), the former largest broiler producer in Thailand, aggressively expanded its production in 2012 resulting in 14.8% growth in chicken meat production over 2011. However, financial problems caused Saha Farm to scale down and limit operations in July 2013. As a result, Thailand experienced a decline in its chicken meat production the same year: from 1.55 million tonnes in 2012 to 1.5 million tonnes in 2013, a 3.2% decrease. As Saha Farm’s chicken farming was mainly carried out by contract farms, the farms could not sell their fattened chickens to Saha Farm as agreed, after the company scaled down its operations. As a result, even though Thailand’s chicken population experienced a positive growth, its growth rate declined from 6.1% in 2012 to 4.6% in 2013, a 1.5 percentage point decrease.

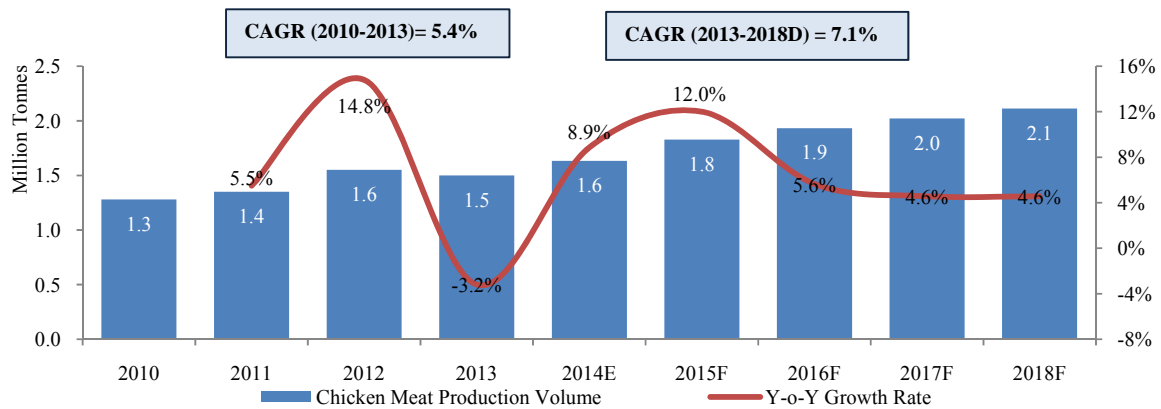
In 2014, Saha Farm returned to operations with around 200,000 chickens per day, which is likely to add to the growing chicken population and chicken meat production in the near future. The increase in chicken population and chicken meat production is expected to be absorbed by the continuous demand for fresh chicken from both domestic and overseas market. Frost & Sullivan expects the broiler chicken population and chicken meat production volume to reach 1,564.9 million chickens and 2.1 million tonnes respectively in 2018, at a CAGR of 7.2% and 7.1% from 2013. The growth is attributable to companies’ expansion plans to meet the opening of Thailand’s fresh chicken export market. The historical and forecast of broiler chicken population and chicken meat production is illustrated in the charts below:

Figure 3.4 Estimated Broiler Chicken Population in Thailand, 2010 to 2018F



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Frost & Sullivan Analysis

Figure 3.5 Estimated Chicken Meat Production Volume in Thailand, 2010 to 2018F



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Frost & Sullivan Analysis

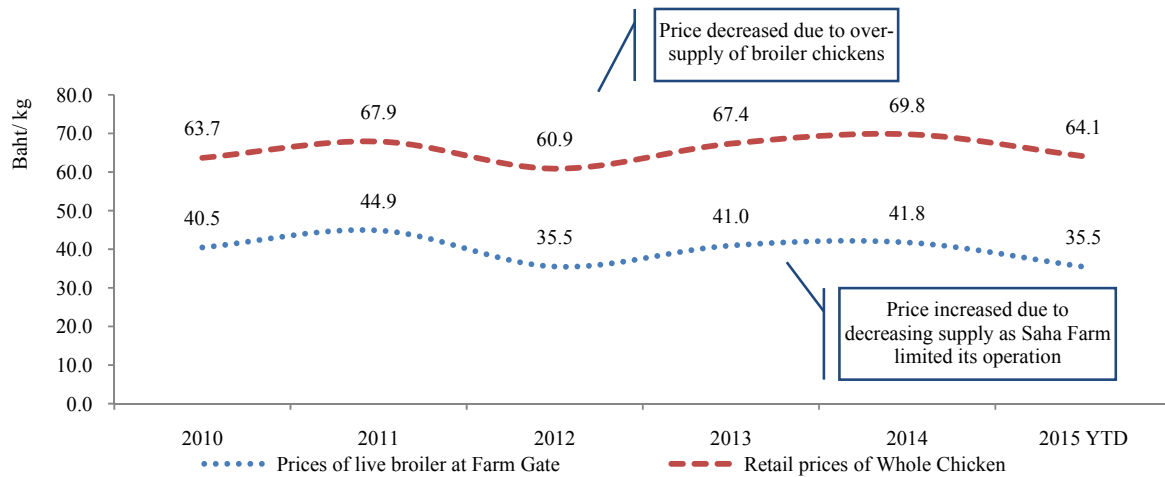
The change in supply resulted in price fluctuations of farm gate price⁶ of broiler chicken. Owing to the oversupply from Saha Farm, the average price of broiler chicken decreased to Baht 42.0 per kg in 2012 (USD 1.30 per kg and 10.2% decrease over average price in 2011); and rebounded to Baht 43.25 per kg in 2013 (USD 1.414 per kg) as supply tightened after Saha Farm limited operations.

In 2014, the retail price markup of whole chicken was approximately 64.8% compared to the price of live chicken at farm gate. The retail market exhibited less tolerance on price fluctuation. In 2012, the retail price decreased by 10.3%, as did the wholesale price; in 2013, the retail price increased by 10.6% while wholesale price increased by 4.7%. This indicates that the market has an accepted range on poultry

⁶ Farm gate is an agricultural term adopted in Thailand which is generally associated with indication of prices. Farm gate price is what farms get when their harvested crop/livestock is purchased in large quantity at door. Such farms are normally established ones and provide certain amount of volume.

retail prices. Frost & Sullivan believes that large poultry producers are capable of weathering price changes, given their stronger capabilities in solvency, storage and planning.

Figure 3.6 Average Price of Live Broiler at Farm Gate and Retail Price of Whole Chicken, 2010 to 2015YTD



Source: Office of Internal Trade, Ministry of Commerce, Office of Agricultural Economics

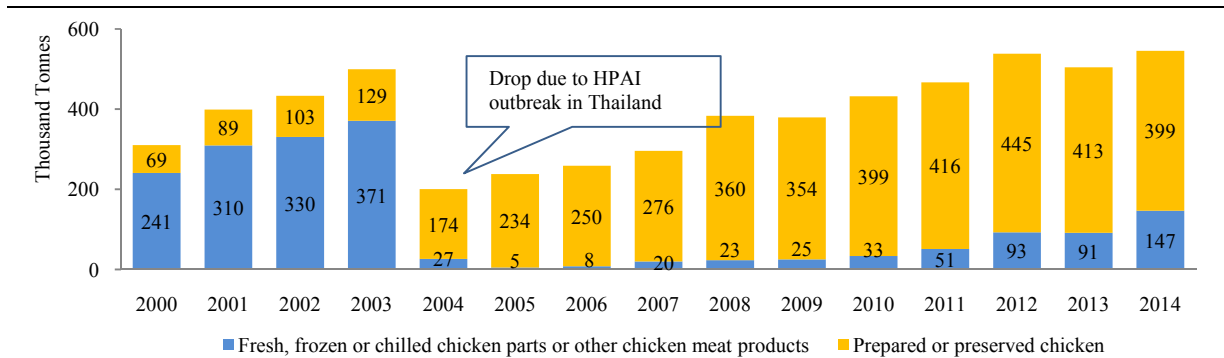
Note: Retail price of whole chicken is estimated at the price of slaughtered chicken with entrails at retail market.

Note: 2015 prices are as of April 2015

3.3. EXPORT DEMAND DYNAMICS

Thailand is the largest chicken exporter in ASEAN, exporting about one-third of its chicken production. Export destinations include Japan, the EU and ASEAN countries. Total chicken export grew from 432,216 tonnes in 2010, worth Baht 52.2 billion (USD 1.61 billion), to 538,105 tonnes in 2012, worth Baht 67.8 billion (USD 2.09 billion), in 2012, registering a CAGR of 11.6% in volume, and 13.9% in value. In 2013, the total export volume and value dropped to 504,406 tonnes and Baht 66.8 billion (USD 2.06 billion), a decline of 6.3% and 1.4% respectively. The decline in chicken exports is mainly due to one of Thailand's largest chicken producer, Saha Farm, limiting operations in July 2013. Prior to its fall, Saha Farm produced an estimated 600,000 birds per day and also accounted for over 20.0% of total chicken exports from Thailand. Saha Farm's limited operations in 2013 thus significantly reduced the country's production and export. However, by 2014, total export volume has normalized, registering an increase of 8.2% compared to the previous year. Thailand's chicken export volume from 2000 to 2014 is illustrated in the figure below.

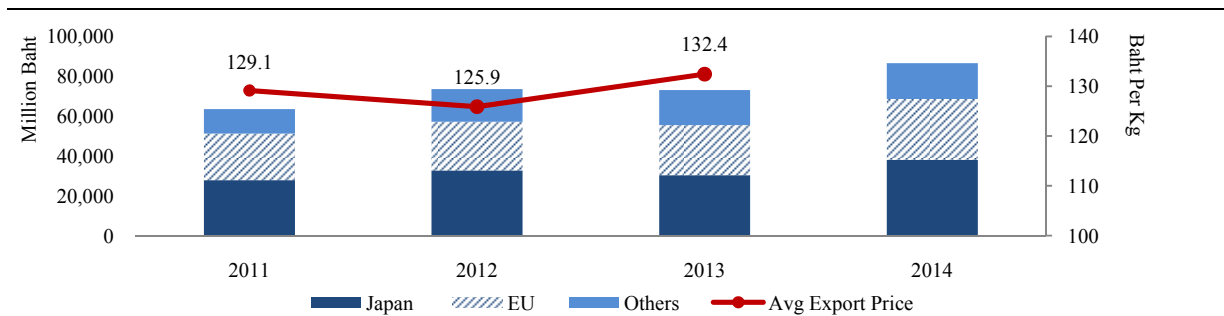
Figure 3.7 Thailand's Export Volume of Processed and Fresh Chicken, 2000 to 2014



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives; and Department of International Trade, Ministry of Commerce.

Majority of the exports are processed and prepared chicken products, accounting for about 73.1% of the export volume in 2014. The balance between exported fresh chicken and processed chicken was disrupted in 2004 due to the HPAI outbreak in Thailand, when the industry faced regulatory prohibits on exporting frozen and fresh chicken to its trading partners. The top export destinations for processed chicken are Japan that accounted for about 41.0% of export value in Thailand in 2013, and the EU that accounted for about 40.0% of export value the same year.

Figure 3.8 Thailand's Chicken Export Destinations and Export Prices, 2011 to 2014



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives

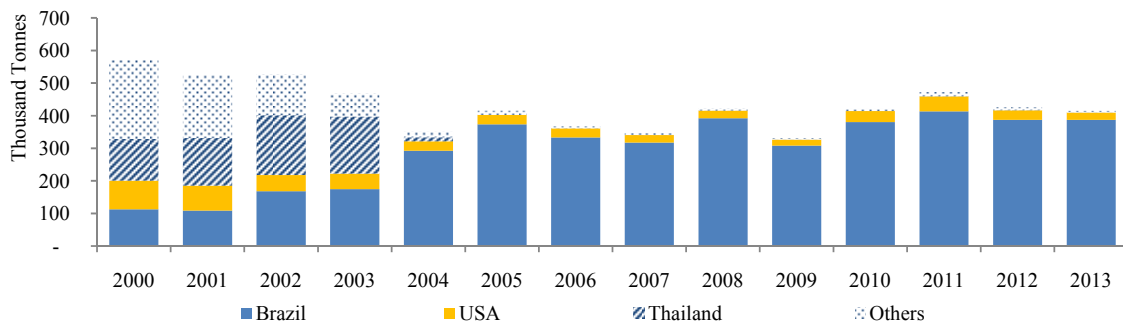
With higher confidence about fresh chicken quality, several countries have re-opened their doors to importing fresh chicken from Thailand. In 2013, Singapore and Japan granted import permissions on frozen and fresh chicken from Thailand. In 2014, there are 28 certified poultry slaughterhouses and 116 poultry meat processing plants that have obtained international export certifications. This proves quality assurance of chicken produced in Thailand. Thailand is now well-positioned to serve the increasing demand from overseas.

Other key broiler meat exporters are Brazil, the U.S. and the EU. Brazil's exports have marginally reduced to 3.6 million tonnes due to lower demand in sub-Saharan Africa and greater competition in the Middle East. Despite a depreciating Brazilian Real, constraints such as antidumping tariffs in South Africa continue to limit exports. The EU exports have marginally reduced to 1.1 million tonnes due to the cessation of export restitutions, in addition to the declines in the whole-bird exports to the Middle East. The EU is one of the world's largest importers and exporters of broiler meat at the same time. This can be attributed to many reasons which include but are not limited to the followings: (i) firstly, different preferences amongst different countries. For example, it has been observed that Germany has a higher demand for broiler breast meat. It exports other parts, such as chicken legs, to other countries.(ii) secondly, the EU imports fresh broiler meat for further processing. The processed meat is then sold domestically and overseas. Exports from the U.S. remain unchanged at a record 3.4 million tonnes, as shipments to top markets such as Mexico and Canada remain strong.

Japan as a Key Export Destination for Poultry

Japan relies heavily on imports to meet its domestic demand for poultry meat. In 2013, Japan consumed about 2.2 million tonnes of poultry including both processed and fresh products, out of which 854,000 tonnes (38.8% of consumption) were imported. The import of poultry included approximately 415,000tonnes of fresh poultry and 439,000tonnes of processed poultry. According to the USDA, Japan was the highest broiler meat importer in 2013, followed by Saudi Arabia (838,000 tonnes), Mexico (682,000 tonnes), Iraq (673,000 tonnes), and the EU (672,000 tonnes). The Middle East remains the world's largest regional importer which imported 2.2 million tonnes poultry meat in 2013.

Figure 3.9 Japan's Imports from Major Trading Partners for Fresh Chicken Meat, 2000 to 2013



Source: United Nations Conference on Trade and Development

Japan used to be Thailand's major export destination for fresh poultry. In 2003, out of 467,000 tonnes of fresh poultry imported into Japan, Thailand contributed about 175,000 tonnes, which is 37.5% of the total. As a result of HPAI outbreak in 2004, Japan implemented a ban on importing fresh poultry from Thailand. Japan substituted Thailand with Brazil, which catered to Japan's demand for fresh poultry. In 2013, Brazil supplied 387,000 tonnes of fresh poultry to Japan, which accounted for approximately

93.3% of Japan’s total import of fresh poultry. In 2013, Japan lifted the decade-long import ban, enabling Thailand to resume its export of fresh poultry into Japan. Frost & Sullivan expects Thailand to regain its leading position, as one of the leading suppliers of fresh poultry to Japan.

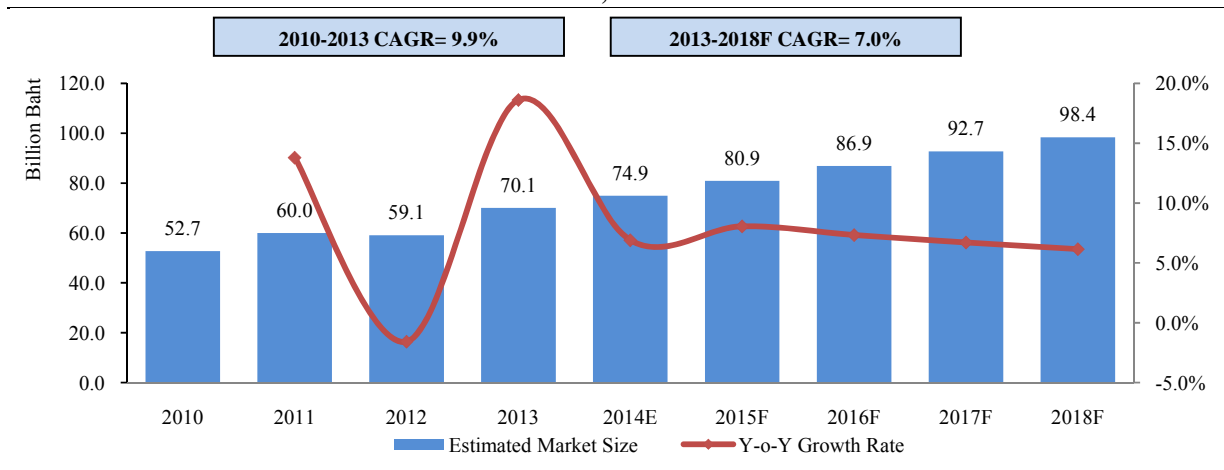
In 2002, prior to the ban, Thailand’s exports of fresh poultry to Japan was relatively more expensive compared to Japan’s other trade partners. Thailand’s average export price for fresh poultry was about USD 1.9 per kg, higher than Brazil (USD 1.6 per kg) and the U.S. (USD 1.3 per kg). This was mainly attributed to two factors: (i) Thailand’s products were able to reach Japan within a period of two weeks compared to almost two months for shipments from Brazil, which ensured better quality and freshness of the meat; and (ii) Thailand was able to cater to the customization requirements from Japan.

3.4. MARKET SIZE ESTIMATION AND FORECASTS

The market size of Thailand’s poultry farming industry for domestic fresh chicken consumption, measured by its sales value of live chicken at farm gates, increased from Baht 52.7 billion (USD 1.63 billion) in 2010 to Baht 70.1 billion (USD 2.17 billion) in 2013, registering a CAGR of 9.9%. The market size for the same, measured by sales volume of live chicken, increased from approximately 1.2 million tonnes in 2010 to 1.6 million tonnes in 2013, representing a CAGR of 8.9%. The growth in market size has been primarily driven by economic growth and changes in dietary preferences towards food products with higher nutritional value. Frost & Sullivan forecasts the market size to increase to Baht 98.4 billion (USD 3.04 billion) in terms of value and 2.1 million tonnes in terms of volume by 2018, at a CAGR of 7.0% and 6.0% respectively from its current levels in 2013.

A negligible amount of total fresh chicken consumption came through import channels, approximately 1.1% of total market size. Frost & Sullivan expects domestic players to continue to play an integral role in Thailand’s fresh chicken meat market.

Figure 3.10 Estimated Market Size of Chicken Farming Industry for Domestic Fresh Chicken Market, in Billion Baht, 2010 to 2018F



Source: Food and Agriculture Organization of the United Nations, Office of Industrial Economics, Frost & Sullivan analysis.
Note: Market size is estimated by sales value of live birds supplied for domestic fresh chicken consumption, at farm gate.

3.5. KEY DRIVERS FOR FUTURE DEVELOPMENT OF THE POULTRY FARMING INDUSTRY

Expanding Global Market Demand

As one of the top poultry exporters in the world, Thailand has achieved steady growth in exporting processed chicken. Thailand was banned from exporting fresh chicken to Japan and the EU, its two major trading partners for poultry exports, since the HPAI outbreak in 2004. In 2013, Japan lifted the decade-long ban in 2013 and started importing fresh and frozen chicken meat from Thailand. This has led to increased export volumes of chicken to Japan, reported at 14,397 tonnes in the first half of 2014 from only 51 tonnes during the same period in 2013. Several other countries, which include the EU, Hong Kong, South Africa, Bahrain, Russia, the United Arab Emirates (“UAE”), Singapore and Qatar, have also lifted bans on importing fresh chicken from Thailand. The growth in overseas demand is expected to drive the future development of poultry farming in Thailand.

Efficient Farm Management and Bio-security Systems for Broiler Production

Thailand has a rigorous regulatory framework to ensure the quality and safety of its poultry production. In 2000, Department of Livestock Development issued a new farming policy requiring all farms producing for export purposes to switch to a closed farm system. In light of the HPAI outbreak in 2004, Thailand’s poultry producers have also become more vigilant towards poultry farming. Besides more stringent regulations, large producers have also adopted stricter farm management tools and advanced techniques, such as evaporative cooling systems and bio-security measures. This has set Thailand’s chicken production to reach international standards, which is expected to facilitate sales in both domestic and overseas market.

Thailand has a commercialized chicken farming industry

Backyard farms rely on chemical vaccinations and antibiotics for disease prevention, resulting in chicken meat of questionable quality. Commercial poultry farms apply relatively less chemicals compared to backyard farms. According to the Food and Agriculture Organization, 95.0% of Thailand’s broiler farming systems are closed-farming systems with high bio-security measures. This significantly reduced the need to inject chemical solutions and antibiotics into chickens and enabled Thailand to provide quality chicken meat to the market. Thailand’s consistent efforts to advance its chicken farming system are expected to support its long-term, sustainable growth.

3.6. KEY CONSTRAINTS FOR FUTURE DEVELOPMENT OF THE POULTRY FARMING INDUSTRY

High Feed Cost Due to Inefficient Domestic Supply of Feed Ingredients

Feed costs contribute about 70.0% of the overall poultry production cost. Thailand lacks self-sufficiency in supplying certain feed ingredients, especially soybean meal. Thailand's reliance on imported soybean meal has significantly pushed up the cost of feed. High feed cost was one of the principal reasons for the scaling-down of the business operations of Saha Farm Group in 2013. It is also one of the reasons for Thailand's poultry export being relatively expensive compared to other exporting countries.

Threats Imposed by Disease Outbreaks

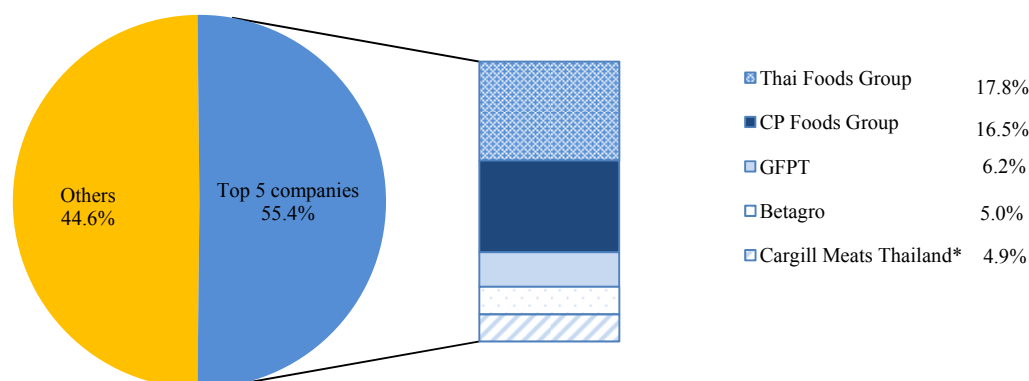
Thailand's poultry farming industry is susceptible to potential diseases that will affect the industry's performance. In 2004, the HPAI virus broke out in Thailand and severely impacted the country's export of chicken. Thailand's chicken export volume decreased from 500,000 tonnes in 2003 to 201,000 tonnes in 2004, a 59.8% decrease. Potential outbreak of contagious animal diseases puts risks on the industry's performance.

3.7. COMPETITIVE ANALYSIS

Thailand's domestic fresh chicken meat market is dominated by large commercial poultry producers which include the Thai Foods Group, CP Foods Group, GFPT, Betagro and Cargill Meats Thailand. Most of these companies are involved in animal feed production, poultry farming, and processing of poultry meat.

In terms of domestic fresh chicken supply, Thai Foods Group was the leader with 160,700 tonnes of fresh chicken meat supply in 2013, achieving a market share of 17.8%. Other suppliers for the domestic market included CP Foods Group (supplied 148,920 tonnes of fresh chicken, accounted for 16.5% market share), GFPT (55,960 tonnes supply, 6.2% market share), Betagro(44,676 tonnes supply, 5.0% market share), and Cargill Meats Thailand (43,920 tonnes supply, 4.9% market share).

Figure 3.11 Competitive Landscape in Domestic Fresh Chicken Market of Thailand, 2013



Source: Company's annual report and press releases, Frost & Sullivan Analysis

Note: Market share is based on key players' live chicken production catered for domestic fresh chicken market.

**Cargill Meats Thailand, formerly known as Sun Valley (Thailand) Co., Ltd, is a fully integrated poultry processing business operating under Cargill Siam Limited.*

***Saha Farm is excluded from the Competitive Landscape analysis due to the fact it limited its operation in 2013.*

Thai Foods Group

Thai Foods Group operates mainly in animal feed, poultry farming, pig farming, livestock slaughtering and others. Thai Foods Group has also made significant investments into livestock and agriculture research in order to enhance its performance. Thai Foods Group has increased its poultry production capacity from 330,000 chickens per day in 2013 to 440,000 chickens per day in 2014. Thai Foods Group supplied majority of their chicken to domestic fresh chicken market, which accounted for approximately 98.0% of their total production volume. In 2013, Thai Foods Group was ranked number one in Thailand's domestic fresh chicken market. Thai Foods Group has also strengthened its chicken breeding business, by commencing operations of a new breeder chicken farm in 2014, in Sa Kaeo province, which increased its breeder chicken capacity to approximately 1.7 million chickens and a new hatchery in the Kanchanaburi province which increased their hatchery capacity to approximately 4.9 million eggs per week.

CP Foods Group

Established in 1978, CP Foods Group is the largest agribusiness firm in Thailand, with vertically integrated operations in animal feed, livestock breeding, farming and further processing as well as food retail and restaurant business, operating into the production of pigs, poultry and shrimps. It is a publicly traded subsidiary of the Charoen Pokphand Group, Thailand's largest and one of Asia's largest conglomerates. In 2013, CP Foods Group had an approximate poultry production capacity of one million chickens per day. CP Foods Group currently has subsidiaries in 17 countries, and mainly focuses on export of processed food. CP Foods Group supplied about 30.0% of its total chicken production to

domestic fresh chicken market. In 2013, CP Foods Group was ranked number two in Thailand's domestic fresh chicken market.

GFPT Public Company Limited (“GFPT Group”)

GFPT Group operates an integrated poultry business which includes feed mill, chicken breeding, chicken farming, slaughtering, further processing and others. In 2013, GFPT Group had an estimated poultry production capacity of 200,000 chickens per day. GFPT Group mainly distributes frozen chicken meat, processed chicken, and its by-products for both domestic and overseas market. GFPT Group supplied about 56.4% of its total chicken production to domestic fresh chicken market. In 2013, GFPT Group was ranked number three in Thailand's domestic fresh chicken market. In 2013, GFPT Group achieved a total revenue of Baht 17,011 million (USD 525.51 million), up from Baht 15,651 million in 2012 (USD 483.50 million) by 8.6%. The company is expanding into the wholesale meat business.

The Betagro Group (“Betagro”)

Betagro is a vertically integrated agro-producer engaged in animal feed, poultry/pig breeding and farming, slaughtering, further processing, animal health and distribution. In 2013, Betagro had an estimated poultry production capacity of 450,000 chickens per day. Betagro supplied about 20.0% of its total chicken production to domestic fresh chicken market. In 2013, Betagro was ranked number four in Thailand's domestic fresh chicken market. Betagro is planning to expand its operations in ASEAN with a specific focus towards Cambodia and Laos by setting up animal feed and livestock representatives. Betagro has established a globally recognized quality and safety standard, *Assured Betagro Chicken Programme*, to standardize its quality assurance across the chicken production value chain.

Cargill Meats Thailand (“Cargill Meats”)

Cargill Meats mainly focuses on processed meat products. Cargill Meats operates as a subsidiary of Cargill Siam Limited, a global firm that provides food, agriculture, financial and industrial products and services. In 2013, Cargill Meats had an estimated poultry production capacity of 300,000 chickens per day. Its production capacity for processed chicken was approximately 80,000 metric tonnes. It supplied about 29.0% of its total chicken production to domestic fresh chicken market. In 2013, Cargill Meats was ranked number five in Thailand's domestic fresh chicken market.

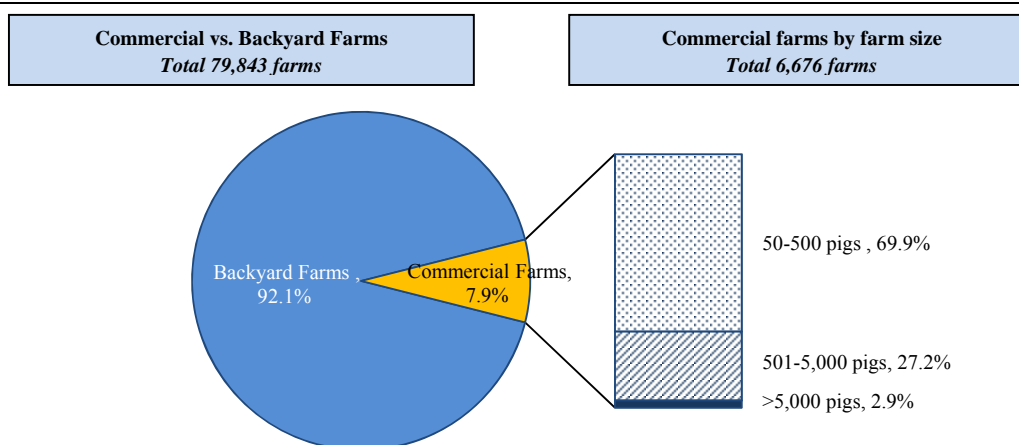
4. ANALYSIS OF UPSTREAM PIG PROTEIN MARKET IN THAILAND

Thailand's pig farming industry is less commercialized compared to its poultry farming industry. It is highly fragmented with the majority of the production being contributed by backyard farms and small-to-medium commercial pig farms. The number of pig fattening farms has grown from 66,014 in 2010 to 79,843 in 2013, registering a CAGR of 6.5%. In 2013, there were 73,167 backyard pig fattening farms, or 92.1% of total, and 6,676 commercial pig fattening farms, contributing to the remaining 7.9% of total pig farms. Commercial pig fattening farms are further classified into three segments based on farm size:

- small farms with a fattening pig population of less than 500 pigs (71.0% of total)
- middle-sized farms with a population between 501 and 5,000 pigs(27.0%), and
- large farms with a population of over 5,000 pigs(2.0%)

According to Ministry of Commerce, even though commercial farms contributed about 10.0% in terms of number of pig fattening farms, their production volume represented over 60.0% of the national production volume, portraying the important role of commercial farms in the Thailand's pig farming industry.

Figure 4.1 Estimated Number of Pig Fattening Farms by Farm Type in Thailand, 2013



Source: Department of Livestock Development, Ministry of Agriculture and Cooperatives

Note: Farms with less than 50 fattening pigs are considered as backyard farms.

Pig farm capacity is measured by the number of pig at a point of time rather than the aggregated pig population produced in a year.

Similar to the poultry farming industry, Thailand's pig farming industry has adopted the contract farming system. According to the Association of Pig Producers and Processors for Export in Thailand, about one-third of the commercial pig farms in Thailand are held either under the contract farming system or are directly operated by the companies themselves. The remaining commercial farms and all of the backyard farms manage their pigs on their own and bear the burden of price fluctuation of the fattening pigs and pig feed. Backyard farms supply their pigs mainly to the local wet market through a traditional distribution system. The existence of the large number of backyard farms is due to the following reasons:

- they engage in independent pig farming as they like the freedom of managing their own production, and the instant profits they get.
- it is convenient for farms to sell their pigs at their doors, where they are not required to get involved in any further activity. Middlemen come to the farm gate to purchase the pigs and deliver them to the next level of stakeholders in the value chain.

Although backyard farms have been enjoying freedom in farm management and sales, they are less competitive compared to commercial farms. Backyard farms are not equipped with advanced farm management knowledge, and bio-security facilities as commercial farms do. They also don't have the ability to manage feed cost and forecast the market demand. There are a few other associated disadvantages with backyard farms:

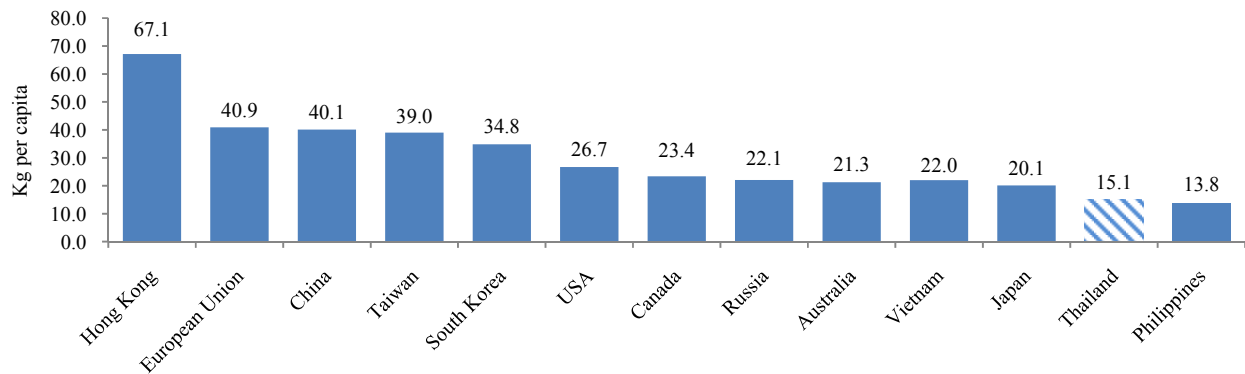
- it impacts the overall profitability and efficiency of the pig farming industry in Thailand. Some backyard farms lack knowledge of farm operations. When backyard farms choose to not sell their pigs when the price is low, the absence of careful cost-benefit calculation of keeping pigs against subsequent price increment sometimes results in an unfavorable profit margin. This is because the yield of pig grows at much slower rate when pigs reach a certain age. Most backyard farms overlook this fact, as they are focused on the selling price.
- backyard farms mainly raise pigs in open or semi-open farming environments and lack accurate health monitoring. This exposes the pigs to the risk of disease, and subsequently to the problems of supplying inferior quality pork to the market which is normally unqualified for export.
- there is a mismatch in supply and demand due to its low degree of commercialization for its pig farming industry. This is mainly because commercial pig farms have the ability to forecast the expected demand and increase or decrease their production capacity accordingly. However, backyard farms lack the knowledge of calculating demand from the market.

Frost & Sullivan expects that Thailand's pig farming is expected to move towards commercialization, with backyard farms continuing to play an important role in the foreseeable future.

4.1. DOMESTIC DEMAND DYNAMICS

In Thailand, per capita pork consumption is estimated to grow at a CAGR of 1.5% from 14.3 kg in 2010 to 15.1 kg in 2014. Pork refers to pig meat excluding entrails and blood. Despite its continuous growth, Thailand's per capita consumption of pork is lower compared to neighboring countries with similar social-economic status such as China (40.1 kg) and Vietnam (22.0 kg). This trend is attributable to the fact that pork is expensive than chicken in Thailand. The lower per capita consumption suggests that there is high growth potential for the pig industry in Thailand. Frost & Sullivan expects per capita pork consumption to continue to increase in the future, driven by improving living standards and increasing disposable income.

Figure 4.2 Per Capita Pork Consumption, 2013

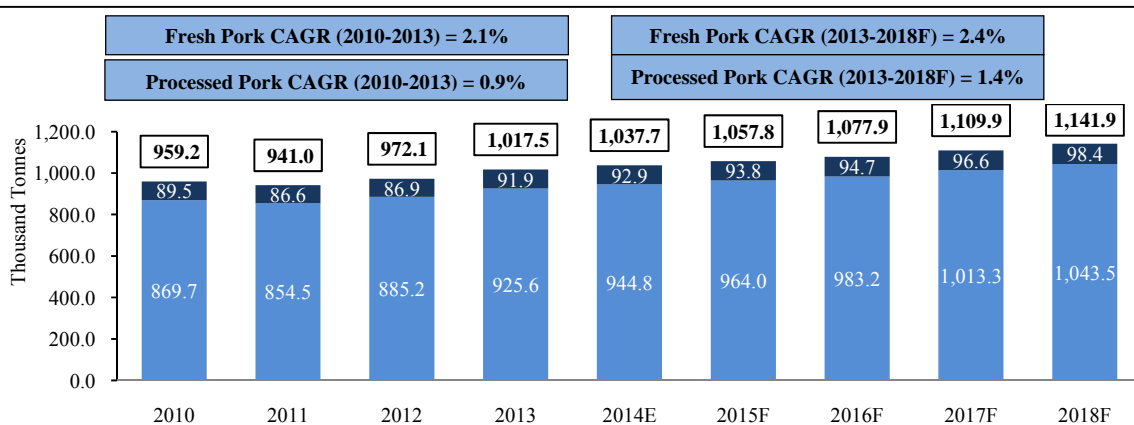


Source: Food and Agricultural Policy Research Institute

In 2013, fresh pork contributed around 90.0% of total domestic pork consumption, while processed pork products contributed to the remaining 10.0%. The Thailand population prefers to consume fresh pork as it can be used in a variety of Thai food menus. Consumers also prefer unprocessed food products, as a result of the general belief that processed food products contain monosodium glutamates and other inorganic ingredients, which could lead to health disorders. This is expected to create increased market potential for fresh pork.

Fresh pork is typically sold at the wet markets as well as through modern retail channels, especially in urban cities. According to National Food Institute (2013), the demand for processed pork is concentrated in the Greater Bangkok metropolitan area and in major cities due to the relatively higher number of convenience stores, supermarkets, hypermarkets, and food chains. Frost & Sullivan believes that domestic consumption of fresh pork will grow at a higher rate than that of processed pork products.

Figure 4.3 Domestic Pork Consumption Volume in Thailand, 2010 to 2018F



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives; Customs Facility, Department of International Trade, Ministry of Commerce; the Office of Industrial Economics; Frost & Sullivan Analysis

Note: Domestic Pork Consumption volume includes both domestic production (minus export), and import. Pork refers to pig meat excluding consumption of entrails, blood.

4.2. SUPPLY DYNAMICS

Thailand has achieved self-sufficiency in pig production. The country's supply of pork caters to its entire domestic demand, and the amount of imported pork is negligible. In terms of location, farms are mainly concentrated in the north and north-east regions. However, majority of farms in these regions are small backyard farms.

In terms of pig population, the Ratchaburi province is the key region for pig farming, followed by Chonburi, Nakhon Ratchasima, Lopburi and Phatthalung. In 2012, the Ratchaburi province was home to about 1.9 million live pigs, accounting for about 20.0% of total domestic pig population, the highest in Thailand.

Many players have set up farms across the country. For example, Betagro has set up pig fattening farms in each region. Some players, such as the Laemthong Group, focus specifically in the east region, its home base.

As shown in Figure 4.3, Thailand's estimated fattening pig population is estimated to increase from 12.1 million pigs in 2010 to 12.8 million pigs in 2014, registering a CAGR of 1.5%. Thailand saw a 1.9% decrease in its fattening pig population in 2011, mainly due to accelerated animal feed cost, spread of Porcine Reproductive and Respiratory Syndrome ("PRRS"), and unfavorable weather conditions. In 2012, the situation improved and the PPRS was securely controlled by majority of the pig farms. As the pig farms restored their confidence, Thailand saw a rebounding over-supply of its pig population to 12.8 million, a 7.9% increase over 2011. Due to the oversupply in 2012, the price decreased in the same year, forcing majority of the pig farms to adopt a slow expansion plan due to shrinking profits. In 2013, Thailand's pig population grew to 13.1 million, registering a moderate growth rate of 2.3%, and is expected to reach 13.9 million in 2015, at a 8.7% year-on-year increase. The expected increase is attributable to the increasing export opportunities from Russia. Driven by growing domestic consumption and growing demand from overseas, Thailand's pig population is expected to further grow to 17.2 million in 2018.

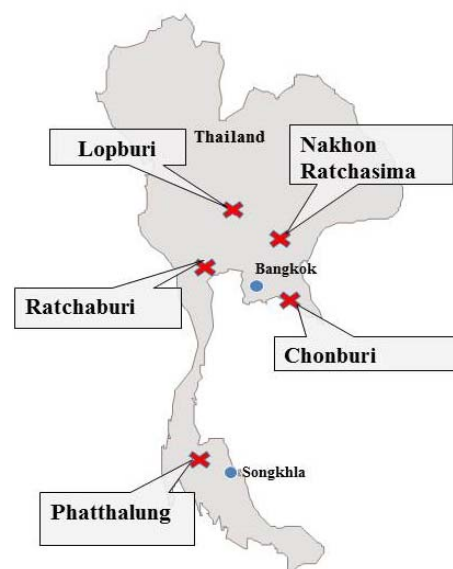
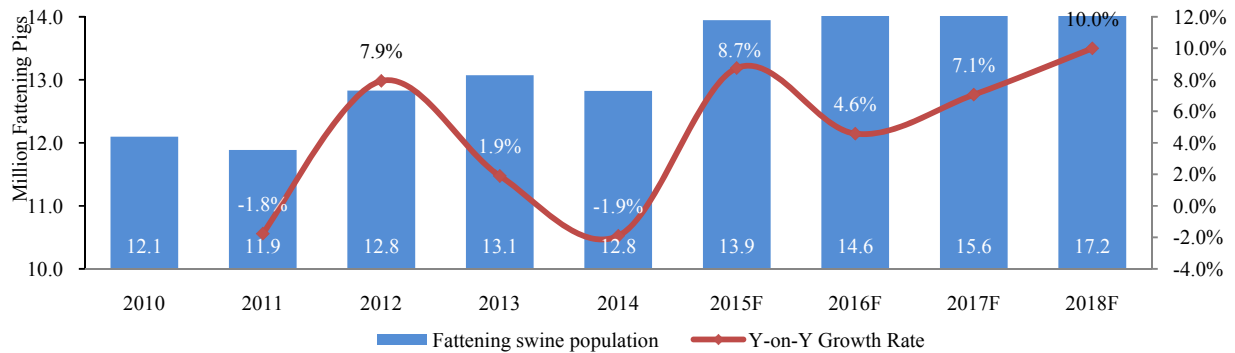


Figure 4.4 Estimated Fattening Pig Population in Thailand, 2010 to 2018F



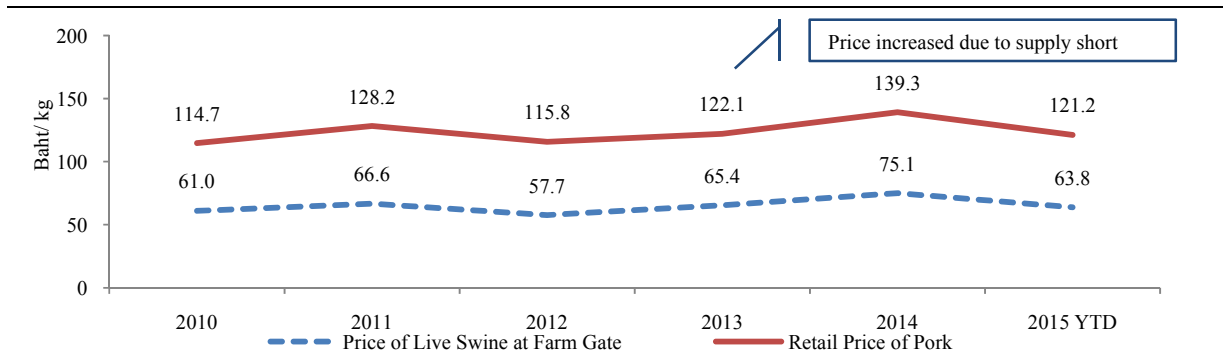
Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Frost & Sullivan Analysis

Average price of live pigs has shown a reciprocal trend to pig population. Thailand saw a 9.2% increase in live pig price in 2011, mainly due to the short supply of live pigs. In 2012, the live pig price decreased to pre-2010 levels, as population of live pigs recovered with a 7.9% growth rate. Live pig price grew to Baht 64.8 in 2013 (USD 2.00 per kg), an increase of 12.3%. This is mainly due to the following two reasons:

- Firstly, farms cut back pig production expansion in 2013, mainly due to their caution for continued oversupply of pig population started from 2012.
- Secondly, Thailand reported instances of PRRS breakout and repeated plaguing of Porcine Epidemic Diarrhea (“PED”) in 2013. This impacted the supply capacity of backyard farms operating with open systems.

According to Office of Agriculture Economics, as of 2014, average price of live pigs grew by 14.8% to Baht 75.1 per kg compared to the previous year. In 2014, the retail price markup of pork was approximately 99.0% compared to the price of live pigs at farm gate, including the value-adds of slaughtering, distribution, pig entrails and blood. The retail market witnessed similar price fluctuations as wholesale price.

Figure 4.5 Average Price of Live Pig Sold at Farm Gates and Retail Price of Pork in Thailand, 2010 to 2015YTD



Source: Office of Agriculture Economics; Office of Internal Trade, Ministry of Commerce, Frost & Sullivan Analysis

Note: Retail price of pork is estimated by the hips part of pig

Note: 2015 price of live swine is as of April 2015. 2015 retail price of pork is retrieved as of May 2015

4.3. EXPORT DEMAND DYNAMICS

Thailand exports a negligible amount of its pork products, approximately 1.5% of its total production in 2013. Total pork export grew from 9,765.1 tonnes in 2010, worth Baht 1,092.7 million (USD 58.8million), to 15,957.2 tonnes in 2013, worth Baht 2,663.8 million (USD 82.3 million), registering a CAGR of 17.8% in volume, and 11.9% in value.

Thailand has been aiming to enhance their quality standards for pork to serve the export market in an attempt to replicate its success in poultry exports. The Government has also been identifying and certifying qualified slaughterhouses and pig farms that meet international quality standards. In 2014, Thailand made significant progress in the pork export market. According to the Pig Raisers Association of Thailand, in October 2014, Bangkhla Pig Slaughterhouse was granted approval to export fresh pork to Russia, following the completion of an audit and assessment process. This is the first time Thailand will export fresh pork to Russia, the second largest importer of pork globally in 2013. Russia is expected to place orders for approximately 4,000 tonnes per month.

Frost & Sullivan expects the Government's initiative and the new trade relationship with Russia to benefit the industry in the long term. Consequently, large-scale, commercial pig farms are expected to be in the forefront to benefit from this new opportunity.

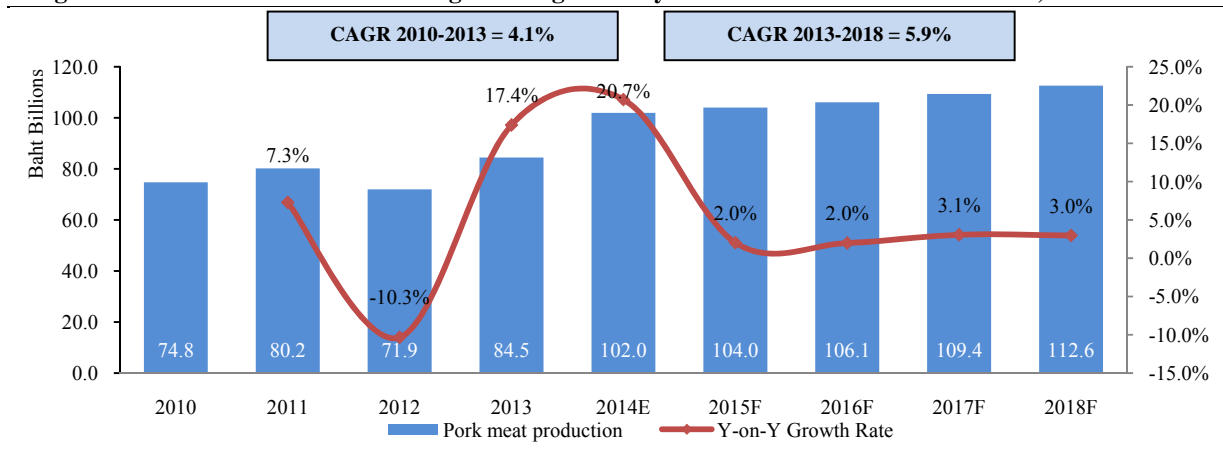
In terms of pork exports, other potential trade partners for Thailand to explore are Japan, Mexico and China. According to the USDA, Japan is the largest importers of pork meat in 2013 (1.2 million tonnes), followed by Russia (868,000 tonnes), Mexico (783,000 tonnes) and China (770,000 tonnes). The USDA expects a lower growth in global trade of pork meat, largely due to Russia's restrictions on imports from the EU as well as limited supply of exportable pork from the U.S.. While African Swine fever ("ASF") is cited as the reason for Russia's restrictions on imports of European pork, PED has affected production in a number of North American, Asian, and South American countries. This in turn impacts import demand and exportable supplies.

The U.S. (2.3 million tonnes), the EU (2.2 million tonnes), Canada (1.2 million tonnes) and Brazil (585,000 tonnes) are the largest exporters of pork meat in 2013. The EU exports are forecast to reduce to 2.0 million tonnes due to the loss of their top market, Russia, which accounted for 23.0% of their trade in 2013. Some shipments will likely be redirected to Asia, with China expected to become their top market. Exports from the U.S. are expected to decline to 2.2 million tonnes as limited supplies and record high prices are impacting their competitiveness. Brazil's export volume for pork is forecast to increase from 585,000 tonnes in 2013 to 675,000 tonnes in 2014, with increased shipments to Russia replacing the pork from the EU. The depreciation of Brazilian Real is also expected to make Brazilian products more competitive in the global market.

4.4. MARKET SIZE ESTIMATION AND FORECASTS

The market size of Thailand's pig farming industry for domestic fresh pork consumption, measured by its sales value of live pigs at farm gates, increased from Baht 74.8 billion (USD 2.31 billion) in 2010 to Baht 84.5 billion (USD 2.61 billion) in 2013, registering a CAGR of 4.1%. The market size for the same, measured by sales volume of live pigs, increased from approximately 1.2 million tonnes in 2010 to 1.3 million tonnes in 2013, representing a CAGR of 2.1%. The growth in market size has been primarily driven by economic growth, changing demographics and consumers' dietary preferences. Frost & Sullivan forecasts the market size to reach Baht 112.6 billion (USD 3.48 billion) in terms of value and 1.5 million tonnes in terms of volume by 2018, at a CAGR of 5.9% and 2.4% respectively from its current level in 2013.

Figure 4.6 Estimated Market Size of Pig Farming Industry for Domestic Fresh Pork Market, 2010 to 2018F



Source: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, Frost & Sullivan Analysis

4.5. KEY DRIVERS FOR FUTURE DEVELOPMENT OF THE PIG FARMING INDUSTRY

Increasing domestic demand driven by Thailand's growing per capita disposable income and expanding urban population

In 2013, approximately 98.5% of the pork produced in Thailand was consumed domestically. Growing domestic demand is thus a crucial driver for Thailand's pig farming industry. Thailand's per capita pork consumption has grown from 14.3 kg in 2010 to 14.9 kg in 2013, at a CAGR of 1.5%. Increasing disposable income, improving living standards, and continuous urbanization are the key forces that support the overall demand in the country for quality food products.

In 2013, Thailand's per capita disposable income was approximately USD 3,752, having grown from USD 2,488 in 2008 at a CAGR of 8.1%. According to the EIU, the per capita disposable income is expected to further rise to USD 5,034 in 2018. In 2013, Thailand's urbanization rate was

approximately 34.5%, up from 33.1% in 2008. According to the FAO, Thailand's urbanization rate is expected to further rise to 37.0% in 2018. Trends of growing per capita disposable income and increasing urbanization have a direct impact on consumer behaviors. For example, it has been observed that multiple Japanese food chains have been set up in urban Thailand. It has helped in lifting the demand for pork as such restaurants mainly serve pork on their restaurant menu. The modern distribution system has been developing in urban Thailand, such as supermarkets, hypermarkets, and convenience stores. Such stores are equipped with refrigeration systems to increase the storage life of fresh pork products. The modern distribution system has increased consumers' accessibility to fresh pork products. Frost & Sullivan expects to see continuous rise in pork consumption in Thailand.

Opportunities in the pork export market are expected to drive Thailand's pig farming industry

In 2013, Thailand had limited presence in the export market for pork. It only exported about 1.5% of the pork it produced. According to the Ministry of Commerce, Thailand's trading partners for pork are mainly limited to Japan, Hong Kong, and Myanmar. These three countries accounted for about over 90.0% by value of pork exported from Thailand. Thailand continues to make great efforts to enhance its pork export market.

The limited export presence is due to the Foot-and-Mouth Disease ("FMD") that has been repeatedly occurring in Thailand at an annual frequency since 2001. Thailand has succeeded in developing vaccines for treating this disease and minimizing its impact on overall production. However, Thailand has not been internationally declared free of FMD and consequently faced restrictions in exporting pork product. Thailand has been working towards establishing FMD-free zones comprising seven provinces in eastern Thailand and is expected to enter full operation of one zone by 2016 earliest. The seven provinces include but are not limited to Chachoengsao and Chonburi, where many pig farms are located. Pigs in the FMD-free zones are expected to be isolated and free from contagious diseases. The potential establishment of FMD-free zones is expected to stimulate the overseas demand for Thailand's pork products.

It is expected that increasing export opportunities will create great potential for Thailand's pig farming industry. Companies that have met the required hygiene and quality standards are the pioneers, and will enjoy a first-mover advantage.

4.6. KEY CONSTRAINTS FOR FUTURE DEVELOPMENT OF THE PIG FARMING INDUSTRY

Changing climatic conditions create difficulties for pig farms in Thailand

Pigs should be raised in a cool and dry weather. However, the changing climatic condition in Thailand is a concern for farms, as they need to take additional efforts in maintaining a cool environment for the inmates. Pigs may lose up to 15.0 kg of weight during the hot and humid season. High temperatures and humidity also have a negative impact on pig reproduction rate. Commercial farms have

installed air conditioners and other cooling devices in the production premises to help improve the overall farm environment. However, such infrastructure improvements require significant capital investment, which may not be affordable to the small backyard farms, thereby impacting the profitability of the industry.

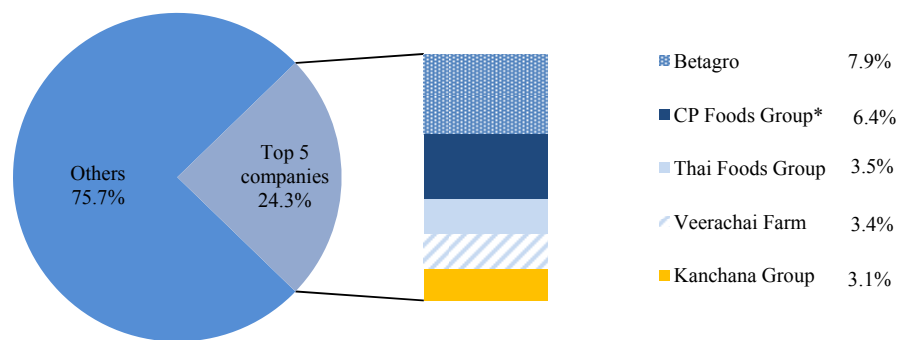
Threat of disease might impact pig production

Many endemic diseases can spread easily across countries, which may reduce pig production and their reproductive performance. Thailand has seen recurring outbreaks of pig related diseases; for example, FMD in hoofed livestock since 1971, PED and PRRS outbreaks since 1995. PED is a viral disease caused by corona virus and characterized by diarrhea and emaciation affecting all ages of pigs. PRRS circulates indefinitely within an infected herd and is based on the persistence of the carrier animals. Such diseases have resulted in stillbirths, death, and infertility of pigs. Pig related diseases are a burden, especially to small-scale commercial and backyard farms, which lack security systems to weather contagious diseases. The recurrence of such diseases, despite the vaccinations, creates short term fluctuations in pork production and has an impact on prices.

4.7. COMPETITIVE ANALYSIS

The established players in Thailand’s pig fattening industry are Betagro, CP Foods Group, Thai Foods Group, Veerachai Farm and Kanchana Group. Betagro, CP Foods Group and Thai Foods Group are the leading players in terms of pig production capacity. The leading players in this industry are not only operating in the pig business but are also engaged in the poultry business to benefit from economies of scale. In addition, they have integrated businesses at various stages of the value chain: pig feed, pig breeding, pig fattening, and food processing.

Figure 4.7 Competitive Landscape in Live Pig Production Catering to Fresh Pork Market of Thailand, 2013



Source: Company’s annual report and press release; and interviews with experts

Note: Total market size is based on domestic suppliers only. Key players’ supply is estimated by their live pig production for 2013 to cater for domestic fresh pork market.

**In 2013, CP Foods Group was ranked the number two for its pig production volume based on its pig farming capacity. In the same year, it was ranked the number one in Thailand for its sales value of fresh pork.*

Betagro

Betagro provides pigs to slaughterhouses mainly to cater for fresh pork production. Betagro has business units delegated for domestic fresh pork market and export frozen/cooked pork market. Betagro is the first in the country to produce and distribute Specific Pathogen Free (“SPF”) pork products. In 2013, 10.4% of its total revenue was contributed by its pig operations, higher than 5.9% in 2012.

In 2013, Betagro had an approximate pig production capacity of 3,400 pigs per day. Betagro supplied about 75% of its pig population to cater for domestic fresh pork market. In 2013, Betagro was ranked the number one player in Thailand for this market segment.

CP Foods Group

CP Foods Group’s swine operation involves fresh pork, processed pork and ready-to-eat meat products. It supplies for both domestic and overseas market. CP Foods Group’s swine business received 4 awards in Thailand’s 5S award 2013 presented by Technology Promotion Association (Thailand- Japan).

In 2013, CP Foods Group had an approximate pig production capacity of 2,100 pigs per day. CP Foods Group’s market share, based on its own production capacity, was estimated to be 6.4% in 2013. CP Foods Group purchases pigs from other farms for slaughtering, processing and sales. In 2013, CP Foods Group’s market share, based on its sales value of fresh pork in Thailand, was estimated to be around 23% in 2013.

Overall, CP Foods Group supplied about 80% of its pork to cater for domestic fresh pork market while the remaining is supplied for processed pork segment and export market.

Thai Foods Group

Thai Foods Group has a vertically integrated pig operation, comprising of pig breeding and farming operations in Thailand. In 2013, Thai Foods Group expanded their pig operations in Vietnam with a 700 grandparent pigs. The company also maintains strict farm oversight like vaccinations, temperature control, hygiene and inspections to ensure the proper raising of fattening pigs.

In 2013, Thai Foods Group had an approximate pig production capacity of 1,134 pigs per day. Thai Foods Group supplied nearly 100% of its pork production to domestic fresh pork market. In 2013, Thai Foods Group was ranked the number three player in Thailand for this market segment.

V.C.F Group Co., Ltd (“Veerachai Farm”)

Veerachai Farm started its business with feed manufacturing and further expanded into pig farming in 2007. It has advanced feed manufacturing facilities and closed-farming system to increase its productivity. Veerachai Farm also uses bio-gas for power generation for internal use.

In 2013, Veerachai Farm had an approximate pig production capacity of 1,000 to 1,100 pigs per day. In 2013, Veerachai Farm was ranked the number four player in Thailand for this market segment with an estimated market share of 3.4%.

Kanchana Group

Kanchana Group is a company that operates in pig farming. It has built its expertise in feed manufacturing and farm management. Kanchana Group has been developing formula feed in order to increase its farming productivity and meat quality.

In 2013, Kanchana Group had an approximate pig production capacity of 1,000 pigs per day. It was ranked the number five player in Thailand for this market segment with an estimated market share of 3.1%.