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Transformation of the Thai Broiler Industry

Phunjasit Chokesomritpol[1], Viroj NaRanong, and Adam Kennedy

Abstract

The Thai broiler industry is an innovative and successful story of transformation from a traditional "backyard" production system to a fully industrialized agri-industry. It is among the first agricultural products in Thailand that developed into a modern value chain that is fully integrated and able to expand its production to keep prices in check whilst making chicken the go-to source of protein. Highlighted by its expansion into regional and global markets through trades and investments, the success of the industry is largely a result of strong and visionary business models that calculated risks yet were clear on their objectives on how to secure emerging markets. This paper describes the development of the Thai broiler industry, documenting its path and reasons behind its success. Focus is particularly placed on the Thai industry's leader, Charoen Pokphand Group (C.P.), and its business decisions over the years that enabled the company to gain a foothold in the highly competitive international market for chicken meat.

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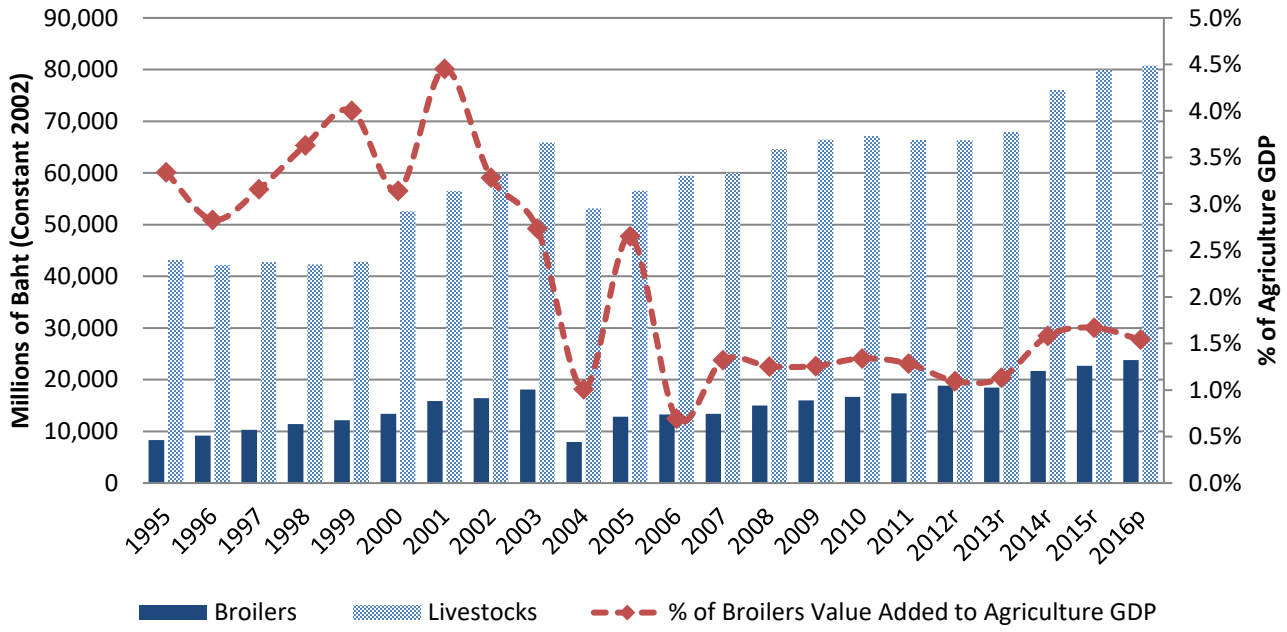
1. Introduction

The Thai broiler industry has been at the forefront of food manufacturing activities and exports in Thailand, often referred as the 'star' of the livestock sector contributing a significant portion to agricultural GDP (Figure 1). Broiler chicken was the first agricultural product in Thailand that made the successful transition from a traditional 'rural backyard' production system to one that is a vertically integrated industry today. The development of the industry happened at a remarkable speed and scale, yet was able to weather through waves of uncertainties, shocks, and changes.

Figure 1: Value Added of Broiler in Comparison to the entire Livestock Sector and Agricultural GDP



Source: Office of the National Economic and Social Development Board (NESDB).

This study documents the four decade-long transition of the Thai poultry sector and the reasons behind the industry's success. Insights are gathered from previous studies, supported by data gathering and interviews with industry experts. A focus is particularly placed on Charoen Pokphand Group (C.P. Group), an industry leader, and its business decisions over the years that enabled the company to gain a foothold in the highly competitive international market for poultry products. The goal of this study is to draw important lessons from the Thai broiler industry's transformation that may be transferable to support the development of other agri-food value chains.

The paper will address the following areas:

- The trends in Thai broiler production in terms of volume, export markets, and the technologies employed to sustain growth.
- The enabling conditions and government policies that allowed the industry to grow rapidly at the early stages of development.
- The industry's adaptation strategies in order to sustain growth and profitability in the face of external shocks.

2. Production Models, Technologies and Vertical Integration

Prior to the 1970's, most Thai farmers grew small numbers of indigenous chickens for their own consumption needs and there were no exports. Domestic consumption within Bangkok was limited due to high chicken prices

and, because small-scale producers were widely scattered, the value chain was dominated by many small middlemen who operated outside of Bangkok to collect and ship chickens to the capital city either by truck or rail. These chickens were then sold to larger Chinese wholesalers who killed and de-feathered them before distributing to retail outlets.

High prices for chicken motivated entrepreneurs to invest in the market to improve production and processing technologies. Improved chicken-raising practices were introduced in 1946 and were followed by the importation of a high-yield layer parent stock in 1956. These methods of raising chickens began to take off in the late 1960s', but in 1970, C.P. Company, one of the domestic pioneers of the industry, entered into a partnership with the US company Arbor Acres that introduced modern production technologies in Thailand.

Before 1970, the Thai broiler industry had been reluctant to allow foreign direct investments into the industry out of fear that their capital-intensive operations would disrupt local farmers (Assawachokanan, 2014). The partnership between C.P. and Arbor Acres was heavily scrutinized by the Broiler Growers Association that viewed this as a move to monopolize the market. In response, C.P. agreed that the foreign partnership would focus only on building facilities such as feed mills, slaughterhouses, cold storage capacity, and a grandparent stock farm to breed and sell parent stock to local farmers. Their aim was not to be in direct competition with local farmers, but rather to improve their profitability through cost reductions.

This partnership introduced a suite of technologies to Thailand for the first time, enabling broiler production to scale up within a short period, causing a structural transformation of the industry. Lengthy research on poultry genetics resulted in the 'CP707' commercial breed – a high-yield, low-death-rate broiler suitable for intensive farming. The introduction of ready-mixed feeds encouraged maximum growth and contract farming arrangements that mandated growers to purchase inputs helped transfer this technology to out-growers quickly. In 1973, C.P. Company also established the first modern slaughterhouse to process frozen chicken with an eye toward exporting high-quality chickens to Japan.

C.P. Company's strategy for market expansion was structured around the potential Japanese export market, targeting high income-per-capita consumers and their 'izakaya' after-work dining style that featured alcoholic beverages served with popular easy-to-eat chicken dishes such as Karaage, Yakitori, and Tebasaki. The Thai market for poultry was limited at the time but C.P. Company foresaw high profits in export markets utilizing relatively cheap labor to process poultry into various cuts of boneless, fresh chicken for the Japanese market. The company, through the partnership with Arbor Acres, was able to move quickly to establish a modern broiler value chain that increased productivity through economies of scale, modern marketing channels, improved logistics, technology and favorable government policies.

Other Thai feed companies quickly initiated partnerships with foreign businesses to compete with C.P. Company. Most of these feed businesses, such as Sri Thai, Centagro, Laemthong, and P.Charoenphan were wholly Thai owned and their partnerships allowed them to maintain majority control over their companies. Centagro and Laemthong established new subsidiary companies co-invested by their Japanese business partners. Others established joint-ventures between Thai and foreign firms such as Betagro and the Australian Siam Agriculture Development Association. As these companies moved into slaughtering businesses, many established joint-ventures with Japanese trading firms – such as Sri Thai and Kanshoku Group, Betagro and Toshoku, Centagro and Itoman, and P.Charoenphan with General Food Poultry from New Zealand and United Trading Corporation from Luxemburg. In these joint ventures, the Thai company usually maintained a larger share of the company thus securing decision-making authority (see details in Assawachokanan, 2014).

Investments and capital resources were not the primary reason behind partnerships with foreign companies as capital was made readily available by local commercial banks and government-supported investment policies and subsidies helped fund early investments (these are discussed later in the paper). Instead, these firms entered into partnerships to secure production and processing technologies and techniques. Furthermore, Japanese trading firms and their sales networks provided Thai firms with a better understanding of the wholesaling and retailing

strategy in Japan giving them insight into consumer demand and product standard requirements. Japanese firms benefitted from the partnerships because it was more economical to import chicken than to produce locally with the value of the Yen rising rapidly as Japan underwent structural transformation (Manarunsan, 1991).

After 1973, chicken farm sizes expanded rapidly, particularly in the major chicken-raising provinces of the Central Plain. The number of broilers raised by commercial farms jumped from 36.4 million birds in 1974 to 288 million in 1981, an increase of 700 percent in just 7 years. C.P. Company, through its subsidiary Bangkok Livestock Trading Company, began exporting 142 tons of frozen chickens to Japan in 1973. By 1981, chicken exports increased rapidly to 24,000 tons, with an annual growth rate of 64 percent, while the value of exports grew at 68 percent annually. The big jumps occurred during the 1976-78 period when the quantity of exports increased by 500 percent in 1976 and another 200 percent in the next two years.

New technologies helped to drastically cut down the costs of broiler production by decreasing the market age of chickens and by increasing the efficiency of the feed-conversion ratio. Thai broilers at that time could be fed up to a weight of 1.2 to 1.5 kilograms within 55 to 66 days with a feed-conversion ratio of 1.98 to 2.10, and a mortality rate of less than 5 percent (Poapongsakorn 1985). Poapongsakorn (1985) noted that Thai broiler production in the early 1980s' was nearly as efficient as that of producers in the US. By the mid-2000s, the broiler raising period shortened to around 40 days, while the feed-conversion ratio improved significantly to around 1.75 or even lower (NaRanong 2007).

The increased efficiency of production was also supported by changing housing types and sizes that reduced labor requirements and improved growing conditions. Prior to the mid-1980s, high temperatures and humidity during the summer months between March and April stressed live chickens, making them less resistant to disease. Coarse and damp litter in the chicken house induced the rapid growth of pathogenic organisms, causing irritation, stress, and breast blisters. The import and modification of "EVAP" housing[2] from the US – helped concentrate as many as 5,000-10,000 birds in a single house. The EVAP system in Thailand uses large fans and water to cool down the housing to around 28 degrees Celsius. These lower temperatures significantly reduce stress, resulting in increased growth and lower mortality rates. The closed system also provides disease control, reduces bugs, and allows more chickens to be raised per square meter. Unlike the EVAP systems in the US, Thai EVAP houses did not use full automation but instead used more labor to host chickens most likely because the labor cost in Thailand was much lower than in the US. With the increase in scale, other cost-saving methods were also exploited. Larger purchasing power meant that growers can leverage for lower feed and drug prices, and affordable services from veterinarians and animal scientists all while receiving a longer credit term than smaller growers.

Similarly, modern slaughtering technology also enabled the large chicken processors to process more chicken in a shorter time. In the early 1980s, there were three slaughterhouses established as joint-ventures with Japanese firms, two belonging to the Bangkok Livestock Trading (a C.P. Company subsidiary), and another to Saha Farm. In 1981, the New Zealand firm General Food Poultry also entered into a joint-venture with P. Charoenphan to establish modern chicken processing. While a drum-shaped machine used for de-feathering by small wholesalers can process only 200 birds per hour, the modern rubber-fingered feather picker used by the large export processors can de-feathered around 2,800 to 9,000 birds per hour, depending on the scale implemented.

2.1. Vertical Integration

To ensure the quality of production and to continue company growth, feed manufacturers soon realized that vertical integration[3] to control the entire value chain was necessary to bring the costs of production and marketing down and ensure a regular supply of chickens at a lower and more stable price. Manopimok (1983) also observes that many integrators who started out as feed traders shifted into the broiler industry following the C.P. Company

[2] short for an Evaporative Cooling System housing

[3] Vertical integration is the control of two or more links in the chain of production by a single company often extending from the primary producer to the final consumer.

partnership with Arbor Acres to adapt to the 'package technology' after they found it difficult to sell their own feed products that did not tie-in technically to high-yield imported breeds that required specific feed formulas. Realizing the importance of scientific knowledge and technologies, they went about to set up their own integrated operations.

To do so, a few feed retail and processing firms began to integrate backward into the production of feed ingredients and the construction of feed storage facilities to ensure the quality of ingredients used in the production of formula feed. Others moved into the production of day-old chicks, veterinary drug and vitamin administration, and farm equipment manufacturing, as well as forward integration to slaughtering activities and processing of meat and by-products, retailing, exporting, and marketing to restaurants. Vertical integration was also used to reduce or eliminate the costs associated with procurement of moving goods-in-process from one vertical stage to another. For example, the costs of handling day-old chicks and moving feeds to the contract farms were reduced by (a) using returnable plastic chick-boxes instead of paper boxes (b) using bulk-feed trucks and (c) improved scheduling of trucks carrying broilers to the slaughterhouse to maximize efficiency at the processing plant.

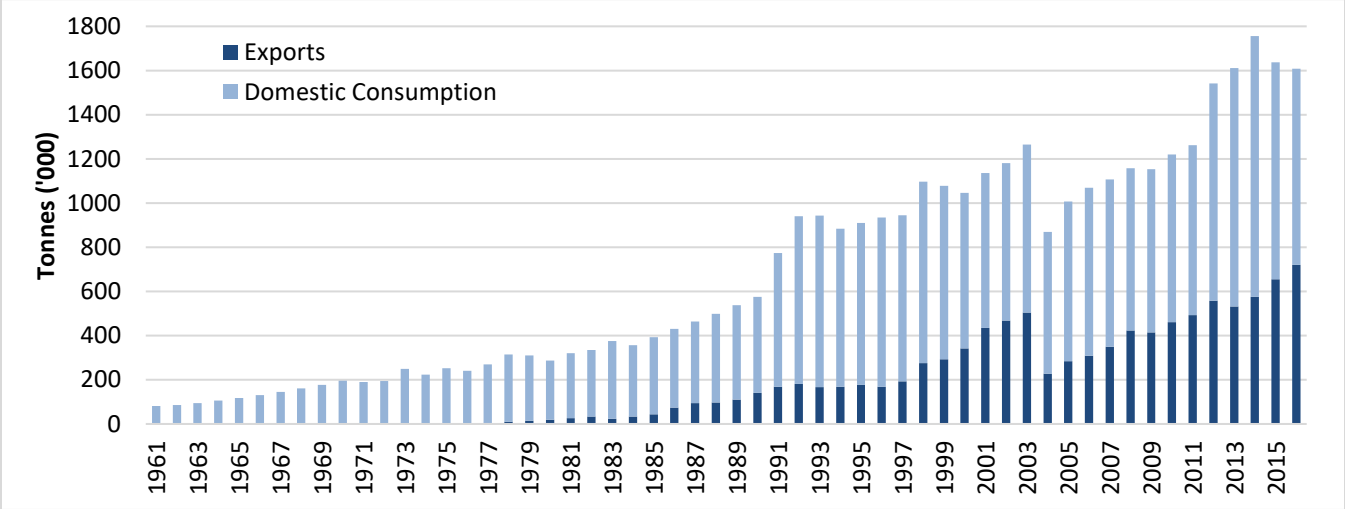
Each company employed a strategy to secure missing links and bring them into a vertically integrated structure. For example, the Saha Farm Company, the second largest chicken exporter, operates broiler farms, hatcheries, and slaughterhouses. Because Saha Farm did not have its own feed mill, it entered into a contract with Welgro to source animal feed for its out-growers. Wide fluctuation in the market prices of broilers also prompted some feed firms to offer production contract-price guarantees and flat-fee contracts to chicken growers. By contracting, the feed firms had a regular and stable outlet for their feeds, and a regular supply of live chickens for their own or contracted processing facilities.

Broiler production clustered in the Central region, accounting for around 70 percent of the total Thai production volume (Annex Table 1). Poapongsakorn (1985) pointed out that the cluster was originally positioned in provinces around Bangkok, such as Nakhon Pathom, Chachoengsao, Chon Buri, and Prachin Buri, because these areas were the major sources of animal feeds, had better public utility services, were close to the largest consumer market in Bangkok, and not far from the port of export. A later study found that large broiler producers began to find it economical to relocate operations to the upper part of the Central region in the early 2000s for three reasons. First, animal feed production areas expanded into the upper part of the Central region corresponding largely to the expansion of irrigation systems. Second, improvement of transport infrastructure connecting to Bangkok also reduced transport costs and shortened shipment time. Third, concerns over diseases and degradation of water quality from large-scale production facilities had encouraged regulations and incentives for large producers to move their base of production away from the city. Broiler farms in these concentrated areas tend to be more efficient, reflecting accumulated experiences and fiercer competition amongst farms; while broiler farms located near urban areas tend to make more profit from access to local markets (Poapongsakorn et al. 2003).

By 1981, the industry had transformed completely from a backyard production dominated by the wholesalers in Bangkok to an oligopolistic market dominated by a few integrated firms with large organizations, each controlling a significant share in various stages of commercial production and marketing. Leading firms such as C.P. Group, Saha Farm, Betagro, Centago, Laemthong, Sri Thai Livestock and P. Charoenphan moved quickly to establish new footholds. The Bangkok Livestock Trading Company, the second largest subsidiary firm in the C.P. Group, was completely vertically integrated – exemplified by its two modern slaughterhouses, one of which could slaughter up to 70,000 chickens within 8 hours. C.P. Group was estimated to control about 40 to 45 percent of chicken supply, about 50 percent of all other stages of production and marketing, and more than 40 percent of live chicken trading in Bangkok (Poapongsakorn, 1985). In contrast, the number of traditional wholesalers had decreased by more than 50 percent between 1968 to 1981 to a market share of only 10 to 15 percent.

With these systemic changes to the industry and increasing demand both domestically and abroad, broiler production grew rapidly. Even if one includes the precipitous drop in production during bird flu outbreaks of 2004 to 2007, production has grown at 5.5 percent annually since 1960 (Figure 2).

Figure 2: Thai Poultry Production- Exports and Domestic Consumption (Tonnes)



Source: FAO STAT

During this period, the industry moved towards larger scale production, oftentimes at the expense of small producers (Table 1). From 1993 to 2013, using the Agricultural Census data, the share of farmers growing 'backyard' chickens for on-farm consumption reduced tremendously from 64.2 percent of total holdings to 32.1 percent, while their corresponding share of production volume reduced from 9.2 to 0.7 percent. Farms on the upper end producing more than 10,000 birds have remained a relatively small share of the total holdings, but their corresponding share of production volume has increased dramatically from 38.5 percent in 1993 to almost 76.5 percent currently (Additional details are provided in Annex Table 2). As will be discussed later in the paper, some of the shift to larger scale production between 2003 and 2013 is attributable to the bird flu outbreaks in 2004 which forced many poultry producers to end contracted outgrowing arrangements in favor of consolidating holdings in controlled environments over which they had greater control.

Table 1: Chicken holdings 1993, 2003, and 2013

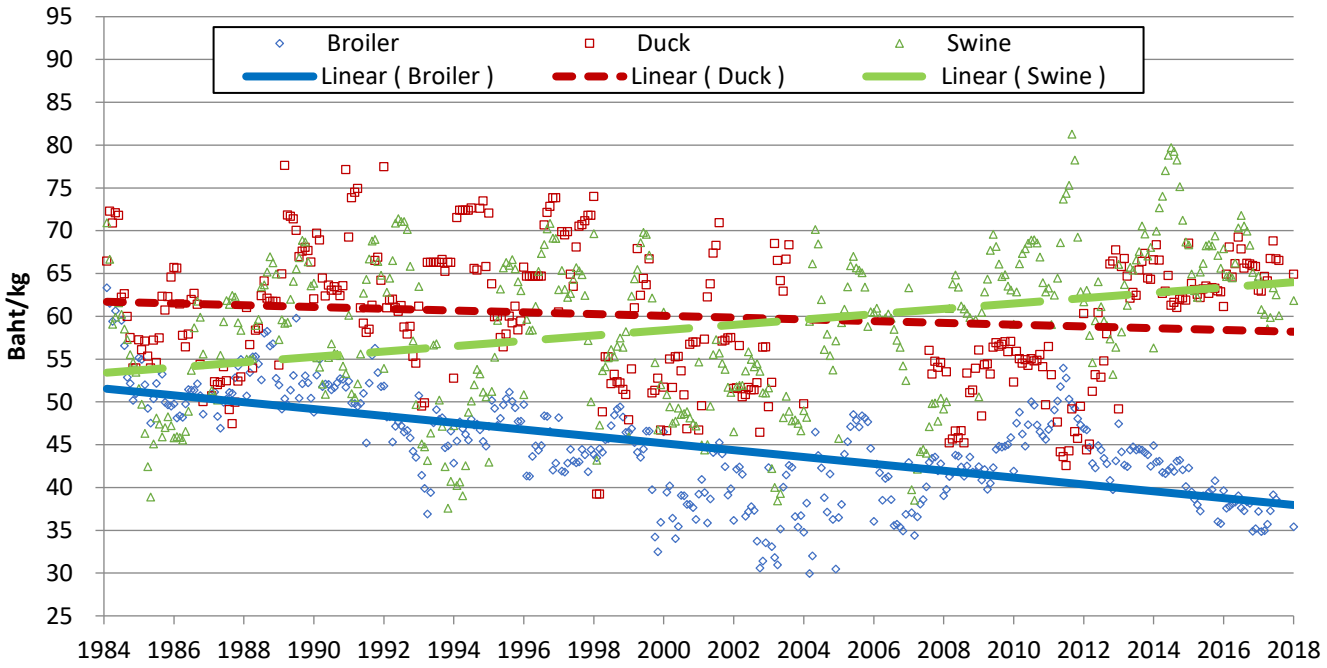
	1993				2003				2013			
Birds per holding	**Holdings ('000)**		**Total birds (000'000)**		**Holdings ('000)**		**Total birds (000'000)**		**Holdings ('000)**		**Total birds (000'000)**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
1 - 19	1,681.3	64.2	141.7	9.2	361.6	35.2	35.6	1.4	184.6	32.1	18.2	0.7
20 - 99	863.8	33.0	262.0	16.9	580.5	56.5	196.1	7.9	339.9	59.1	120.6	4.8
100 - 499	53.1	2.0	74.4	4.8	65.9	6.4	86.2	3.5	43.4	7.5	57.1	2.3
500 - 999	3.9	0.2	23.8	1.5	1.9	0.2	11.0	0.4	0.8	0.15	4.8	0.2
1,000-9,999	13.0	0.5	451.0	29.1	14.2	1.4	580.0	23.3	3.4	0.6	138.2	5.5
10,000 - 49,999*	2.3	0.1	596.3	38.5	3.5	0.3	588.6	23.6	2.3	0.4	403.9	16.1
50,000 - 99,999	N/A	N/A	N/A	N/A	0.3	0.03	178.4	7.2	0.3	0.05	186.3	7.4
100,000 and over	N/A	N/A	N/A	N/A	0.2	0.02	813.9	32.7	0.4	0.06	1,584.4	63.0
Total	**2,617.4**	**100**	**1,549.2**	**100**	**1028.2**	**100**	**2,489.8**	**100**	**574.9**	**100**	**2,513.4**	**100**

Source: National Statistic Office. Agricultural Census 1993, 2003, and 2013.
Note: *The agriculture census data for 1993 do not disaggregate farms larger than 10,000 birds so these numbers should be understood as farms with 10,000+ birds.

With the increase in productivity and improved economies of scale, poultry prices in Thailand decreased relative to other meats such as pork (Figure 3). Real farm-gate price data show broiler prices decreasing from 52 Baht per kilogram in 1984 to around 37 Baht in 2018, though seasonality in pricing persists. Decreasing poultry prices, combined with growing household incomes has grown the domestic market for chicken. The average Thai

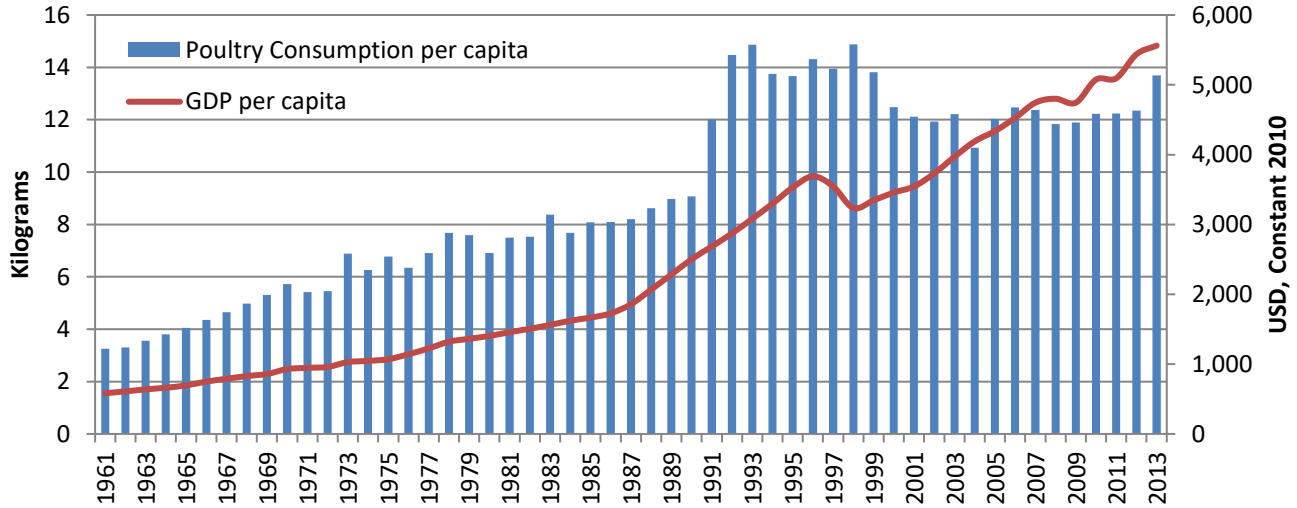
consumed just over 3 kilograms per year of chicken in the early 1960s but now consumes around 14 kilograms per year (Figure 4).

Figure 3: Farm-gate monthly prices of broiler, duck, and swine in Thailand (2015 prices)



Source: Office of Agricultural Economics (OAE).

Figure 4 Annual Thai Poultry consumption per capita



Source: FAOSTAT

Note: Poultry consumption in FAOSTAT includes duck. The volume of duck production in Thailand is, however, relatively insignificant compared to the volume of broiler production (about 4% in 2016).

2.3 Contract farming

Livestock farming is a risky business with the price of inputs (feed, day old chicks) and outputs (birds, products) varying frequently. Moreover, chicken growers must also take into account seasonal variations in price and the risks of chicken mortality.[4] While the supply of chicken meat typically plays a more important role in determining price, varying demand also adds a level of risk.

Contract farming serves as cushion that mediates profit loss and brings stability to the production side. For large integrated companies, contract farming presents a means to increase production while shielding themselves from risks of heavy investment – thus allowing the contractors the flexibility to adjust the volume of production to seasonal and irregular changes while minimizing adjustment costs and idle capacity. For growers, contract farming provides them with choices. Unlike independent commercial growers who exercise complete control over their production and marketing decisions and assume all the risks, contract growers have the option of selecting contracts that deliver a specific return while minimizing risks or, conversely that take on more risk to maximize return.

Contract farming in the Thai broiler industry usually involves a large integrated company that provides several contractors with day-old chicks and inputs such as feeds, medicines, and other supplies at stipulated prices, and agrees to buy the raised chicken at guaranteed prices. Contractors, in turn, provide housing, bedding, equipment, utilities, and labor – based on the company's specifications, to raise the day-old chickens to specified weights.

The first Thai broiler industry contract farming system was established in 1975 in Sri Racha, a town on the east coast of Thailand, situated at about 120 kilometers away from the capital city. Bangkok Livestock Trading Company initiated contract farming, using a blueprint copied from its multi-national partner in the US, Arbor Acres. The company would help growers in securing a loan from commercial banks to build necessary facilities and then hired them on a piece-rate basis to raise chickens. Additionally, contract farming became a mechanism through which technologies and knowledge were transferred from foreign firms to Thai integrated contractors and finally to local growers who otherwise would not have such access.

With the success of Sri Racha model popularized, contract farming became a successful formula that was copied by competitors. Modern commercial farms entered into contracts with large feed-mill companies or with feed agents, accelerating a rapid expansion in the number of large-scale commercial farms with more than 10,000 birds, in the provinces of Chachoengsao, Nakhon Pathom and Chon Buri.

There are three type of farming contracts, namely (a) price guarantees, (b) flat-fee contracts, and (c) open-account contracts. For price guarantee contracts, growers are furnished with feed, day-old chicks and other necessary supplies at a specified charge and are guaranteed a certain price when the broilers are sold to the contractor. If the insured price exceeds the costs of supplies advanced, the growers get the excess. If receipts fall short of those costs, some contractors may bear all or part of the burden while other contractors may postpone the debt service schedule. Many chicken-processing firms such as the Bangkok Livestock Trading Company, Saha Farm, Sri Thai Livestock Company, etc. used this type of contract as a means to secure a regular supply of chickens – representing about 30 percent of all contract types in 1981 (Poapongsakorn, 1985)

There are two variants of flat-fee contracts (also known as piece-rate contracts) – namely the wage contract and the combination contract. Under the wage contract, that which C.P. copied from Arbor Acres, growers with or without chicken houses are hired on a piece-rate basis to grow chicken. For growers who do not yet have chicken house, the company helped them to get a loan from the commercial banks to build the necessary facilities. The wage contracts were the most popular form of contracts, representing about 53 percent in 1981 (Poapongsakorn, 1985).

[4] For example, the price of chicken is often highest between December and April due to demand during festival months and again in the summer due to the higher death rate of chickens.

However, the wage-rate contract does not provide enough incentive for growers and it also allows growers to perform quality shirking. Therefore, after a few years of experience, C.P. introduced the combination plan. Under this contract, a lower flat fee is offered for the labour service of the growers but the contract offers a bonus plan which relates to the prices of broilers, feed-conversion ratio, and other efficiency indices. The details of each combination plan vary from contract to contract. For example, some combinations may include a feed-conversion bonus, market price adjustment, and mortality clause on top of a flat fee payment. Another combination contract tied in a flat fee plan to the cost of production with a 50-50 profit sharing clause.

Under the open-account contract, the feed dealer generally agrees to furnish feeds, day-old chicks and other inputs to the independent growers under the condition that (a) the growers have to sell their production to the dealers or (b) that the growers must obtain the dealers' consent if they want to sell chicken elsewhere. The dealer will then deduct the outstanding debt from the sale proceeds and return the rest to the growers. If the proceeds do not cover the debt, the dealer will usually postpone the repayment schedule to the next period.

Poapongsakorn (1985) observed a shift in the choice of contractual arrangements from price-guarantee toward flat-fee contracts due to risk aversion and transaction costs. Independent and open-account growers bear both the risk of yield variation such as sickness and death of birds and the risk of price changes which commonly occur. Under the price guarantee contract, the variance of the output price is distributed among the contracting parties, while the risk of variation in output yield is borne entirely by the grower. This is because the integrator bears the loss when his guaranteed price is higher than the prevailing market price, but the growers bear the loss when the market price is higher than the guaranteed price. In contrast, the integrator under the piece-rate contract will bear most, if not all, of both types of risks.

Another factor determining growers' contract choice is the transaction costs which are associated with each arrangement. Price guarantee contracts involve higher transaction costs, particularly for growers, than piece-rate contracts, because the quality of feed and health of chicks provided by the contractor are uncertain. Transaction cost accruing to piece-rate growers however are minimal while the cost to the contractor in terms of enforcing the quality of inputs and checking quality of output is relatively high.

This structural shift toward large-scale production to achieve economies of scale happened quickly for the Thai broiler industry. Growth in the export of frozen chicken supported the emergence and dominance of large processors due to their financial advantages and access to technology. The ability to export high quality and standardized frozen poultry products is essential in international trade where competition is very keen and meat inspection is very important. High quality processed broiler products implies a large investment in the technology and is a mark of quality assurance. The achievement of this standard of excellence opened further growth opportunities on the international market, the profits of which can be far larger than those obtained domestically.

3. Expanding Regional and Global Markets

The Thai broiler industry adopted a strategy to expand into regional and global markets through trade and investment. Unlike most agricultural products in Thailand which originate in domestic markets and then grow into regional, then global markets, the Thai broiler industry took a different path – first entering the high-value global markets of Japan and the EU before advancing into regional ones.

Thai broiler exports have shifted over the years in terms of destination and product composition (Table 2). From the outset in 1973 through 1995, most chicken exports went to Japan – amounting to 78.5 percent and 92.2 percent of the export share of frozen and prepared chicken respectively in 1995. At that time, exports to the EU were increasing, primarily to Germany and the Netherlands, while exports to ASEAN were still insignificant. By 2000, exports of frozen and prepared chickens to the EU increased but the Japanese market remained important for frozen chicken export at 53.2 percent of market share. There was also a significant increase in the net weight and trade value of frozen chicken export between 1995 to 2000 as a result of Baht devaluation (details below).

In 2005 following the bird flu outbreaks, exports shifted almost entirely towards processed chicken. For the first time, both net weight and trade value of processed chicken exports surpassed those of frozen chicken exports. At this point, the export share of processed chickens was divided equally among the Japanese and EU market at 48.5 percent and 46.7 percent respectively. By 2010, the exports of frozen chicken began to make a comeback though were only about 14 percent of the volume of 2000 exports and, this time, exports headed primarily to lower-income markets in ASEAN. Processed chicken exports were still dominated by the Japanese and EU market, but the volume increased significantly – almost doubling the 2005 figure. Frozen chicken exports never quite recovered from the bird flu outbreaks with other key players such as Brazil and the US dominating the market. On the other hand, the collapse of the export market forced Thai producers to adapt and ushered in a series of new production techniques allowing them to expand and diversify prepared poultry products. This shift has allowed Thailand to increase exports and expand into new markets, so much so that the country has become the top exporter of prepared and processed poultry capturing 31 percent of the global market share by trade value in 2016 (Table 3).

The expansion of Thai production has been accompanied by investment in foreign, often emerging markets. In recent years, the industry has moved into ASEAN countries to capture domestic markets, but investment is still at an early stage. The approach to investment varies according to local contexts, such as local demands for meat, infrastructure readiness, government policies, and regulations. C.P. Group, for example, is using the Sri Racha model of the mid-1970s in the developing countries of ASEAN, investing in feed businesses and employing local contract farmers to scale up production gradually at the same pace as local demand. In ASEAN, the company's investments were facilitated by local financial institutions and negotiated with local government to secure incentives. In contrast, investments in more developed economies such as the US and Turkey have been in through mergers and acquisitions.

Table 2: Thai poultry exports

Fresh, chilled, and frozen*		Net Weight		Trade Value		Prepared, processed**		Net Weight		Trade Value	
		Tonnes	%	USD ('000)	%			Tonnes	%	USD ('000)	%
1995											
1	Japan	117,074	76.9%	309,544	78.5%	1	Japan	24,241	92.2%	114,364	92.3%
2	Germany	9,675	6.4%	33,949	8.6%	2	Germany	1,344	5.1%	6,477	5.2%
3	Singapore	6,175	4.1%	13,738	3.5%	3	UK	399	1.5%	1,791	1.4%
4	Netherlands	3,252	2.1%	10,672	2.7%	4	Hong Kong, SAR	101	0.4%	471	0.4%
5	So. African Customs Union	2,148	1.4%	5,028	1.3%	5	Belgium-Luxembourg	40	0.2%	243	0.2%
	Top 5 Exports	**148,849**	**90.9%**	**385,919**	**94.6%**		**Top 5 Exports**	**26,248**	**99.4%**	**123,803**	**99.5%**
	EU Exports	**14,043**	**9.2%**	**47,738**	**12.1%**		**EU Exports**	**1,840**	**7.0%**	**8,799**	**7.1%**
	ASEAN Exports	**6,989**	**4.6%**	**15,587**	**4.0%**		**ASEAN Exports**	**49**	**0.2%**	**149**	**0.1%**
	Total Export	**152,276**	**100.0%**	**394,161**	**100.0%**		**Total Export**	**26,278**	**100.0%**	**123,931**	**100.0%**
2000											
1	UK	129,606	53.8%	207,331	53.2%	1	Japan	20,559	29.7%	62,299	28.6%
2	Japan	33,627	14.0%	64,429	16.5%	2	UK	17,322	25.0%	59,570	27.4%
3	Viet Nam	20,325	8.4%	39,130	10.0%	3	Netherlands	18,280	26.4%	55,489	25.5%
4	Netherlands	12,738	5.3%	26,414	6.8%	4	Germany	3,537	5.1%	13,473	6.2%
5	Germany	12,105	5.0%	17,081	4.4%	5	Ireland	3,699	5.3%	10,439	4.8%
	Top 5 Exports	**208,401**	**86.5%**	**354,387**	**90.9%**		**Top 5 Exports**	**63,396**	**91.5%**	**201,270**	**92.5%**
	EU Exports	**69,303**	**28.8%**	**135,355**	**34.7%**		**EU Exports**	**42,640**	**61.5%**	**140,043**	**64.4%**
	ASEAN Exports	**12,077**	**5.0%**	**16,260**	**4.2%**		**ASEAN Exports**	**4,107**	**5.9%**	**9,589**	**4.4%**
	Total Export	**240,923**	**100.0%**	**390,080**	**100.0%**		**Total Export**	**69,328**	**100.0%**	**217,533**	**100.0%**
2005											
1	UK	2,464	54.2%	7,017	52.1%	1	Japan	114,744	48.6%	332,548	48.5%
2	Japan	1,331	29.3%	5,442	40.4%	2	UK	66,938	28.4%	198,085	28.9%
3	Viet Nam	472	10.4%	383	2.8%	3	Netherlands	23,846	10.1%	68,829	10.0%
4	Netherlands	101	2.2%	242	1.8%	4	Germany	9,398	4.0%	26,104	3.8%
5	Germany	26	0.6%	190	1.4%	5	Ireland	6,662	2.8%	16,665	2.4%
	Top 5 Exports	**4,537**	**96.7%**	**13,462**	**98.5%**		**Top 5 Exports**	**233,870**	**93.9%**	**678,624**	**93.6%**
	EU Exports	**2,592**	**57.0%**	**7,451**	**55.3%**		**EU Exports**	**109,727**	**46.5%**	**319,728**	**46.7%**
	ASEAN Exports	**489**	**10.8%**	**398**	**3.0%**		**ASEAN Exports**	**3,042**	**1.3%**	**9,102**	**1.3%**
	Total Export	**4,547**	**100.0%**	**13,472**	**100.0%**		**Total Export**	**235,897**	**100.0%**	**685,119**	**100.0%**
2010											
1	Viet Nam	7,424	22.3%	16,144	27.0%	1	Japan	174,011	43.6%	741,705	46.5%
2	Lao PDR	12,228	36.7%	15,101	25.3%	2	UK	132,063	33.1%	495,917	31.1%
3	Hong Kong, SAR	6,794	20.4%	14,893	24.9%	3	Netherlands	31,767	8.0%	124,597	7.8%
4	Malaysia	3,635	10.9%	7,713	12.9%	4	Germany	12,058	3.0%	47,096	3.0%
5	Myanmar	1,912	5.7%	3,584	6.0%	5	Singapore	11,649	2.9%	44,227	2.8%
	Top 5 Exports	**33,190**	**96.0%**	**59,568**	**96.1%**		**Top 5 Exports**	**392,394**	**90.6%**	**1,566,779**	**91.2%**
	EU Exports	**11**	**0.0%**	**51**	**0.1%**		**EU Exports**	**195,622**	**49.0%**	**744,799**	**46.7%**
	ASEAN Exports	**25,436**	**76.4%**	**42,768**	**71.6%**		**ASEAN Exports**	**11,908**	**3.0%**	**44,710**	**2.8%**
	Total Export	**33,275**	**100.0%**	**59,753**	**100.0%**		**Total Export**	**398,924**	**100.0%**	**1,593,793**	**100.0%**
2015											
1	Japan	90,062	51.3%	248,233	59.5%	1	Japan	218,180	48.9%	966,961	49.6%
2	Lao PDR	40,595	23.1%	83,576	20.0%	2	UK	123,767	27.7%	538,540	27.6%
3	United Kingdom	5,484	3.1%	16,841	4.0%	3	Netherlands	29,677	6.7%	124,498	6.4%
4	Malaysia	8,780	5.0%	14,515	3.5%	4	Singapore	15,442	3.5%	67,090	3.4%
5	Netherlands	4,920	2.8%	12,063	2.9%	5	Germany	13,084	2.9%	55,300	2.8%
	Top 5 Exports	**163,027**	**85.3%**	**405,097**	**89.9%**		**Top 5 Exports**	**432,244**	**89.7%**	**1,892,203**	**89.8%**
	EU Exports	**13,586**	**7.7%**	**37,146**	**8.9%**		**EU Exports**	**180,214**	**40.4%**	**774,378**	**39.7%**
	ASEAN Exports	**57,233**	**32.6%**	**109,882**	**26.4%**		**ASEAN Exports**	**15,894**	**3.6%**	**68,890**	**3.5%**
	Total Export	**175,546**	**100.0%**	**416,957**	**100.0%**		**Total Export**	**446,016**	**100.0%**	**1,950,208**	**100.0%**

Source: UN Comtrade Database.

Note: Based on various versions of HS Codes.

* Fresh, chilled, and frozen broilers are the sum of: HS020710, HS020721, HS020739, HS020741 and HS020750 (1995) or HS020711, HS020712, HS020713 and HS020714 (2005, 2010, 2015)

** Prepared and processed broilers are HS160239 (1995) or HS160232 (2005, 2010, 2015)

Table 3: World Top Exporters in 2016

Fresh, chilled, and frozen*		Net Weight		Trade Value		Prepared and processed**		Net Weight		Trade Value	
		Tonnes	Market Share	USD (Million)	Market Share			Tonnes	Market Share	USD (Million)	Market Share
1	Brazil	3,959,394	31.5%	5,946	29.5%	1	Thailand	477,077	27.9%	2,032	31.0%
2	USA	1,722,942	13.7%	2,860	14.2%	2	China	209,998	12.3%	864	13.2%
3	Netherlands	1,316,930	10.5%	2,375	11.8%	3	Germany	150,267	8.8%	594	9.1%
4	Poland	759,293	6.0%	1,241	6.2%	4	Netherlands	109,059	6.4%	436	6.7%
5	Hong Kong SAR	526,202	4.2%	794	3.9%	5	Brazil	166,167	9.7%	414	6.3%
6	Belgium	488,995	3.9%	786	3.9%	6	USA	68,959	4.0%	268	4.1%
7	Germany	356,880	2.8%	634	3.1%	7	France	56,479	3.3%	237	3.6%
8	France	309,903	2.5%	524	2.6%	8	Belgium	42,585	2.5%	203	3.1%
9	Thailand	212,543	1.7%	496	2.5%	9	Poland	66,575	3.9%	203	3.1%
10	China	176,335	1.4%	420	2.1%	10	Denmark	50,064	2.9%	193	3.0%
	Top 10	**9,829,416**	**78.3%**	**16,075**	**79.8%**		**Top 10**	**1,397,230**	**81.6%**	**5,443**	**83.1%**
	Total Export	**12,556,032**	**100.0%**	**20,140**	**100.0%**		**Total Export**	**1,712,672**	**100.0%**	**6,549**	**100.0%**

Source: UN Comtrade Database.

Note: Based on HS 2012 Code.

* Fresh, chilled, and frozen broilers are the sum of: HS020711, HS020712, HS020713 and HS020714.

** Prepared and processed broilers are HS160232.

4. Government Policy

The Department of Livestock Development (DLD), under the Ministry of Agriculture and Cooperatives has been the main governmental department responsible for the livestock sector in Thailand and their policies were important factors governing the success of the Thai broiler industry. In contrast to other livestock sectors, the DLD took a hands-off approach to regulating the poultry sector as it developed and instead focused on supporting productivity enhancement and investment promotion.

The poultry sector's origins as a small cottage industry made it difficult to regulate at the early stages of its development. All Thai livestock slaughtering is to be undertaken under the close supervision of local government authorities or by municipalities who regulate and issue permits to generate a source of income through fees. Before large private sector companies initiated activities in the sector, most producers had less than 20 birds and more than 90 percent of chickens sold by small wholesalers in retail markets as "New York dressed", which means the chicken sold is not eviscerated; only the blood and feathers are removed while heads, feet and viscera are still intact. Because poultry processing did not take place in slaughterhouses per se, the Ministry of Interior never issued regulations governing their operation. This stands in contrast to the swine industry that was operated in slaughterhouses and regulated in accordance with DLD rules. As it turned out, the overlapping authority of the DLD and local governments led to poor standards and unhygienic conditions in swine slaughterhouses. These complications, along with a myriad of other regulations made it unprofitable for new private investors to expand into modern swine production and processing businesses for export markets though production increased in line with domestic demand as incomes grew (Poapongsakorn, 1985). By the time the broiler industry had established its foundation in the Japanese market in the early 1980s', most pigs were still illegally slaughtered without a permit.

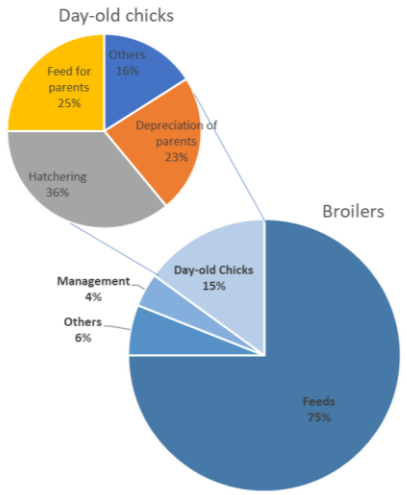
Seeking to circumvent the complex livestock slaughtering regulations, in 1973, C.P. Group appealed to the Ministry of Interior to establish a modern chicken slaughterhouse. It must be remembered that C.P. Group primary market was for export, and as such, their internal standards were very high and mandated modern equipment and hygienic processing practices. They coupled this with careful quality controls and strict meat inspections in close collaboration with veterinarians from the DLD. In a sense, by working with the DLD at the outset and being at the forefront of the industry, C.P. Group was able to set the standards for the whole of the Thai poultry processing industry.

Based on the success that C.P. Group had in entering export markets, in 1977 the Board of Investment (BOI) extended promotional privileges to firms that invested in processed chicken export. Privileges were granted only to firms with a working capital of at least 50 million Baht (about USD $2.5M in 1977). This helped dictate the scale of production and generally mandated a high capital to labor ratio, bringing modern slaughterhouse activities to the same degree of factor intensity as the average industry. By 1981, there were 12 firms that had been granted investment promotional privileges that included an exemption of 50 percent on imported machinery and raw material duties, an exemption on export and sales tax, and an exemption from income tax at 5 percent of the increase in export earnings. At the same time, the Bank of Agriculture and Agricultural Cooperatives (BAAC) offered a low-interest loan for small farmers and growers, many of which had begun to supply larger corporations as out-growers through contract arrangements. These policies provided large incentives for private investors to enter the modern chicken processing industry.

Again, the comparison with the swine industry is useful as it was limited by a quota on frozen piglet export by the Department of Foreign Trade and was governed by various price controls from 1948 to 1980. In contrast, the broiler industry enjoyed regulation-free exports and experienced no price control. With minimal export taxes and no limiting quota, the export of frozen chicken to the Japanese market increased significantly and became highly competitive. Moreover, the government also played an active role in expanding export markets. Through government-to-government negotiations, the Thai government was able to lift Singapore's ban of Thai chicken at the end of 1981 originating from past allegations of animal disease issues.

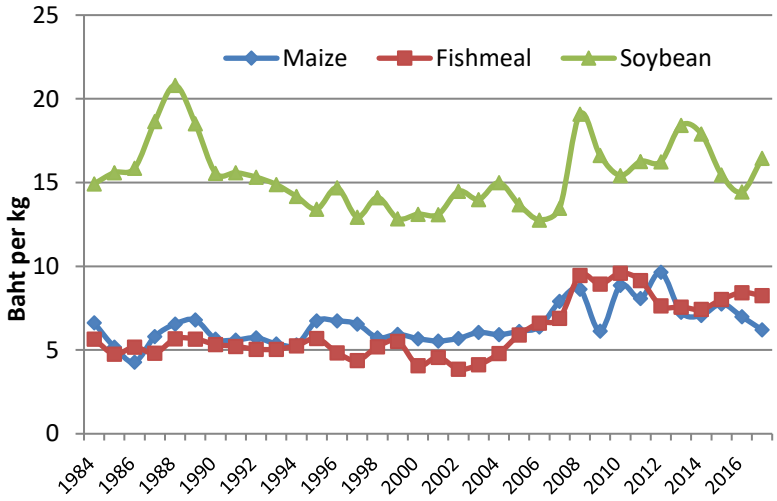
Policies to protect Thailand's maize and soybean farmers have however limited the profitability of the broiler industry. At present, feed costs constitute about 75 percent of the total cost of production while day-old chicks, management and other costs make up the remaining 25 percent (Figure 3).

Figure 4: Thai Broiler Production Costs



Source: Department of Livestock Development.

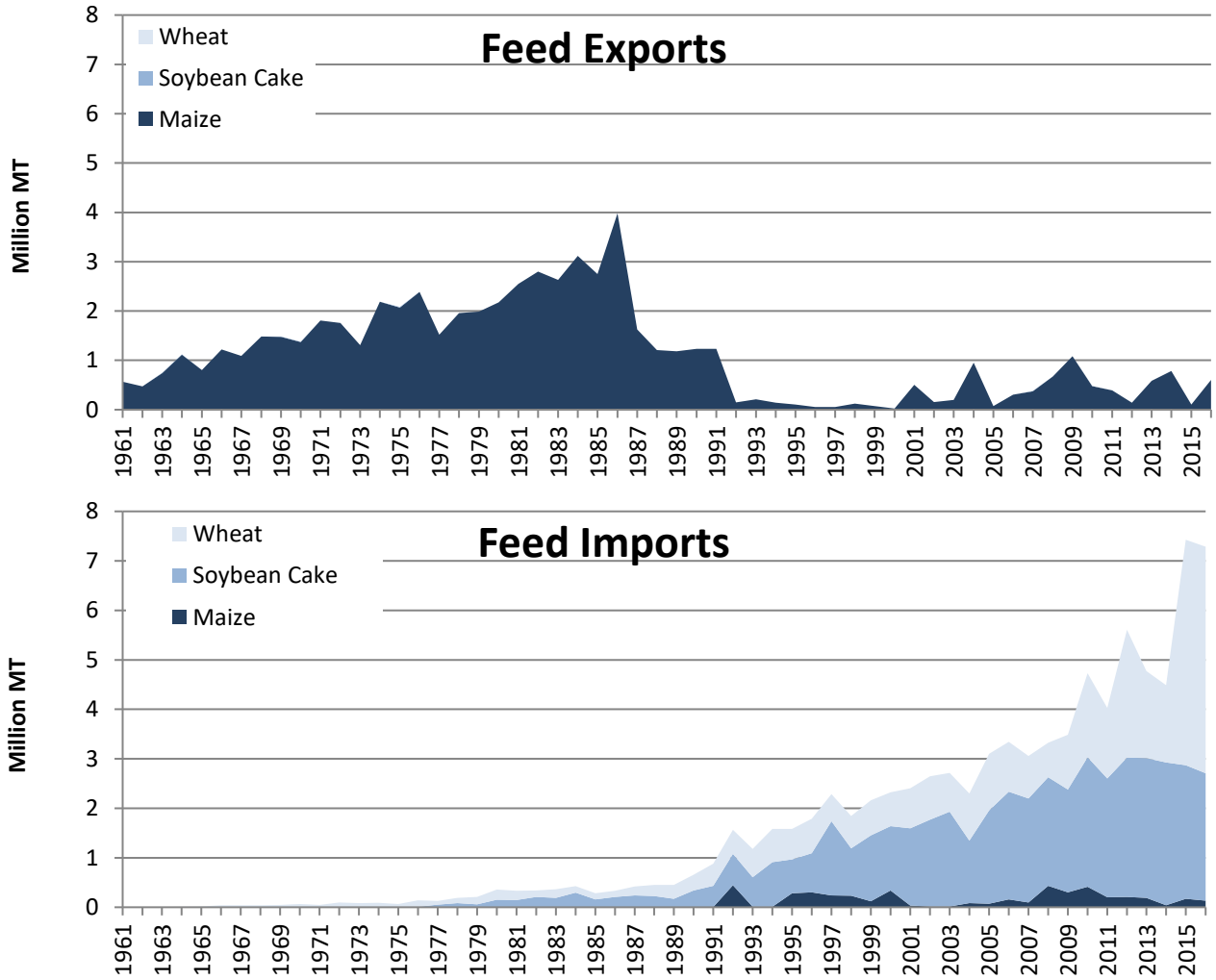
Figure 5: Price of Major Feeds in Thailand (2015 prices)



Source: Office of Agricultural Economics.

Prior to 1990, the Ministry of Agriculture and Cooperatives and the Ministry of Commerce set import duties on maize and soybean at 88 percent in an effort to protect domestic farmers. However, up until the late 1980s, maize production was greater than the broiler industry's needs, so the majority of maize was exported (Figure 6). By the end of the decade, the demand for maize as feed began to exceed domestic supply due to the livestock sector's growth. Around this same time, maize production also fell due to a drought in 1988-89 while many maize farmers shifted to other, more profitable crops. It is around this time that the import duty became binding. The demand for soybean cake, the primary source of protein in feed, had exceeded domestic production starting in about 1977. In both instances the import duty raised the prices of feed and eroded the competitiveness of Thai poultry products.

Figure 6: Thailand's Feed Imports and Exports 1961-2013



Source: FAOSTAT

In the early 1970s up through much of the 1980s the industry was able to remain competitive with other countries (primarily the US and Brazil) even with high feed costs because of Thailand's relatively low wage rate for unskilled labor. By the mid-1980s, industrial growth began to attract rural unskilled labor from the agricultural sector, rapidly increasing the real wage rate. Thailand's competitive advantage began to disappear while other Asian countries with cheaper labor costs – especially China – began to increase broiler exports, with the added advantage of closer proximity to Japan. It is also around this time that the Thai industry begin to shift to higher value processed poultry products.

The government's unilateral liberalization policy in response to internal and external trade pressure began in January 1990 when the Ministry of Agriculture and Cooperatives and the Ministry of Commerce reduced the import duty to 6 percent. In addition, a committee was formed to impose minimum and maximum prices. The minimum price represented the amount that local farmers would receive, such that whenever the import price went below the minimum, a surcharge was applied to normalize the price to protect local farmers. The maximum price, however, represented the cost that the livestock industry could incur so that whenever the import prices went above the maximum level, a tariff reduction was applied. This half-liberal, half-protectionist policy would continue until 1995 and varied in forms and rates as set at the government's discretion often in unpredictable ways. For example, between 1990 and 1994, the surcharges were applied 14 times, most of which to other feeds but not maize.

After the Uruguay Round of General Agreement on Tariffs and Trade (GATT), in which the World Trade Organization (WTO) was founded in 1995, the previous system was replaced by a tariff-quota system. Out of the 23 agricultural products agreed upon, only three were animal feeds (Table 4). The application of the rules was made a bit more transparent and predictable.

Table 4: Agricultural products under Tariff Rate Quota commitments

Product	In-quota tariff rate (%)		Quota (tonnes)		Actual Imports (tonnes)		Out-quota tariff rate (%)	
	Mar-Aug	Sept-Feb	1995	2004	1995	2004	1995	2004
Maize	7.5	20	52,096	54,700	383,209	86,525	80.2	73.0
Soybean	7.5	20	10,402	10,922	278,934	1,435,803	88.1	80.0
Soybean cake	7.5	20	219,580	230,559	648,035	1,262,261	146.5	133.0

Source: Department of Business Economics.

Because the agreement was negotiated between 1986 to 1988 and took almost 7 years to complete, the base values used for quota and tariff rate calculations were much lower than the actual trade volumes and tariffs (Table 4). The actual quota in 1995 was set at 52,096 tonnes – almost 8 times lower than the 383,209 tonnes that were actually imported. The in-quota tariff rate was set much lower at 7.5 percent but under the condition that imports must happened during March-June and July-August periods to avoid conflicts with local supplies. Beyond these periods, the in-quota tariff rate was set at the 20 percent and the out-quota tariff rate was set at 80.2 percent with an additional surcharge of 180 Baht per tonne. The actual in-quota tariff rates would change each year to make sure that the cost of feed imports would be higher than the domestic prices. Aside from the commitments under the Uruguay Round agreement on agriculture, trade liberalization in Thai agriculture has also been determined by bilateral liberalization agreements (such as ASEAN Free Trade Area and the Ayeyawady - Chao Phraya - Mekong Economic Cooperation Strategy amongst Cambodia, Lao PDR, Myanmar, Thailand and Vietnam) though to a lesser extent.

The domestic pricing policy of agricultural products has also tended to shift towards subsidies and increasing protection through trade-related investment measures (TRIMs). The most common measure is a local content requirement whereby importers must proportionally purchase or use domestic products in order to import feed. For example, between 2012 to 2014, the in-quota tariff rate was set at 2 percent. However, only certain associations could import and do so under the condition that they buy local soybean cake leftovers from the soybean oil industry at a specified price set by the Department of Internal Trade. Similarly, in 2016 following a global price drop in wheat that adversely affected Thai maize farmers, the Ministry of Commerce developed a measure that forced importers to purchase domestic maize in order to import wheat at a ratio of 3 to 1.

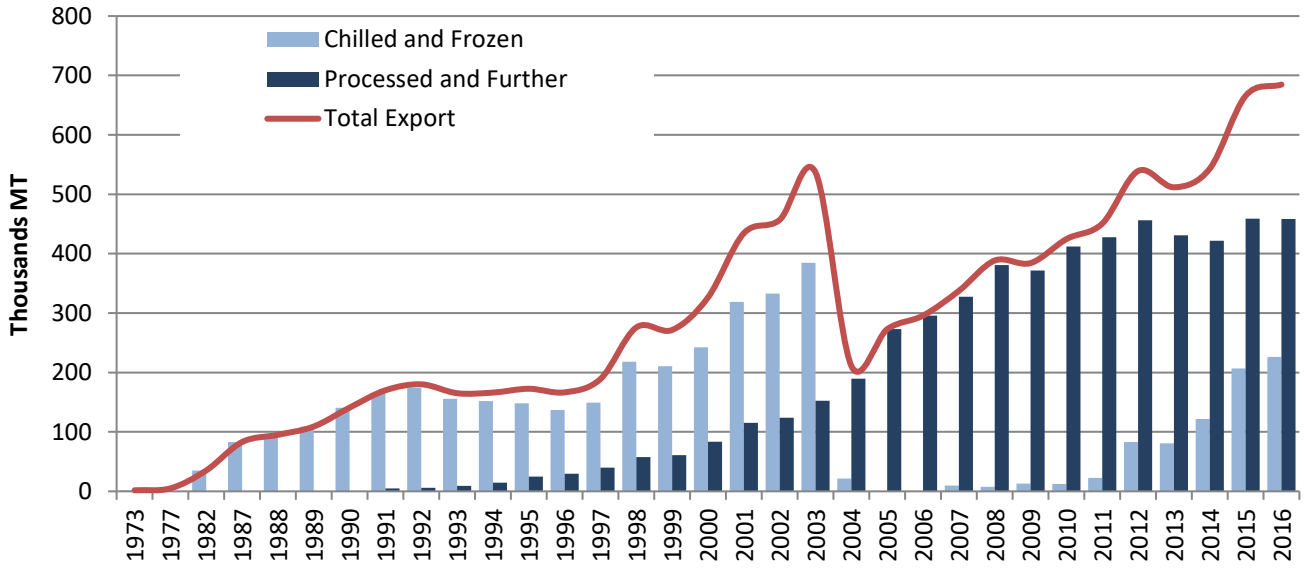
The Thai government's policies have both helped and hindered the performance of the domestic poultry sector. On the one hand, their laisse faire attitude toward regulation while the sector was first establishing itself as an export industry encouraged the private sector to self-regulate and adopt standards that would allow it to compete on an international stage. As the industry began to get a foothold, government policy was supportive in the sense that they collaboratively developed quality standards and utilized government monitoring capacity to ensure food quality and safety. Government policy also provided financial incentives for businesses and new producers to encourage exports. On the other hand, protectionist policies supporting soybean and maize farmers have increased the costs of imported feed and hastened the backward integration into feed production by a small number of large corporations that, in a way, has reinforced the oligopolistic nature of the industry.

5. Developing Resilience

During its 40-year history as a modern agri-food value chain the Thai broiler industry has encountered numerous unanticipated challenges including the Asian financial crisis, avian influenza outbreaks, and changing consumer preferences that forced the industry to exhibit a degree of resilience in order to stay competitive in the

international market (Figure 7). It has done so by shifting its structure, approach to risk management, levels of transparency, and products. This section highlights how the broiler industry adapted to these unforeseeable disruptions.

Figure 7: Thai Broiler Export by Net Weight and Major Events



Source: Thai Broiler Processing Exporters Association.

1970	: C.P. – Arbor Acres formed a partnership
1973	: First modern slaughterhouse, export of frozen chickens to Japan
1997	: The Asian financial crisis and Baht devaluation
2002	: Ban of Nitrofurans & Chloramphenical
2004 - 2006	: Bird Flu Outbreaks
2005	: Start of Compartmentalization
2012	: EU started to import fresh and frozen chickens again
2013	: Japan lifted the import ban on fresh and frozen Thai chickens

5.1. Market Fluctuations and the 1997 Financial Crisis

Small price fluctuations are common in the poultry market due to seasonal variations in supply and demand, but during October 1980, chicken prices dropped by 17 percent as a result of a supply glut as many new entrants scaled up production due to high average prices the year prior. Responding to the crisis, major chicken processors and feed manufacturers formed a cartel called the “Thai Broiler Business Club”. The cartel spent 4 million Baht to subsidize their contract growers and agreed that every club member would limit hatchlings according to a self-imposed quota. This strategy to raise prices failed because there were many small independent hatchery operators who were not part of the club or obligated by the agreement such that when the price of day-old chicks began to increase as a result of the cartel’s actions, many small operators increased their production. Other members of the cartel also did not keep their commitments to the group and thus the agreement ultimately failed.

A similar situation took place in 1993, when prices and exports of broilers declined substantially. During the crisis, major players in the industry whose combined market share was about 60 percent cooperated to control the supply of breeding stock through a “Broiler Breeding Stock Center”. Improved public information on the import of grandparent stock and parent stock helped to create a system of accountability such that cartel members were unlikely to break their commitments. While controlling the market was a success, supply control in this manner is now considered illegal under the Competition Law of 1999.

The Asian financial crisis of 1997, known as Tom Yum Goong crisis, affected different segments of the livestock sector differently depending on how tightly each was integrated with the world market (NaRanong 1999). The broader implications of the financial crisis were reduced consumption of meat due to increasing unemployment. Even domestic consumption of chicken, which was the least expensive source of protein, dropped by 20 percent in 1997 (NaRanong, 1999). The weakened Baht also increased the prices of imported feed, especially the contents of mixed feeds such as fishmeal, soybean cake, and maize though the prices of domestically produced feeds such as cereals and oilseeds decreased. Veterinary drug prices also doubled after 9 months of the Baht floating.

For livestock mainly consumed locally, as was the case of pigs, the increasing cost of production and the decreasing domestic demand affected the subsector adversely. However, the Thai broiler industry fared much better than the other livestock subsectors because of the large share of exports as a percentage of total production. With the dramatic reduction of prices as a result of devaluation, exports increased even when the domestic prices of chicken and chicks continued to rise to a decade high. The gain in exports was more than enough to offset the increasing cost of feed and medicine.[5]

The shock of the financial crisis was not all good for the Thai broiler industry. The credit crunch was so wide-spread that some exporting firms were unable to secure sufficient working capital to fulfill their increased orders and also halted some companies' plan to transform their line of production to cooked products slowing the industries efforts to reap the full benefit from the Baht devaluation. The 1997 financial crisis also caused a 20 percent budget cut across the Ministry of Agriculture and Cooperatives. Consequently, the Department of Livestock Development (DLD) set out to reprioritize its roles, by handing over animal and vaccine production to the private sector, while increasing its role in setting standards, inspection, and providing certification as well as prioritizing research and extension.

5.2. Changing consumer preferences

In 1998, the European Union (EU) adopted the Council Directive 98/58/EC based on the European Convention for the Protection of Animals kept for Farming Purposes, that reflects the so-called "Five Freedoms": (a) freedom from hunger or thirst, (b) freedom from discomfort, (c) freedom from pain, injury and disease, (d) freedom to express normal behavior, and (e) freedom from fear and distress. Animal welfare requirements by most EU importers also encouraged the adoption of traceability standards to the farm of origin.

At the time, the adoption of animal welfare trade requirements were viewed by many Thai exporters as protectionist measures meant to support domestic EU farmers. However, some Thai exporters were rather optimistic, because they believed that Thailand was in a better position to follow these guidelines than other major competitors like the US. In dialogue with the industry the Department of Livestock Development quickly issued new farm standards and various regulations on animal welfare in 1999 to comply with the EU's requirements.

In 2002, EU importers detected Nitrofurans, a banned group of antibiotics, and Dioxin in broilers from Thailand quickly leading to a decrease in EU poultry imports. Responding quickly that same year, the government began to closely monitor and regulate the entire poultry value chain including the importation and retail of antibiotics and other chemicals, as well as setting new product standards. While some producers had begun to move toward antibiotic-free broilers targeting the emerging, lucrative Japanese market, the positive test result by EU importers was sufficient to induce many other producers to move toward anti-biotic free production, the premiums for which were sufficiently high to cover the increased costs of production. Companies were also motivated to shift some of their production lines toward precooked and processed products with higher value-added to overcome higher production costs.

As a result of these two shocks and the modified standards that ensued, many companies slowly began to bring a larger share of poultry production processes in-house. By doing so, integrators would have better control on all

[5] Brazil's 1998-99 financial crisis and subsequent devaluation provided the same export advantage, but its effects on the Thai broiler industry were nominal because 90 percent of Thai exports went to Japan and the EU, neither of which were Brazil's traditional market.

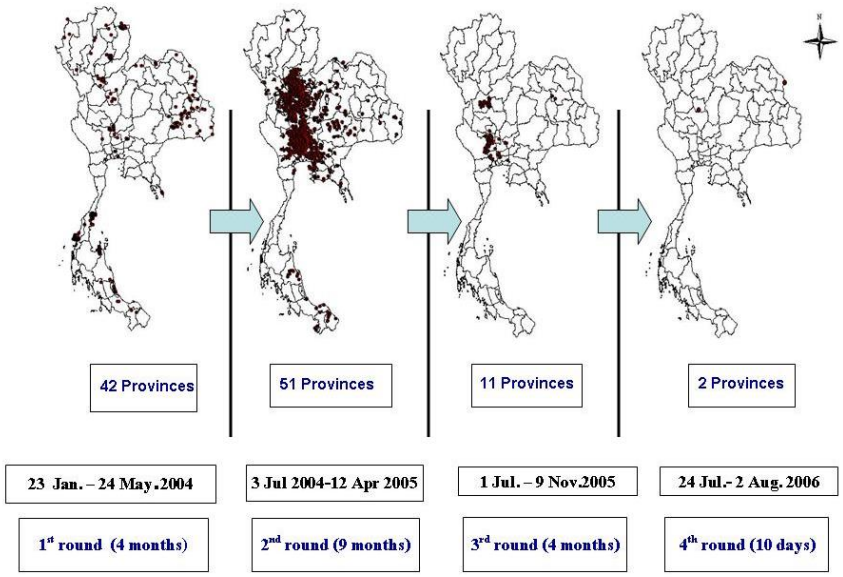
inputs used and improved information on the origin, location and life history of a poultry product. This information could provide a guarantee to the consumer and other stakeholders as well as assisting in crises management in the event of a safety and quality breach. Many of these processes helped to quickly isolate and contain infected chickens during the Bird Flu shocks.

5.3. Bird Flu Outbreaks, Recovery and Post-Restructuring

Since January 2004, Thailand and other Southeast Asian countries have experienced periodic outbreaks of Highly Pathogenic Avian Influenza (HPAI) H5N1 in poultry – a highly infectious, severe respiratory disease in birds that can be transmitted to people. Thailand was hit by four rounds of outbreaks between 2004 and 2006 (Figure 8) and another minor outbreak in early 2007. The initial outbreak was catastrophic for the industry, with the Thai Government culling as many as 63 million birds in 2004, and quickly applying additional control measures such as disinfectant application, quarantines, controlling animal movements, and a thorough surveillance program – dubbed the "X-ray measure" that substantially improved the rate of outbreak detections (NaRanong, 2007). Checkpoints and disinfectant stations along the roads leading to slaughterhouses were set up and officials from the Department of Livestock Development were stationed at production centers to monitor the industry. These helped improve the biosecurity of poultry production which had a major impact in reducing the spread of disease. Although chaotic at the beginning, HPAI control in Thailand has been considered by many to be a success story. Consequently, the fourth and the fifth outbreaks involved only sporadic events with minimal impact to the broiler industry.

Still, with the outbreak in 2004 much of the damage to the export industry was already done. After the initial outbreak, an export ban was implemented, and, from 2004 up until 2012, Thailand's two largest markets for chicken products, Japan and the EU, banned imports of frozen/fresh poultry from Thailand. Overall, the Thai Broiler Processing Exporters Association claimed that total damages the poultry industry suffered from the HPAI in 2004 was almost 100 billion Baht (about USD 2.5Billion).

Figure 8: HPAI outbreaks in Thailand (2004-2006)



Source: Department of Livestock Department.

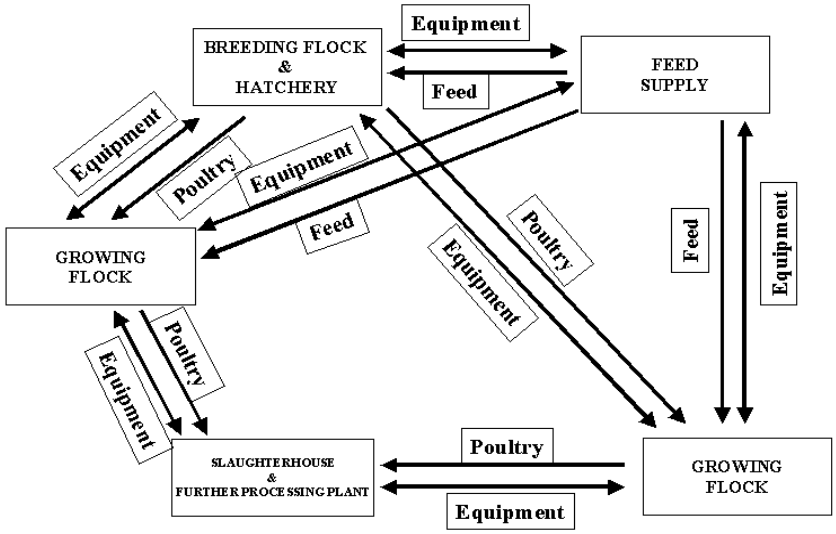
In a sense though, some of the damage to the industry was self-inflicted. Between 2000 and 2003, prior to the outbreak, broiler production contributed between 3 and 4.5 percent of agricultural GDP with exports generating important foreign reserves that had been depleted during the financial crisis of 1997. The broiler industry was important economically and as such, during the outbreaks, the well-connected Thai Broiler Exporters Association leveraged its considerable influence within the government to impact the control mechanisms employed in

limiting the spread of HPAI. Safman (2009) identifies multiple instances where the broiler industry influenced the animal health authorities to suppress information about early infections including the first outbreak in November 2003 that coincided with a visit from an EU agricultural delegation in which they officially declared Thailand 'bird flu free'. As the outbreak spread and was formally acknowledged by the government in January 2004, a diplomatic row ensued. If the outbreak had been addressed more transparently, a more protracted and widespread outbreak may have been avoided and been less costly economically, politically, and in terms of public safety.

The broiler industry also lobbied extensively to encourage a government policy specifying that all poultry production must take place in EVAP style housing to better control and contain the spread of the disease. Large industrial broiler farms argued successfully that small, backyard farms were the primary source of the spread of HPAI and that failure to contain production would encourage the movement of the disease. In fact, Walker et al.'s (2012) study using a spatiotemporal model based on the spread of infection from outbreak data collected during the second wave of HPAI suggests that commercial and backyard poultry both played their own distinct role in propagating the initial large-scale waves of outbreaks of H5N1 in Thailand. They found that, per bird, backyard chickens contribute more to the susceptibility of a sub-district to infection, but outbreaks involving commercial chicken flocks were approximately twice as transmissible to neighboring sub-districts as those involving backyard chickens. The authors found that the interaction between poultry production types was crucial in propagating the spread of infection. The outbreaks in backyard chickens would not have easily been able to transmit across sub-districts without initiating outbreaks in commercial chickens. Once large-scale commercial operations were infected, the infection spread more effectively over longer distances.

In July of 2006 the DLD together with World Organization for Animal Health also initiated a compartmentalization system as part of an effort to re-enter the fresh chicken meat export market, especially to the EU and Japan. The concept (Figure 9) was developed as a credible way forward for the industry to continue trading from 'free' compartments of a country or zones during periods of disease outbreak.

Figure 9: Avian Influenza Free Compartmentalization



Source: Santiwattanatam (2005).

Most of the integrated broiler farms quickly adopted closed EVAP housing and compartmentalization to increase the level of biosecurity. In fact, many had already adopted these standards in keeping with EU animal welfare regulations and the movement toward antibiotic free production in the wake of Nitrofuran and Dioxin detections in 2002. Smaller poultry operations, on the other hand, became increasingly difficult to sustain following the HPAI outbreak. First, most large firms sought to limit the interaction between out-growers and their commercial operations, dramatically reducing opportunities for contracted out-growers. Those smaller-scale production companies that continued to rely on contracting arrangements were generally forced to scale-up production, move to EVAP houses, and adopt increasingly stringent standards on traceability and bio-safety. These changes

came at immense cost to small enterprises and as such most left the poultry sector (as reflected in agricultural census data in Table 1). While consolidation and increased scale were likely to occur as the industry grew and evolved, the implementation of standards to control HPAI, many advanced at the behest of the integrated broiler companies, hastened a restructuring of the industry, largely at the cost to small farms that were unable to adapt quickly.

For a large integrator like C.P., the bird flu shocks came with changes in production best described by its compound in Nakorn Ratchasima which encompassed improved management and facilities to better monitor animal health and well-being. The compound is a fully compartmentalized system which includes everything from feed mills to farms and processing plants.

- Feed mills now separate raw materials from finished products. Ready-mix feeds are processed with heat treatment to prevent Aflatoxin.
- New EVAP housings are located in an isolated area and feature a computerized control system for ventilation and automatic feed equipment. Daily water and feed intake is monitored along with average weight, temperature, and humidity.
- To ensure disease prevention and control, an 'all in all out' system is practiced by making sure that all day old chick and birds are removed from the farm at the same time.
- All new chick replacements must now be inspected by DLD officers followed by farm cleaning and disinfection.
- Poultry health inspection and animal welfare inspection is done regularly by veterinarians and a poultry welfare officer.
- All logistics in and out of the compound are monitored and controlled with GPS, which along with barcode and IT systems enable the full traceability from within the compartment and beyond.

The outbreak of HPAI also initiated a transformation of poultry processing. At the time of the ban, frozen/fresh products accounted for about two-thirds of exports by weight. Following the HPAI outbreaks, most importers were reluctant to purchase fresh/frozen poultry products from Thailand and the Thai industry was forced to undergo two important structural changes. The first was aimed at gaining tighter vertical control over production through industrialization. Most large, integrated poultry companies moved to near full automation using highly efficient machines employed to minimize human contact and contamination. Less reliance was placed upon labor, while at the same time increasing the efficiency of production. Greater automation also decreased reliance on costly chemical solutions such as vaccination, antibiotics and antiseptics that can leave undesirable residues in products.

The second major shift was changing the composition of exports towards processed and pre-cooked products. In just three years, the volume of precooked and processed chicken exported almost doubled (Figure 7) while fresh products made up less than 1 percent of the total. In some sense, the structural shift toward precooked products had been underway for some time to comply with some importers' food safety and animal welfare requirements in the mid- to late-1990s, but the HPAI outbreaks were the call to action for many of the industry's leaders to accelerate the transition in order to survive.

6. Conclusion and Policy Lessons Learned

Thailand has grown to become a global leader in poultry production through rapid technology adoption, vertical integration, and a favorable policy environment. In some sense the industry has also benefited from the pioneering C.P. Group that was frequently ahead of the curve in identifying new business opportunities, correctly foreseeing changing consumer preferences, and forging strong relationships with government all of which led the way for the sector. This paper has tried to summarize some of these achievements. In doing so, several lessons emerge that may be beneficial for less developed countries seeking to expand their agri-food value chains or pursue opportunities in export markets.

First, many of the foundational technologies that dramatically increased production and processing of chicken were imported from abroad through partnerships with established private sector enterprises. These partnerships transferred technologies, skills, and expertise to Thai companies allowing them to adapt to their own country context. These relationships also established linkages with export markets providing early adopters with marketing channels for their products and a better understanding of consumer demands. Forging these types of linkages can be crucial when expanding from a low base and governments can promote these learning opportunities as well as provide direct technical assistance to assist fledgling industries with growth potential.

Second, the government's role in the development of the poultry sector was primarily facilitative. At the outset, the poultry sector was unique in that some of the leading firms actively sought to produce for exports rather than for the nascent Thai market. Their production thus had to meet standards higher than those generally accepted domestically. A reputation lost due to poor quality had an immense impact on the future viability of a company. What is more, for a highly integrated industry, a small mistake could potentially lead to a cascading failure that affects the entire chain. As such, quality benchmarks set by exporting companies were high, but soon became the standard for the whole industry. Government aided the industry by monitoring food safety and working with companies to contain and neutralize disease outbreaks. As standards changed and as the industry evolved, the Thai government also provided financial services such as low-interest loans to help the industry adapt.

Third, this paper has also documented a series of shifts in the industry due to the financial crisis, avian influenza, changing standards on animal welfare, and the move toward antibiotic free production, each of which has tested the resilience of the Thai broiler industry. While corporate poultry lobbying groups had some hand in setting new standards that excluded smaller producers, there are winners and losers any time new business models and technologies are introduced that change production systems in agriculture. In the case of the Thai broiler industry, many small farms were unable to meet new standards requiring investment and scale beyond their means. At the same time larger firms underwent a transformation that consolidated production in-house to reduce costs and improve efficiency to remain competitive and to meet standards of traceability in keeping with customer preferences and international requirements. The contracting mechanism on which many small firms relied to engage with larger firms largely disappeared. The government of Thailand allowed the industry to adjust production systems, and for competition amongst the key set of firms to take place.

Fourth, as the poultry sector has transformed, the skills need to effectively operate in the industry have changed. Participants must increasingly have greater knowledge of technologies, livestock science (nutrition, disease control, and breeding), farm management, and marketing to effectively do their job. Training young students to enter a modern agriculture sector requires new thinking on the types of skills that are employable and the curricula that will best prepare them for a rapidly changing job market. Evaluating the agricultural education systems as well as national agricultural research systems (NARS) is essential to ensure that they are relevant in an evolving agricultural sector.

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Annex

Annex Table 1: Production Volume by Region

	North		Northeast		Central		South		Whole Country
	Volume (birds)	%	Volume (birds)	%	Volume (birds)	%	Volume (birds)	%	Volume (birds)
1985	48,462,561	10.0%	25,711,703	5.3%	353,514,646	73.3%	54,571,431	11.3%	**482,260,341**
1990	47,114,148	9.6%	33,325,830	6.8%	359,535,679	73.6%	48,510,844	9.9%	**488,486,501**
1995	59,581,467	8.5%	67,972,912	9.7%	509,597,766	72.9%	61,480,169	8.8%	**698,632,314**
2000	64,090,285	6.9%	115,981,496	12.6%	674,289,629	73.0%	69,469,091	7.5%	**923,830,501**
2005	64,404,895	7.9%	103,904,377	12.7%	581,458,924	71.1%	67,470,907	8.3%	**817,239,103**
2010	80,547,663	8.3%	141,652,985	14.6%	681,290,178	70.2%	67,452,232	6.9%	**970,943,058**
2015	124,016,204	9.1%	250,112,618	18.4%	933,281,390	68.5%	54,498,805	4.0%	**1,361,909,017**
2016	129,429,272	8.8%	266,795,561	18.2%	1,011,114,390	69.1%	56,441,070	3.9%	**1,463,780,293**
2017	137,849,879	8.8%	286,616,746	18.4%	1,076,067,942	69.0%	60,082,162	3.8%	**1,560,616,729**

Source: Office of Agricultural Economics (OAE)

Annex Table 2: Chicken holdings by farm size 1993, 2003, 2013

1993		Numbers of chickens			
Chickens per holding (heads)	Number of holdings	Total	Boiler	Layer	Native
1 - 19	1,681,300	14,170,942	228,319	145,222	13,797,401
20 - 99	863,809	26,201,585	494,451	368,816	25,338,318
100 - 499	53,064	7,435,997	937,310	860,693	5,637,994
500 - 999	3,861	2,380,482	925,821	768,119	686,542
1,000 - 4,999	9,491	22,793,596	18,286,871	4,447,281	59,444
5,000 - 9,999	3,551	22,306,491	19,398,236	2,896,318	11,937
10,000 and over	2,336	59,632,837	45,461,938	14,165,823	5,076
Total	2,617,412	154,921,930	85,732,946	23,652,272	45,536,712
2003		Numbers of chickens			
Chickens per holding (heads)	Number of holdings	Total	Boiler	Layer	Native
1 – 19	3,560,037	172,288	66,672	3,321,077	3,560,037
20 - 99	19,612,648	844,901	345,646	18,422,101	19,612,648
100 - 499	8,616,041	573,190	509,528	7,533,323	8,616,041
500 - 999	1,103,274	295,305	417,733	390,236	1,103,274
1,000 - 9,999	58,000,450	45,027,273	11,183,272	1,789,905	58,000,450
10,000 - 49,999	58,862,757	49,109,024	9,712,822	40,911	58,862,757
50,000 - 99,999	17,837,232	13,640,608	4,186,510	10,114	17,837,232
100,000 and over	81,390,544	65,951,788	15,438,576	180	81,390,544
Total	248,982,983	175,614,377	41,860,759	31,507,847	248,982,983
2013		Numbers of chickens			
Chickens per holding (heads)	Number of holdings	Total	Boiler	Layer	Native
1 - 19	184,548	1,819,100	60,727	138,674	1,619,699
20 - 99	339,918	12,063,871	370,136	576,653	11,117,082
100 - 499	43,354	5,705,621	243,849	472,555	4,989,217
500 - 999	834	479,167	77,870	170,642	230,655
1,000 - 9,999	3,351	13,815,649	8,230,642	4,281,534	1,303,473
10,000 - 49,999	2,271	40,394,371	31,723,356	8,647,792	23,223
50,000 - 99,999	282	18,626,324	15,302,308	3,323,716	300
100,000 and over	360	158,435,030	119,558,070	38,866,910	10,050
Total	574,918	251,339,133	175,566,958	56,478,476	19,293,699

Source: Agricultural Census data 1993, 2003, 2013.

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