THE ENHANCEMENT OF PIG DISTRIBUTION IN NAKHORN PATHOM PROVINCE, THAILAND

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ABSTRACT

Abstract— The objective of this research was to study the upstream of the downstream supply chain system of pig farming in Nakhon Pathom Province and to increase the efficiency of information technology in pig farming in Nakhon Pathom Province. This research led to an analysis of the strengths and weaknesses of the supply chain in order to determine the guidelines for the development of pig production and marketing in Nakhon Pathom province in the future. The data collection was collected from interviews with 133 stakeholders from upstream to downstream of the supply chain. Supply and Margin Cluster Analysis and SWOT and TOWS matrix were used in this study.

The results showed that the demand for pigs farming in Nakhon Pathom Province tended to be stable or saturated due to the epidemic of pigs farming in Nakhon Pathom province. There is also a limited area for the farming as well. The pig supply chain analysis of Nakhon Pathom Province was found that it still has the potential to produce and there is still demand for the piglet farming. The breeding business can still be profitable with the average cost in the range 117.94-962.52 baht/square meter, average income 853.42-2,450.98 baht/square meter and net profit 209.79-1,488 baht/square meter. For the pig farmers in Nakhon Pathom province, the average cost is 58.11-60.52 baht per kilogram with an average income of 62.29-93.85 baht per kilogram and a net profit of 2.17-33.33 baht per kilogram. Whereas the pigs of Nakhon Pathom province, their net profit per kilogram is no different while the pigs of other provinces are higher collector/merchant The 119.16 baht per kilogram, the average income is 85average cost will be in the range of 75.56 142.41 baht per kilogram, net profit 9.44 - 23.25 baht per kilogram.

Keywords— Downstream Supply Chain, Information Technology, Nakorn Pathom Province, Pig, Supply Chain System

INTRODUCTION

Pig production in Thailand intensified significantly during the last decade, with many economic, epidemiological, and environmental implications. Currently, strategies toward more sustainable future developments were investigated, and these could be informed by a detailed assessment of the main trends in the pig sector, and on how different production systems were geographically distributed. Indigenous livestock has played an important role in smallholder farms and local populations for a long time. They have been raised using low input, but they still generate their products and by-products to meet household needs. Moreover, in relation to biodiversity, indigenous livestock seem to be a reservoir of genes that could be an asset for future use. However, in recent years livestock production in Thailand was switched from backyard systems to industrialized husbandry. In parallel, exotic livestock was imported to improve the production performance and for economically important traits. Indigenous livestock were therefore gradually used for crossbreeding and were finally replaced completely by exotic commercial breeds. These breeding strategies oppose the concepts of sustainability and resource

management, and their long-term use threatens the loss of the genetic identity and diversity of the indigenous breeds.

A major structural change in livestock production occurred in the past 20-25 years in Thailand. Private sector innovations such as improved breeds, feed technology, housing, farm management and contractual arrangements have been the prime drivers of growth and export opportunities, and rapid domestic and regional economic growth during the 1985-1995 period were the essential catalysts. The livestock industries have been clustered near Bangkok and the heavy concentration of animals is causing environmental stress. Farm sizes have become significantly large, and the expansion is made possible by imported technology and increasing domestic demand. Pig and cattle development have been driven by domestic market demand and significantly affected by governmental regulations of slaughterhouses and by subsidies. (Riethmuller, P., 2003) In this section, general information on the Thai agricultural sector and livestock production focusing on pig and cattle production is provided.

Pig production intensified significantly during the last decade, with many economic, epidemiological, and environmental implications. Strategies toward more sustainable future developments are currently investigated, and these could be informed by a detailed assessment of the main trends in the pig sector, and on how different production systems are geographically distributed. (Thanapongtharm, et al. 2016) Therefore, the researcher would study "enhancement the distribution of a pig farm in Nakhon Pathom Province" in order to increase the efficiency of the downstream supply chain system and information technology for gaining income of pig farmers in Nakhon Pathom province.

OBJECTIVE

1. To enhance of pig distribution efficiency of a pig farm in Nakhon Pathom province.

LITERATURE REVIEW

The pig revolution in Thailand corresponds to the introduction of modern technologies and farm management. The introduction of modern technology includes the use of evaporated cooling animal housing, which provides temperatures, artificial insemination, and optimized feed ingredients and additives. These combined factors have allowed commercial farmers to raise more pigs per square meter with faster production cycles. These production systems are referred to as 'intensive' in the sense that a high amount of infrastructure, technology, health care and feeds are used to increase the productivity of high-yielding animals on the farm, resulting in increased outputs (kg meat per animal space per year). In the pig sector, intensive production systems characterized by high input/output ratios generally, also correspond to large farm size. Although intensive systems could also be obtained in small-scale farming, using high inputs of manpower for example, this does not correspond to the current situation in the Asian region. The very large majority of smallholders use very low levels of inputs in their production cycle, have limited outputs in return, and can therefore be characterized as extensive. Consequently, in Asia, pig production systems are still largely classified in extensive vs. intensive by their farm size, expressed as number of head per farm. (Thanapongtharm, W., et al., 2016)

The domestic pig is mainly raised to provide meat though the leather and hair can also be used. The distribution of pigs is that most influenced by religious and cultural factors, with few occurring in predominantly Islamic countries. Large populations occur in Asia, with China being home to almost half the world's pigs. Pigs are extremely versatile and are raised in a spectrum of systems ranging from massive, capital-intensive production units to small, labor-intensive family units, in which pigs scavenge for food.

Pig and Beef Cattle Husbandry in Thailand

At present, livestock production in Thailand is growing very quickly and plays an important role in food production. It has shifted from backyard animals and integrated crop-livestock farming systems to industrial livestock farming enterprises, although the extent of this development differs among livestock species. Rapid growth has occurred in pig and poultry production. Pigs as well as broilers and layers have been produced mainly by large agribusiness companies for the export markets. The principal challenge for pig production in Thailand is to close the wide gap between demand and production by upgrading the current production system towards that with high input and high output. In contrast to the pig production situation, the importance of beef cattle and

buffaloes is still low although they are mostly raised by smallholders in rural areas rather than by companies. (Charoensook, Rangsun, et al., 2013)

Pig production

The development of pig production started in the 1960s when the first group of exotic pig breeds was imported by the Department of Livestock Development from the United Kingdom. These were Large White, Tamworth and Berkshire breeds. Later, Landrace and Duroc pigs were imported from the US. Before these exotic breeds were introduced, farmers relied on the relatively slow growing native pigs that had the desirable quality of not needing much in the way of trade inputs. (Riethmuller, P., 2003) Since 1981 pig breeding has steadily been industrialized in Thailand. Thus, indigenous native pigs have been increasingly mated with imported breeds to improve their performance in economically important traits. Native pigs have gradually become crossbreeds and are finally replaced by European commercial breeds as the meat delivering product in the pork industry. (Rattanaronchart, S., 1994).

Nowadays, like in other major swine-producing areas of the world, there has been a change from small farms to large farming enterprises. This trend will continue and is expected to lead to improved quality pork and to better meet the requirements of overseas importers. Ten large operators account for most of the increase in the current production and the outlook for development is significantly positive. Groups of agribusiness companies such as Charoen Pokphand (CP), Betagro, Laem Thong and Mittraparp are integrated and account for more than 20% of the swine production in Thailand. The operations employed by these companies are fully automated and have increased the efficiency of production, which will make them competitive in the world market. (Charoensook, Rangsun, et al., 2013)

Pig production systems

In current intensive production systems, pigs are generally ranked according to age or physiological stage, for example in the three following categories: weaning, growing, or finishing pigs; pregnant or nursing sows; boars. Given that profit is the principal goal of farm managers, the holistic approach towards the pig unit tends to prevail over consideration of individual pigs. However, to better achieve this goal, the breeding pigs are considered individually for the purpose of recording reproduction results. Therefore, pigs are individually identified even on production farms, and this is the corner stone for appropriate herd management, regarding culling strategy. In addition to productivity per se, health aspects can be recorded on an individual basis and integrated when a culling strategy must be decided. (Madec, F., at el., 2001)

In Thailand, pig farming systems can be categorized into three groups: i) the farrow-to-finish production system, which includes breeding pigs, producing piglets and fattening pigs in the same farm; ii) the nursery system, which only raises breeding pigs to produce piglets; and iii) the finishing system, which raises weaners until they reach market weight. Nowadays, two groups of pig breeds are used in Thailand: the native breeds such as Raad or Ka Done, Puang, Hailum, Kwai, and wild pigs (and the main commercial breeds, including the Large White, Landrace, Duroc, and crosses of these. Native pig breeds grow slowly, and their reproduction rates are lower than those of commercial breeds. However, they are better adapted to hot and humid climates and to low-quality feed and they apparently show higher resistance to endemic diseases such as Foot and Mouth Disease (FMD) and internal parasites. In contrast, commercial pig breeds grow much faster, with comparatively higher feed conversion rates and their carcass and meat quality better meet supermarket needs for standardized products. (Thanapongtharm, W., et al., 2016).

Pig distribution

Zhao, Q., et al. (2022) studied driven by population growth and rising incomes, the demand for animal source foods in low and middle-income countries is increasing rapidly. Pork is one of the most consumed animal-based food, with the highest demand being in China due to its largest population and changing dietary habits linked to increasing wealth. The changes in pig production systems in terms of farms capacity, productivity, and production at the national and provincial levels by analyzing several censuses of China. In addition, it used a downscaling methodology to provide a recent and highly detailed map of the distribution of pigs in China. Between 2007 to 2017, pork production increased by 26.6%, up to 55 million tons and the number of large-scale farms with a yearly production of over 10,000 heads increased by 145%. Much of the production has changed from extensive backyard subsistence farming to intensive corporate farming. Moreover, the pig distribution has shifted from watercourse-intense southeast to northeast and southwest of China due to environmental policy in

2015. These policy-driven transitions primarily aimed to increase pig production efficiency and reduce environmental impacts and resulted in a profound transformation of geographic production patterns.

KANG, Geunho, et al. (2014) studied the distribution channel of meat by-products from the pig farm to the final consumer can include a meat processor, wholesale market, wholesaler, retailer, and butcher shop. Bacterial contamination at any of these steps remains to be a serious public health concern. The aim of this study was to evaluate the distribution channel and microbial characteristics of pig by-products in Korea. Upon evaluation of pig by-products in cold storage, we found that the small and large intestine were significantly higher in pH value compared to the heart and liver. The total plate counts were not significantly different among offals until cold storage for 7 d. The coliform count after 1 d of cold storage was significantly higher in small and large intestine than in the other organs. The coliform count of heart, liver, and stomach showed a higher coliform count than small and large intestine until 7 d of cold storage. As determined by 16S rRNA sequencing, contamination of major pig by-products with Escherichia coli, Shigella spp., and other bacterial species occurred. Therefore, our results suggest that a more careful washing process is needed to maintain quality and hygiene and to ensure the safety of pig by-products, especially for small and large intestine.

Charoensook, Rangsun, et al. (2013) reviewed the current situation of livestock production in Thailand, genetic diversity, and evaluation, as well as management strategies for animal genetic resources focusing on pigs and cattle. Sustainable conservation of indigenous livestock as a genetic resource and vital components within the agricultural biodiversity domain is a great challenge as well as an asset for the future development of livestock production in Thailand.

METHODOLOGY

1. Collecting data and information from the case study

To collect data and information of the case study, by means of survey the pig farm in Nakhon Pathom province and interview farmers, middlemen, buyers, and stakeholders including collect pig supply chain information to find and specify a problem. After receiving the data, literature review was next studied to find relate research and theories with relate this issue.

2. Analyzing information and indicating the problem

SWOT and TOWS matrix were used to analyze information and indicate the problem. This step would identify potential factors causing an overall effect from the pig farms. Each cause or reason for imperfection is a source of variation. Causes are usually grouped into major categories to identify and classify these sources of variation.

3. Designing solutions

To design pig farm improvement, literature review and relate research were used again to find a procedure and method to solve the problem and improve the pig production efficiency.

4. Evaluating cost of pig farm

To evaluate the cost of pig farm for analyzing pig production processes and supply chain to enhance the pig farm and elimination of waste.

5. Result and Conclusion

This step was to collect and show the result and conclusion of the enhancement of pig distribution in nakhorn pathom province.

RESULTS

From a survey of sample pig farms in Nakhon Pathom Province, it was found that pig farmers had a shortage of piglets and pig breeding has a high price. Pig farmers studied breeding methods from the department of fisheries and experimented with breeding pigs, resulting in having basic breeding knowledge. Pig breeding farm consisted of breeder pond and nursery pond. Breeder farm was a land farm, size 0.42 rai, with an average number of breeders 507, each price was 83.33 baht, took around 135 days to grow them. Feeding the breeders was ready-made food, using 2-3 sacks per month, 20 kg per sack, 315 baht per sack.

For the pigs of Nakhon Pathom Province, around 60 kilograms of fresh pork was purchased of the production cycle. The average price of fresh pork is about 68.3 baht per kilogram. The total operating cost was

4,850 baht. The highest cost was raw materials to buy ready-made food, averaging 4,100 baht per production cycle. Followed by an average wage of 600 baht per production cycle. For the proportion of dried pork, it was 1:0.33. Because the pork was dried until it was sold to the dried pork factory in Nakhon Pathom Province. Most of them were used to cook Tom Klong or Tom Yum dishes. The average price of dried pork in Nakhon Pathom was about 600 baht per kilogram. Each production cycle had an average volume of 18.30 kilograms, representing an average income of about 10,980 baht. Resulting in a net profit of 6,081.50 baht per cycle or a cost per kilogram of 254.60 baht, representing a net profit of 345.40 baht per kilogram. The production period was about one day.

CONCLUSION

Overview of costs and returns of pig farming in Nakhon Pathom Province was found that the group of pig farmers in Nakhon Pathom Province still had the potential to produce and still needed male breeders. Piglet breeding business could be profitable with an average cost of 117.94 - 962.52 baht per square meter. Average income was 853.42 - 2450.98 baht per square meter and net profit 209.79 -1,488 baht per square meter. For pig farmers in Nakhon Pathom Province, the average cost was 58.11 - 60.52 baht per kilogram. Average income was 62.29 - 93.85 baht per kg and net profit 2.17 - 33.33 baht per kilogram. The net profit per kilogram of pigs in Nakhon Pathom Province was not different. While the pigs in other provinces had higher incomes. Collectors or middlemen had average costs in the range of 75.56 - 119.16 baht per kilogram. Average income was 85 - 142.41 baht per kilogram. Net profit 9.44 to 23.25 baht per kilogram.

RECOMMENDATION

1. Governments should promote pig farms developments by introducing new technology or provide knowledge of pig production.
2. Future research direction to study on technology and innovation to develop pig farms and lower cost of pig productions.

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