The Direction of Pig Breeding and Raising in Thailand

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Summary

This paper reviews the current situation of pig production in Thailand and the progress for pig breeding for the Thai market as well as the future direction and challenges for pig breeding. There are some key points, such as diseases, animal health and welfare issues, which are great challenges for the future development of a sustainable pig industry in Thailand.

Keywords: Thai pig breeding, Thai pig market

Introduction

Fifty years ago, pig raising was considered to be the main income for Thai farmers. Statistics show that there is a constant increase in the number of pigs produced in Thailand. The number of pigs increased from 11.9 million in 2011 to 14.0 million in 2016. Domestic consumption is the main market for Thai farmers, which accounts for 95% of pork produced.

In 2016, over 6 thousand commercial pig farms (>500 pigs per farm) or 10% the number of pig farms in Thailand contributed over 60% of the national pig production volume. The domestic consumption of pork in Thailand increased from 0.901 million tons in 2011 to 0.971 million tons in 2016, a growth of about 2-3% each year (Office of Agricultural Economics, 2015). Nevertheless, there is a positive trend for the number of live pigs and pork meat for export, due to the opening of ASEAN Economic Community (AEC) in 2016.

Foot and Mouth disease, or FMD, is the main obstacle for fresh pork exports from Thailand to other countries. Since 2008, the Thai government established a project for combating FMD in 8 provinces in Eastern Thailand (a FMD-free zone project), but the zone has not been certified by the OIE as yet. If such a project closely follows the regulations from the World Organization for Animal Health, there will be a positive effect for the export of both live pigs and pork meat from Thailand.

Furthermore, there are various pig breeds available in Thailand, which are suitable for raising in South East Asia. Thailand also has a geographical advantage being at the centre of the ASEAN region, thereby facilitating the transport of animals and animal feed.

This paper reviews the current status and potential of pig production in Thailand, and highlights the challenges that the Thai commercial pig breeding may face.

Development of pig production in Thailand

The methodology of Thai pig breeding consistently changes overtime. Originally, the
majority of farmers would raise 2-3 pigs in each household, the most common breed used were native breeds which including Raad (or Ka Done), Puang, Hailum and Kwai (Charoensook et al., 2013).

The way of raising such pigs was on a small scale, which included feeding with rice bran, broken-milled rice and left-over foodstuffs. Such a pattern of pig raising has become rare in today society and can only be seen in the rural area. Since 1918, Thailand has been successful in improving pig breeding and has made it more efficient by importing pigs from abroad. Over the past 30-40 years, several agencies from the Department of Livestock Development (DLD) and some private companies have imported live pigs and pig semen from Taiwan, USA, Europe, etc. Currently, Large White, Landrace and Duroc are among the most popular pig breeds in Thailand. The majority of pork producers prefer to breed the female hybrids of Large White and Landrace with a male Duroc, in order to explored the heterosis and complementarity of litter size trait from the female, and the fast growth rate and high percentage of lean meat from the male. Such a pattern is the standard pig breeding model utilized in Thailand (Kunavongkrit & Heard, 2000; Charoensook et al., 2013).

A continuous improvement in pig breeding technology has been ongoing since 1997 and artificial insemination has become widely popular in the pig farming industry. In addition, other new technologies were also introduced, for example commercial farm houses were equipped with an evaporative cooling system and a computer system for collecting data was introduced to perform the pig breeding efficiently (Ravungsook, 2013).

Although in the earlier years Thailand was dependent on imported live pigs, nowadays several pork producers decided to develop their own breeds as a substitute for those imported. Such scientific development allows Thai pork producers to sustainably run their farms with pig breeds that are suitable with the environment. Moreover, such development can prevent possible diseases from the imported pigs and fulfil the specific local demand for better pork.

Nevertheless, Thailand’s pig farming industry has adopted the contract farming system. According to the Association of Pig Producers and Processors for Export in Thailand, about one-third of the commercial pig farms in Thailand are held either under the contract farming system or are directly operated by some large companies.

The progress for pig breeding and pig market in Thailand

The methodology for pig breeding has evolved over time. It started with simple appearance selection and paper-records, and now the most recent popular method of Estimating Breeding Value (EBV) is used. EBV includes analysis of measurable phenotypes, such as growth rate, percentage of lean meat, number of piglets per litter, etc. Such EBV data is used to calculate index values in which each characteristic weigh differently depending on their importance.

In Thailand, the main consumption is lean meat as small pieces of pork are needed for different methods of Thai cooking. Almost all Thai menus use small pieces of meat and a lot of herbs and spices. Therefore, in order to achieve a better market price, Thai pork producers are working on developing pig breeds that will give high quality carcasses with a high percentage of lean meat. For a terminal sire, the main characteristics are growth rate and percentage of lean meat, while for the dam line, the farmers emphasize on the number of piglets per litter.

Carcass quality is extremely important and consumers and middlemen are demanding carcasses of steadily increasing quality. This marketing pressure has forced some producers to depend on the illegal substance, β-agonist.
Fresh pork is typically sold at the wet markets as well as through modern retail channels, especially in urban cities. Currently, most of Thai pig farmers are paying attention to the selection of male breeders with a muscular body structure, with the hope that such a characteristic will be inherited by their offspring.

Nevertheless, a number of consumers prefer different types of pork due to foreign influences on their choice of food. Increasing disposable income, improving living standards, and continuous urbanization are the key forces that support the overall demand in the country for quality food and pork products. For example, Western-style pork chop steak, Japanese and Korean-style foods, which require different types and cuts of quality meat. Mostly, such cuisines would require juicier, softer, and fatter meat than in Thai cuisine. Due to these differences, some pork producers have chosen to focus on producing such a type of pork, in order to fulfil this demand. For example, a research reported that Kurobuta pork is premium quality and is becoming preferred by Thai consumers due to its unique taste and aroma (Srikanthai and Watcharananun, 2017)

In the past 20 years, genetics development was the most challenging part for Thai pig breeding due to limited technology for accurately measuring different phenotypic traits. Moreover, important characteristics, such as meat quality and litter size, are controlled by many genes. Therefore, there was an adaptation to molecular genetic studies related to pig economic traits, such an adaptation allows the producers to use Markers Assisted Selection (MAS) as a tool to select breeders.

In the past 10 years, there were several studies carried out relating to Single Nucleotide Polymorphisms (SNP), Quantitative Trait Loci (QTL) and Genome-wide association studies (GWAS). The bioinformatics data from SNP chips were used for Genomic Estimated Breeding Value (GEBV) in which such estimation allows efficient and accurate selection of pigs with interesting characteristics (Ibáñez-Escríbe et al., 2014; Wilaiphant et al., 2015).

In Thailand, however, such methods were regarded as new and only being applied in some large private companies. But all sizes of pig producers do realize and understand the importance of these technologies, before establishing any specific planning for pig breeding.

Generally, pig genetic improvement within Thailand is currently under-emphasised, and genetic stocks are still being imported from Europe and the United States. The fact that genetic costs comprise only 10% of the weaned pig cost or 2% of the finishing pig cost suggests that this situation is likely to continue.

Table 1. Candidate genes for economic traits in Thai pigs.

<table>
<thead>
<tr>
<th>Pig breeds</th>
<th>Traits</th>
<th>Genes</th>
<th>Genotyping methods</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duroc x Large white x Landrace (n=620)</td>
<td>IMF, FA composition</td>
<td>4 SNPs</td>
<td>AFLP, PCR-RFLP</td>
<td>Supakankul et al. (2017)</td>
</tr>
<tr>
<td>Duroc (n=40), Pietrain (n=40), Thai Native x Pietrain (n=35)</td>
<td>ADG, FCR, Backfat thickness, Loin eye area</td>
<td>IGF2</td>
<td>PCR-RFLP</td>
<td>Teltathum &amp; Mahinchai (2017)</td>
</tr>
<tr>
<td>Duroc (n=40), Pietrain = (n=40), Duroc x Pietrain (n=100)</td>
<td>Backfat thickness, Loin eye area, FCR, ADG</td>
<td>MC4R</td>
<td>PCR-RFLP</td>
<td>Mahinchai et al. (2016)</td>
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Future Direction and Challenges of Pig Breeding in Thailand

The technology for animal breeding is developing at a fast-pace; however this does not mean that all farmers have to change their farming technology every now and then. It is only necessary for them to understand the new technology and appropriately pick the breeding technology that is suitable for their purpose, worthwhile, and practical.

Local market research is also necessary, it is essential to know the market direction for pork demand, because it is crucial for the planning of pig breeding. Pig breeding objectives in Europe and the US are often focused on their market needs, i.e. to the culture of red meat and fat consumption. For example, the industrial sausage manufacturing requires lots of fat mixture rather than lean meat only. This usually happens in combination with selective breeding, focusing on achieving a high number of piglets per sow per year (PSY). The negative genetic correlation between PSY and lean meat percentage makes the pigs suboptimal for the needs of countries importing breeding stock, e.g. Thailand.

In the past, there was a huge demand for pork with lean meat and less fat in Thailand; recently the new market trend derives from shopping malls, cafes, supermarkets and restaurants. With this new market, consumers demand another type of pork with more fat and more marbling. As such, some pork producers can work specifically to fulfill such a demand.

Thailand also has a resilient and growing tourist population which helps boost local demand of pork directly and indirectly and through improved consumer incomes. It estimates that travel and tourism generated almost 20% of Thailand’s GDP in 2014 (US$72 billion).

For the future direction, the world population is likely to increase from 7,200 million in 2017 to 9,600 million in 2050, an average increase of 65 million/year. With the expansion of urban areas, areas for agricultural will continually decrease.

Thus, the environmental issues such as Global Warming can lead to a lack of feed ingredients, resulting in a higher cost of production and higher prices for animal feeds. Furthermore these potential problems necessitate that producers have to adapt themselves and be more efficient by developing breeding plans with lower costs. Feed conversion efficiency and carcass quality are the most desired traits for Thai pig producers, regardless of the size of their operation. With the cost of feed during the grow-finishing period comprising 55% of the production cost, improvement in feed conversion efficiency clearly has a highly significant impact on the profitability of the enterprise. For example, a Siampig breeding plans can include the efficient usage of animal feed by increasing the feed use efficiency (53% economic weight in their selection index), growth rate and the numbers of piglets weaned per sow per year. Such characteristics are economically important traits, which affect the farms directly.

In addition, conditions for animal health and welfare will become more challenging in
the near future, as shown through consumers trends for stopping the usage of antibiotics in animals. Furthermore, Thai pork producers are always at risk of animal diseases. For example, in 2008-2009, Porcine Epidemic Diarrhoea (PED) was widely spread and led to the loss of at least 1 million piglets. Later on in 2010-2011, Porcine Reproductive and Respiratory Syndrome Virus (PRRS) was the cause for the loss of more than 50,000 pigs (The Swine Raisers Association of Thailand). Following on from these past experiences, the challenge for the pig breeding scientists is to develop healthy and immune pig breeds. Moreover, with such breeds, antibiotics will not be needed and hence the foundation for consumer confidence will be built (Kenchaiwong et al., 2012). Most importantly, such well-developed pig breeds will not slow down the genetics development, in case of the environment with wide-spread diseases.

Animal welfare systems have been implemented in animal raising, for example the law from the European Union (EU), in 2018, that prohibits the castration of male piglets. Therefore, the pig farmers need to find a way to identify non-aggressive male piglets. Moreover, pig farmers are also trying to select male pigs with a mild smell (boar taint) by using, the recent technology of molecular genetics (Verdon et al., 2015). Although animal welfare issues have not reached the degree of prominence in Thailand, large pig farms in Thailand actually seem to be run along similar lines to those in the West.

In addition, Thailand has pig breeds that are efficiently fulfilling domestic pork demand, and cashing in on a number of exporting opportunities. When Thailand can overcome the challenge of FMD, the next challenges will include increasing efficiency, reducing the cost of production, fulfilling the new demand, and dealing with animal health and welfare issues. The pork producers that are able to adapt to these changes and apply the appropriate technology will be able to sustainably stay in the pig business.

**List of References**


