PIG PRODUCTION IN THAILAND

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ABSTRACT

During the recent years, ASEAN Member States have been preparing to step into the new economic integration, the ASEAN Economic Community by 2015. Pig and pork sectors have improved very fast since Thailand became a member of the WTO. The National Bureau of Agricultural Commodity and Food Standards has been established, and the Agricultural Standards Act has been legislated, including Good Agricultural Practices for Pig Farms. The current status and changes in pig production have been reviewed. In 2013, the standing populations of pigs of all ages were 9.51 million from 210,978 households. The majority of these households (94.15%) raised <50 pigs, while 0.11% of them were big farms with >5,000 pigs. The numbers of breeder pigs were approximately 1.01 million, 46% of which were owned by the two big companies. Only 6.1% of standing populations were indigenous breed. The 2013 production of fatteners was 16.2 million. Farming system is based on sheltered accommodation with little outdoor pig keeping. The numbers of small and medium-sized farms are dramatically decreasing, while pig populations are increasing due to up-scale production. Reproductive performance in top rank farms is close to the average figure of front line countries, 28 pigs weaned/sow/year are achieved. The loss of pigs is mainly due to PRRS, PED and colibacillosis. Traceability of fresh meat and pork products has been started since 2006 with success for high-level markets, and is going on for all-level markets. In addition to the import of genetic materials, liver was imported from Germany, South Korea, Brazil, and Denmark; skin and other visceral organs from Italy, the Netherlands, Germany, and Spain, with the total value of 1,545.09 million baht. Export of live pigs to Lao PDR, Cambodia, Myanmar, and Vietnam was at the total value of 876.3 million baht. Frozen/chill pork and cooked products were exported to Hong Kong, Japan, Singapore, Malaysia and others with the total value of 2,663.81 million baht. Thai pig industry in the near future could be: Only professional and big farms will survive. Integrated business – group of companies will be more and more active and aggressive. More standard and systemic farming will be established. Labor, animal welfare and environment will be the new problem issues. Pork price crisis will be less, getting more price stability. More people could venture into pig production possibly to target the export market. Producers and consumers will be more negotiable. ASEAN Economic Community (AEC) will play an important role in pig-pork trading. Pig diseases will still be a big barrier in the export of pigs and pork products to other parts of the world.

Keywords**:** Pig Production, Pig Statistics, Thailand

INTRODUCTION

ASEAN (Association of South East Asian Nations) member states comprise of 10 countries, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. ASEAN is a major source of pig production in the world after China, EU and U.S. In the past, they mainly produced pork to meet demand inside the country. During the recent years, all ASEAN countries are preparing to step into the new economic system, ASEAN Economic Community (AEC) by 2015. Pig and pork sectors in Thailand improve very fast after Thailand becoming WTO member. Since then, The National Bureau of Agricultural Commodity and Food Standards was established, and The Agricultural Standards Act was legislated including Good Agricultural Practice for pig farm. Even though, export of Thai pigs is very limited due to foot and mouth disease, but government sector and all steak-holder are fighting these problem with intention to stabilize the pig price and to some extend to be kitchen of the world. In the meanwhile, the leap of economic expansion in ASEAN countries enhances the income of people, so the consumption of pork also

increases. This makes ASEAN countries to expand their pig production to meet domestic demand growth, and some members to export in the region. Thailand has better potential for the production and export of pork products compared with other countries in ASEAN. Products of pigs from Thailand are accepted by ASEAN countries in the farming standards and processing standards. In addition, the consumption of pork in the country is not very high and pig price is lower, compared to other countries. However, pig production in Thailand is facing with problems of production shortage due to over exporting, production loss caused by epidemic of diseases, and farm expanding too fast.

PIG FARM IN THAILAND

Development

Before 1970, more than 70% of total pig population was kept in backyard farm. Locally contact farming. The biggest farm confined < 400 sows. No recording system was applied. Solid floor with individual pen found in common. From 1970 – 1990, the system developed to modern farming, confinement and intensive. A gestation crate, Taiwan design, was first used. Breeding companies and other related business expanded very fast. Herd book and white broad were available, but no farm data analysis. Small farm possessed 60% of total pig population. Big farm populated up to 5,000 sows in a single site. More and more emerging diseases occurred. First reported of those pig diseases in Thailand are shown in Table 1. Until now, Swine fever, Foot and mouth disease, Porcine Circovirus, Porcine Epidemic Diarrhea, Porcine Reproductive and Respiratory Syndrome (PRRS), Porcine Respiratory Disease Complex, and Colibacillosis still are economic important disease. From 1990 – 2000, farm size was expand. The biggest size kept more than 10,000 sows in a single site farm. Artificial insemination was practiced in more than 60% of female breeder. Farm computerized data system was applied and farm data analysis was available. Slatted floor and individual sow crate of modern farming was introduced. Proportion of small farm decreased to less than 50% of total pig population. Pig diseases are more complex.

Table 1. Emerging of pig diseases in Thailand.

1950	Swine Fever	Kongsamak (1980)
1967	Toxoplasmosis	Sangkasuwan (1967)
1971	Foot and mouth disease	Supawilai et al. (1971)
1973	Pastuerellosis	Pruksarat et al. (1973)
1977	Japanese Encephalitis	Wattanavijarn and Sunyasootcharee (1977)
1978	Aujeszky's disease	Sanyasootcharee et al. (1978)
1980	Brucellosis	Posuwannamsook et al. (1980)
1981	Transmissible gastroenteritis, Athrophic Rhinitis	Arjsongkoon et al. (1981) Boonyanuruk et al. (1981)
1982	Porcine Parvovirus	Chunruksa et al. (1982)
1984	Trypanosomiasis, Mycoplasma suis (Eperythrozoonosis)	Thepsumethanone et al. (1984) Wajjawalku et al. (1984)
1985	Rotavirus	Kummalue et al. (1985)
1986	Actinobacillus Pleuroneumoniae, Swine dysentery	Urairong et al. (1986) Chungsamarnyart et al. (1986)
1988	Mycoplasma Hyopneumoniae	Saitanu et al. (1988)
1989	Glässer's disease	Naramitmansook et al. (1989)
1995	Porcine Epidemic Diarrhoea, Porcine Reproductive and Respiratory Syndrome	Srinuntapunt et al. (1995) Oraveerakul et al. (1995)
1999	Porcine Circovirus	Tantilertcharoen et al. (1999)

From 2000 – present, housing is equipped with evaporative cooling system. Standard farming is controlled and certified by the Department of Livestock Development. Big enterprises have expanded their business through contact farming. Swine practitioner and farm consultants are more popular. Environmental awareness becomes a hot issue. Farm biosecurity are more concerned. Farm owners are better educated and some of them are replaced by new generation. Pig Board has been established. Misused and off-label using chemical, vaccines and drugs in

pig farms are more often seen. Minimal disease farms and Specific Pathogen Free herds are available. Small and middle-size farms are less than 40% of total pig populations.

Pig populations

In 2013, the standing populations of all-age pig were 9.51 million head. The annual production was 16.2 million heads (Table 2). The population and production drop in 2010 caused by epidemic of highly pathogenic PRRS (Fig. 1). Farming system based on sheltered accommodation with little outdoors pig keeping. The number of small and medium-size farms dramatically decreased, but pig populations increased due to up-scale. There were 210,978 households. The majority of these household (94.15%) raised <50 pigs, while 0.11% were big farm with >5,000 pigs. The number of breeder pigs was approximately 1.01 million heads, 46% of which owned by the two big companies. Only 6.1% of standing populations are indigenous breed.

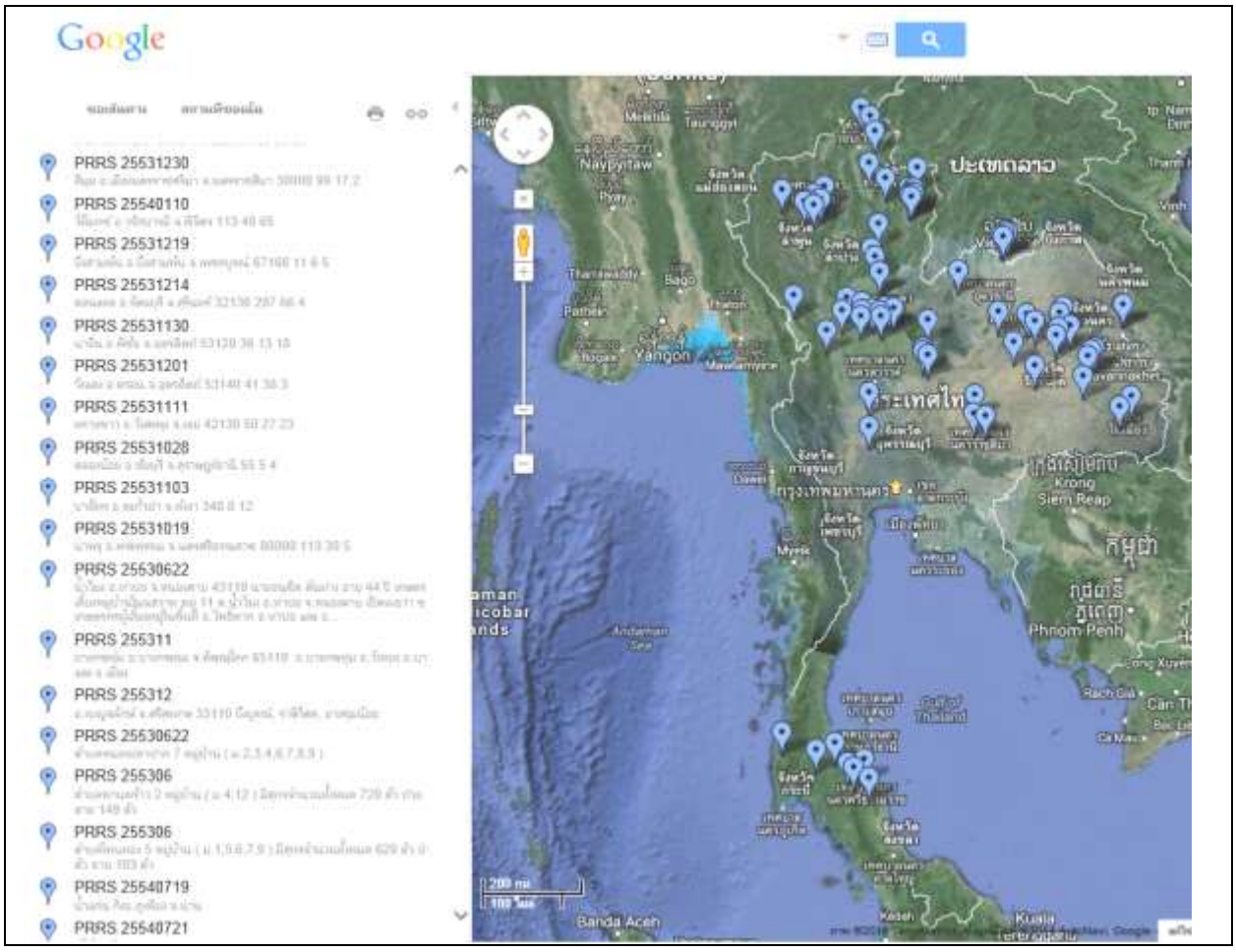

Fig. 1. Epidemic of highly pathogenic Porcine Reproductive and Respiratory Syndrome in 2010 – 2011.

Table 2. Number of sows and annual production.

: heads x 1,000,000

Year	No. of Sows	Annual piglets produced	Annual fattener produced
2006	0.85	11.56	9.83
2007	0.93	12.23	10.4
2008	1.00	19.40	11.63
2009	1.16	15.89	15.50
2010	0.80*	16.30	15.49
2011	1.09	17.76	13.92
2012	1.08	17.57	13.95
2013	1.01	17.88	16.21

*HP-PRRS epidemic Jun 2010
Source: Department of Livestock Development

FACTORS INFLUENCE PIG PRODUCTION

The reproductive performance of pig in Thailand

The reproductive performance of pure bred sows in tropical areas, such as Thailand (Tantasuparuk *et al.*, 2000), is lower when compared to the performance reported from Europe (Muirhead and Alexander, 1997), especially litter size, even though the sows in Thailand come from the same breeding sources as those in Europe. Thailand continues import the genetic materials from world top class breeding, thus the reproductive performance get improve follow after the figure of the origin such as Denmark. Reproductive performance in top rank farms is close to the average figure of front line countries, 28 pigs weaned/sow/year are achieved.

Typically, such farms will have a high sow replacement rate approaching 50% each year. This results in a mean parity number of between 3 and 4. Farrowing rates are around 80% and sow mortality frequently averages 4% per year. The hot, wet humid weather experienced in most South East Asian countries between March and May each year results in reduced farrowing rates and smaller litters (Tantasuparuk *et al.*, 1997), when the sows served during that period farrow four months later. Reproductive performance can be depressed by 5-10% during this period. There is little data available on the number of abortions that occur. From time to time abortion storms are reported but accurate data is not available.

There is a wide variation in the length of the suckling period. Many big commercial farms, with access to better creep feeds and with good facility in the nursery unit, are currently weaning at 22 days of age. Farms that are more traditional still wean at 4-5 weeks of age.

Natural mating is still the normal practice on most backyard farms but there is a strong move towards artificial insemination, which is currently practised on 80% of farms. Commonly, in Thailand farmers producing fatteners use a cross breeding programme. A three way cross is made between Landrace and Large White to produce a female, which is mated with a Duroc boar as the terminate sire. The typical reproductive performance of these crossbred sows is shown in Table 3. This figure is similar to that reported earlier (Kunavongkrit *et al.*, 1989). Such performance falls short of the sows potential, as reported from many temperate countries (Nibe *et al.*, 1995; Dan and Summers, 1996; Muirhead and Alexander, 1997). Recently, various breed and line including composite breed are imported. Except for 2 big pig enterprise (Charoen Pokphand and Betagro), breeder and semen are mostly imported from Denmark, US., Canada, Finland-Norway, UK., and Ireland.

Table 3. Reproductive performance of crossbred (LW x L) sows from a commercial breeding herd.

	1997-1998	2010-2013
Weaning to service interval (days)	6.2	5.8
Farrowing rate (%)	81.6	88.7
Litter/sow/year	2.23	2.42
Total born/litter	9.58	13.1
Born alive/litter	9.36	11.9
Piglets born alive/sow/year	20.6	28.8

Source: unpublished data

Climate

The climate in South East Asia can be both hot and dry or hot and wet. In the November to February period, mean temperatures (24 h) of 25°- 28°C are experienced, while in the April to October period 27°- 31°C is typical. The highest temperature can be above 42°C for several weeks in a year. The months of December to April report mean rainfalls in the order of 0.50 cm per month, while in the May to October period the mean rises to 3 cm, a six fold increase.

The farmer understands this problem very well, and they try many ways to solve it. Air conditioning or evaporative cooling systems are used in boar (AI) housing. Dripping and fogging systems are used in sow houses. Both help to improve performance; however, it needs a lot of investment and redesign, which some older farm cannot implement.

High temperatures and high humidity influence boar semen quality by decreasing semen volume and semen concentration, especially during the summer months (Kunavongkrit and Prateep, 1995). Gilts when faced with high temperatures during pro-oestrus show reproductive dysfunctions, which include anoestrus, delayed anovulatory oestrus and cystic ovaries. Kunavongkrit and Tantasuparuk, 1995). The low farrowing rate for sows mated during the second part of the hot season and during the rainy season might be due to the delay effect of high temperature on spermatogenesis. The low litter size in July-September in Thailand might be the result of poor fertilization and/or early embryonic death during the hot period (March-May) when the mating and implantation taking place (Tantasuparuk *et al.*, 2000a).

Average maximum temperature and heat index (combining temperature and humidity) of the first four weeks after mating had a significant unfavourable effect on the number of total born piglets that decreased by 0.07 piglets when the maximum temperature increased 1°C within the range 26° to 38°C. Temperature and heat index during lactation significantly ($P<0.001$) influenced weaning-to-service interval. An increase in maximum temperature by 1°C led to an increase in weaning-to-service interval by 0.17 days. Farrowing rate decreased significantly when temperature and heat index during the first four weeks after mating were elevated. Farrowing rate decreased by 1.8% for each 1°C increase within the range 26° to 38°C (Tantasuparuk *et al.*, 2000a).

Diseases

In South East Asian countries, there are many infectious breeding herd problems and most infectious diseases and reproductive diseases (except African Swine fever). Due to such diseases, reproductive performance is inevitably lowered. The problems caused by these diseases present themselves as abortions and SMEDI syndromes (Stillborn, Mummified, Embryonic Death and Infertility) (Kunavongkrit *et al.*, 1980; Kunavongkrit and Robison 1988). In tropical countries, the climate is very suitable for both bacterial multiplication and parasite survival. It also supports fungal growth, which can cause lot damage through such problems as mycotoxicosis. Contamination of semen with non-specific bacteria during mating or insemination can cause infertility (return to oestrus) and/or early abortion (Heard and Kunavongkrit, 1998). Even when antibiotics are added to semen, bacterial resistance and high levels of challenge can render them ineffective.

Nutrition and management

Raw materials used in pig feeds include, Maize, Rice, Cassava, Sweet Potato, Peanuts, Soybeans, Cottonseed, Copra, Coconut oil, Fish meal, Blood meal, Meat and Bone meal, Sea shells and Limestone. Poor quality due to contamination with mold and mycotoxin, bacteria e.g. E. coli, Salmonella and decomposing condition commonly found. The quality of feed in tropical countries is a major issue as fungal and bacterial contamination can easily occur. Abortion and stillborn piglets will be frequently seen if contaminated feed is fed to sows (Pfeifer, 1994; Etienne and Dourmed, 1994; Lemmens and Krska, 1996). Contamination with Salmonella and *E. Coli* can considerably influence reproductive performance. Quality assurance of the raw materials being used for

feed, must be strictly enforced. Environment and feed management also play an important role by affecting feed intake at critical times such as during lactation. Lactating sows in tropical conditions eat on average 4.5 kg feed per day, which is too little; they need to be taking more than 6 kg. Farmers try very hard to increase lactating sow feed intake but appetite in hot, humid conditions is depressed. Frequent feeding, wet feeding, improved feed palatability, added flavours, cooling water drips and evaporative fans are all used to help increase feed consumption but results do not always match up to the efforts employed.

The result is that the lactating sows that loses more than 15% of its body weight will become a problem sow after weaning e.g. a longer weaning-to-service interval (Patience *et al.*, 1995), which is found in both the first and the second parity sows (Tantasuparuk *et al.*, 2001a). However, it is not only the environment that interferes with the consumption but also the health status. Observations indicate that healthy sows (free from mange, worms and major diseases, with good feeding and a balanced energy intake) can achieve a feed intake during lactation of up 7 kg/day. Such sows show good reproductive performance (Heard, 1992).

Both subsequent farrowing rate and litter size were influences by weaning-to-service interval. Sows that were mated within 5 days after weaning have significantly higher farrowing rate than sows mated later. Sows that were mated between 6-10 days after weaning have lower litter size than the others (Tantasuparuk *et al.*, 2000b). Weaning-to-service interval of primiparous sows can be used as a predictor of sow longevity and total piglet production (Tantasuparuk *et al.*, 2001b).

Traceability

Traceability of fresh meat and pork products has been started in 2006 with success high-level market, and is going on for all level market. The Department of Livestock Development has set up its e-traceability system to upgrade fresh meat safety standards and prepare for the AEC.

Import and export

Besides import of genetic materials, liver was imported from Germany, South Korea, Brazil, and Denmark; skin and other visceral organs from Italy, The Netherland, Germany, and Span, with the total value of 1,545.09 million baht (Table 4). Export of live pig to Laos, Cambodia, Myanmar, and Vietnam had the total value of 876.3 million baht (Source: Swine Producers and Processors for Exporting Association). Frozen/chill pork and cooked products were exported to Hong Kong, Japan, Singapore, Malaysia and others with the total value of 2,663.81 million baht (Table 5). In order to facilitate exporting of live pigs and fresh meat, FMD free zone with vaccination in the eastern part of Thailand is being established.

Table 4. Import quantity and value of genetic materials, pork and products.

Quantity (Head / Dose / Ton), Value (million Baht)

Item	2012		2013		Change, %	
	Quantity	Value	Quantity	Value	Quantity	Value
Breeder	1,346	55.378	635	62.560	-52.82	12.97
Boar Semen	1,903	56.031	326	0.247	-82.87	-99.56
Viscera and other	37,038.71	1,480.64	42,415.51	1,481.96	14.52	0.09
Pork and products	-	-	0.384	0.327	-	-
Sum		6,197.41		4,508.68		-27.25

Source: Department of Livestock Development

Table 5. Export quantity and value of pigs, pork and products.

Quantity (Head / Ton), Value (million Baht)

Item	2012		2013		Change, %	
	Quantity	Value	Quantity	Value	Quantity	Value
Breeder	21,585	57.204	23,952	44.731	10.97	-21.80
Nursery pig	165,727	247.236	89,260	56.685	-46.14	-77.07
Fattener	433,228	2,428.354	136,933	774.889	-68.39	-68.09
Frozen/chill pork	883.696	84.481	1,001.213	95.286	13.30	12.79
Other parts	1,094.158	107.777	2,061.488	203.123	88.41	88.47
Cooked products	15,376.926	3,272.361	16,987.13	3,333.970	10.47	1.88
Sum		6,197.41		4,508.68		-27.25

Source: Department of Livestock Development, Swine Producers and Processors for Exporting Association

Research in pigs

Pig research in Thailand during the last decade (2001-2011) yielded 352 publications (Table 6). The average number of publication per year was 39 articles. While, Reodecha and colleague (2000) reported an average of 37 articles per year was published during 1978 to 1997. This indicates the limitation in funding, facility, researcher and government policy. Even, the Thai government aims to increase the budget gradually to 1.0% of GDP for research and development, 0.22% was allocated last year and 0.37% of GDP in 2014.

Table 6. Number of pig and pork publication.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	**Sum**
Pig production	**25**	**36**	**21**	**23**	**16**	**30**	**28**	**30**	**33**	**56**	**298**
- Genetics	*0*	*2*	*1*	*0*	*0*	*2*	*3*	*1*	*5*	*2*	*16*
- Nutrition	*3*	*6*	*4*	*5*	*2*	*5*	*4*	*5*	*7*	*5*	*46*
- Farm management	*5*	*12*	*10*	*5*	*6*	*6*	*7*	*6*	*4*	*22*	*83*
- Health	*17*	*16*	*6*	*13*	*8*	*17*	*14*	*18*	*17*	*27*	*153*
Processing	**4**	**0**	**1**	**2**	**2**	**3**	**6**	**2**	**4**	**2**	**26**
Logistic, Packaging and Branding	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**
Trade and Marketing	**0**	**1**	**0**	**1**	**3**	**1**	**3**	**0**	**0**	**0**	**9**
Environment	**0**	**1**	**1**	**0**	**2**	**1**	**0**	**4**	**1**	**1**	**11**
Social and Regulations	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**3**	**0**	**0**	**6**
Sum	**30**	**38**	**23**	**26**	**23**	**38**	**38**	**39**	**38**	**59**	**352**

Thai pig and pork in the near future

For industrialize system, professional and big farms will survive. Small scale independent operations will abolish, otherwise, the co-op must be formed, or upscale to > 1,400 sows. Another side, natural and organic pig farming is promoting, in order to keep backyard pigs survive for utilizing an agricultural by-product and for serving the local remote areas consumption.

Integrated business – group of companies will be more and more active and aggressive. More standard and systemic farming will be established (90% in target). Labor, animal welfare and environment will be new problem issues. Pork price crisis will be less, getting more price stability. Pig production may be possibly for more exports. Producers and consumers will be more negotiable (Producers have to listen to consumers and know the consumers need). ASEAN Economic Community (AEC) will play an important role in pig-pork trading. Pig diseases are still a big barrier for export to other parts of the world.

CONCLUSION

Pig production in Thailand has a fast move forward prepare for the new economic integration, AEC. In spite of emerging and reemerging diseases, oversupply can be a big problem, which now is minimize by export live pigs to neighbor countries.

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