

Present Situation of Thai Native Pigs

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Introduction

There are four so-called native pig breeds (Raad, Puang, Hainan, and Kwai) in Thailand. These breeds were common 20 to 30 years ago. They, however, began to reduce in number since 44 years ago when the Department of Livestock Development (DLD), Ministry of Agriculture, started to import European pig breeds into Thailand. In 1957 the DLD, under the guidance of Mr. Sondergard a FAO official, initiated a programme to promote and sponsor private pig farms to be local pig breeding centers. The program's main objectives were to increase production and sale of pure European pig breeds in local areas.

In 1981 pig raising in Thailand became an industry. There were several large pig farms, individual or corporate owned with several thousand sows and/or fattening pigs each, operated on their own or under the guidance of the DLD. Since then Thai native pigs have largely decreased in number. They became crossbreds and recently were replaced by pure European pig breeds. Some authors (Charan, 1983; Prasob, 1983; Tawan, 1987) believed that Thai native pigs were endangered or nearly extinct.

This paper attempts to describe the present situation of native pigs in Thailand. The information was obtained from several surveys in northern Thailand and from library sources.

Descriptions of Thai Native Breeds

Thai native pigs are classified as lard type pigs. They grow slowly and their reproductive rate is low. They, however, adapt well to hot and humid climates, tolerate low quality feed, and probably are resistant to foot and mouth disease and internal parasites.

Thai native pigs are generally classified into four breed groups according to physical appearances and regions where they are predominant (Sucheep, 1967; Prasert, cited in Charan, 1983), viz.,

(1) **Lower Northeastern Thailand** Pigs in this region are "Raad" breed, or in some places it is called "Ka Done". Raad pig is the smallest among the Thai native pigs, with a mature body weight of 60 to 70 kg. It has black hair coat color, short set, small head, small and erect ears, long and straight snout, and short body. They were alert pigs and capable of seeking food. Raad pigs are relatively low in prolificacy, with 5 pairs of teat and a litter size about 6. Due to its small bones and fine textured muscle, its meat is delicious.

(2) **Upper Northeastern Thailand** Pigs in this region are "Puang" breed. The Puang pig is much bigger than the Raad pig, its mature body weight may reach 120 to 130 kg. They are black, with large thick ears, rough and wrinkled skin. They are similar to Chinese Taihu pig. Due to their rough and wrinkled skin their price is lower than other breeds. They, however, are excellent in crossing with the Raad breed (Prasob, 1983).

(3) **Central, Eastern, Western, and Southern Thailand** Pigs in these regions are "Hainan" breed (pigs mainly raised by Hainanese immigrants). Mature body weight of Hainan pig is 110 to 120 kg. Hainan pigs generally have a black and white hair coat color, with black at the head, back, and rump, and white on the belly

and legs. The back is concave, and the belly is drooping. They have short and straight snout, small and erect ears, and weak pastern. They were most prolific compared to other Thai native pigs with 6 pairs of teat and 8 piglets per litter.

(4) **Northern Thailand** Pigs in this region are "Kwai" (Kwai means buffalo or big in Thai) breed. Kwai pigs are the biggest among the Thai native pigs. Its mature body weight is 130 to 150 kg. Their appearance is similar to Hainan pigs except they have black hair coat color (sometimes a little white color at belly), with white legs, longer and straight snouts and larger ears. Some people call them "white eye pig", since it has a white ring around a black cornea.

Body measurements, reproductive performance, carcass composition, carcass characteristics, and percentages of internal organs data for Thai native pigs except the Puang breed are shown in Tables 1, 2, 3, 4, and 5 respectively. The data is mainly obtained from government experiment station at Tubkwang, Saraburi Province.

Table 1 Body measurements and mature body weight of Thai native pigs^a.

Breed	Sex	Number	Hight (cm)	Length (cm)	Heart Girth (cm)	Mature Weight (kg)
Raad	Male	8	52.7 (1.43)	86.6 (2.43)	85.3 (2.12)	60 to 80
	Female	14	51.9 (2.97)	84.0 (2.77)	85.7 (2.99)	
Hainan	Male	6	58.1 (2.30)	101.4 (3.78)	97.6 (4.54)	110 to 120
	Female	20	57.2 (2.30)	102.1 (3.86)	98.6 (3.81)	
Kwai	Male	10	70.3 (2.51)	127.4 (3.40)	130.1 (2.62)	125 to 150
	Female	8	71.2 (1.88)	127.5 (6.88)	136.8 (3.66)	

^a Adapted from Suntraporn, 1980. ^b Figures in parentheses are standard deviations.

Table 2 Number of teats and reproductive performance of Thai native pigs.

Trait	Raad	Hainan	Kwai	References
Number of teats	9 -- 12	10 -- 14	10 -- 12	Tanaka ^a , 1974.
Pigs per litter at birth	5.5	7.6	5.6	Koh, 1981.
	6.0	7.7	6.9	Prasert and Siripong ^b , 1960
Birth weight per pig (kg)	0.59	0.69	0.57	Koh, 1981..
	0.59	0.51	0.61	Prasert and Siripong, 1960
Birth weight per litter (kg)	3.23	5.31	3.21	Koh, 1981.
Pig per litter at weaning	4.1	6.1	3.9	Koh, 1981.
	3.0	4.5	3.5	Prasert and Siripong, 1960
Weaning weight per pig (kg)	5.89	7.67	6.68	Koh, 1981.
	3.35	6.62	---	Prasert and Siripong, 1960
Weaning weight per litter (kg)	21.81	48.87	25.88	Koh, 1981.
Surviving rate at weaning	74	80	69	Koh, 1981.

^a Cited in Suntraporn, 1980. ^b Cited in Nam, 1965.

Table 3 Carcass composition, length of intestine, and stomach weight of Thai native pigs^a.

Trait	Raad	Hainan	Kwai
Meat percentage	32.4	40.6	41.3
Fat percentage	50.0	39.4	36.5
Bone percentage	5.6	7.7	6.9
Hide percentage	11.9	12.1	15.2
Length of intestine (m)	17.4	20.6	17.1
Stomach weight (kg)	0.49	0.63	0.60

^a Adapted from Koh, 1981.

Table 4 Carcass characteristics of Thai native pigs^a.

Trait	Raad	Hainan	Kwai
Dressing percentage	78.7	74.6	76.5
Rib number	13	14	14
Spine segments	19	20	20
Back fat thickness (cm)	6.1	4.9	4.7
Hide thickness (cm)	0.45	0.48	0.70
Loin-eye area (cm ²)	3.9	4.4	4.1

^a Adapted from Isara, 1958.

Table 5 Percentages of internal organs, head, fillet, and leaf fat of Thai native pigs^a.

Trait	Raad	Hainan	Kwai
Heart	0.19	0.22	0.23
Liver	1.23	1.38	1.36
Stomach	0.50	0.62	0.54
Lung	0.50	0.59	0.68
Kidney	0.16	0.21	0.17
Pancreas	0.10	0.15	0.14
Head	6.53	6.80	7.28
Fillet	0.38	0.52	0.43
Leaf fat	4.98	3.52	2.67

^a Adapted from Isara (1958).

Survey

Target Areas

I requested from livestock officers in 17 provinces in the northern part of Thailand information concerning about raising of Thai native pigs (Figure 1). There were, however, only seven provinces viz., Chiangrai, Chiangmai, Lamphun, Lampang, Phayao, Phrae, and Uttaradit, which replied. Their answers, except from Uttaradit province, were the same, that was only hilltribe peoples in their provinces still keep raising black (native) pigs. To limit the amount of travelling to fit to the time available, the survey areas had to be restricted to only three provinces: viz., Chiangmai, Lamphun, and Uttaradit. According to villagers and pig traders in these provinces, fewer villages (20 from several hundred villages) in these three provinces were targeted as survey areas. Twenty two surveys were made from June to September 1994.

Survey Results

Provincial livestock officers mentioned that native pigs are raised mainly by hilltribe peoples. I have seen during several surveys very few northern Thai people that still keep raising pigs. There were several reasons for fewer villagers to be involved with pig raising than in the past. Most villagers interviewed said that pigs make odour pollution to villages, pig noise disturbs the neighborhood, the price of pig always fluctuated, pig feed always increases in price, etc. Many villages that I have seen have recently become crowded, therefore there is no place for raising pigs.

I found very few villagers at Ban Pae village, Chomthong District, Chiangmai Province, that still raise pigs. They, however, bought castrated native pigs from hilltribe peoples for fattening only. They said raising castrated pigs was safer, faster, and more convenient than raising sows in order to produce piglets for sale. It is fortunate that Ban Pae is located in the lowlands near a mountain where Karen

and Meo peoples live. Therefore, native pigs of the hilltribe peoples are available all the time, it is not necessary for Ban Pae villagers to reproduce their own piglets.

As far as Thai native pig are concerned, there are not any institutions recently involved with breed conservation. There are, however, few villages at Thunguachang District of Lamphun Province and at Numpard, Faktha, and Ban Kok Districts of Uttaradit Province that still keep raising native Thai pigs. Hilltribe peoples in the highlands of

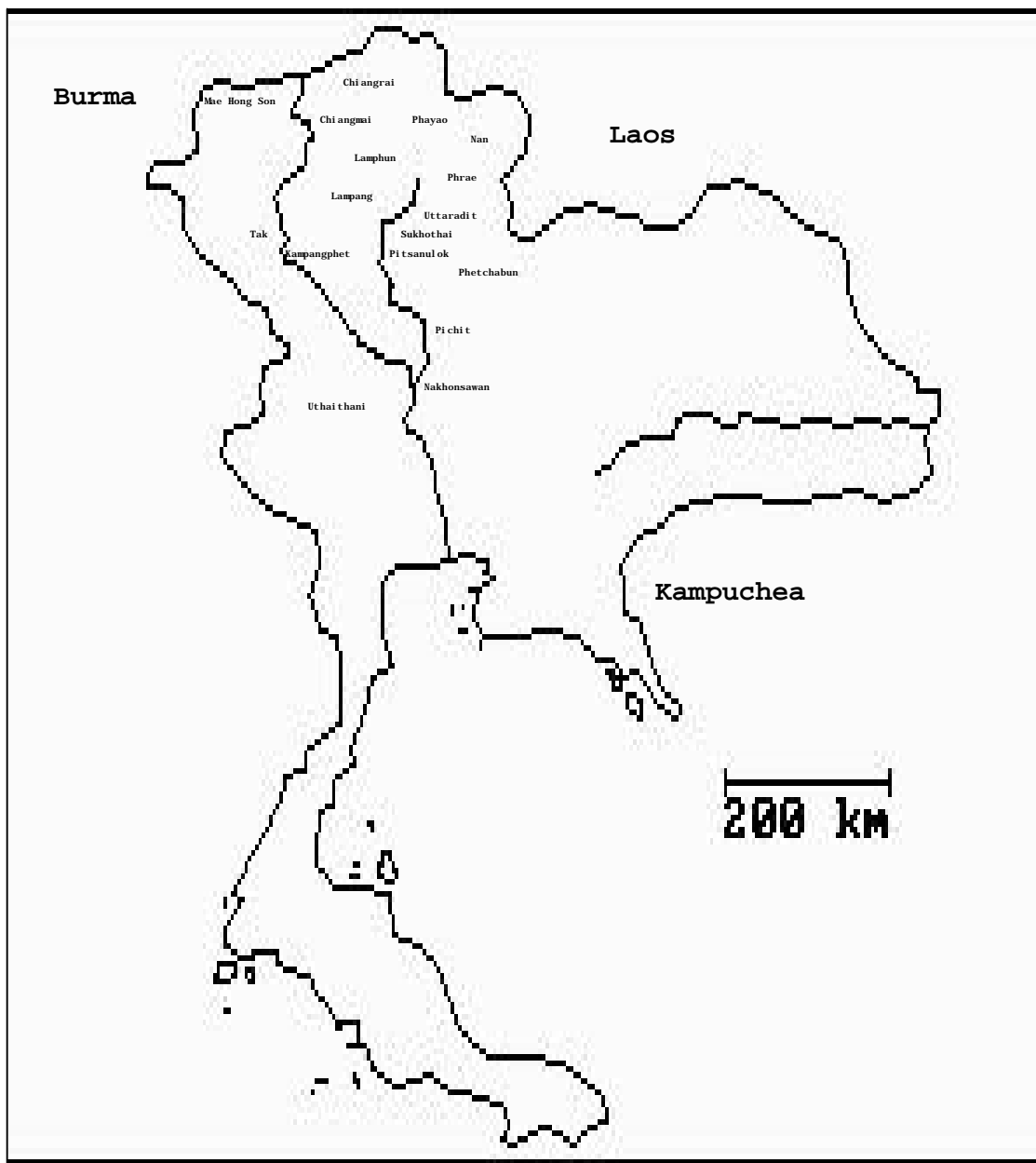


Figure 1 Map of Thailand indicating seventeen provinces in the northern area.

northern Thailand also still keep raising native pigs as long as their socio-economic status and religion are not disturbed. It was also found in the northeast that So and Khmer peoples have been raising Raad pig for producing piglets to sell (Pongcharn, 1985). Wild pigs are now widely raised in the central part of Thailand (Chaiya, 1989). The details of native and wild pigs raised in these different areas and groups of peoples are described separately in the following sections.

Native Pigs of Uttaradit Province

Area and People

Numpard, Faktha, and Ban Kok Districts are close to the border of Thailand and R.D.P. Lao, are three adjacent districts in Uttaradit Province that still raise Thai native pig. Most people in these districts speak two dialects, viz., Thai and Lao. At about 100 to 300 m above sea level, the climate of this area is extremely warm and humid (average above 30^o C) almost the whole year round. Rainfall is about 1,500 mm per year. The area is surrounded by mountains and has abundant green fodder and water plants. Rice bran, a by-product from paddy rice milling, is available for pigs all year round.

Pig Type and Population Size

Native pigs raised in this area, so-called Numpard pigs, are probably of two types (Figure 2, 3), Hainan (black back, white belly and legs) and Kwai (black body and white legs) breed.



Figure 2 Hainan pig in Uttaradit Province.



Figure 3 Kwai pig in Uttaradit Province.

Some of them, however, may be crossbred pigs between these two breeds. There are all together about 1,000 pigs, which may be divided into 700 breeding females and 300 males, and probably include 400 pigs with 280 breeding females and 120 males for each Hainan and Kwai breed.

Performance and Management

Most sows in these areas are confined in pens with a soil floor, and fed with all kinds of local plants such as banana stems, papaya fruit, taro, etc., chopped, mixed, and boiled together with rice bran and food wastes. They have 5 to 6 pairs of teats, with 8 to 9 piglets per farrowing. Birth weight of each piglet is about 0.5 kg, and weaning weight is about 4 kg per piglet. Their mature body weight is probably 90 to 100 kg, and weigh only 50 to 60 kg at 6 months old. Vaccination, disease, and internal parasites control are rarely practiced for these pigs.

Mating of pigs in the areas are under the control of a few villagers, 3 to 4 for each village, who own boars used for contract service with a fee. Boars usually are inbred animals while some of them are crossbred.

Native Pig of Thunghuachang District

Area and Climate

Thunghuachang District of Lamphun Province, with 64,000 hectares, is one of the few areas in the north that still have commercial Thai native pig production. At about 600 m above sea level, the climate of this area is relatively dry and cool (average under 30^o C), particularly during the cold season. Rainfall is usually greater than 1,000 mm per year. Green fodders and rice bran are abundant in this area all year round.

Pig Breed, Performance, and Management

Pigs, with large ears, in this area (Figure 4) are similar to Kwai pig except they have more teats (12 to 14 vs. 10 to 12). It is, however, suspected that large-eared pigs in this area is probably a result of crossbreeding of Thai native pig and Chinese Meishan pig. Since 8 years ago a pair of Meishan pigs were introduced by a livestock officer into the area, however Meishans have now completely disappeared from the area. Further investigations are needed to clarify the pig breed

in this area. There are, however, about 200 breeding female pigs of this breed in the District.



Figure 4 Large-eared pig in Thunghuachang District.

This pig breed is more prolific compared to other Thai native pigs, by usually giving birth to 9 to 12 piglets per farrowing. It is, however, common for sows of this breed to have 16 or 17 piglets, more than its teats, per farrowing. Piglets are usually weaned at about one month old, though their mortality rate is rather low. I was told by some villagers that their sows were able to produce at least 2 litters per year for several consecutive years.

Villagers in this area do the same as in other rural areas. They give only rice bran, as a supplement to plant products, to their pigs. Piglets may receive some concentrate feed a few days after weaning. Sows are tethered or confined in a wooden pen. There are no vaccination, disease, and internal parasite control for these pigs.

Large-Eared Pigs at Huaygusingha Village

Ban Huaygusingha, which is rather isolated village in Tunghuachang District, has played an important role in producing native pigs for a long time. The village has about one hundred households.

Almost every household in this village has been raising a large-eared pig, usually one sow each, for several generations. There are about 80 sows and 3 boars in the village. The boars used for contract service are rather pure inbred animals. The boar owners have practiced closed herd breeding, starting with one boar and one sow, for a long time. Because of that and there have been no pigs from outside imported to the village, most sows in the village should be generally related to each other. Although the breed is highly inbred, no genetic defects have been noted.

Pigs of Hilltribe Peoples

Highlands

The highlands of north Thailand are generally considered to be in nine provinces, viz., Chiangrai, Mae Hong Son, Chiangmai, Lamphun, Lampang, Phayao, Phrae, Nan, and Tak, where the elevation varies appreciably from the lowland plain. The highlands comprise an estimated 75% of the 105,000 sq.km in these nine provinces. Within the northern region, valleys of elevation of 250 to 600 m occupy 50% of the area while lands between 600 to 1,200 m and above 1,200 m occupy 39% and 11% respectively.

The climate of the highlands is monsoonal with three distinct seasons: a wet season from May to October, a cool and dry season from November to mid-February, and a hot and dry season from mid-February to April. Rainfall varies over the highlands but is usually between 1,000 to 2,500 mm per year. Highest rainfall occurs during the period of May to October. Mean maximum temperatures in the hot and dry season, wet season, and cool+dry season at elevation of 1,500 m were 28° C, 24° C, and 20° C respectively. The corresponding minimum temperatures were 14° C, 15° C, and 11° C (Andrew, 1979).

The highlands are abundant in green feeds, being especially rich in wild banana. Rice bran, a by-product of rice pounding, is generally available for pigs, but may be scarce in some months.

Hilltribes

The inhabitants of the highlands have traditionally been called "hilltribes people" a term which includes ten ethnic groups; viz., Karen, Meo or Mong, Lahu, Yao, Lisu, Akha, Lua, H'Tin, Khamu, and Yunnanese Haw. there are total of 600,000 hilltribe peoples in Thailand, which comprises 100,516 households. Many of these hilltribe peoples migrated from either China, Lao, or Burma from several hundred years ago until recently. Among them, Karen (51%), Meo (16%), and Lahu (10%) are the biggest groups (Tribal Research Center). They live in highlands at elevations from 500 to 1,800 m. There are, however, many Karen villages locate in the lowlands.

It is a tradition that each household of hilltribe peoples raises a few pigs. The main purpose of raising pigs of the hilltribe peoples is for their own use, not for sale, in various religious sacrificial ceremonies and other special celebrations such as their new year and weddings. Table 6 shows the percentages and numbers of hilltribes household raising and slaughtering pigs for their own consumption. It is a religious belief of the hilltribe peoples not to use white pigs in their sacrificial ceremonies, therefore they raise only native pigs.

Table 6 Percentages and numbers of hilltribes household raising and slaughtering

pigs for their own consumption^a.

Ethnic group	Percentage of households raising pigs	Number of pigs raised per household	Percentage of household slaughtering pigs	Number of pigs slaughtered per household
Meo	96.3	7.5	96.3	3.8

Karen	85.0	7.2	95.0	2.9
Yao	100.0	6.0	100.0	5.3
Lisu	100.0	8.8	100.0	2.5
Akha	83.3	3.8	66.7	2.8
Lahu	88.2	4.4	83.3	2.3
Haw	50.0	4.0	50.0	3.0
Average	90.0	5.2	84.5	3.2

^a Adapted from Theera and Chok (1980).

Pig Type

Pigs of the hilltribe peoples usually have narrower heads, longer snouts, and shorter bodies than the Thai native pigs on the lowlands. According to their body color and size, native pigs in the highlands may be classified into three groups:

(1) Small black pigs (Figure 5), which may be considered the same type as Raad breed, is rather short, low-set, and fatty pig. It has small and erect ears, narrow head, long and pointed snout, concave back, pouched and pendulous belly. This type is the major group of the hilltribe pigs and is favorable among Yao and Akha peoples in Chiangrai Province (Theera, 1980).

(2) Black and white pigs (Figure 6), which may be considered the same type as the Hainan breed, is somewhat bigger than the first group. It also has a low-set, short body, small ears, concave back, pouched and pendulous belly. It has a hair coat color pattern similar to the Hainan breed, with black at the back and rump, and white on the belly and legs.



Figure 5 Small black type of hilltribe pig.



Figure 6 Black and white type of hilltribe pig.

(3) A crossbred between groups one and two (Figure 7), which usually has black body and white legs similar to Kwai pigs but has longer heads and smaller body.



Figure 7 Hilltribes crossbred pig.

Population Size

The population size of the hilltribe's pigs is calculated from the percentage of households that raise pigs (90%) and average number of pigs raised per household (5.2 pigs) given in Table 6 and found to be 470,415 pigs. Theera (1980), however, found 70% of these pigs were small black type, therefore the population size of this type should be 329,290 pigs, and of those black and white and the crossbred should be 141,125 pigs.

Performances

Very little research has been done on the hilltribe pigs, only one report on reproduction, carcasses (Table 7), and growth performance (Table 8) is available. It has been shown that the growth performance of these pigs could be greatly improved by using concentrate feed instead of banana stalk and rice bran (Table 8).

Table 7 Reproductive and carcass performances of pigs of hilltribe peoples in the Highlands^a.

Trait	Mean	Trait	Mean
<u>Reproductive</u>		Percentage of bone	8.4
Teat (pairs)	5	Percentage of skin	8.4
Mature age (months)	5.8	Percentage of head	9.1
Pigs per litter at birth	7.1	<u>Internal organs</u>	
Pigs per litter at weaning	5.8	Percentage of heart	0.41
Birth weight per pig (gm)	864	Percentage of lung	0.56
Life span of sow (years)	12.9	Percentage of liver	1.84
<u>Carcass</u>		Percentage of kidney	0.25
Numbers of rib	13 to 14	Percentage of stomach	1.41
Spine segments	18 to 19	Percentage of small intestine	1.69
Slaughter weight (kg)	92.5	Percentage of large intestine	3.17
Dressing percentage	76.3	Percentage of pancreas	0.24
Percentage of meat	29.2	Percentage of spleen	0.11
Percentage of fat	23.1		

^a Adapted from Theera and Chok (1980).

Table 8 Growth performances of hilltribe's pigs fed with concentrate and banana stalk mixed with rice bran within 168 days^a.

Trait	Concentrate	Banana stem +rice bran
Initial weight (kg)	13.47	13.16
Final weight (kg)	101	24.45
Average daily gain (gm)	521.0	67.2
Feed intake (kg/day)	1.92	0.58
Total protein intake (kg/day)	0.23	0.05

Table 8 (continued)

Trait	Concentrate	Banana stem +rice bran
Feed conversion rate	1:3.6	1:7.7
Protein conversion rate	1:0.5	1:0.7
Digestibility of dry matter	88.2	64.3
Digestibility of protein (%)	83.9	51.3

^a Adapted from Theera and Chok (1980).

Management and Feeding

Pigs are commonly raised on a free range basis except in the more progressive villages such as Meo Ban Long Pong, Mae Jam District, Lahu Ban Huey Tadt, Chiang Dao District, Chiangmai Province, where pigs are mainly kept in pens. At several Karen villages, piglets are always let to run loose while most sows are tethered or confined in a pen.

Vaccination, internal parasite, and disease control are rarely practised. Swine fever was the most serious disease in the highlands with a mortality rate of about 74% when the outbreak occurred (Theera, 1980).

Most hilltribe peoples feed their pigs mainly with chopped wild banana stems and other available plant products. Theera (1980), however, noted that though banana stems were cut around the village, they might also be transported up to six km, mainly by women, who were often responsible for raising pigs. Rice bran, a by-product from traditional rice pounding, corn, and legume seeds may often be used as supplemental feed, but only small amounts.

Breeding

Most hilltribe peoples usually will not purchase a new boar as long as they still have one, i.e. one boar per household. Together with closed-herd-breeding practices, inbreeding is unavioded in most hilltribe's pig populations. It is, however, interesting to note that the Karen people at Huai La Village, Ban Hong District,

Lamphun Province, try to avoid inbreeding by keeping all boars as scavengers around village, so that any boar can mate with any sow in the village. Occasionally, piglets are born showing wild-pig characteristics.

Raad Pig in Northeastern Thailand

Pongcharn (1985) found Raad pig raising in a So village at Ban Bong Kam, Nakhon Phanom Province, and in a Khmer village at Ban Lalom Rasai, Surin Province, in the lower northeastern part of Thailand. Almost every household in both villages raised pigs, there were together around 200 Raad breed sows.

The traditional pig raising systems of these two villages is quite different. At Ban Bong Kam, pigs were let to run loose almost all year round to graze around the village, and were confined only during the rice planting period. They got only a minimum amount of rice bran, a by-product from traditional rice pounding, as supplemental feed. Most sows and boars in this village mated randomly. While pigs at Ban Lalom Rasai were confined all the time. The feed given to pigs in this village consisted of various kinds of local plants and pounded whole paddy boiled together. The mating of pigs in this village was obtained through contract service provided by some villagers with a boar.

Management and disease control for pigs in both villages were minimal. Producing piglets for sale was the main purpose of both villages. Performance data in these villages is unavailable.

Thai Wild Pigs

Wild pigs (*Sus scrofa*) are now widely domesticated in Thailand. Its meat is served as a special dish in some restaurants, and is more expensive than ordinary pork. Its tasty meat and crisp skin are delicious to Thai tastes. Sakol Farm at Nakornphatom Province close to Bangkok, one of the biggest wild pig farms, has been raising wild pigs for a decade. The owner of the farm started his operation with

a pair of wild pigs bought from a villager. He has now several hundred of wild pigs in his farm. He sells both meat and piglets of these wild pigs.

Breed and Characteristic

There are two types of wild pigs in Thailand viz. long-narrow and short-wide face. They generally have black hair coat, with five pairs of teats, small head, very small and erect ears, straight and pointed snout, long legs, strong feet and hard hooves, straight top-line, long and coarse hair, especially on the top-line which is longer than 15 cm. Wild pig always have grouped hair, three hairs per group, while domestic pigs have evenly spreading hair.

The long-narrow face type is thinner and grows slower than the short-wide face type. The long-narrow face type, however, seems to be more resistant to diseases than the short-wide face type.

Raising

Due to its relatively large scale commercial production, wild pigs are kept and raised similar to European pigs. They are confined in pens with a roof and fed with concentrate. They, however, consume much less feed and water than European pigs. Five wild pigs may consume the same amount of feed as one European pig. One gallon of water per day is enough for one mature wild pig.

Sunlight and silence are very important to wild pigs. They will jump and vigorously scratch their hooves on the floor if they are frightened, therefore a polished concrete floor is useful for preventing jumping and hoof injuries.

Vaccination for swine fever is necessary for these pigs, but not necessary for foot and mouth diseases. Scour also causes some problem for wild piglets, therefore a clean environment is important for them.

The ratio of boar to sow is best at 1 per 7. Mating should be made in the third day of the heat period. Their pregnancy period is 114 to 117 days, the same as

those of European breeds. Piglets are weaned at about one and a half months old, one week after weaning sows will become in heat again and should be mated.

Performance

Wild sows usually give 5 to 7 piglets per litter. Crossing between the two types of wild pigs gives better fertility, with five pairs of teats, they often produce 10 to 12 piglets per farrowing, and two litters per year is common for them. Mortality of piglets is rather low.

They, however, grow slowly, and weigh only 60 to 70 kg when slaughtered. The usual age for slaughter varies and depends on the breed types, i.e. 8 months for the short-wide face type and one year for the long-narrow face type. At the optimum age of slaughter the yield is 40 kg of meat.

Conclusions

Results from the surveys, particularly in the northern Thailand, revealed that Thai native pigs in the lowlands have been decreasing in number. Due to its fewer than 500 breeding females and smaller than 10 herds, Raad, Hainan, and Kwai breeds are probably at a risk level (Maijala, 1992). The Hainan and Kwai pigs such as that found in Uttaradit Province, the Raad pigs in the northeast, and the large-eared pigs in Thunghuachang District of Lamphun Province should receive more attention from the Department of Livestock Development or other institutions. Because so little research has been done on these pigs, it is not known if they have any special qualities. Thus, they should be evaluated before they are completely lost. A special effort should be made for their conservation either from live animals or with cryogenic materials.

With a large number of pigs, the hilltribe pigs will be a major viable genetic resource of Thai native pigs for the future-use. Though they are slow growing and less prolific, they may have some resistance to foot and mouth disease, since the disease has not been known to these hilltribe pigs. Research should emphasize any

good qualities on these pigs, such as diseases resistance and internal parasites tolerance. As long as the hilltribe's socio-economic and religious beliefs are not interfered with, they will keep raising their native pigs.

Wild pigs such as those in the commercial farm at Nakon Phatom Province should also be evaluated in more detail because they are really valuable in terms of both meat production and genetic diversity. Commercial production should help increase the population size of wild pigs.

Aside from crossbreeding with European breeds, crossbreeding among the native breeds is also a major cause of the loss of the pure native breeds. Preservation of cryogenic storage materials of the pure native breeds is probably necessary in the future, but it is likely that this will be achieved only if supported by government and/or international cooperation agencies.

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