

Goat meat production in Thailand

S. Saithanoo^{1,2} and J.T.B. Milton²

¹Department of Farm Animal Medicine and Production, University of Queensland, St Lucia, Queensland, Australia 4067, and ²Department of Animal Science, Faculty of Natural Resources, Prince of Songkla University, Hat Yai, Thailand 90110

Abstract: Goat production in Thailand is primarily for meat. Approximately 88% of the total goat population is found in villages of the southern region where the Thai Muslim population is relatively high. Goats are traditionally integrated with agricultural systems such as fishing, rice growing, and rubber, oil palm, or fruit tree plantations and are raised by small-scale farmers who own about 1.4 half-family. Although the flock size in southern Thailand is small (5 head/family), the contribution of goats to the farm cash income is relatively high, especially in a rice-growing system (approx. 56% per year). More than 65% of goat owners employ a tethering system; a cut and carry system is practiced only in the wet season. Cash inputs, concentrates, mineral supplements, and medical treatments are minimal. Village goats are mainly indigenous with average mature body weights of 23 and 22 kg for males and females, respectively. Average growth rates to 6 months of age were 62 and 47 g/day for males and females, respectively. Age at first kidding was 12.4 months. An average kidding rate for all age groups is 190%, but the weaning rate is only 135%. A high mortality rate of 25–37% in young kids is mainly caused by accidents (such as dog bites) and diseases (such as scabby mouth or pneumonia). Under improved conditions, body weights of village goats increased by 21–55%; the kidding rate is somewhat lower (147%) and the weaning rate is higher (146%). However, the improved conditions have little effect on dressing percentage of the native goats (45.8 vs 45.0%).

Résumé: En Thaïlande, on élève surtout la chèvre pour sa viande. Environ 88 % du cheptel caprin se retrouve dans les villages du Sud du pays, dans lesquels la population musulmane Thai est relativement élevée. De tradition, l'élevage de la chèvre est intégré aux systèmes agricoles : pêche, culture du riz et exploitation de plantations d'hévéa, de palmiers oléagineux et d'arbres fruitiers; ce sont les exploitations agricoles familiales d'une superficie d'environ 1,4 ha qui pratiquent cet élevage. Même si les troupeaux de chèvres du Sud de la Thaïlande sont petits (5 têtes par famille), la contribution de cet animal au revenu de la ferme est relativement élevé, en particulier dans celles où l'on cultive le riz (environ 56 % du revenu annuel). Plus de 65 % des propriétaires de chèvres se contentent de les garder attachées à un poteau et de les abattre à la saison des pluies. Ils y investissent peu d'argent, ont peu recours aux aliments concentrés et aux suppléments minéraux, et se préoccupent à peine de les soigner. Dans les villages, on retrouve surtout des chèvres indigènes dont le poids moyen à maturité est de 23 kg pour les mâles et de 22 kg pour les femelles. Leur taux de croissance quotidien jusqu'au sixième mois est de 62 g pour les mâles et de 47 g pour les femelles. L'âge moyen des femelles à la première mise bas est de 12,4 mois. Le taux de mise bas moyen, tous groupes d'âge compris, est de 190 %, tandis que le taux de sevrage n'est que de 135 %. Le taux de mortalité élevé des jeunes chevreaux (25 à 37 %) est en grande partie attribuable à des accidents (morsures de chien) et à la maladie (bouche scabieuse ou pneumonie). L'amélioration des conditions permet une augmentation de 21 à 55 % du poids des chèvres des villages; celles-ci présentent un taux de mise bas quelque peu inférieur (147 %) et un taux de sevrage supérieur (146 %). L'amélioration des conditions n'a cependant que peu d'effet sur le rendement à l'abattage des chèvres indigènes (45,8 contre 45,0 %).

Resumen: La producción de cabras en Tailandia está orientada primordialmente hacia la obtención de carne. Aproximadamente el 88% de la cantidad total de cabras se encuentra en aldeas de la región sur donde el volumen de la población musulmana tailandesa es relativamente elevado. Las cabras están integradas tradicionalmente con sistemas agrícolas tales como el de la pesca, el cultivo de arroz y las plantaciones de goma, aceite de palma o frutos, y son criadas por pequeños agricultores que poseen aproximadamente 1,4 hectáreas por familia. A pesar de que el tamaño del rebaño en el sur de

Tailandia es pequeño (5 cabezas por familia), la contribución de las cabras al ingreso familiar es relativamente elevada, especialmente en un sistema que se dedica al cultivo del arroz (aproximadamente 56% del año). Más del 65% de los propietarios de cabras emplean el sistema de pastoreo al piquete; el sistema de corte y acarreo (del pasto) se pone en práctica solamente en la estación húmeda. Las inversiones, concentrados, suplementos minerales y tratamientos médicos son mínimos. Las cabras de aldea son nativas en su mayoría, con pesos promedio de cuerpo adulto de 23 a 22 kg para los machos y hembras respectivamente. El crecimiento promedio se alcanza en 6 meses, durante los cuales los machos ganan 62g de peso por día y las hembras 47. El primer parto ocurre a los 12,4 meses. Un índice promedio de partos para todos los grupos de edades es de 190%, pero la tasa de destete es solamente de 135%. Un índice de mortalidad elevado de 25 a 37% en los cabritos pequeños es causado fundamentalmente por accidentes (tales como mordidas de perros) y enfermedades (tales como la sama bucal o neumonía). Bajo condiciones mejoradas, los pesos a 55%; la tasa de parto es algo más baja (un 147%) y la de destete es mayor (146%). Sin embargo, las condiciones mejoradas afectan poco el porcentaje de los rendimientos de la carcasa de las cabras nativas.

The major species of livestock in Thailand are buffaloes, cattle, swine, chicken, and ducks (OAE 1986); goats and sheep are only important in the southern region (Chantalakhana 1985; Saithanoo 1985). More than 60% of all goats are found in the villages of the Thai-Malaysian border zone where the proportion of Thai Muslim people is high (Suthiwanich 1983; Saithanoo, Kuprasert, Di Donato, et al. 1985). In general, goats are traditionally raised for home consumption or for sale by small-scale farmers as component of mixed-farm agricultural systems (Saithanoo and Norton 1987).

Studies on goat production in Thailand are scarce but, recently, interest in goat research has increased. Most studies have been conducted on research stations and little effort has been made to directly study or improve goat production in villages. Since 1984, the Department of Animal Science, Prince of Songkla University (PSU), in collaboration with the Thai-Australian PSU project has established a long-term study of village goat production in southern Thailand (Jinahyon 1985). Initially, a village survey was conducted to investigate goat production in different farming systems classified as fishing (FS), rice growing (RS), rubber, oil palm, or fruit tree plantation (TS), and the combination of RS and TS (RT). In 1984, village goats (110 does and 16 bucks) were randomly chosen and brought to the University Farm to be used as breeding stock. Since 1985, approximately two-thirds of the does have been inseminated with Anglo-Nubian semen imported from Australia; the remainder have been mated to local bucks. The productivity of local and crossbred goats produced from these matings is being compared under improved management and village conditions.

This paper describes goat meat production systems in Thailand, with particular attention to village goats in the south and discusses the possibility for improved production.

The goat population of Thailand

Goat production in Thailand is primarily for meat (Falvey 1977; Chantalakhana 1985; Saithanoo 1985). Dairy goats are raised in the central region but are estimated to be less than 1% of the total population (Saithanoo 1985). Because of the small scale of production, skin, hair, wool, and by-products from goats are not economically important.

According to the 1978 Agricultural Census Report (Table 1), the total goat population of Thailand was approximately 84,000, 88% of which was found in the south. However, contradictory values have been reported by other sources (e.g.,

Table 1. Number and distribution of goats in different regions of Thailand compared with other important livestock species.

Region	Goats			Ratio of other species to goat			
	Head	Head per holding	Head per 1000 people	Buffalo	Cattle	Swine	Sheep
Central	5639	11.7	<1	91	126	334	2.95
North	3341	4.8	<1	363	296	426	0.18
Northeast	1504	3.2	<1	2420	1128	858	1.14
South	73979	3.2	13	3	10	10	0.17
East coastal zone	5860	3.5	2	22	52	78	0.04
West coastal zone	15330	4.1	16	4	4	6	0.02
Border zone	52789	2.9	26	1	7	1	0.23
Average	84463	3.4	2	66	49	63	0.38

Source: NSO (1980).

Ashzaq and Kitiwan 1976; FAO 1980a, 1983a; DLD 1981; Suthiwanich 1983). For example, an estimate of 222,000 goats in the south made by Suthiwanich (1983) is three times higher than that reported by FAO (1980a, 1983a), DLD (1981), and NSO (1980).

The border zone of the southern region, which covers an area of about 20,000 km², has the largest per capita population. In 1979, 61% of the total population in this zone (1.31 million) were Thai Muslims (NRCT 1981). The low proportions of other livestock species to goat emphasizes the importance of goats in this region.

From 1978 to 1983, Saithanoo, Kuprasert, Di Donato, et al. (1985) estimated that the goat population in the south decreased at an annual rate of approximately 2.4% because of the high mortality of young kids and a decrease in breeding stock caused by the high demand and price of goat meat. Unofficial reports cited by Sarobol (1985) and Cheva-Isarakul (1987) indicated that about 1000 goats/month were brought from the south to supply the Bangkok market and that about 2000 goats/month were illegally imported from Burma during the dry season (September–December). According to FAO (1980b, 1983b, 1986), 270 live goats were intermittently imported into Thailand from 1976 to 1985. They were mainly dairy goats used for milking and breeding purposes. Importation of goat and sheep meat in this period was about 27 t/year with an increase of 12% per year. This implies that the in-country production is not enough to supply local demand.

Village goat production

Socioeconomic aspects

The results of a 1987 village survey conducted in 86 villages of the border zone (S. Saithanoo, J.T.B. Milton, W.A. Pattie, and B.W. Norton, unpublished data) showed that 99% of a total of 121 goat owners interviewed were Thai Muslims. They raise goats as a secondary enterprise in their farming systems (FS, RS, TS, and RT). Only 12 and 21% of them raise goats solely for sale and home consumption, respectively; the majority (67%) raise goats for both purposes.

Traditionally, goat production has been inherited from one generation to another. Most farmers (95%) raise goats because they are easily managed, sell for a good price, and need little input. Although the average number of goats per family in the survey areas is small (five), cash income from goats contributes as much as 56% to total annual farm cash income (Table 2).

About 65% of the goat owners interviewed own less land and fewer goats than the average. In the average six-person family, only two help with the major farm work (e.g., plantation, fishing) and one looks after the goats. About 63% of those who manage the goats are women.

Production systems

Village goats are usually grazed on natural grass and weeds available in the area. Since most goat keepers own little land, more than half the goats graze on land other than their own, either public (47%) or private (7%). Tethering is

Table 2. Village goat production to farming systems in southern Thailand.

Farming system ^b	Land owned (ha/family)	Annual farm cash income per family	Goats per family ^a		Income from goats (% of annual farm cash income)
			Does	Total	
FS (20)	0.25	55914	2.4(1-5)	5.8(1-10)	1.70
RS (33)	0.99	3302	2.8(1-6)	5.5(1-19)	55.53
TS (31)	1.85	37011	2.5(1-7)	5.8(1-28)	3.38
RT (37)	1.97	14425	2.4(1-18)	4.8(1-30)	8.83
Average	1.40	24306	2.5	5.4	5.76

^aValues in parentheses are ranges.

^bThe number of goat owners interviewed are show in parentheses. FS, fish; RS, rice; TS, tree crops; RT, RS plus TS.

^cIn November 1987, 26 Thai baht (THB) = 1 United States dollar (USD).

Table 3. Management system of village goat production used in southern Thailand during the wet and dry seasons (%).

Farming system ^a	Tether	Free to roam	Controlled grazing	Cut and carry
FS (20)	35.0	50.0	5.0	10.0
RS (33)	75.8	9.1	-	15.1
TS (31)	58.1	16.1	-	25.8
RT (37)	78.4	5.4	2.7	13.5
Avg.	65.3	16.5	1.7	16.5
Dry season				
FS (20)	25.0	75.0	-	-
RS (33)	84.8	6.1	9.1	-
TS (31)	74.2	25.8	-	-
RT (37)	91.9	8.1	-	-
Avg.	74.4	23.1	2.5	-

^a The number of goat owners interviewed are shown in parentheses. FS, fish; RS, rice; TS, tree crops; RT, RS plus TS.

widely used in all seasons; a cut and carry system is only practiced in the wet season (Table 3). Controlled grazing and extreme grazing is practiced along roads and uncultivated grazing land such as in fishing villages.

Village goats occasionally get extra feed, mostly in the form of tree leaves, when they return to the owner's house in the evening. A few owners use green grass, rice straw, fruit peels, or cereal as supplements and some (34%) give salt to their goats. Only 21% of the owners provide shelters for the goats.

Production levels

Village goats in Thailand are phenotypically similar to the Katjang breed of Malaysia (Falvey 1977; Saithanoo, Kuprasert, and Suttiyotin 1985). They are small with average mature body weights of 23 and 22 kg for males and females, respectively. Because of the several constraints in the villages, their growth rates up to 6 months of age are low (approximately 62 and 47 g/day in males and females, respectively). Higher growth rates are feasible with improved conditions including access to tree legumes and improved pastures, parasite control, and supplementary feeding. Under these improved conditions, the weights of male and female village goats can increase by as much as 56 and 41%, respectively (Fig. 1).

A comparative study of carcass compositions (W. Pralomkarn, J.T.B. Milton, and W.A. Pattie, unpublished data) shows that the dressing percentage, muscle content, and bone content of the male goats (weight range, 9–22 kg) under improved conditions are slightly higher than those under village condition (45.8 vs 45.0%, 69.6 vs 71.3%, and 16.4 vs 17.9%, respectively) and the difference in their fat contents is high (8.8 vs 4.5%).

Reproductive performance and kid mortality

In the villages, bucks are run together with does year-round. Approximately 78% of the farmers slaughter or sell their bucks before 3 years of age, whereas most farmers (79%) keep does until they are 5 years old. Kidding data of 122 does

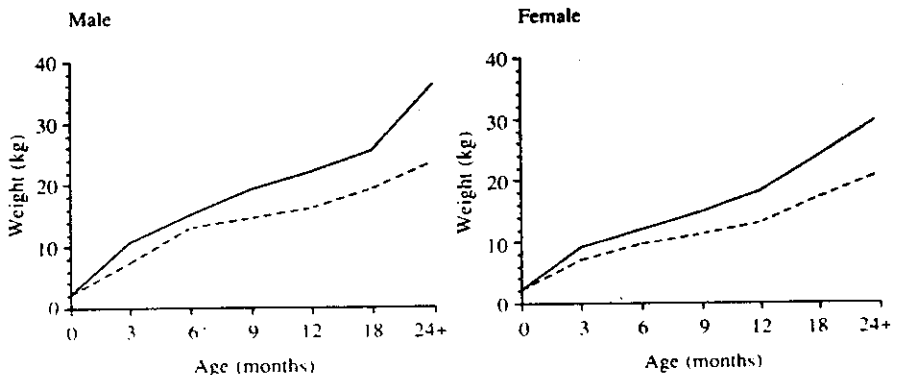


Fig. 1. Comparative live weights of Thai local goats raised under village (dashed line) and improved farm (solid line) conditions.

indicate a peak conception rate (44%) between October and December, which coincides with the period of highest rainfall.

The average age at first kidding is 12.4 months. Because of uncontrolled breeding, about 60% of young females conceive before 7 months of age with some of them (7%) conceiving when they are as young as 3-4 months. Kidding and weaning rates of does less than 1 year old are much lower than those of the older does (Table 4).

The mortality rate among young kids is high (29%) and, of these deaths, most (75%) are caused by accidents such as dog bites or diseases such as scabby mouth or pneumonia. Other causes are poor mothering ability (20%) and abortion (5%). Under improved conditions, the mortality rate in young kids is only 2.3% (Milton et al. 1987).

The kidding rate of village goats is high as does have several opportunities to mate each year. Although the kidding rate under a managed single-mating system at PSU Farm (147%, Milton et al. 1987) appears to be lower than that under the village conditions (190%), the weaning rate is higher (146 vs 135%).

Goat marketing

Unlike other livestock marketing, there is no auction market or selling place for live goats or goat carcasses in Thailand. Traders and consumers have to make direct contact with the goat owners. Goat prices, therefore, vary from place to place and it is difficult to estimate the number of goats sold. The price of goats depends on sex, age, size, appearance, and physical condition (Saithanoo,

Table 4. Reproductive and mortality rates of Thai native goats under village conditions.

Age of doe (years)	Kidding rate (%)	Weaning rate (%)	Preweaning mortality rate (%)
<1	130.8	82.7	36.8
1-2	194.4	131.8	32.2
>2	207.9	155.7	25.1
Average	169.6	134.5	29.1

Table 5. Prices (THB/head)^a of live goats in southern Thailand in 1984 and 1987.

Age (years)	Sex	1984 ^b	1987 ^c	Price change (%)
<1	Male	396	544	37.4
	Female	367	433	18.1
1-2	Male	533	710	33.2
	Female	393	485	23.4
>2	Male	550	740	34.6
	Female	398	486	22.1

^aIn November 1987, 26 Thai baht (THB) = 1 United States dollar (USD).

^bSource: Saithanoo, Suttiyotin et al. (1985).

^cSource: S. Saithanoo, W.A. Pattie, and B.W. Norton (1987), unpublished data.

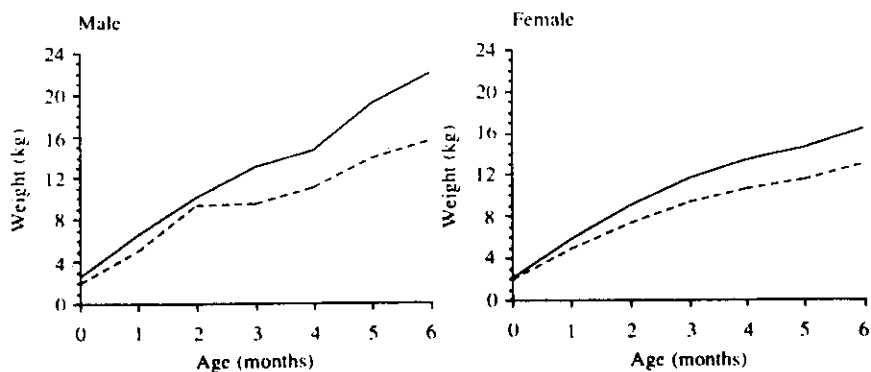


Fig. 2. Comparative live weights of local (dashed line) and crossbred (local \times Anglo-Nubian; solid line) goats under an improved management condition.

Suttiyotin, et al. 1985). Live goats are usually sold on a price-per-head basis. Goat prices have increased by 18–37% or approximately 9% per year from 1984 to 1987 (Table 5). Saithanoo, Suttiyotin, et al. (1985) also reported that goat meat was 90, 26, 30, and 43% more expensive than that of buffaloes, cattle, swine, and chicken, respectively.

The major consumers of goats in Thailand are the Muslims. Apart from seasonal demands for religious rites, goat meat is gaining general acceptance in Muslim and Chinese restaurants.

Future development of goat production

Because most goat meat production is in the hands of the small-scale farmer, any development program should aim to improve productivity at the village level. Goats in the villages are generally small but they may be well adapted to the environment. Goat production levels are markedly increased under improved conditions (Fig. 1). Even with available labour and feed resources, there is a high potential for goat development in the villages in terms of both quantity and quality of meat. A comparative study of local and crossbred goats under improved conditions shows that F₁ crossbred goats are much bigger than local goats despite the low milk supply from the local does (Fig. 2; J.T.B. Milton and S. Sripongpun, unpublished data). The real value of the crossbred animals, however, will not be determined until a later stage of the project when the crossbred goats will be tested on farms.

Considering the increased demand for goat meat, goat development in Thailand needs urgent attention. To improve the productivity of goats in the villages, a knowledge of breeding and management systems is important. In addition, particular attention to health care and nutrition during the wet season is needed to overcome high mortality rates. Finally, costs and returns of production should also be considered before extending any development programs to a large number of the farmers.

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References

- Ashzaq, M., Kitiwan, C. 1977. Planning livestock industry in northern Thailand falling within the eight northernmost provinces covered by the Northern Region Agricultural Development Centre. Ministry of Agriculture and Cooperatives, Chiang Mai, Thailand.
- Chantalakhana, C. 1985. Goat production and development in Thailand. In *Proceedings of the International Seminar on Recent Improvements in Goat Production in Asia*. Philippine Council for Agriculture and Resources Research and Development, Los Baños, Laguna, Philippines. pp. 67-79.
- Cheva-Isarakul, B. 1987. Integration of small ruminants and mixed deciduous forest in northern Thailand. In *Small ruminant production systems in South and Southeast Asia: Proceedings of a workshop held in Bogor, Indonesia, 6-10 October 1986*.
- International Development Research Centre, Ottawa, Ont., Canada. IDRC-256e, 223-234.
- DLD (Department of Livestock Development). 1981. Annual statistical report. Ministry of Agriculture and Cooperatives, Bangkok, Thailand. pp. 303-304.
- Falvey, L. 1977. Goat production in the northern Thailand highlands. *Thai Journal of Agricultural Sciences*, 10, 121-130.
- FAO (Food and Agricultural Organization of the United Nations). 1980a. 1979 production yearbook. Volume 33. FAO, Rome, Italy. 309 pp.
- _____. 1980b. 1979 trade yearbook. Volume 33. FAO, Rome, Italy. 356pp.
- _____. 1983a. 1982 production yearbook. Volume 36. FAO, Rome, Italy. 320 pp.
- _____. 1983b. 1982 trade yearbook. Volume 36. FAO, Rome, Italy. 366 pp.
- _____. 1986. 1985 trade yearbook. Volume 39. FAO, Rome, Italy. 372 pp.
- Jinahyon, S. 1985. Goat development in southern Thailand. In *Proceedings of a Workshop on Goat Production and Research in the Tropics*. Australian Centre for International Agricultural Research, Canberra, Australia. pp. 24-26.
- Milton, J.T.B., Kochapakdee, S., Saithanoo, S., Pralomkarn, W., Rakswong, W., Suttiyotin, P. 1987. Feature of goat research facility at Prince of Songkla University. In *Proceedings of the 25th Annual Conference on Animal Science*. Kasetsart University, Bangkok, Thailand. pp. 14-21.
- NRCT (National Research Council of Thailand). 1981. A study of a five-province border zone of southern Thailand for future development. Ministry of Science and Technology, Bangkok, Thailand.
- NSO (National Statistical Office). 1980. 1978 agricultural census report. Office of the Prime Minister, Bangkok, Thailand.
- OAE (Office of Agricultural Economics). 1986. Agricultural statistics of Thailand, crop year 1985/86. Ministry of Agriculture and Cooperatives, Bangkok, Thailand.
- Saithanoo, S. 1985. Goat production in Thailand. *Songklanakarin Journal of Science and Technology*, 7, 335-342.

- Saithanoo, S., Kuprasert, S., Di Donato, R., Suttiyotin, P., Choldumrongkui, S., Pralomkarn, W. 1985. Village goat production in southern Thailand. 1. Number and distribution of goats. *Songklanakarin Journal of Science and Technology*, 7, 267-270.
- Saithanoo, S., Kuprasert, S., Suttiyotin, P. 1985. Distribution and characteristics of Thai local goats. In *Proceedings of the 23rd Annual Conference on Animal Science*, Kasetsart University, Bangkok, Thailand.
- Saithanoo, S., Norton, B.W. 1987. Livestock production systems in southern Thailand: development of methodology for investigating the limitations to goat production in rubber, rice and fishing village farming systems. Paper presented at the 4th National Conference on Farming Systems in Thailand, Hat Yai, Thailand, 7-10 April 1987. Prince of Songkla University, Hat Yai, Thailand.
- Saithanoo, S., Suttiyotin, P., Kochapakdee, S., Rakswong, W. 1985. Goat marketing in the border region of southern Thailand. *Animal Husbandry Magazine*, 1, 75-79.
- Sarobol, S. 1985. Goat development in southern Thailand. In *Proceedings of a Workshop on Goat Production and Research in the Tropics*. Australian Centre for International Agricultural Research, Canberra, Australia. pp. 22-23.
- Suthiwanich, C. 1983. Goat production in southern Thailand. In *Proceedings of a Seminar on Goat Development Program in the Southern Region of Thailand*. Faculty of Natural Resources, Prince of Songkla University, Hat Yai, Thailand. pp. 6-37.