

การศึกษาความเป็นไปได้ของการเลี้ยงแพะระดับฟาร์มในประเทศไทย

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บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อประเมินความเป็นไปได้ทางเศรษฐกิจของการเลี้ยงแพะระดับฟาร์มในประเทศไทย ภายใต้เงื่อนไขการจัดการที่ดี ทำการวิเคราะห์ทั้งการผลิตโดยเลี้ยงพ่อและแม่พันธุ์ และการซื้อลูกแพะหย่านมเพื่อเลี้ยงขุน โดยมีอัตราผลตอบแทนภายใน (internal rate of return) มูลค่าปัจจุบันสุทธิ (net present value) อัตราส่วนระหว่างผลตอบแทนต่อต้นทุน (benefit cost ratio) ระยะเวลาคืนทุน (payback period) และจุดคุ้มทุน (break-even point) เป็นดัชนีสำหรับการตัดสินใจทางเศรษฐศาสตร์ จากการศึกษาพบว่า การซื้อลูกแพะหย่านมเพื่อเลี้ยงขุนจะให้ผลตอบแทนทางเศรษฐกิจสูงกว่าการเลี้ยงพ่อและแม่พันธุ์ อย่างไรก็ตามการเลี้ยงพ่อและแม่พันธุ์ผลิตลูกเพื่อขุนขายทั้งหมด โดยสร้างโรงเรือนชั่วคราวและปล่อยให้แพะแทะเล็มกับกรรมที่สร้างโรงเรือนชั่วคราวแต่ตัดหญ้าเลี้ยง ยังให้ผลตอบแทนทางเศรษฐกิจที่น่าสนใจต่อการลงทุน มีอัตราผลตอบแทนภายในเท่ากับ 18.90% และ 27.33% มูลค่าปัจจุบันสุทธิเท่ากับ 162,033 และ 272,033 บาท อัตราส่วนระหว่างผลตอบแทนต่อต้นทุนเท่ากับ 1.14 และ 1.27 ระยะเวลาคืนทุนเท่ากับ 7 และ 5 ปี และจุดคุ้มทุนเท่ากับ 69.38 และ 65.57 บาทต่อน้ำหนักแพะเพิ่ม 1 กิโลกรัม ตามลำดับ แนะนำให้ภาคราชการเพิ่มการผลิตพ่อและแม่พันธุ์เพื่อนำลูกแพะหย่านมจำหน่ายให้เกษตรกร

คำสำคัญ : แพะ, ฟาร์มแพะ, แพะไทย, ความเป็นไปได้

A Feasibility Study of Raising Goats as Farm Animals in Thailand

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In this study, an attempt was made to evaluate the feasibility of raising goats under improved farm management conditions in Thailand. Economic analysis for 2 major types of goat production programs (breeding and non-breeding stock) were made. Internal rate of return (IRR), net present value (NPV), benefit cost ratio (B/C), payback period and break-even point were considered. It was found that raising goats as non-breeding stock was more productive than raising goats as breeding stock. However, breeding stock in which all weaners and all finishing were raised on farm in temporary housing with grazing and with cut and carry methods also yielded good returns, with IRR = 18.90 and 27.33%; NPV = 162,033 and 272,033 baht; B/C ratio = 1.14 and 1.27; payback period = 7 and 5 years; and break-even point = 69.38 and 65.57 baht/kg live-weight, respectively. It was suggested that the government sector should increase the breeding stock farms to provide weaners for the small-land holders.

Key words : goat, goat farm, Thai goat, feasibility

In many countries, goats are found in the semi arid or arid zone, but in Thailand, most of the goat population is in the southern humid tropical zone. They are exclusively raised for meat by Thai Muslims in mixed small-scale farming (Somkiat Saithanoo, *et al.* 1991). FAO (1996) has reported that the goat population in Thailand in 1994 was 141,000 head, but it was only 78,000 head in 1995 and 1996, respectively. This may be due to some farmers discontinuing goat production or selling a part of their stock. As a consequence, goat prices in southern Thailand have drastically increased to 100 baht/kg live-weight. At present, goat meat realizes higher prices than most other types of meat. It is suggested that the goat population, especially in the

south, should be increased as soon as possible. Otherwise, it may be necessary to import goats to Thailand in the future.

In Thailand, there is limited information on the potential of goat raising, especially under farm conditions. The following study was undertaken to evaluate the feasibility of goat raising under improved management conditions.

Materials and Methods

1. Management and facilities for goat farms

Data on goat production were collected from publications on goat study and Winai Pralomkarn (personal communication). The study was conducted by simulation model.

This study includes 2 main types of production systems : breeding stock and non-breeding stock. Breeding stock is divided into 3 categories : 1) 50% of kids sold at weaning and 50% raised on farms, 2) all kids sold at weaning and 3) all kids raised on farm. In both systems, goats will be kept in permanent or temporary housing and they will be either fed by cut and carry or grazing systems.

Goat housing, fencing, land preparation and pasture establishment should be done 6 months before the purchase of the standard flock size of 50 does and 2 bucks. The weight of Thai native goats of less than one year of age should range between 10-15 kg. All goats should be drenched and vaccinated against foot and mouth disease within one week after introduction to the farm. The does should be rotationally grazed in a paddock for approximately 30-45 days. All goats should be regularly observed and handled.

When the does reach about 18-20 kg (after approx. 4 months), a buck should be put in the paddock for a period of 30-45 days for mating. Approximately 90% of the does are expected to conceive and be separated from the buck. The does will give birth in 5 months. The kids will be weaned at about 12 weeks of age with approximately 8 kg live-weight. The does should be fed with a good quality feed and should be mated within 2-3 months after weaning. The kids should be fed with a good quality roughage and a concentrate diet equal to 2% body weight. A suggested concentrate is composed of 35% palm kernel cake or rubber seed meal, 57% corn or broken rice, 5% soybean meal, 2% crude sea salt, 0.5% dicalcium phosphate, 0.5% oyster shell and vitamin A and D 5,000 and 100 IU/kg, respectively. The crude protein content is about 15%.

2. Data for analyses

2.1 Building and construction

The two kinds of housing are permanent and temporary housing. Permanent housing should be strong and long lasting (15 years). The building is constructed from wood and the roof is tilted. The pen has a slatted-floor raised 2.2 metres above ground level. In case of breeding stock and

all finishing, the weaners should be kept on slatted-wood under the slatted-floor. Temporary housing is constructed from wood and the roofing material is of tree leaves, which is cheap. Slatted-wood is put on the ground. The area in the house is 1.2 square metres/goat. The cost for permanent housing and temporary housing is approximately 400,000 and 120,000 baht for 15 years and 5 years, respectively. The project will be finished in 15 years; therefore, the total cost for temporary housing is approximately 360,000 baht.

The cost of a ground water well at the beginning of the project is 6,000 baht. The fence is approximately 1,000 metres long and 1.2 metres high.

2.2 Breeding stock

The cost of weaned goats with about 8 kg live-weight should be 100 baht/kg plus 250 baht each for opportunity cost. Goats sold as finishing and breeding stock should be about 20 and 35 kg live-weight respectively, costing 100 baht/kg.

2.3 Agricultural materials

Agricultural tools should be replaced at 7.5 years. The cost of electricity is about 1,500 baht/year. Concentrate diets for breeding stock and finishing stock are approximately 82 and 14 kg/head/year. Drugs for breeding stock and weaners should be 40 and 20 baht/head/year, respectively. Fertilizer should be about 20 kg/rai/year (6.25 rai = 1 ha).

2.4 Labor cost, land rental, maintenance and miscellaneous

Temporary labour should be 135 baht/day. Cost of preparing the paddock at the beginning and at year 7 should be 1,000 baht/rai. The maintenance of the properties was estimated by linear computation starting at 0 in the first year and 6% of the cost of housing and electricity systems at the end of the period. Miscellaneous cost should be 1,200 baht/year.

3. Procedure for estimating costing

The data used to estimate the cost of production and the returns of goat farming are given below :

Variable costs - include feed costs, labor costs, veterinary costs, miscellaneous costs and interest on operating capital.

Fixed costs - include depreciation of goat-sheds, depreciation of does, depreciation of equipment and interest on fixed capital.

Return - includes sale of goats.

4. Analysis of data

Economic analyses were made in terms of internal rate of return (IRR), net present value (NPV), benefit-cost ratio (B/C), break-even point and payback period.

$$\text{IRR}(\%) : \sum_{t=1}^n \frac{B_t - C_t}{(1+r)^t} = 0$$

$$\text{NPV} = \sum_{t=1}^n \frac{B_t}{(1+i)^t} - \sum_{t=1}^n \frac{C_t}{(1+i)^t}$$

$$\frac{B}{C} = \frac{\sum_{t=1}^n B_t(1+i)^t}{\sum_{t=1}^n C_t(1+i)^t}$$

Payback Period = Number of Years to Recover Investment

$$\text{Break-Even Point} : Q^* = \frac{\text{TFC}}{(P - \text{AVC})}$$

where B_t is expected cash inflows in the t^{th} year,
 C_t is expected cash outflows in the t^{th} year,
 t is time period (year),
 r is internal rate of return (%),
 i is interest rate,
 Q^* is output quantity at break-even point,
 TFC is total fixed cost,
 P is output price,
 AVC is average variable cost.

Results and Discussion

1. Economic analysis

Table 1 shows an economic analysis for 16 types of goat production systems. All finishing kids of the breeding stock involved a lower production cost than those of 50% of kids sold at weaning and 50% finishing or all kids sold at weaning. Fifty percent of kids sold at weaning and 50% finishing or all kids sold at weaning had B/C ratios of less than

1. Five economic analysis pointed out that breeding farms could not be recommended to interested farmers for all cases. However, all finishing, except permanent house/grazing, had B/C ratios of more than 1. IRR (%) ranged from 10.57 to 27.33 with a payback period of 5-9 years. The break-even point ranged from 65.57 to 75.13 baht/kg live-weight. All finishing, temporary house/cut and carry was the best with IRR (%), NPV (baht), B/C, payback period (years) break-even point (baht/kg live-weight) 27.33, 272,033, 1.27, 5 and 65.57, respectively.

Rearing goats as non-breeding stock was better than rearing goats as breeding stock. Break-even point of permanent house/grazing, permanent house/cut and carry, temporary house/grazing and temporary house/cut and carry was 78.96, 77.54, 76.56 and 74.99 baht/kg, respectively. IRR (%) was 23.84, 29.68, 45.92 and 74.87, respectively. NPV was 379,667, 479,667, 591,563 and 701,563 baht, respectively. B/C ratio was 1.13, 1.17, 1.21 and 1.26, respectively. Payback period was 6, 5, 3 and 3 years, respectively.

In general, temporary housing was more cost efficient than permanent housing as fencing is not required. It is observed that Thai farmers do not house the small ruminants. It is necessary to convince the farmers to provide a proper shelter and housing facilities. In fact, in southern Thailand there is no lack of availability of adequate grazing areas compared with other regions due to a small number of ruminants and a high rainfall; therefore, there is green roughage available all year round.

The small size of goat flock is significant in terms of economic, managerial and biological aspects (Devendra and Burns, 1983). Low individual values mean a small initial investment and corresponding less risk of loss by individual death. Goats can conveniently be cared for by women and children, occupy little housing space and supply both meat and milk in quantities suitable for immediate family consumption. Finally, a goat or two can be kept when nutrition is insufficient for even one cow. Publications on the economics of goat enterprises in various tropical and subtropical countries are available (Devendra, 1981; 1982). Raut and Nadkarni

Table 1 Economic analysis for various types of goat production systems

Type of production system	Break-even point (baht/kg)	Interest rate							
		12%				14%			
		IRR(%)	NPV	B/C	Payback period	IRR(%)	NPV	B/C	Payback period
Breeding stock									
50% sale at weaning and 50% finishing									
Permanent house/grazing	*	-2.29	-433,624	0.67	**	-2.29	-456,709	0.63	**
Permanent house/cut and carry	*	-0.34	-323,624	0.73	**	-0.34	-346,709	0.69	**
Temporary house/grazing	*	0.99	-219,591	0.80	**	-2.44	-260,352	0.77	**
Temporary house/cut and carry	*	4.75	-109,591	0.89	15	4.75	-126,926	0.86	15
Sale all at weaning									
Permanent house/grazing	*	-4.10	-486,789	0.62	**	-4.10	-505,751	0.58	**
Permanent house/cut and carry	*	-2.38	-376,789	0.68	**	-2.38	-395,751	0.64	**
Temporary house/grazing	*	-1.46	-272,757	0.74	**	-1.46	-285,968	0.71	**
Temporary house/cut and carry	*	1.56	-162,757	0.83	15	1.56	-175,968	0.81	15
All finishing									
Permanent house/grazing	75.13	10.57	-51,999	0.96	9	10.57	-114,853	0.91	9
Permanent house/cut and carry	71.32	13.83	58,001	1.05	8	13.83	-4,853	1.00	8
Temporary house/grazing	69.38	18.90	162,033	1.14	7	18.90	104,930	1.10	7
Temporary house/cut and carry	65.57	27.33	272,033	1.27	5	27.33	214,930	1.23	5
Non-breeding stock									
Permanent house/grazing	78.96	23.84	379,667	1.13	6	23.84	289,037	1.10	6
Permanent house/cut and carry	77.54	29.68	479,667	1.17	5	29.68	389,034	1.15	5
Temporary house/grazing	76.56	45.92	591,563	1.21	3	45.92	506,260	1.20	3
Temporary house/cut and carry	74.99	74.87	701,563	1.26	3	74.89	616,260	1.25	3

* Break-even point could not be estimated due to various prices of materials

** Could not return through the project life

(1974) reported that in India, under migratory and stationary conditions, the incomes from goats for both systems were higher than those from sheep.

2. Production cost of goat farms

The production costs for goat farming consisted of variable and fixed costs. The cost of various inputs such as feed (green grasses and concentrates), veterinary care, miscellaneous and interest on operating capital were considered as variable costs. Fixed costs included the depreciation costs of goats, housing, equipment and interest on fixed capital. Table 2 shows production costs (%) for 16 types of goat production systems which could be calculated in baht. The major cost of goat production under farm conditions was purchase cost (98.96-

99.69 %). In breeding stock, major costs of production were permanent workers, housing and electrical systems, and breeding stock. However, the major cost of production of non-breeding stock was incurred in the finishing stock. Temporary housing with cut and carry methods could reduce costs of production compared with those of permanent housing with grazing methods. Labor cost (%) could be reduced for larger farms; that is, one permanent worker may rear more than 50 does. The cost of housing could be reduced by using local materials.

In a comparative study of management systems done in Malaysia, Deichert and Peters (1985) reported that net profit/does for raising does was 52.18, 20.02 and 40.07 ringgit (1 ringgit is about

Table 2 Production costs for various types of goat production systems

Item	Production system*															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Purchase cost	99.13	99.08	99.06	99.00	99.10	99.05	99.02	98.96	99.17	99.13	99.10	99.05	99.69	99.67	99.66	99.66
Building and construction																
Housing and electricity system	19.27	20.35	18.85	20.22	19.98	21.14	19.61	20.86	18.43	19.41	17.96	19.00	7.24	7.37	6.72	6.86
Ground water well	0.29	0.31	0.31	0.33	0.30	0.32	0.33	0.35	0.28	0.29	0.30	0.32	0.11	0.11	0.11	0.11
Fencing	5.30	0.00	5.76	0.00	5.49	0.00	5.99	0.00	5.07	0.00	5.49	0.00	1.81	0.00	0.00	0.00
Non-expendable material																
Breeding stock	3.76	3.97	4.08	4.33	3.90	4.12	4.25	4.52	3.59	3.79	3.89	4.12	0.00	0.00	0.00	0.00
Agricultural materials																
Agricultural tools	0.48	0.51	0.52	0.56	0.50	0.53	0.54	0.58	0.46	0.49	0.50	0.53	0.18	0.18	0.19	0.19
Finishing stock													66.49	67.71	68.57	70.01
Concentrate diet																
Breeding stock	17.88	18.89	19.44	20.63	18.54	19.62	20.22	21.51	17.10	18.01	18.52	19.59	0.00	0.00	0.00	0.00
Finishing stock	2.88	3.04	3.14	3.33	0.00	0.00	0.00	0.00	1.00	6.57	6.75	7.15	5.32	5.42	5.49	5.60
Electricity	1.05	1.11	1.14	1.21	1.09	1.15	1.18	1.26	1.00	1.06	1.08	1.15	0.39	0.40	0.41	0.41
Drugs	2.17	2.29	2.36	2.50	1.56	1.65	1.70	1.81	2.98	3.14	3.23	3.41	0.63	0.64	0.65	0.67
Fertilizer	1.01	1.07	1.10	1.17	1.05	1.11	1.14	1.22	0.97	1.02	1.05	1.11	0.38	0.39	0.39	0.40
Labour cost																
Permanent workers	33.95	33.85	36.90	39.16	35.20	37.25	38.39	40.83	32.46	34.20	35.15	37.19	12.75	12.98	13.15	13.42
Temporary workers	0.96	1.02	1.05	1.11	1.00	1.06	1.09	1.16	0.92	0.97	1.00	1.06	0.36	0.37	0.37	0.38
Land rental	1.45	1.53	1.57	1.67	1.50	1.59	1.63	1.74	1.38	1.46	1.50	1.58	0.54	0.55	0.56	0.57
Maintenance	8.67	9.16	2.83	3.00	8.99	9.51	2.94	3.13	8.29	8.73	2.69	2.85	3.47	3.54	1.01	1.03
Operating cost	0.87	0.92	0.94	1.00	0.90	0.95	0.98	1.04	0.83	0.87	0.90	0.95	0.33	0.33	0.34	0.34
Miscellaneous	0.87	0.92	0.94	1.00	0.90	0.95	0.98	1.01	0.83	0.87	0.90	0.95	0.33	0.33	0.34	0.34
Total cost (baht)	2,075,560	1,965,560	1,909,560	1,799,560	2,001,850	1,891,850	1,835,850	1,725,850	2,170,738	2,060,738	2,004,738	1,894,738	5,527,450	5,427,450	5,359,450	5,249,450

*1 to 16 is in table 1

10.0 baht) for cut and carry, controlled grazing and free grazing, respectively.

In practice, when the price of goats is low, concentrate diets may be reduced and farmers may feed goats by allowing them to browse and/or by bringing roughage from outside the farm. However, this practice may increase the risk of contracting diseases and/or parasite outbreaks, and the growth rate of goats on a non-supplemented diet is low compared with that of those supplemented with concentrate diets.

As mentioned, the population of goats in Thailand is small and mainly raised by small farmers. Consequently, the price of live goats is markedly high compared with other ruminants such as cattle. The cost of goat production under farm conditions is very high where as the price of live goats could not be guaranteed. It is suggested that the government sector, especially, the Department of Livestock Development, should provide more breeding stock and weaner kids to farmers.

In addition, meat goats and dairy goats are also important for the farmers. They provide not only milk but kids. Farmers can sell kids after weaning or raise them to about 20-25 kg body weight. Winai Pralomkarn (1997) reported that farmers who raise 3-5 does have about 5,000-7,000 baht/family/year extra income.

3. Returns to goat farms

Returns to goat farms come from the sale of goats. In Thailand, the most common reason for raising goats and sheep is primary for meat. Milk is a secondary product and mainly used for home consumption (Somkiat Saithanoo, *et al.* 1991). In fact, farmers could sell their goats when the price is high. However, a proper marketing system is needed to reduce the interference of the middlemen, thereby preventing exploitation and helping the farmers to get a maximum share of the consumer price. At present, the goat price in Thailand is determined by the trader instead of the farmers. It is proposed that the socio-economic scheme should be studied. Since the small ruminants are mostly raised by low-income farmers, there is need to organise them into groups so as to practice group farming. Wherever there is

scope, cooperatives can also form.

Conclusions

The information presented in this paper provides data on the feasibility of raising goats under improved farm management conditions. Non-breeding stock, temporary housing with the cut and carry system were better than breeding stock, permanent housing with the grazing system, respectively. It is suggested that breeding stock programs should not be recommended for farmers in southern Thailand. However, they should invest on non-breeding stock programs with temporary housing, either with cut and carry or grazing system, due to a short payback period.

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