Feed Resources For Smallholder Livestock Production In Southeast Asia

Proceedings of the Fifth Meeting of Forage Regional Working Group
on Grazing and Feed Resources of Southeast Asia

Vientiane, Lao P.D.R.
16-20 January 1996

Sponsored by
The Food and Agriculture Organization of The United Nations

Edited by
R.A.Halim and C.P. Chen

CONTENTS

CROP-LIVESTOCK INTEGRATION IN SOUTHERN THAILAND: PROSPECTS AND CONSTRAINTS

Pravit Sophanodora[1]

INTRODUCTION

Agriculture in Thailand has become concentrated in monocultural production systems during the past three decades, as one means of maximizing food production. Increases in the production of some crops have in fact mainly been due to expansion of the total area of cultivated land. This latter practice has led to the use of marginal or unsuitable lands for crop production, and the consequent unsustainability of the systems, as can be seen from the number of farmers in Thailand currently facing crop failure in varying degrees, or unprofitable operations. In addition, signs of land degradation, such as low crop yields, soil erosion and even landslides, are clearly evident in some areas. During the same period, there has been strong growth in the industrial and urban sectors, bringing about other socio-economic problems, such as rural migration and a shortage of farm labour.

The Royal Thai Government recently proposed a plan for the restructuring of agricultural production systems, involving reduction of the total area dedicated to the production of specified crops, diversification of cropping and the integration of crop-livestock production system.

In southern Thailand, there are major crop-livestock integration projects in progress (Table 1). There are a) renovation of the typhoon Gay disaster area for beef cattle production, b) development of beef production in 5 provinces in the lower south, and c) introduction of cattle to marginal rice and coffee production areas.

This paper will look at the constraints and prospects relating to these development plans, with a particular emphasis on feed resources.

Table 1 Crop-livestock projects actively planned or being implemented in southern Thailand.

Project	Site	Projected No. of cattle	No. of households	Duration
a)	Chumporn and Prachub Kirikan provinces	9 000	1 000	1991-1995
b)	Satul, Songkhla, Yala, Pattani and Narathiwat provinces	6 375	3 125	1994-1998
c)	Marginal rice and coffee production area	18 500	-	1994-1996

Source : Department of Livestock Development (DLD), 1994

[1]Dept. of Plant Science, Faculty of Natural Resources (FNR), Prince of Songkla University, Hat Yai 90100 THAILAND

CURRENT SITUATION

Project of the renovation of the typhoon Gay disaster areas for beef cattle

In late 1989 two provinces in the upper south (Chumporn and Prachub Kirikan) were struck by typhoon Gay and suffered severe damage, including the complete destruction of a production area of about 250 000 ha of rubber, coconut and fruit crops. The renovation project was implemented during the period 1991-1995 with the objective of the distribution of 9 000 beef cattle to 1 800 farmer households. The first group of about 1 000 pregnant Australian Brahman were introduced in late 1992 for distribution to c. 200 farm households in the project areas. However, due to late and insufficient preparation of forage resources, the imported cattle suffered weight loss and abortions, less than half being accepted by farmers, and the remaining creatures being relocated to central Thailand instead of promoted in the south as was planned. What we have learned from this is the fundamental importance of the preparation of sufficient and appropriate pastures to hold and sustain the imported cattle while awaiting distribution to farmers.

Beef cattle promotion in the lower south

Selected individual farmers will be given c. 2 pregnant cattle to develop beef production in this region. An area of c.2 500 ha is also planned for the establishment of the communal grazing area, to be sown with ruzi *(Brachiaria ruziziensis)*, Hamil guinea (*Panicum maximum* cv. Hamil), Purple guinea (*P. maximum* TD58) and Verano stylo (*Stylosanthes hamata* cv Verano); individual backyard pasture establishment is also being encouraged. Selection of farmers, and livestock and feed resource management training, is currently being implemented. This project has not yet been concluded, but experience gained from a previous project is being carefully used to prevent failure of the project. It is to be noted that socio-economic and traditional farm practices would tend to restrict the progress of this project. These areas are predominantly inhabited by the Muslim community and most of them earn their living from fisheries and rubber tapping.

Agricultural systems restructuring project

This is national plan aiming to diversify from production of four unsustainable crops (rice, cassava, coffee and pepper) to other production systems. Several packages of alternative production systems have been developed and farmers are encouraged to participate and to make independent choices. Soft loans from the Bank of Agriculture and Agricultural Cooperation (BAAC) have been provided to assist with diversification to recommended alternative systems. One of the alternatives is the crop-livestock integration system. In southern Thailand, it is expected that c 5 900 ha of coffee-producing land will be re-developed to support c. 18 500 cattle. No data is available on a plan to integrate rice and cattle production in the area, but it is expected that some marginal rice-producing areas in Patthalung and Nakorn Si Thammarat Provinces will be converted under this project.

Recently, under the IMT-GT project (Indonesia, Malaysia, Thailand Growth Triangle), a private-sector agreement for cooperation in the supply of meat for export to Malaysian and Indonesian markets was signed. This is another project which will enhance crop-livestock integration in southern Thailand.

There are also dairy development projects, a vaccination and animal insemination service project, forage promotion and livestock marketing projects being planned to complement the major beef cattle projects. Those projects are mainly initiated by either local or central governments. Extension and promotion are strongly handled by the local government and the BAAC. Some projects ignored the importance of farmer's participation.

PROBLEM AND CONSTRAINTS

The constraints of soil fertility, availability of suitable species and agricultural system adopted must be considered in the establishment of pasture for animal production in southern Thailand.

Soil fertility

As summarized in Table 2, most soils in Southern Thailand are very poor (Nilnond et al. 1986, Suthipradit et al. 1992, Malakarn 1994, Sukthangpee 1995). These papers indicated that the major limiting nutrient are P, N, and K, and several micronutrients (S, Mg, Cu, Zn etc.) will become limiting factors if major nutrients are added without them.

Table 2. Major nutrient limitations in southern Thai soils

Soils series	Major Limitation	Test crop	Reference
14 soil series derived from different parent materials	P, N, K, S, Ca, Cu, Zn	Corn	Nilnond et al., 1986
Ban Ton	N, P	Ruzi grass	Egara et al., 1989
Kok Kian	P, N, Ca	Peanut	Suthipradit et al., 1992
Vi Sai	P, K, Mg, Cu, Mo	Verano stylo, Centro, America Jointvetch	Suthipradit et al., 1992
Ban Ton & Ba Jo	P,N	Verano stylo, Seca stylo	Malakarn, 1994
Vi Sai	P, N, S	Paragrass	Sukthangpee, 1995

In addition, the above-mentioned studies also reported that an application of basal fertilizer was essential for best establishment of the sown forage species. The major fertilizer recommendations by the Department of Livestock Development are for application of lime at a rate of 100 kg/ha and complete fertilizer, 12-24-12 (N-P-K), at rate 64 kg/ha as a basal fertilizer and top dressing with a complete fertilizer at the same rate after each cut. However it has also been reported, in a Vi Sai soil series at Klong Hoi Khong Research Station, PSU Hat-Yai, (Sukthangpee, 1995) that a basal application of 200 kg N and P/ha was satisfactory for the establishment of para grass (*Brachiaria mutica*). This was higher than the recommendation by DLD.

In an experiment examining the establishment of forage legumes (*Stylosanthes hamata* cv Verano, and *S. scabra* cv Seca) into communal native grass swards, Malakarn (1994) found that basal fertilizer at rate of 8-8-4 kg N-P-K/ha significantly ($P<0.05$) increased total dry matter of the swards. The response was more significant for those swards oversown with legumes than the pure native grass swards.

The above-mentioned reports indicate the importance of basal fertilizer for the satisfactory establishment of pasture; however, in practice this importance is always overlooked, because of the relatively high cost of fertilizer and additionally because the recommended fertilizer grade is not commercially available in local markets. For these reasons, many beef cattle projects have failed to establish good sward from the beginning and an insufficient feed supply has resulted.

Adapted species and availability of planting materials

Supplies of seeds of Ruzi (*B. ruziziensis*), Hamil guinea (*P. maximum* cv Hamil) and Plicatulum (*Paspalum plicatulum*), Hamata (*S. hamata* cv Verano) and Centro (*C. pubescens*) are commonly

available through the local DLD extension officer. However, it is our experience that Ruzi is not well-suited to the alluvial soils found in southern Thailand, where flooding can easily occur after successive rainy days. Para or Napier and Plicatulum grasses are better adapted to such alluvial soils (Sophanodora 1995), but there are few planting material supplies available to farmers, with the exception of Plicatulum seed. Unfortunately the palatability and nutritive value of Plicatulum grass are quite poor, especially when the grass becomes mature. In addition, while guinea and para grasses are strongly responsive to fertilizer, they require high fertilizer input for good establishment and yields. Again, chemical fertilizer is always omitted by small farmers, hence the growth and yields of planted pastures are quite poor, and forage is low in nutritive value (Sukthangpee 1995). Low seed quality is sometime found in locally-produced seed stock because of unfavourable climatic conditions during seed ripening and processing. Some seed lots, given free to farmers, have had a zero germination rate, leading to delays in pasture establishment and even project failure, due to a lack of pasture for the animals.

In one grazing experiment, Wanwisa (unpublished data) found an average daily gain of 0.53±0.18 kg/head/day in 75% Holstein-Friesian weaners during a continuous 4 months of grazing a mixed pasture (*Panicum maximum* cv. Hamil, *Paspalum plicatulum*, *Brachiaria mutica* in mixture with *Centrosema pubescens*, and *Stylosanthes hamata* cv Verano) which had received a basal fertilizer (20-20-20 kg N, P and K/ha), compared to only 0.12±0.05 kg/head/day in the treatment without fertilizer. Wanwisa reported significant differences in total dry matter yield between the two treatments. There also were huge differences in botanical composition of the swards, Plicatulum grass becoming a major component (> 60-78%) in the treatment without fertilizer, while Hamil and para grasses were major components (c. 31-53 & 12-19%, respectively) of the sward receiving fertilizer (Figure 1).

Recently, Humidicola (*Brachiaria humidicola*) known in Thailand as 'creeping signal' has been recommended as an adapted species well-suited to the environments of Southern Thailand. This species is well-adapted to acid and infertile soils and it has good shade tolerance. Furthermore, it is more nutritious than Plicatulum (Table 3). Unfortunately seed production of this species is very low, and it is in addition a quite aggressive species which easily competes with young rubber or oil palm trees. Some farmers are therefore reluctant to grow it.

Agricultural systems

Most agriculture in Southern Thailand is concentrated in plantation crops, such as rubber, oil palm, fruit and coconuts (Sophanodora 1995). Rice production, a second important system, can be found on alluvial soils and around Songkhla lake. The integration of cattle with plantation systems is less practised than cattle-rice integration, but some farmers favour using cattle or goats as weeders in oil palm and coconut plantations. Few farmers have sown improved pastures for their animals. Hence the animals rely mainly on native weed species which is abundant during the rainy season but scarce during the dry season. In addition, the animals, if not confined or tethered, can create problems for neighbouring farms.

Integration of cattle with rice production is commonly practised, and dairy cattle are highly successful in Patthalung province where rice crop is the dominant production systems. Paspalum and para grass are sown in some abandoned rice fields, but an analysis by the Agrarian System Research and Development project of FNR found that there is insufficient forage supply for dairy cattle, especially during the rice growing season. Dairy farmers in Patthalung province spend about 48% of total production cost on feeds (Ayut and Aat 1993). This expense could be reduced and much greater benefits could be expected if sufficient forage could be obtained. Rice straw and

native weeds are, however, commonly used as cattle feed. Terwoort and Koffemen (1993) have suggested that Urea Mineral Molasses Block (UMMB) supplement for dairy cows could significantly increase milk production in the region.

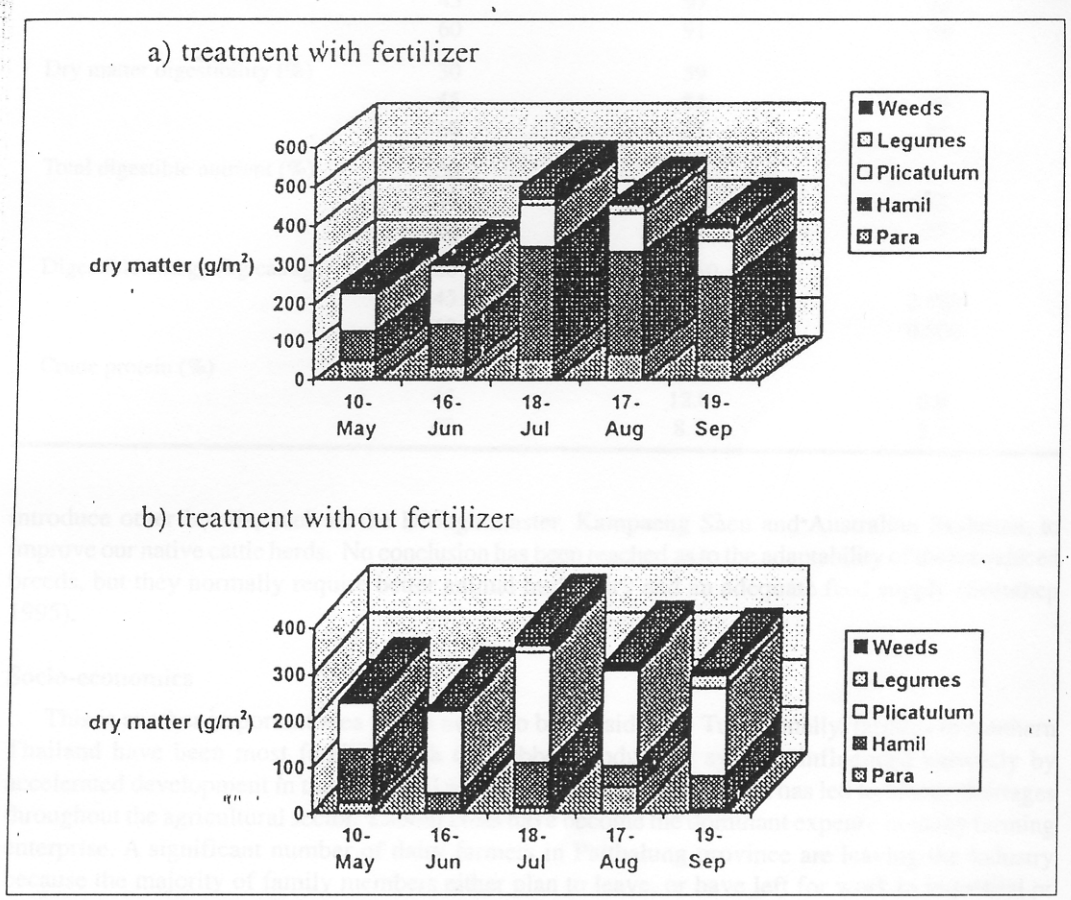

Figure 1. Dry matter and its composition in the mixed swards receiving fetilizer (a) compared to sward without fertilizer, (b) grazed by 4 weaners at a stocking rate of 0.6 head/ha.

Animal breed

Small farmers, owning 2-2.5 ha of land per household, are the primary target group for the encouragement of the integration of livestock with existing cropping systems. With this farm size, we can estimate the optimum number of animals per household at 5 beef or 2-3 dairy cows. There are no strict recommendations as to the type of animal, beef or dairy cows or goat, selected according to what is considered best suited to local conditions.

Native animal breeds have lower productivity than crossbreeds. Kochpakdee *et al.*, (1994) reported that the reproductive performances of crossbred of Anglo-Nubian X native Thai goats, providing that they were grazing improved pasture well maintained with fertilizer, was better than those of native Thai goats.

Crossbred Native X American Brahman is considered a beef cattle breed well adapted to the humid tropics; however, local markets favor red cattle over white. Attempts have been made to

Table 3. Comparison of the nutrive value of B. humidicola and *P. plicatulum* at different cutting intervals (After Anant *et al.* 1990, Sasithon and Saranya 1990)

Attribute	Cutting interval (day)	*Brachiaria humidicola*	*Paspalum plicatulum*
Voluntary intake (g/kg)	30	102	-
	45	97	39
	60	91	38
Dry matter digestibility (%)	30	59	-
	45	54	39
	60	55	38
Total digestible nutrient (%)	30	48	-
	45	45	35
	60	47	35
Digestible energy (kg cal/kg)	30	2.160	-
	45	2.028	2.900
	60	2.054	0.500
Crude protein (%)	30	13.9	-
	45	12.8	6.9
	60	8.1	5.7

introduce other breeds, such as the Droughtmaster, Kampaeng Sæn and Australian Brahman, to improve our native cattle herds. No conclusion has been reached as to the adaptability of the introduced breeds, but they normally require better animal husbandry and an adequate feed supply (Sornthep 1995).

Socio-economics

This is another important area which needs to be considered. Traditionally, farmers in southern Thailand have been most familiar with the rubber production system, influenced currently by accelerated development in the industrial and aquaculture sectors, which has led to labour shortages throughout the agricultural sector. Labour costs have become the dominant expense in many farming enterprise. A significant number of dairy farmers in Patthalung province are leaving the industry because the majority of family members either plan to leave, or have left for work in industrial or urban service-related jobs.

CONCLUSION

To plan a project which will deliver successful and sustainable results, consideration must be given to the whole system and its integrated components. Physical factors (e.g. land, climate), biological factors (e.g. crop, livestock, agricultural systems) and socio-economic factors (e.g. household, labour, marketing and economic justification) must be taken carefully into account. These factors and their interrelations need to be clearly identified, and the plan needs to be discussed between researchers, extension officers, bankers and participating farmers.

There are prospects for crop-livestock integration in southern Thailand, though some projects have a poor success record. The reasons for this are:

- Lack of effective planning
- Lack of trained extension staff
- Lack of good quality and quantity of feed resources
- Socio-economic constraints
- Lack of quality-beef marketing

However, the lessons learned from those projects, particularly those concerning animal feed supply, are:

- Land preparation and seed-bed preparation must be completed prior to the importation of animals
- An increased range of suitable forage species is needed
- Satisfactory quality and quantity of seed or planting materials must be readily available
- Basal fertilizer is essential for pasture establishment
- UMMB supplementation is strongly recommeded.

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to FAO who sponsored my attendance at this meeting and to the Thai Government for providing funds for pasture research projects carried out by FNR, PSU.

REFERENCES

Anant, Poositikul; Saikim, Sangchote; Somchit, Intharamanee; Chantakarn, Arananant. 1990. Digestibility of *Paspalum plicatulum* for ruminant. Ann Report 1990. Division of Animal Feeds. Department of Livestock Development, Ministry f Agricultural and Cooperation. Bangkok: 336-348

Ayut, Nissapa; Aat, Phisarnwanich, 1993. A study on cost of milk production and its responses to changes in input prices in Phattalung province. Progress report of Agrarian Systems Research and Development Project. FNR. PSU : 27pp.

Division of Agricultural Economics. 1994. Beef cattle : production and marketing. The Office of Agricultural Economics, Minister of Agriculture and Cooperation. Bangkok: 187 pp (in Thai).

Department of Land Development. 1994 Land use planning for the disaster areas from typhoon Gay. Land use division, Department of Land Development, Ministry of Agriculture and Cooperation, Bangkok: 77pp. (in Thai).

Egara, K.; Kodpat, W.; Manidool, C.; Intaramanee, S.; Srichoo, C.; Krongyuti, P.; Sukkaseme, P. 1989. Development of technology for pasture establishment in Thailand. Tropical Agriculture Research Center, Minister of Agriculture, Forestry and Fisheries, Japan and Department of Livestock Development, Ministry of Agriculture and Cooperative. Thailand.

Kochpakdee, S.; W. Pralomkarn; S. Saithanoo; A. Lawpetchara; B.W. Norton 1994. Grazing management studies with Thai goats, II. Reproductive performances of different genotypes of does grazing improved pasture with or without concentrate supplementation. Aust. J. Animal Sci. 7(4): 563-570.

Malakarn, Suksa. 1994. Productivity and improvement of natural forages along the coastal area of Changwat Songkhla. M.Sc. Thesis. Prince of Songkla University, Hat-Yai.

Nilnond, C.; Panaphitakkul, N., Patanahiran, W., Aiken, R., and Asher, C.J. 1986. Soil fertility assessment in southern Thailand. In Trans. International Congress Soil Science Society. Hamburg, August 13-20, 1986: 615-617.

Sasithon, Tinnakorn; Saranya, Wattayanupapyuenyong. 1990. Digestibility of creeping signal *(Brachiaria humidicola)* at different cutting intervals. Ann. Report 1990. Division of Animal Feeds. Department of Livestock Development. Ministry of Agricultural and Cooperation, Bangkok : 336-348.

Sophanodora, P. 1995. Forage research in southern Thailand, In: Mullen, B.F. and H.M. Shelton eds. Integration of Ruminants into Plantation Systems in Southeast Asia. ACIAR Proc. No. 64. Canberra

Sukthangpee, Punchai. 1995. Effects of plant nutrients on establishment of Mauritius grass grown on Alluvial Soil of Changwat Songkhla. M.Sc. Thesis, Prince of Songkla University, Hat-Yai.

Suthipradit, S.; Sophanodora, P.; Wongleang, P. 1992. Nutrient requirements of some pasture legumes species on Vi-sai soil series. Thai Journal of Soils and Fertilizers. 14(2): 146-156.

Terwoort, L; I. Koffeman. 1993. The uses of urea molasses minerals blocks for cattle in farming systems in southern Thailand. Instate of Research and Development Region 8. Patthalung.

Somthep, Tumwasorn. 1995. Integration of livestock research for rural development. Proc. in seminar on HM the King's Projects Technology for Rural Development. The Institute of Technology for Rural Development, Chula Longkorn Unviersity. 3 August 1995. Bangkok: 71-82p (in Thai).