

RESEARCH PAPERS AND REPORTS IN ANIMAL HEALTH ECONOMICS

AN ACIAR THAI-AUSTRALIAN PROJECT

Working Paper No. 24

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the Management and Health of Livestock in
Thai Villages**

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ISSN 1322-624X

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RESEARCH PAPERS AND REPORTS IN ANIMAL HEALTH ECONOMICS is published by the Department of Economics, University of Queensland, Brisbane, 4072, Australia as a part of a research project sponsored by the Australian Centre for International Agricultural Research, viz., Project No. 9204, 'Animal Health in Thailand and Australia: Improved Methods in Diagnosis, Epidemiology, Economic and Information Management'.

The Commissioned Organization is the Queensland Department of Primary Industries. Collaborating institutions in Australia are CSIRO-ANHL, Geelong, Victoria and the University of Queensland (Department of Economics; Department of Geographical Sciences and Planning). In Thailand, the collaborating institutions are the Department of Livestock Development (National Institute of Animal Health; Disease Control Division), Chiang Mai University (Department of Agricultural Economics; Department of Animal Husbandry) and Thammasat University (Faculty of Economics). The collaborating institution in Laos is the Department of Livestock and Veterinary Services. Dr F.C. Baldock, Senior Principal Epidemiologist, Queensland Department of Primary Industries is the Project Leader in Australia and Dr P. Chamnanpood, Senior Epidemiologist, Thai Department of Livestock Development is the Project Leader in Thailand. Professor Clem Tisdell and Dr Steve Harrison, Department of Economics, University of Queensland are responsible mainly for the economic component of this project.

'The overall goal of this project is to develop and evaluate the necessary tools to provide decision-makers with reliable animal health information which is placed in context and analysed appropriately in both Thailand and Australia. This goal will be achieved by improving laboratory diagnostic procedures; undertaking research to obtain cost-effective population referenced data; integrating data sets using modern information management technology, namely a Geographical Information System (GIS); and providing a framework for the economic evaluation of the impact of animal diseases and their control.

A number of important diseases will be targeted in the project to test the systems being developed. In Thailand, the focus will be on smallholder livestock systems. In Australia, research will be directed at the northern beef industry as animal health information for this sector of livestock production is presently scarce.'

For more information on *Research Papers and Reports Animal Health Economics* write to Professor Clem Tisdell (c.tisdell@economics.uq.edu.au) or Dr Steve Harrison, (s.harrison@uq.edu.au) Department of Economics, University of Queensland, Brisbane, Australia, 4072.

Women and Common Property Resources in the Management and Health of Livestock in Thai Villages

ABSTRACT

In many Asian countries, women play a significant but varying role in the management of livestock and the use of common resources plays an important role in animal husbandry, and can affect the health of some types of livestock. This paper concentrates on village livestock in Thailand and makes use of survey data as well as national statistics. It first of all outlines the nature and development of livestock industries in Thailand. It then considers the role which women play in the village livestock economy in relation to cattle and buffalo, particularly dairying, and in the keeping of poultry and pigs. The extent to which women are involved in maintaining the health of livestock is considered. Both village bovines and poultry utilise common property resources to a considerable extent in Thailand. This has implications for the economics and productivity of keeping village livestock, the healthiness of such livestock and the spread of livestock diseases.

Keywords: livestock disease, role of women in farming, common property resources, Thailand.

JEL Classification: Q16, Q12

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1. Introduction

After a period of very rapid growth in the late 1980s, with growth rates peaking at over 13 per cent, Thailand's economy slowed down during the 1990s (Department of Foreign Affairs and Trade 1994). While about 60 per cent of Thailand's workforce is employed in the agricultural sector, the share of agriculture in its GDP is only about 10 per cent, having decreased from 23% in 1980. However, agriculture is a dominant sector of the Thai economy in terms of employment and exports.

Livestock industries in Thailand have experienced considerable changes during the past decades, and the management of livestock as well as the use of common resources are crucial factors in their future development. Women play a significant, but undervalued role in animal husbandry and their impact on the health of livestock as well as their potential contribution to an improvement of the present state needs to be considered. Both village bovines and poultry utilise common property resources to a considerable extent which has implications for the productivity and healthiness of village livestock.

2. An Overview of Livestock Industries in Thailand

Traditionally, the livestock sector in Thailand has been, as in most of South-East Asia, complimentary to the subsistence economy, with pigs and poultry being raised for village consumption, and cattle and buffaloes mainly being used for draught purposes. Livestock industries are important in Thailand and make a significant contribution to food production. Thai • farms are small due to the high man-land ratio, and crop production on the farm can neither generate sufficient income to satisfy farming families, nor provide full time employment for family members. Thus, livestock production on a small farm usually plays a complementary, yet significant role to crop production. Livestock utilize by-products from crop production, generate income and diversify employment opportunities for the family. In particular, the importance of the pig, poultry and cattle industries in Thailand seems to have

increased in recent years, whereas buffaloes play a relatively minor role, especially as a source of draught power, since animal drawn ploughs have progressively been replaced by tractors.

3. The Nature and Development of Livestock Industries in Thailand

Under existing farming systems in Thailand, 60 per cent of farmers are still small farmers living in rural areas of whom almost 90 per cent are self-employed. These figures are taken from a survey of farm households throughout Thailand. These small farm households whose living standard is mostly at the subsistence level frequently operate an integrated farming system, consisting of field crops, horticulture, fishery and livestock. Livestock, however, are most important to these farmers, including buffaloes, cattle, pigs and poultry, and- to a lesser extent and mainly in the South of Thailand where Islam is important - goats and sheep. The varying importance of these animals is explained by their differing income to the farmers, with dairy cows supplying one of the highest returns, and buffaloes yielding the lowest annual income. Among farm operations, land is relatively evenly distributed, with average land holdings of 5.6 ha (35 rais). However, there are still a number of small farmers who own less than 1.6 hectares of land, and some are landless.

3.1 The Pig Industry

Throughout the 1960s and 1970s, pig crossbreds were raised in backyards of small farms for consumption and generation of supplementary income. While pigs generated the largest share of value added in the Thai livestock sector in 1975, the development of pig production had been remarkably slow up to the 1980s (Murphy, Tisdell and Kehren 1996). The virtual stagnation of the industry in the past was - to a large degree - due to a considerable degree of government intervention, which discouraged private investment in the pig industry. In addition, the market price of pigs and feed costs were quite unstable. Over the last decade, commercial pig farms have increased significantly, particularly in Eastern and Central regions of the country, due to a rapid increase in urban demand for pork. A recent estimate is that 80 per cent of pig production in Thailand is undertaken by commercial enterprises (Sheehan 1993). Today, a small number of live pigs and frozen piglets are exported to Hong Kong and Singapore.

Until the mid-1980s, small middlemen (often the agents of large wholesalers) collected the

required supply of pigs by travelling from village to village, delivering them to the often illegally working slaughterhouses (Murphy, Tisdell and Kehren 1996). In recent times, however, with the development of commercial pig raising farms in provinces around Bangkok as a consequence of a rapid increase in urban demand for pork, the role of small middlemen has diminished.

Supported by a small number of feed mill companies providing piglets, animal feeds, drugs, veterinary services and farm management expertise to contracted pig producers; and through improved conditions of slaughterhouses, Thailand's exports of pork increased markedly towards the end of the 1980s.

Thailand has the potential for significant expansion of pigmeat exports (Harrison and Tisdell 1995), but foot-and-mouth disease (FMD) is still a major problem in the country, which leads to enormous losses of profits. Although high mortality rates for FMD outbreaks are rare amongst adult livestock, they can reach up to 90 per cent, in particular among piglets in high density populations (Donaldson 1994). The periodic shortage of some vaccines when disease outbreaks occur and inadequate treatments present additional serious problems.

FMD led to imports of pigs (from Malaysia) to Thailand in the early 1990s because of enormous damage to local pig farms, particularly in the country's South, and a resulting shortage of pigs. (Anon 1991). In addition, strongly fluctuating pig and feed prices -partly a consequence of frequent government intervention and changing policies - also have a constraining impact on the growth of the Thai pig industry. In 1993, economic losses in the Thai pig industry were at a record high, due to an oversupply of pigs and consequently low prices. If substantial improvements could be made with respect to the eradication of foot-and-mouth disease in the pig industry in Thailand, there would be many opportunities to increase the country's pig export market.

3.2 The Poultry Industry

The Thai poultry industry consists of ducks, broilers and laying hens. Ducks only play a minor role and their value of exports (to Hong Kong, Japan, Germany and Singapore) has been relatively insignificant. Similar to the pig industry, the principal area for broiler production is the Central Plains region where more than 35% of broilers are raised. The largest chicken raising provinces are Chacheongsao, Chon Buri and Nakhon Pathom. While the commercial poultry industry in Thailand has grown significantly, large numbers of

poultry are still raised by village households. In general, the number of poultry in each household is quite low, the most common number being between 3 and 10, according to a survey in Northern Thailand. Poultry is generally used by village householder to provide either food (meat and eggs) or supplementary income.

Chicken farms in Thailand can be classified into three types (Murphy and Tisdell 1995): First, there are the backyard farms where chickens are raised on a small scale for consumption and supplementary income purposes. Ten years ago, virtually all growers (approx. 99.5%) were backyard growers, though they produced only about a third of production. Nowadays, they account for less than one quarter of production, due to the expansion of commercial production. Independent commercial growers are the second group of producers who often engage in contract farming with smaller growers. However, their numbers are likely to decline in the future because of their inability to benefit from the economies of size associated with the larger contract growers.

The third group of producers, the contract growers, mainly started to develop since the late 1970s. The Charoen Pokphand Company introduced wage and price guarantee contracts in 1976 and since then, contracts between chicken growers and hatcheries or feed companies became widespread.

Prior to the 1970s, there were few attempts to encourage growth in the poultry industry. In 1946, modern production methods were introduced and in 1956, the importation of high yielding stock commenced. Even by the early 1970s, most farmers raised only a small number of indigenous chickens for their own consumption, and hardly any poultry was exported. Yet, a few large private firms began to contribute to a significant expansion of the poultry industry, with the Charoen Pokphand Company commencing to export chickens to Japan in 1973. Modern chicken processing companies developed which established their own slaughterhouses and adopted modern marketing strategies. Nowadays, Thailand is one of the world's largest chicken producing countries in terms of broilers produced, and one of the largest exporters to Japan.

A distinctive characteristic of the Thai poultry industry is that it is dominated by a relatively small number of multinational companies. It is estimated that about 80 per cent of the broiler sector is controlled by 10 to 12 companies, including for instance the Charoen Pokphand Group, General Foods and Sun Valley (Anon 1996). This oligopolistic market structure is not

necessarily beneficial to everyone, however, and creates public concern about possible exploitation of small farmers or even monopolisation of the market.

Thailand has been a major exporter of poultry meats, but in the past few years, the country's broiler exports experienced a decline by about 5-10 per cent. China has become Thailand's major competitor for exports of chicken to its principal export market, Japan. Thailand's competitive edge is starting to diminish with rising wages and therefore higher labour costs. Shortages of livestock feedstuff also contribute to the decreasing competitiveness of Thailand's poultry industry. The country's large supply of agricultural and fishery products is becoming scarcer, and the quality is relatively low. Moreover, feed costs in Thailand and China seem to be similar, yet they are well above the costs in Brazil and the US. Thus, the present situation for Thai broiler producers does not appear to be very auspicious.

3.3 The Dairy Industry

Indian settlers commenced dairying operations in Thailand in the 1950s. Their activities were centred around Ayutthaya¹ with Bangkok being the major market for their milk. Today, the Central Zone is still the primary region for dairying activities, due to its rich agricultural land and the almost continual availability of cattle feed throughout the year (Rao 1990). At present, the main dairy cow raising areas are Chiang Mai, Nakom Pathom, Ratchaburi and Saraburi (Office of Agricultural Economics 1992).

Extensive dairy development in Thailand began with the establishment of a joint venture between the Thai and Danish governments in the early 1960s, the Thai Danish Farm and Training Centre (TDDF) at Muak-Lek² (Pichet 1991). A few years later in 1968, another joint venture, the Thai- German Dairy Training and Processing Plant, was founded in Chiang Mai until it was taken over by the Department of Livestock Development in 1977. During the 1970s, the popularity of milk as a beverage continued to rise considerably as a result of increased advertising in the mass media. In addition, manufacturers strongly promoted milk powder as a substitute for mother's milk and now milk powder represents - in terms of value - a significant proportion of Thailand's milk imports (Chinwala and Umrod 1993).

Due to factors such as strong government support and increased economic growth in Thailand, local milk production has expanded rapidly since the 1980s. An estimate of the

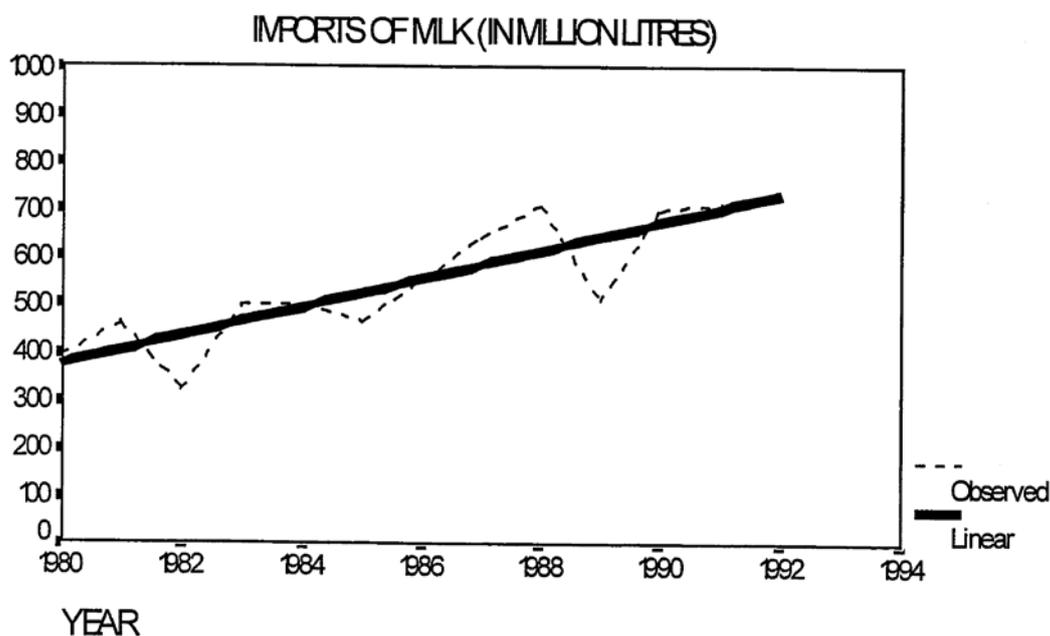
¹ This is the ancient Thai capital, located about 80 kilometres north of Bangkok.

² Muak Lek is located in the province of Saraburi, about 250 kilometres northwest of Bangkok.

total raw milk output in 1995 is about 300,000 litres per day. In 1982, Thailand had 13,700 cows producing 27,240 tonnes of milk. By 1991, the amount of milk had risen to 178,000 tonnes, with domestic herd sizes also displaying similar growth- to over 70,000 cows (ADC 1993). This growth of the Thai dairy industry is due to a rapidly growing economy and population, changes in consumers' lifestyle and buying patterns, active promotion of milk products by the Thai government and a range of customs duties.

However, the supply of milk in Thailand is still insufficient for the rapidly increasing domestic demand in recent years. Despite considerable growth in production and herd numbers, the average herd size in Thailand is only about 6 cows (compared with 104 for Australian farms), with relatively low average yields of around 9-10 litres (per cow) a day (ADC 1993/Watkin and Sukpituksakul 1992). Apart from low productivity, infertility is also a common problem of dairy cows in the country. It is believed that deficiency of minerals is one of the nutritional constraints limiting the cow's reproductivity (Vijchulata 1995). Since the extent of mineral deficiencies and their influence on the fertility of lactating cows in Thailand is still largely unknown, further research is needed.

Around 60 per cent of Thailand's drinking milk is sourced from local production. Since the early 1980s, Thai imports of milk products increased considerably. Figure 1 indicates the trend of milk imports by Thailand from 1980 to the early 1990s. It is apparent that the consumption of milk in Thailand exceeds domestic production by far. Local cattle do not produce much milk and due to financial constraints, small farmers are unable to purchase improved breeds of dairy cows or obtain a bank loan. In support of the domestic dairy production, the Thai government has attempted to improve this situation by providing active support to small farmers who cannot afford the initial investment in a dairy cow. The Department of Livestock Development offers small loans as well as technical advice, milk collection and veterinary services as financial support to small farmers (Thummabood and Morathop 1993).



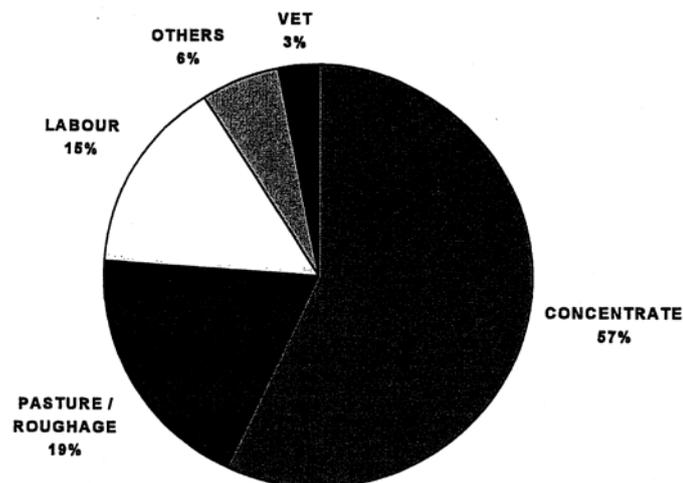
Source: Based on Australian Dairy Corporation (1993)

Figure 1: Imports of milk (in million litres)

However, there are still a number of other factors that hinder the development of the Thai dairy industry. Marketing of dairy products is difficult for small farmers because of high milk collection and transport costs (from farms to milk processing plants) and poorly developed refrigerated distribution systems. The majority of dairy farm sites in Thailand are widely scattered which makes evaluation, collection and transportation of milk difficult (Chinwala and Umrod 1993). Moreover, there is a shortage of milk collection centres and milk delivery trucks which causes irregular quality and immense losses of raw milk. All these factors result in high expenses of disease prevention and treatment, as well as of extension work.

A low level of local dairy management skills and a lack of adaptability of imported dairy breeds to Thailand's tropical climate also constitute serious problems for small scale livestock producers. In addition, inadequate feed supplies and high production costs (particularly of meal concentrate) are amongst the most serious problems for small farm households. Improvements in feeding and nutrition are crucial for higher production levels of milk in

Thailand. The high cost of high quality energy³ and protein ingredients⁴ for dairy cattle influences the level of imports required, and thereby the cost of production for Thai farmers, with protein being the most expensive ingredient (Wanapat and Devendra 1992). Figure 2 illustrates the various on- farm variable costs of production.



Source: Watkin and Sukpituksakul (1992), p. 198

Figure 2: Total variable costs in the Thai dairy industry

Meal concentrate clearly constitutes the highest cost to the farmer, amounting to almost 60 per cent (Wanapat and Devendra 1992, Watkin and Sukpituksakul 1992). Concentrates are widely used by milk producers in Thailand because of the low availability of forage and roughage.

Limited access of farmers to pastures leads to overgrazing and low levels of milk production. Sometimes, small farmers even hire trucks in order to collect green forage outside the village, up to 100 km away from their homes. Due to limitations of pasture as a source of feed, the use of concentrates and other feeds, including rice straw, pineapple waste and whole sugarcane, is of importance. An unpublished study by Wanapat and Sommart (Wanapat and Devendra 1992) of 30 farmers in the Northeast of Thailand using locally available feed

³ Including, for example, maize and cassava.

⁴ Soybean meal, groundnut cake and fish meal, for instance.

resources, including cassava chip⁵, rice bran, dried cassava leaf, broken rice and cotton seed meal, in order to reduce their production costs by formulating their own concentrates, found a decrease in cost by 1-2 Baht/kg, compared with the production costs of commercial concentrate. This suggests the use of locally available feed resources through the cooperation of farmers (and an improvement in production techniques) as a possible future alternative for improved feeding and nutrition of dairy cows in Thailand.

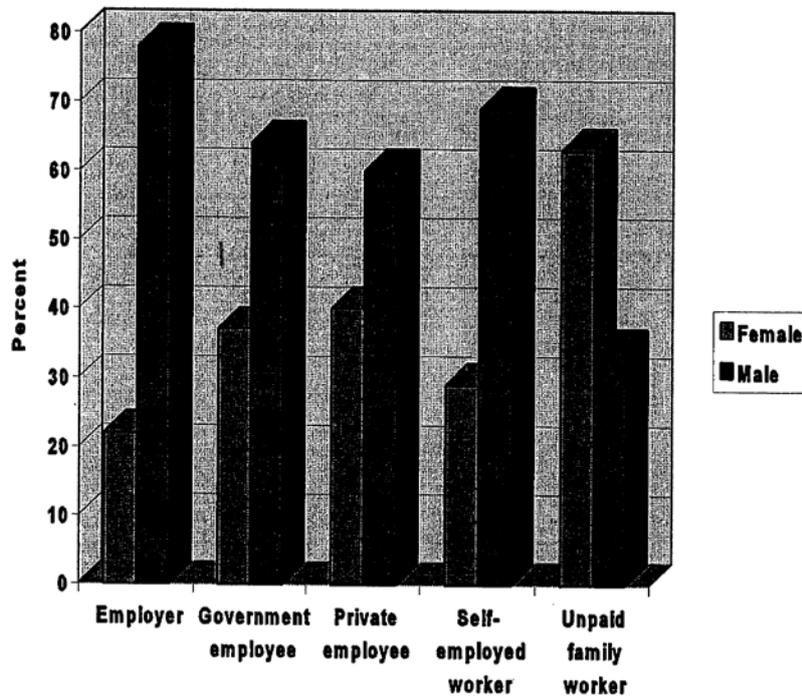
All of the above mentioned factors still limit the productivity of the small scale dairy producers in Thailand. An improvement in these conditions is necessary in order to achieve substantial growth in Thai milk production and exports.

4. The Role Of Women in the Village Livestock Economy

Women comprise close to half the population of Thailand and have made a substantial contribution to the household and national economies. In the past, women in the agricultural sector used to play a very important role in household income production. In fact, under the absolute monarchy, men had to leave their farms for extended periods of time to perform various services for the ruling class. Thus, the women who were left behind were forced to manage the farms, including all the buying and selling activities that were required (Chotipimai 1995). Even though women shared economic responsibilities with men, were responsible for managing household finances and had an important role in trading and marketing activities as well as managing agricultural production, they had little real economic power in the family.

Changes in the economic structure and within the Thai society took place as a consequence of industrialisation, commercialisation and the promotion of economic growth in Thailand. In 1991, Thai women constituted 47% of the workforce, the highest percentage in Asia (Chotipimai 1995). Despite this high proportion of females in the labour force, however, the majority of women are employed as unskilled workers in low paid agricultural or industrial work. Women are concentrated in the lowest income brackets in all industries (Chotipimai 1995, Rao 1990). In fact, 'unpaid family worker' is the only employment category in which the number of women is greater than the number of men, as can be seen from Figure 3.

⁵ Cassava chips are reported to increase milk production and decrease the cost of feeding in Holstein Friesian cows (Wanapat and Devendra 1992).



Source: Based on Chotipimai (1995)

Figure 3: Gender distribution of employed persons in Thailand by category – 1989

With respect to Thai women's contribution to farm work, controversial figures exist. In a survey of 135 farm households in Northern Thailand in late 1994 (ACIAR 1994), the proportion of males constituted approx. 55% and women accounted for approx. 45%. This survey indicates that males comprised significantly more of the workforce (64%) than females (36%), and those having the main responsibility for caring for the animals were predominantly male. According to the survey results, a greater proportion of family members participated in working with crops (54%) than were involved in stock work (44%). While women and men participated roughly equally in working with crops (45% females to 55% males), significantly more males participated in stock work than females. However, in analysing these figures, it needs to be considered that about 90% of the respondents were males, which is likely to produce biased results, and that the average household size of the survey was 4.3 people, which is a smaller number than the national average (of 6 family members).

In another survey, conducted in 17 provinces and comprising 200 small farm households, similar percentages were found with respect to workforce percentages. About 70% of the farm work was reported to be done by men, and 30% by women. It was also found that more than half the work done by men involved stock work (Thummabood and Morathop 1993). However, it also has to be considered that the family size in this survey was larger than average (7 people). Yet, both surveys indicate that Thai women contribute around a third of the work on the farms.

However, it is not true that women contribute only a third to the farm work. Table 1 indicates that Thai women are highly represented in the agriculture sector, the sector where lower wages generally apply. As can be seen, Thai women are highly represented in agricultural and farm work, contributing at least half of the work to farm management as well as small scale animal raising. Even though these figures are ten years old, there is no reason why they should be outdated. It is true that rural women appear to increasingly leave the agricultural sector to find work in urban areas. During 1960-1990, the labour force participation rate in the agricultural sector decreased from around 80% to around 60%. The participation of women in the agricultural sector decreased from almost 88% to about 57% during the same time period (Chotipimai 1995).

Table 1: Percentage of Thai women's participation in agricultural development (1985)

Activities	Organization	Women Participation (%)
Rice cultivation	Dept. Of Agri. Extension	50
Field crop cultivation	DOAE	50
Horticulture	DOAE	50
Vegetable/orchard growing	DOAE	100
Sericulture	DOAE	100
Beekeeping	DOAE	20
Soil improvement	DOAE	10
Plant protection	DOAE	30
Farm management	DOAE	70
Post harvest: harvesting	DOAE	50
Storing, food processing	DOAE	90
Small scale animal raising	Dept. of Animal Husbandry	50
Small scale aqua-culture	Dept. of Fishery	90
Co-operatives	Dept. of Co-operatives	50
Home food preservation	DOAE	100
Home food processing	DOAE	100
Compost	DOAE	100

Source: Sheehan (1993), p.23

While the agricultural sector has experienced a decline in its proportion of the Thai labour force, labour force participation has increased rapidly in the commerce, manufacturing and service sectors, including female workers. However, the figures in Table 1 are percentages, and despite the decline of women's participation in agricultural work, it is very likely that their farm work activities have not changed and are still the same today. In most developing countries, women are to a large extent involved in agricultural activities and make up the majority of subsistence farmers (Roy, Blomqvist and Tisdell 1996).

Even though more women than men left the agricultural sector to work in the commerce, manufacturing or service sector, this does not mean that a much greater proportion of women are now in higher positions. First of all, the agricultural sector still provides the vast majority

of employment compared with all other sectors which means that the proportion of employment in other industries is still rather low. Some Thai women now hold senior positions in business and academia, and women are well represented in higher education (Sheehan 1993). However, the percentage of women in politics, in particular occupying provincial or national government positions, is still much lower than that of men, as Table 2 displays.

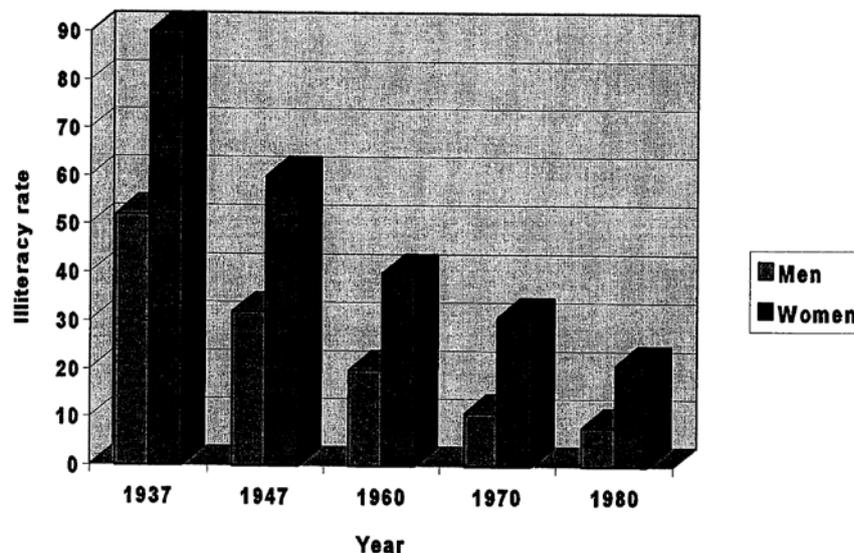
Table 2 -Employment by gender in Thailand at various government levels in 1993

	Total	Percentage	Percentage
	Number	Female	Male
National Government			
Members of Parliament	360	4.2	95.8
Senators	270	2.6	97.4
Cabinet Members	48	2.0	98.0
Secretary to Ministers	14	0	100.0
Judges	1,534	12.3	87.6
Attorney	1,574	9.2	90.8
Civil Servant Executives			
Permanent Secretary	13	0	100.0
Director-General	134	8.9	91.1
Deputy Director-General	336	5.6	94.4
Provincial Government			
Provincial Governors	73	1.4	98.6
District Officers	779	0	100.0
Deputy District Officers	4,674	0.3	99.7
Elected Government			
Provincial Council Members	2,046	4.9	95.1
Municipality Council Members	2,112	6.0	94.0
Sub-District Heads	6,669	1.0	99.0
Village Heads	60,554	1.2	98.8

Source: Chotipimai (1995), p. 32

Moreover, while now many jobs are at least in theory open for women, in practice, it is still difficult for women to hold leadership positions in local communities because of strong traditional values (Chotipimai 1995). Thai women who leave the agricultural sector to work in urban areas have limited employment opportunities and can frequently only work in low wage industries, due to their lack of skills and education. While young men from poor families are encouraged to continue studying following their compulsory education, girls have to start working (Chotipimai 1995). In many cases, sisters have to work to send their brothers to school or university as well as being responsible for their families.

The result is an illiteracy rate of Thai women that has been more than double that of Thai men since the 1930s. While there has been a significant decline in illiteracy for both women and men over the past 40-50 years, the rate of illiterate women in proportion to men seems to have grown since the 1960s, as Figure 4 illustrates. Unfortunately, these figures are the latest available; more recent figures may indicate an improving position for women.



Source: Based on Sheehan (1993) p.23

Figure 4 Illiteracy rate of Thai men and women

There are, of course, several reasons for the migration of people from rural to urban industrial areas. One of the main arguments is that it is a consequence of the neglect of rural areas in the government's industrialisation strategy, as people are migrating to urban areas in the hope of finding employment. It has also been argued that the exclusion of Thai women from

agricultural development programmes has been an additional factor contributing to women leaving the agricultural sector.

However, there seems to have been improvements in more recent times. According to Thummabood and Morathop (1993) from the Department of Livestock Development in Thailand, training courses in animal husbandry are held for Thai farmers by district livestock extension officers (under the supervision of the Department of Livestock Development), addressing issues such as animal nutrition and the prevention, management and control of disease. After these training courses, the farmers are provided with high quality forage seed for the improvement of their pastures. At present, women represent only about 20-30 % of the people trained. Yet, interestingly livestock extension officers have recognised that it would be more beneficial if more women could participate in these training courses and spread livestock technologies, for two reasons. Firstly, women seem to be more effective at applying the knowledge they gained from these courses, as they practice more than men. Sometimes, men ignore the new technologies and do not apply them. Secondly, women seem to believe women more than men, probably for cultural reasons. In this regard, it is even more important that considerably more women receive training for effective instruction and dissemination of livestock technologies and disease control.

As in many developing countries, women are the most underprivileged group in Thailand and suffer the extremes of poverty (Patanapongsa 1992). Even though they contribute - in addition to all the household chores - at least as much as men to the farm management and animal husbandry, their participation is never acknowledged and they do not have a say in any economic affairs of the family. This might be related to the fact that Thailand is a patriarchal society and the male is seen as the head of the household (Sheehan 1993). The husband should love, respect, care and work for his wife and family, whereas his wife should obey him, defer to him and look after him and the children. Even if the wife is in a higher professional position, these convictions still hold true.

The lack of power over economic affairs is a crucial factor for rural women in Thailand which hinders an improvement in their conditions and status. The successful establishment of the Muak-Lek Dairy Project in the province of Saraburi in Central Thailand (Rao 1990) proves that Thai women can make a great contribution to an increase in rural families' income and to sustainable development through participation in the Thai agricultural industry, if they are given access to credit. Since it is unusual for Thai women to have an opportunity to

participate in the agricultural industry, the project is very significant. It has channelled government resources and secured commercial bank financing to make women the key participants in a relatively new and growing agricultural sector in Thailand, and it has had a major impact on women's income, status, and access to financial resources.

5. Common Property Resources

Private property rights in Thailand have evolved gradually in response to the increased benefits of defining property rights in land, induced by the commercialisation of agriculture (Feder and Feeny 1991). When land was abundant and labour scarce, property rights in labour were often defined with much greater precision than property rights in land. In the early nineteenth century, slaves rather than land served as collateral in financial markets. With increased exports of rice, land value in Thailand appreciated and land disputes became endemic.

In 1892, a major comprehensive new law on land rights was enacted, but the lack of adequate surveys and record-keeping prevented an end to the disputes. It created nine types of land and provisions were made for transferable title deeds that could be used as collateral (Thomson, Feeny and Oakerson 1992). A formal system of land titling was established in 1901, followed by surveys of the commercialised areas in the Central Plains region. The present system regarding land rights in Thailand is based on the 1954 legislation, which is a compromise between the traditional practice of allowing citizens to bring unoccupied forest land under cultivation as private property and the requirements of the land titling system. However, in many areas outside the Central Plains region, the degree of documentation of land rights is insufficient to be used legally as collateral on loans, which means that farmers in these areas have restricted access to credit.

Keeping animals in a safe and hygienic environment is a prerequisite for their health and growth. With respect to poultry raised in villages, the conditions vary. In some countries, they share the house of the owners and might be regarded as companion animals. Only in a few places in developing countries are good housing and supplementary feed provided for animals. Usually, poultry have very primitive housing, or no housing at all, and their conditions are almost those of feral animals.

The situation is similar in Thailand. Village livestock and poultry are raised in traditional

ways in Thailand (Khajarem and Khajarem 1989). Some pigs and poultry are kept under the house at night, but often only a small percentage of animals (11%). During the day, most (if not all) of the poultry are free roaming. Many farmers raise chickens as stray chickens, i.e. let them find their own food, sleep under trees or scattered within the house (Patanapongsa 1992). Usually, the small amount of care bestowed upon the birds, such as table scraps or limited amounts of grain each morning, is given by the women of the household.

Only very few households raise chicken for sale. In most countries, the village chicken is considered a gourmet meat and thus the price paid is considerably higher than for a similar sized commercial chicken. However, the production yield from these flocks is very low, hardly exceeding 3 birds per month. Production is too unreliable and villagers are reluctant to commit any investment of their limited resources. Therefore, they regard these scavenging chickens as a “natural low grade crop that offers a very desirable meat on occasions.” (Cumming 1992, p.21).

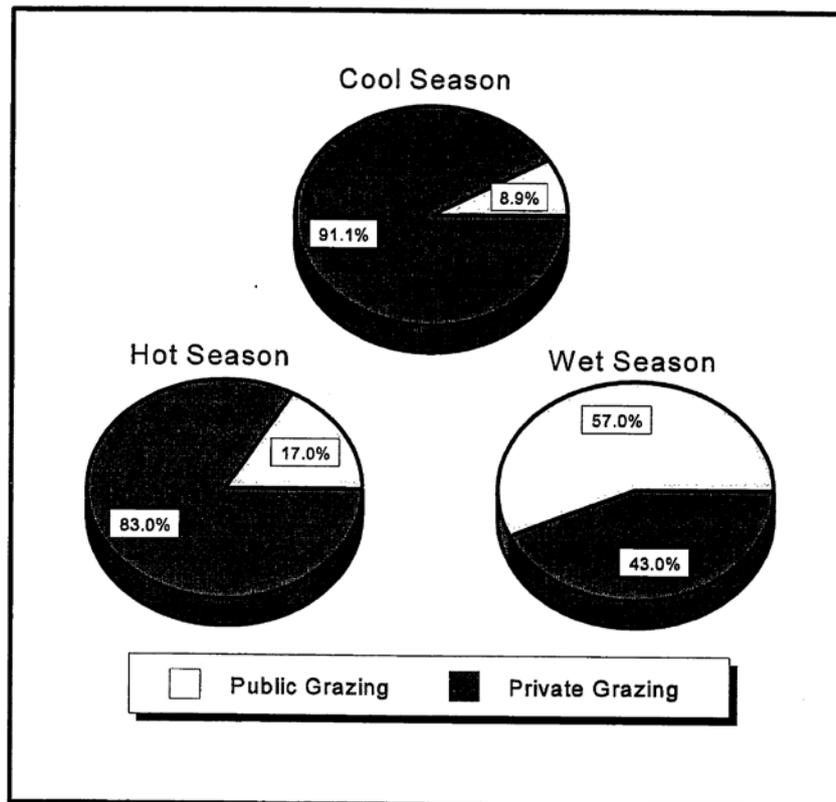
Considering the poor feeding, the unhygienic conditions and the lack of disease and vaccination control in Thai villages, it is not surprising that diseases can occur and spread easily. Little attention is paid to maintaining the health of flocks which, being in the field can mix and thereby spread diseases easily. The major disease affecting village chickens around the world is. Newcastle disease, which generally appears in the most severe form, often killing 100% of the birds (Cumming 1992). Outbreaks are often associated with a change of season, particularly the start of the wet season (Martin 1992). The recommended vaccination and deworming programmes as well as other veterinary services are not strictly followed by small farmers.

In trials with oral Newcastle disease vaccination in Thailand, some observations have been made (Jackson 1992). Particularly during the rice-growing seasons, birds needed to be confined overnight prior to feeding in the morning, or fed immediately on leaving the roost at dawn. Birds irregularly and reluctantly returned from their scavenging to receive the feed vaccine. Many of the birds also appeared semi-feral in their behaviour, and the impact of the stress associated with catching, transport and confinement is as yet unknown.

While women in Thailand take care of pigs and poultry, ruminants are looked after by the elderly or children on farms. Buffaloes and cattle are usually kept under the house at night and are mainly fed with crop residues and native grasses from village communal lands. In

order to collect water for the bovines, farmers frequently have to leave their village. The conditions of these animals are greatly affected by environmental conditions, particularly rainfall, as feed shortages occur between February and August, and feed supplements are rare. According to a survey of 135 farm households in Northern Thailand (ACIAR 1994), the most important problems for cattle and buffaloes were FMD (39%), leg injuries (14.3%), not enough food (8.3%) and weight loss (7.1%).

In the dry season, these animals graze on the harvested paddy fields, whereas in the wet season (which is the crop growing season), they graze along roadsides, on edges of cultivated plots, and in the forests and mountains. As shown by Murphy and Tisdell (1995), the type of grazing can be broadly categorised as either public or private, with the seasonal patterns represented graphically in Figure 5. It is clear that public (communal) grazing is particularly evident in the wet season when Thai livestock owners mostly graze their stock in the forests and mountains.



Source: Based on ACIAR (1994)

Figure 5: Incidence by season of public (communal) grazing vs private grazing for bovines in a village sample in Northern Thailand

The nature of grazing is regarded as an important factor in the degree of infection and spread of FMD in village stock. As Donaldson (1994) noted, seasonal variations in animal husbandry can markedly influence the spread of FMD in a herd and its severity. Stocking density and increased contact through communal grazing are significant factors in the spread of FMD. The seasonal pattern of FMD outbreaks in Africa for instance, have been explained by Rweyemamu (1970 in Donaldson 1994) as a consequence of climate and increased animal contact. During the wet season in Africa, animals are dispersed due to the prevalence of water holes. Consequently, there is little opportunity for the dissemination of the FMD virus. By contrast, in the dry season, animals congregate at the limited number of waterholes and hence, there is increased contact between livestock and of livestock with wildlife. Therefore, a greater opportunity exists for the spread of infection. While communal grazing and interaction of herds is most common in Africa during the dry season, in Thailand it is most common in the wet season. The latter is the case in Thailand because at that time, rice fields are under cultivation and unavailable for grazing. According to a survey of 135 farm households in Northern Thailand, a very high percentage of public grazing (41.5%) in Thailand's wet season takes place in the forests, as can be seen from Tables 3 and 4.

Table 3: Private grazing

Season		At Home	Rice Field	Orchard Garden	Total
Cool	No*	22.	85.	5.	112
	%	16.3	63.	3.7	83
Hot	No*	19.	101.	3.	123
	%	14.1	74.8	2.2	91.1
Wet	No*	33.	11.	14	58
	%	24.4	8.1	10.4	42.9

* Number of village families reporting

Source: Based on ACIAR (1994)

Table 4: Public grazing

Season		Public pasture	Forest	Mountain	Near water	Roads	Total
Cool	No*	2	12	6	0	3	23
	%	1.5	8.9	4.4	0	2.2	17
Hot	No*	0	7	1	4	0	12
	%	0	5.2	0.7	3.0	0	8.9
Wet	No*	5	56	13	0	3	77
	%	3.7	41.5	9.6	0	2.2	57

* Number of village families reporting

Source: Based on ACIAR (1994)

Dairy cattle are mostly managed under stall feeding systems, the milking cows being kept in the milking bam almost all the time. Dry cows and heifers are tied under trees (or other shady areas), whereas calves are confined together in small cages close to or in milking barns. Most of the dairy cows are fed with roughages that are harvested from along the roadside and from waste areas which are often far away. If these areas are too far away from their farms, small farmers have to hire trucks to collect the grasses. Some of the farmers will travel as far as 100 kilometres. According to a survey of households throughout Thailand (Thummabood and Morathop 1993), small farmers collect 68 per cent of green and dry fodder for cattle and buffaloes from communal lands. Almost five hours per day are needed to take animals to and from public grazing areas, and farmers spent around four hours every day to cut and carry fodder from these fields.

Watkin and Sukpituksakul (1992) suggest an adjustment in dairy farmers' feeding strategies in order to optimise the use of pasture, the cheapest source of feed available. With a wet season of 6-7 months and a dry season of 5-6 months, there is not sufficient pasture for milk production for about half a year. Yet, most farmers in Thailand are undergrazing their pastures during the wet season and overgrazing them during the dry season by letting their cows calve throughout the year, which is not in accordance with pasture growth and supply. Thus, an adjustment of letting dairy cows calve at the beginning of the wet season and maintaining only non-lactating cows during the dry season is a possible change in farmers'

strategies for an improvement in pasture growth.

6. Conclusion

Despite the declining importance of agriculture in the Thai economy, it is still a crucial sector for the country's development, since it provides employment for around 60 per cent of the people. The importance of livestock industries for small farmers in Thailand and the use of common property resources in their development have increased in recent years, as some of these industries - in particular pigs and poultry - have experienced growing competition from the commercial sector. Despite a rapid development of the Thai dairy industry since the 1980s, small farmers are still faced with a number of difficulties which limit their productivity.

Women do play a significant role in the management of livestock as well as in other farm activities. While there has been some progress with respect to women's status in Thailand and their access to various professions in recent years, the significant contribution of women's work on farms in rural areas is still denied. The Muak-Lek Dairy Project has shown that women in rural areas could contribute even more in terms of earning additional income, provided they are given the opportunity and have access to credit. For a healthier and sustainable development of the livestock industry in Thailand, more resources need to be directed towards the training of rural women regarding animal husbandry, as well as towards an improvement in their access to credit.

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