ISSN: 1322-624X

RESEARCH PAPERS AND REPORTS IN ANIMAL HEALTH ECONOMICS

AN ACIAR THAI-AUSTRALIAN PROJECT

Working Paper No. 9

Specific Livestock Industries, Livestock Diseases and Policies in Thailand: An Overview of Bovines (Buffalo/Cattle)

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THE UNIVERSITY OF QUEENSLAND

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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.

Specific Livestock Industries, Livestock Diseases and Policies in Thailand: An Overview of Bovines (Buffalo/Cattle)

ABSTRACT

Traditional characteristics of Thailand's bovine sector are outlined and its changing nature and structure are considered. Cattle numbers have increased absolutely in relation to buffalo numbers which have declined. Whereas in the early 1980s buffalo numbers considerably exceeded those of cattle, cattle stocks now exceed buffalo stocks which nevertheless are still substantial. The keeping of bovines for meat rather than draught purposes has become more important and since the mid-1980s Thailand has expanded the number of its dairy cattle considerably. Nevertheless, it remains a larger net importer of beef and dairy products. Because of a number of constraints outlined in this paper, it seems that Thailand is likely to remain a substantial net importer of these products and in fact its net imports can be expected to rise. While some avenues exist for increasing domestic supplies, these possibilities e.g. improved control of livestock disease and improved breeding of cattle, are unlikely to be sufficient to reduce greatly Thailand's import dependence for these products. Unlike the case of poultry and pig production in Thailand, where the commercial sector has become dominant, most of the production of bovines is accounted for by villagers with very small herds. Beef production in most cases is a sideline activity utilising crop by-products and wasteland.

Keywords: livestock disease, Thailand

JEL Codes: Q1**,** Q160

Specific Livestock Industries, Livestock Diseases and Policies in Thailand: An Overview of Bovines (Buffalo/Cattle)

1. Introduction

Thailand is a country in transition to a 'modern' market-type economy, and it has experienced a rapid rate of economic growth in recent decades (Murphy and Tisdell, 1995). Its economic growth has had a number of important implications for its livestock industries. Important changes have occurred in the demand for livestock products and services in Thailand and hence for economic interest in the control of diseases in livestock in Thailand in recent years. The main features of the development are outlined in Murphy and Tisdell, 1995. Notable features have been the increased demand for 'red meat' and dairy products in Thailand and the decline in the use of bovines for draught purposes. It is probably also true to say that the relative importance of bovines as a source of manure (fertilizer) for agricultural production has declined as the use of artificial or chemical fertilizer has risen. Nevertheless, animal manure is still considered by villagers as an important source of fertilizer for their agriculture (ACIAR, 1994).

The Thai system of livestock husbandry is basically one involving, on the one hand, village systems and on the other, commercial enterprises. Commercial systems of livestock rearing are principally used for poultry and pig production in Thailand and involve enterprises specializing in production. With economic growth in Thailand, Thailand's commercial livestock sector has expanded rapidly. It has played an important role in supplying the meat requirements of an expanding urban population and has been the principal source of Thailand's exports of chicken meat and pork.

In order to obtain a better appreciation of changes occurring in Thailand's livestock subsector, let us specifically consider developments in relation to buffalo and cattle in this paper. Pigs and poultry will be considered in the succeeding paper.

2. Traditional Characteristics of Thailand's Bovine Sector

Thailand reported around 4.8 million buffalo and 5.8 million cattle in 1992/1993. Despite the growing commercialisation of the sector in recent times, the major proportion of these animals is raised in a largely traditional manner by small farm families with small herds as a part of their overall farming activities.

The traditional production of buffalo and cattle in Thailand has always been an integral component of the crop production system. Buffalo and cattle in the rural regions of Thailand are traditionally bred primarily for draught power, with meat production, transportation and fertiliser as a by-product. During the dry season, village animals are herded on the harvested paddy fields, while rice straw and grasses are used as supplementary forage. During the wet season the animals are grazed on communal pastures in fallow fields and in forests. Late in the wet season grass is often cut and carried back for the animals to avoid crop damage (Tokrisna and Panayotou, 1985, p. 202).

2.1 Traditional bovine production systems

Traditionally meat from buffalo and cattle herds was only obtained from retired working animals. Selling the retired animal for slaughter enables the farmer to obtain extra income. Replacements are acquired through either purchase or breeding (given the ownership of female stock). The Thai farmer would sell calves in excess of the necessary replacement numbers or raise them for draught, breeder or slaughter purposes depending on the market and gender of the stock. Tokrisna and Panayotou (1985) claimed that Thai farmers maintained their herds for basically four objectives: surplus calves for sale and for replacement, mature males for draught power, and mature females for breeding. Historically milk was never an important product for the Thai people or to the South-East Asian people in general (Crotty, 1980) and hence the virtual nonexistence of dairy cattle within Thailand until late this century.

The management of the buffalo and cattle herds has always been characterised by its complementary role within the crop production process. For instance, the main feed source for village buffalo and cattle is mostly the agricultural residue and waste of the cropping system. The allocation of arable land for livestock is primarily constrained by the cropping cycle (utilising only arable land that is fallow or between cropping seasons) and the availability of communal or village pastures, forest reserves and other common property or

open access land.

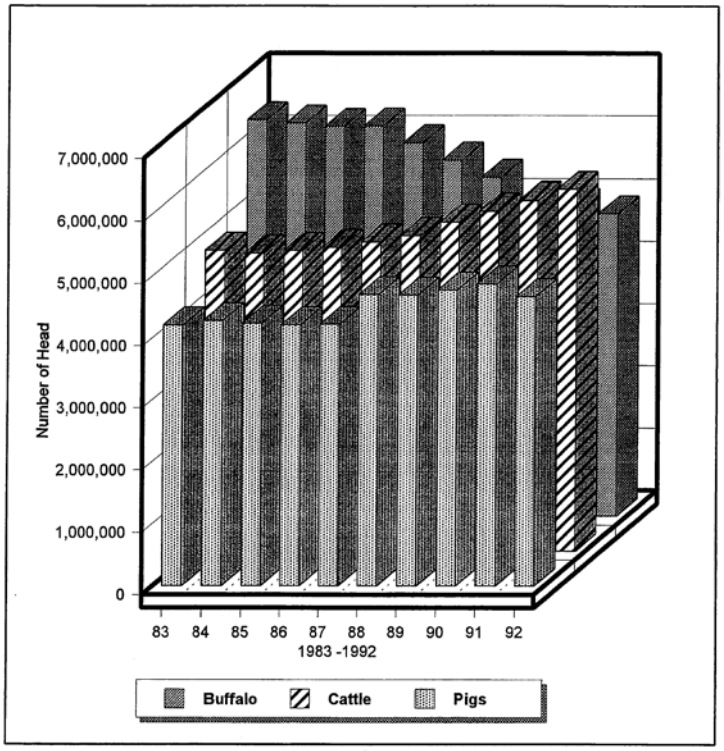
Historically therefore, very little capital is committed to bovine husbandry relative to cropping. While the costs of keeping livestock can include the costs for land and feed, labour for feeding and tending the animals and capital inputs in the form of shelters and yards, the main investment is generally the stock itself (Crotty, 1980). Crotty (1980) in his study of South-East Asian cattle suggested each animal is a 'capital asset' in every sense of the term because it embodies past investment, it produces services, it requires maintenance and it can be liquidated and the proceeds reinvested. For Thai farmers therefore, livestock has always been a very cost effective means of converting common property resources (such as communal grassland) into private capital (livestock) (Tokrisna and Panayotou, 1985).

3. Commercial Beef and Dairy Industries

3.1 Cattle Industry

Given dramatic socio-economic changes within Thailand over the last twenty years, the traditional role of buffalo and cattle has begun to change. In the mid-1980s, it was reported only 5% of cattle and buffalo were commercially produced with the larger scale cattle farms exporting most of their output (Tokrisna and Panayotou, 1985). These larger herds (anywhere from 10-50 animals) were usually owned by wealthier farmers employing hired herdsmen. It has only been since the late 1980s that herd improvement and significant expansion in the cattle industry have been seen (see Figure 1) to meet the rising demand for beef and milk. The positive growth in demand for beef and milk with the dramatic growth in Thai income and standards of living in recent times can be attributed to the income-elastic nature of demand for these commodities (Murphy and Tisdell, 1995). This expansion has been generated in recent times by a booming economy, rising population and increased tourism (Murphy and Tisdell, 1995). It is claimed that previous attempts to increase productivity in this industry were hampered by the carryover of traditional practices and attitudes, i.e. an inability of Thai farmers to see their buffalo/cattle stocks in a commercial sense. The increase in income and the associated advances in technology have also seen the decline in numbers of buffalo. The growing use of mechanical wheeled tillers by Thai fanners has caused a reduced demand for draught animals of which buffaloes comprised a high proportion. While there is a demand for buffalo meat, the net real value of buffaloes to villages has declined.

It is interesting to note that prior to 1991 buffalo stock exceeded that of cattle in Thailand. However declining numbers of buffalo and rising cattle numbers meant that by 1991 cattle population overtook that of buffalo. Nevertheless buffalo stocks are still substantial and the price differential between beef and buffalo meat has fallen (see Figure 4).

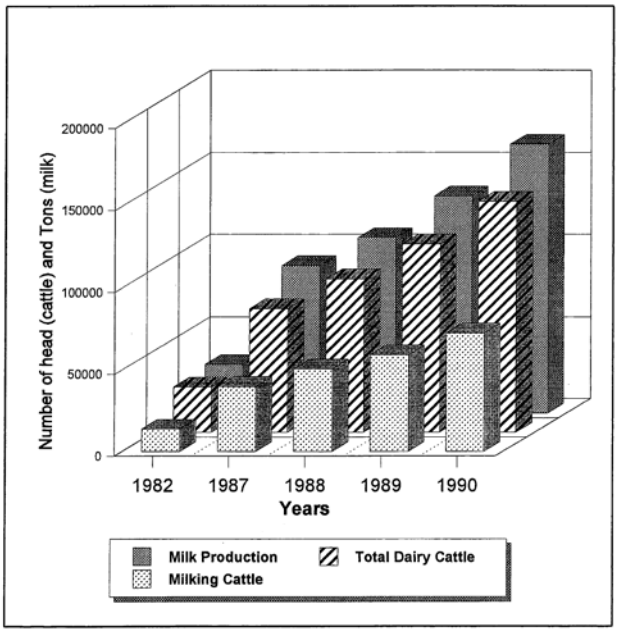


Source: Based on Office of Agricultural Economics 1993

Figure 1 Official statistics on reported number of Buffalo, Cattle and Pigs: Thailand 1983-1992

3.2 Dairy Industry

One of the more significant developments in the livestock industry in recent times has been the development of the dairy industry in Thailand (see Figures 2). As noted earlier, milk was not traditionally important within Thai culture. However, the commercial production of dairy cattle in Thailand was begun after the establishment of the Dairy Farm and Herd Training Centre, established with the aid of the Danish Government in 1962. Dairy production was then developed through the subsequent establishment of the Dairy Farming Promotion Organisation of Thailand, a state owned enterprise under the Ministry of Agriculture and Cooperatives in 1971 (O.A.E., 1992, p. 153).



Source: Based on Office of Agricultural Economics 1992

Figure 2 Number of Dairy Cattle and Milk Production Unit: Cattle (hd) Milk (ton)

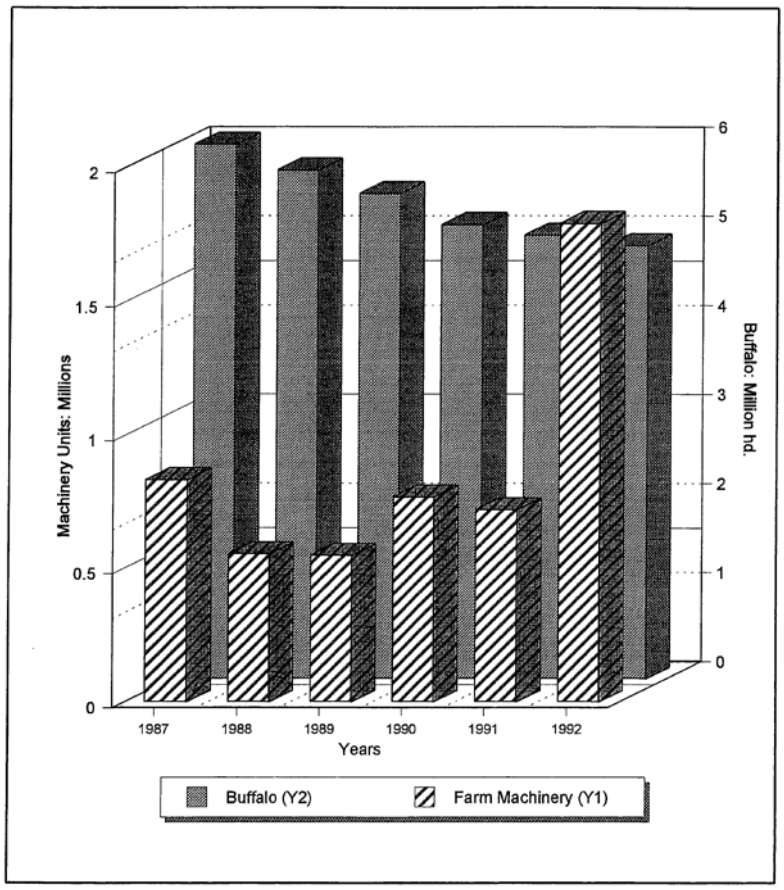
Major dairy provinces are Chiangmai, Nakorn Pathom, Ratchaburi and Saraburi. Approximately half of Thailand's liquid milk is processed as fresh milk while the rest is 'recombined milk'. Milk powder is imported into the country as milk production is currently unable to meet the rising demand for milk generated by the increased population levels and higher standards of living. Thailand exports a small amount of milk products to Laos, Singapore and Burma.

3.3 Market Performance of Livestock in Thailand

Livestock was for years one of the slowest growing sectors of the Thai economy. However in the 1970s the growth of poultry and swine production was stimulated by the rising demand for meat and the development of the animal feed industry. During this time the buffalo and cattle sub-sectors remained stagnant with only a marginal increase in buffalo numbers (0.6%) and a decline in cattle stocks (0.9%). However despite this limited growth in production, beef demand grew by around 5-6% resulting in gradually higher prices over that decade (Tokrisna and Panayotou, 1985, pp. 201).

However since the 1980s – with the rising demand for beef, higher incomes and population levels – there has occurred a steady increase in stocks of cattle. By contrast, a slow decline in

buffalo numbers has also occurred, due in part to increased farm mechanisation reducing the need for draught animals (see Figure 3). Nevertheless, the Thai government attempted to promote the development of both the cattle and buffalo industry throughout this period in order to meet the rising domestic demand for meat and milk and to capitalise on the export potential of neighbouring markets such as Malaysia, Hong Kong and Singapore.



Source: Thailand Department of Livestock (cited in Office of Agricultural Economics 1993).

Figure 3: Number of buffalo vs farm machinery imports in Thailand, 1987-1992

3.4 Income, Price and Consumption

Buffalo and cattle meat account for about half of all meat consumed in Thailand. The majority of Thais obtain about 80% of their calories from rice while their meat consumption is relatively low. While consumption of meat, particularly red meat, in South-East Asia is low compared to Western consumption (as Table 1 indicates), rising incomes may see meat permanently overtake fish as the second most important protein source for Thai consumers,

given its higher income elasticity.

The average market prices for Thai buffalo and cattle (given steady market conditions) are influenced by such factors as their type (breeder, draught, dairy), their age, and the quality of the breed (local or improved). Tables 2 and 3 indicate the percentage of varying breed and types of buffalo and cattle in an average rural farm in Thailand with mean market prices included (Thummabood and Morathop, 1993). As can be noted, the average market price per head of cattle at $375.3 was higher than that for the average market price for buffalo at $276, with dairy cattle and improved breeds receiving a price premium.

The Thai Department of Livestock estimated that the average total annual income per farm from livestock sales is $1,013, with cattle providing $812 per year- second only to pigs (raising on average $2,378 per year). While pigs were the higher income earner in terms of livestock sales, only 17% of Thai farmers sold pigs compared to 55% of fanners who sold cattle. Buffalo however generated the lowest average form of animal income from sales, $451 with only 12.4% of Thai farmers selling buffalo (Thummabood and Morathop, 1993).

Table 1: Red meat consumption in Thailand and other South-East Asian countries, 1988-199.

Average Red Meat Consumption per Person 1988-1990 (kg/head)		
	Beef and Veal (retail weight)*	Sheep and Goat meat (retail weight)**
Singapore	4.2	5.1
Thailand	2.9	(negligible)
Malaysia	2.7	0.5
Philippines	1.6	0.3
Indonesia	1.2	0.5

*** Average annual per person domestic disappearance for 1988-90. Carcass weight to retail weight conversion factor is 0.70 (e.g. Australia's beef and veal consumption averages 41.4 kg/hd, ewe)**

**** Average annual per person domestic disappearance of lamb, mutton, and goat meat for 1988-90. Carcass weight to retail weight conversion factor is 0.88 (e.g. Australian sheep meat consumption averages 22.3 kg/hd ewe)**

Source: King, A. (1993) p. 29.

Table 2: Buffalo inventory of thai farm buffalo 1993

TOTAL BUFFALO	Percent of farm	BREED		NUMBER OF ANIMALS (Hd) Per Farm average		PRICE($) per head	VALUE
		Local	Improved				
YOUNG STOCK							
Males	19	100	0	2	0.31	170.2	262.2
Females	20	100	0	2	0.37	178.3	319.24
ADULT STOCK							
Breeder Bulls	15.9	100	0	2	0.34	364. 7	709.4
Draught males	14.9	94	6	2	0.23	373.8	620.0
Dairy cows	5.6	17	83	2	0.10	396.6	733.3
Dry cows	1.0	100	0	1	0.001	320. 0	320.0
Draught cows	24.3	100	-	2	0.50	30.06	582.2
Average	100	88	12	2	1.85	276.0	499.6

Source: Thummabood and Morathop (1993) pp. 34-35.

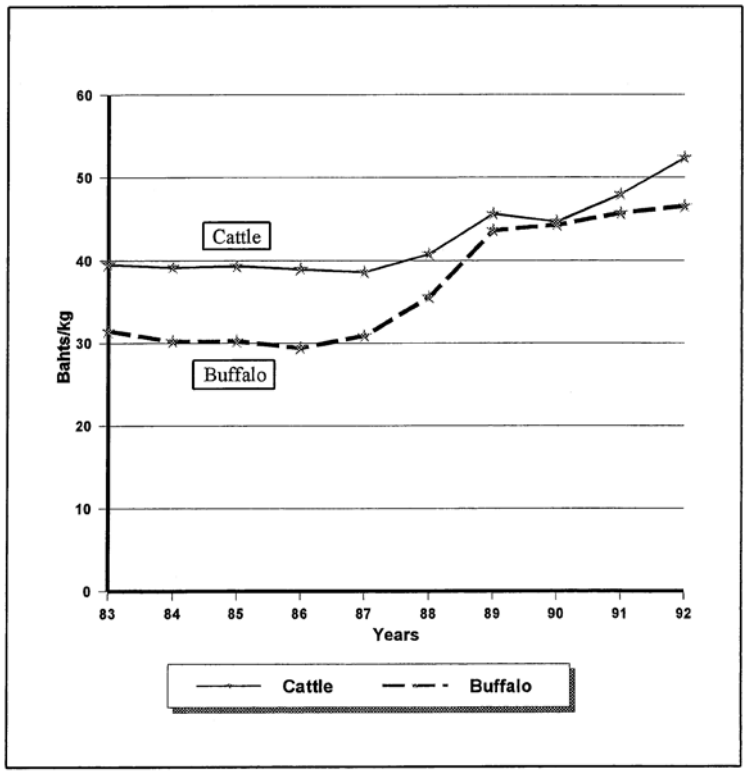
Table 3 Cattle inventory of Thai farm cattle, 1993.

TYPES OF BOVINES	Percent of Farm	BREED		NUMBER OF ANIMALS		PRICE($)	VALUE
		Local	Improved	Per Farm Average		Per head	
YOUNG STOCK							
Males	22.8	16	84	3	0.69	171.4	691.1
Females	33.7	13	87	3	1.12	237.4	898.6
ADULT STOCK							
Breeder Bulls	16.8	24	76	4	0.64	416.9	1702.9
Draught males	2.3	29	71	8	0.19	232.0	2152.0
Dairy cows	14.2	0	100	5	0.78	791.9	4202.7
Dry cows	6.6	0	100	3	0.20	814. 1	3625.9
Draught cows	3.6	30	70	4	0.14	407.6	1512
Average	100	16	84	4	3.76	375. 3	1686.5

Source: Thummabood and Morathop (1993) pp. 34-35

Beef has shown a marked increase in price, consumption and demand in Thailand in recent years. As mentioned earlier, the Thai beef market throughout the 1970s was characterised by limited production and high demand which resulted in a dramatic rise in prices. For instance, the wholesale price index of meat (WPI) increased almost twofold between 1962 and 1978. Figure 4 indicates the wholesale meat price for cattle and buffalo for the period 1983-1992. Previous attempts by the Thai government to control beef prices have been generally ineffective. For example in 1980, the retail price of beef was around 45-50 baht per kg, 80% higher than the controlled price of 28-34 baht (Tokrisna and Panayotou, 1985, p. 199). In 1992 the retail price of beef had increased to over 50 baht per kg.

Figure 4: Wholesale Meat Price in Bangkok for Cattle and Buffalo: 1983-1992



Source: Department of Livestock (cited in Office of Agricultural Economics 1993)

3.5 Market Chains

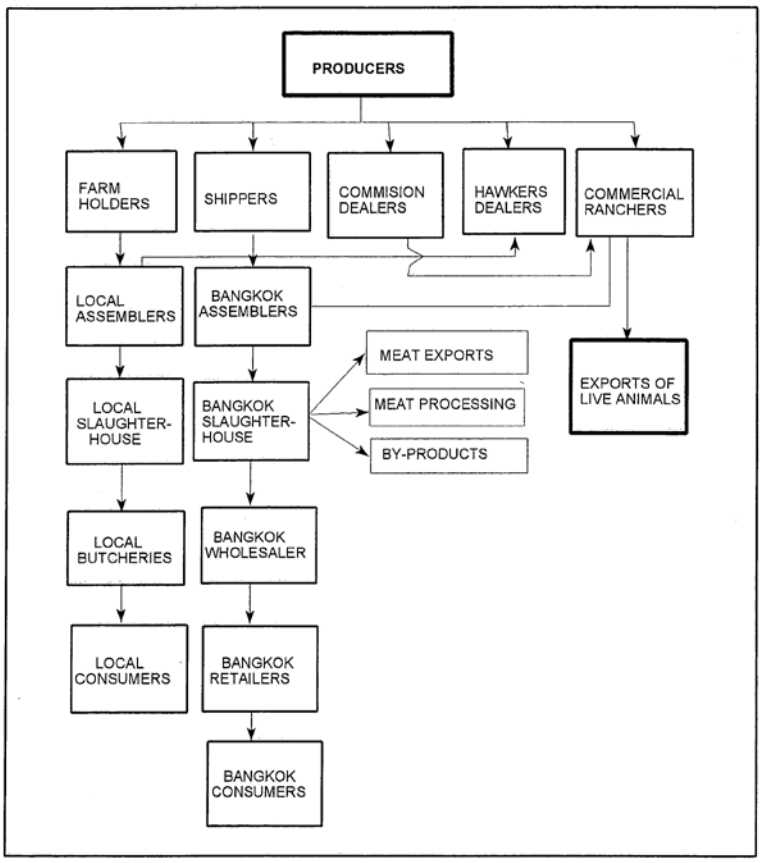
A successful transition of the Thai bovine sector from small scale subsistence farming to a profitable commercialised industry is dependent on the development of an efficient marketing process that secures adequate returns to producers. For a small-scale owner of Thai livestock, profitable commercial production relies on a high price for livestock ‘at the farm gate’ - a

price dependant on the cost effectiveness of each link in the marketing chain from farm to retail outlets.

Links in the marketing of Thai buffalo and beef in terms of product flows can be seen in Figure 5. Retired buffalo and cattle are sold live to middle-men who transport them to provincial slaughter houses or to Bangkok. On average, beef producers receive about 75% of the price paid by the final consumer. A high proportion of the costs in marketing beef is the transportation of stock from producers to the regional slaughterhouses. Tokrisna and Panayotou (1985) suggest that because transportation constitutes more than 40% of total marketing costs, a shift toward more local slaughtering and refrigerated transportation of carcasses would reduce marketing costs considerably. Figure 6 indicates that there has been a marked shift to local slaughtering since the early 1980s.

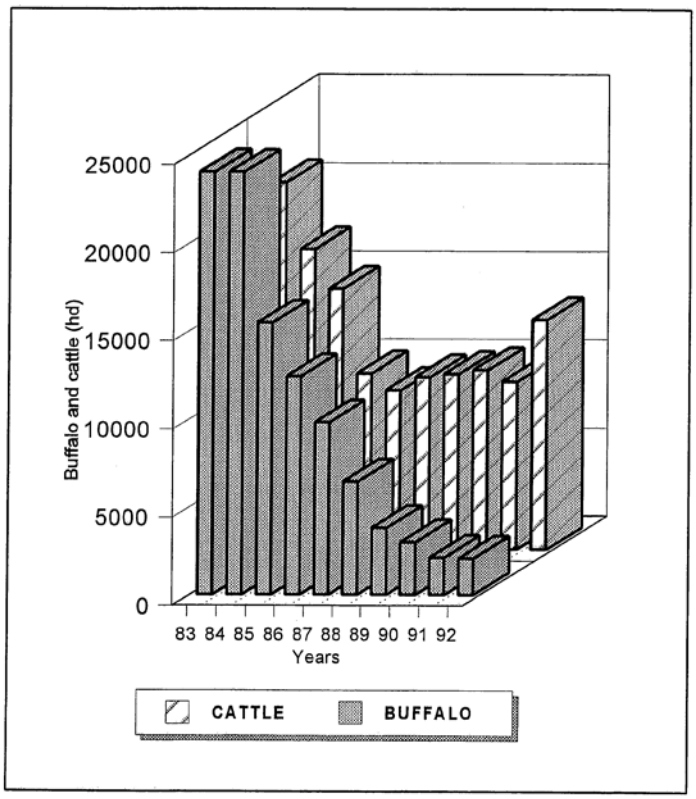
The number of both cattle and buffalo slaughtered in Bangkok in the early 1990s is less than in the early 1980s.

Figure 5: Buffalo and cattle product flows from consumers to producers



Source: UNDP/IBRD, 1981 cited in Tokrisna and Panayotou (1985)

Figure 6: Buffalo and cattle (hd) slaughtered in Bangkok: 1983-1992



Source: Based on Department of Livestock (in OAE, 1993)

The returns to small scale dairy producers in Thailand have also been reduced by high transport costs associated with the large distances from farms to milk processing plants. Furthermore Thummabood and Morathop (1993) report that Thai dairy farmers often report lower than expected prices for their milk due to what is claimed as inaccurate assessments of milk weight and quality by milk collectors.

4. Thailand's Imports and Exports of Cattle and Buffalo Products

Hong Kong, Malaysia and Singapore are the main export markets for Thai live cattle and buffalo. Access to these markets in the past however has been constrained by problems with transportation, disease and strong competition from other livestock exporting countries in the region. Traditionally Hong Kong has been the major destination for Thai exports, where in the past the market share of animals from Thailand has been over 10%. This share has reportedly declined in recent times with competition from such countries as Australia, China and Indonesia (Tokrisna and Panayotou, 1985).

Table 4 gives an indication of the export status of both meat and live cattle and buffalo from Thailand over the last couple of decades. Prior to this period, from about the early 1960s, live export of buffalo began to experience a gradual decline followed by stagnant growth throughout the 1970s. Thailand's export of live cattle however gradually increased over this period with an average increase of around 20% in its live cattle exports from 1971-79. However, as Table 4 and 5 indicate, there has been an increase in the net importation of cattle in recent times which also corresponds to an increase in the level of Thailand's bovine meat imports (Table 5). In recent years, a large increase in imports of live cattle for breeding has occurred in order to improve the bloodlines of the domestic herds to increase production and quality of Thai beef and milk. Furthermore imports of cattle products have risen markedly. This includes imports of leather.

Table 4 Import/export statistics- live cattle/buffalo in Thailand 1961-1992

National Plans	Bovine Imports		Bovine Exports	
	Cattle	Buffalo	Cattle	Buffalo
Plan 1 1961	-	-	55	68872
Plan2 1967	-	-	10563	39911
Plan3 1972	-	-	18196	25175
Plan4 1977	1253	261	214497	17306
Plan 5 1982	1145	236	2221	76
Plan6 1987	9068	408	149	446
1988	9844	390	429	866
1989	8991	987	180	338

Source: O.A.E. (1992) p. 154

Table 5 Cattle import/export statistics: Thailand 1990-1992

	IMPORT		EXPORT	
Years	Head	Value	Head	Value
1990	24240	14610	450	101
1991	21281	24982	178	40
1992	17096	11378	5090	376

Source: F.A.0. (1993).

Table 6 Import/export statistics of bovine meat- fresh chilled frozen: Thailand 1988-1992.

Years	1988		1989		1990		1991		1992	
Ton: 000/bht	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Baht	Value
Imports	171	33398	273	52713	515	73867	810	77663	1218	100443
Exports	2	99	5	273	18	928	23	1096	2	200

4.1 Dairy Products

Thailand's imports of dairy products have risen markedly in recent times to meet the country's growing level of milk consumption. In 1977, Thailand imported 45,541 tons of dairy products and exported 8,016 tons. By 1990, its imports had risen to 80,586 tons and its exports had increased only marginally to 9,922 tons. However the number of Thailand's dairy cattle has increased more than fivefold since 1982 (from 13,697 head to 72,437 head) and its milk production by a somewhat larger but comparable multiple.

The figures indicate that development of Thailand's cattle and buffalo industry has as yet been unable to keep pace with its rising demand for livestock products such as meat and milk.

Table 7: Dairy products: import/export statistics for Thailand 1977-1990

Year	EXPORT		IMPORT	
	Volume (ton)	Value (ml baht)	Volume (ton)	Value (ml baht)
1977	8016	68.29	45541	845.15
1982	10674	207.26	34296	1649.73
1987	25523	457.81	69469	2442.54
1988	13322	258.77	79450	3267.12
1989	8524	231.29	62950	3286.77
1990	9922	285.42	80586	4180.15

Source: Office of Agricultural Economics (1992) p. 156

Table 8- Number of dairy cattle and milk production in Thailand: Plan 1 (1961-1990)

DAIRY CATTLE AND MILK PRODUCTION IN THAILAND				
National plan:	**Year**	**Total (Hd)**	**Milking cattle (Hd)**	**Milk production (Tons)**
PLAN 1-4:	**1961**	NA	NA	NA
PLAN5:	**1982**	27572	13697	29568.96
PLAN6:	**1987**	75555	39656	89712.75
	1988	93417	50353	106708.85
	1989	114662	59022	132228.27
	1990	140722	72437	163850.66

Source: Office of Agricultural Economics (1992) p. 156.

5. Constraints on the Cattle/buffalo Industry

The growth of the cattle/buffalo industries in Thailand have been constrained by a number of factors. Disease problems, land availability and breeding quality have in varying ways limited the economic progress of Thailand's bovine based industries.

5.1 Disease Control

Outbreaks of infectious diseases such as foot-and-mouth disease (FMD) in rural Thailand are a common occurrence. Leidl (1989) identified some of the major bovine disease problems in Northern Thailand as haemorrhagic septicaemia, FMD, trypanosome evansi infection, mineral deficiencies, fasciolosis in swamp buffalo (to a lesser extent cattle) and gastrointestinal parasitism in buffalo calves. As in many developing countries, the knowledge and methods of diagnosis and treatment of such diseases among local communities (and commercial slaughterhouses) is still limited despite developments in the structure and efficiency of animal health control programs in recent times. The loss in stock numbers, productivity and potential export markets are the result of ineffective disease control and hygiene conditions. Table 9 provides a qualitative outline of the potential economic losses caused by FMD. The decreased productivity in draught animals caused by disease such as FMD, only serves to increase the appeal of mechanical substitutes. Tokrisna and Panayotou (1985) claim that reduced morbidity and mortality in herds caused by disease would reduce premature switching from draught animals to mechanical power at village level.

Table 9: Economic impact of FMD on production

Mortality – Very low in adults in enzootic areas, may approach 50% but very rarely and usually with animals with no immunity and those stressed from high productivity – it is usually calf mortality that is severe in enzootic areas.

Direct effect on meat and milk production – Effect on meat varies as it delays finishing off fattened animals or delays maturity in dairy animals. Even with compensatory growth, there are deterious effects on food conversion efficiency – effects aggravated by mouth lesions which make eating painful, and foot lesions which reduces the range of grazing animals. Both of these effects reduce feed intake. Effect on milk is similar and secondary mastitis infections cause more loss of milk than do direct effects.

Indirect effect of FMD on meat and milk production – There is an indirect effect on meat and milk due to infertility ie dairy cows have longer calving to conception intervals resulting in less lactation per year and therefore less milk produced. Production of calves is lower and meat production is reduced.

Restrictions on world trade in meat and meat products – Loss of potential export markets for meat and meat products is an important economic impact of this disease. Disease restrictions are used as barriers to imports by countries who import from infected areas. These barriers have led to instability in world beef markets therefore eradication of FMD in exporting countries would lead to more stable export markets in these countries. This would further allow importing countries an opportunity to import an assured quantity of beef at relatively stable prices. Risk and uncertainty is another economic effect as farmers deviate from optimal i.e. closed herd rather than include herds from outside.

Impact of FMD on development – Disease impacts on the efficiency of livestock production systems that are important for both agricultural development and the general development of most countries. The control of the disease enables other improvements in livestock production to be carried out and their important benefits are attributable to the control of FMD. Control of FMD is often seen an essential link in the chain of overall economic development.

Source: Based on James and Ellis (1993).

5.2 Land

Land availability directly influences the livestock economy. The size of landholdings is determined by historical and institutional factors as well as by population. Until recently, Thai farmers could increase their landholding by reducing forested lands. However the clearing option has now been virtually eliminated. The Thai government's ongoing land reform and tenancy restrictions have also limited the chances of developing an extensive cattle ranching industry in Thailand (O.A.E., 1992).

The access of farmers to pastures other than their own is localised and limited to a few overgrazed communal pastures, dwindling scrub forests, roadsides and verges of waterways. The expansion of crop land into upland areas has reduced available grazing lands and open access to the remaining pastures has resulted in overgrazing (Tokrisna and Panayotou, 1985, p. 199).

Overgrazed pastures lead to low breeding rates and low growth rates for buffalo and cattle with poor nutrition increasing the susceptibility of animals to disease. Past attempts to increase agronomic productivity have met with only limited success. Expansion of cattle production in Thailand may depend on increased feedlotting of cattle.

Use of extensive pastures for a beef-oriented cattle industry in Thailand is in conflict with the established pattern of landholding. Furthermore, the high level of risk borne by small-scale farmers even in attempting to raise a few large animals, limits potential expansion of cattle grazing at village level.

5.3 Quality of Thai Livestock Breeds

With the gradual development of commercial production and introduction of more intensified, regulated feeding methods (i.e. feedlotting), the breeding and beef production qualities of the Thailand bovines has become increasingly important.

Traditionally the quantity and quality of beef in Thailand has been constrained by the pattern of land holdings, the relative shortage of adequate pasture land and the need to keep buffalo and cattle to supply draught power. Bovines are often kept until the age of 12-15 years old. The quality of beef is therefore traditionally low and essentially a by- product of crop farming and supply has not been responsive to consumer demands for beef.

However as commercial demand for livestock products increases the continuation of new breeding programs is said to be necessary in order to produce higher weaning rates among local breeds - similar to the 1965 introduction of the American Brahman that was adopted in the early 1970s. New breeds help improve the quality of the animals both in strength and in meat production and achieve full effect when combined with improved nutritional programs.

Around 80% of cattle held by small scale producers are said to be improved breed. The most popular beef breed is the native crossbred Brahman while in dairy breeds Holsteins (or Fresians) are the most popular. As Table 3 notes these improved breeds receive a price

premium compared to local breeds. Around 80% of buffalo are the native swamp buffalo breed with only 12% of dairy buffalo being improved breed (Thummabood and Morathop, 1992).

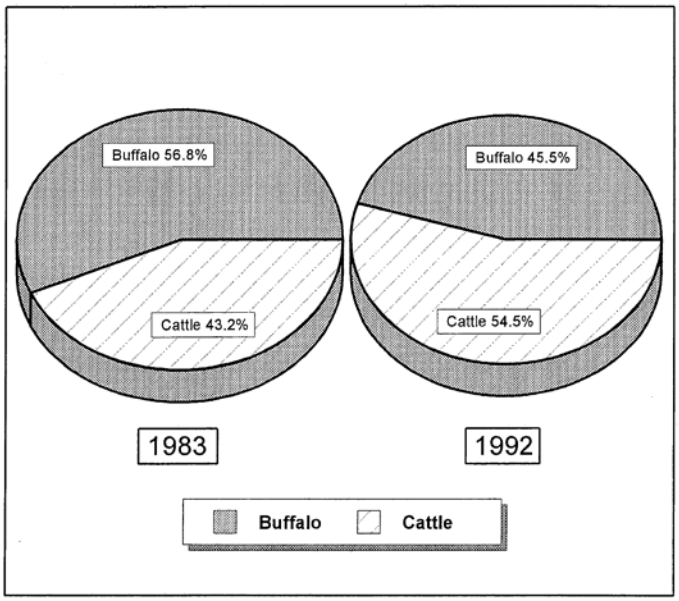
It is notable that in the past breeding programs for buffalo have not received as much attention as cattle. This is unfortunate given the low and variable weaning rates of local buffalo breeds. Most buffalo crossbreeding programs undertaken in South-East Asia and China have had mixed success in their attempts to improve the performance of swamp buffaloes (the major draught breed of Thailand). Crossbreeding programs have been undertaken between the swamp buffalo of South-East Asia and the riverine buffalo (a dairy breed of the Indo-Pakistan region). While the crossbreds have shown improved weight gain and milk production, they are perceived in some countries (such as Thailand) as difficult to manage as a working animal (Anon., 1994c, p. 160).

For breeding programs to succeed they must meet the realities of the rural environment and not just the controlled institutionalised environments in which they are first tested. With this in mind, increased attention to breeding programs in beef and dairy buffalo may be beneficial given their resilience and suitability to the given climate and such attributes as their high feed conversion ratio of local forage. While buffalo populations have declined they are still about as large as those of cattle and the decline in numbers appears to have halted. Imported breeds often incur greater risks for the Thai villagers as they require greater attention to disease control and nutrition relative to the resilient indigenous breeds of buffalo and cattle. This compromise between beef quality and disease resilience in bovine breeds is an important trade-off in developing future breeding programs as it potentially effects the long term viability of the herds.

6. Concluding Comments

Cattle numbers in Thailand have expanded considerably in relation to buffalo numbers which have declined. Figure 7 indicates the percentage composition of Thailand's bovine stock in 1983 and 1990. Buffaloes have gone from being the largest percentage of this stock to being the smaller proportion. This changing composition reflects primarily the increased demand for beef in Thailand and the reduced demand of Thai farmers for animal draught power.

Figure 7: Percentage share of buffalo and cattle stocks in Thailand: 1983 and 1991



Source: Based on Tokrisna and Panayotou, 1985

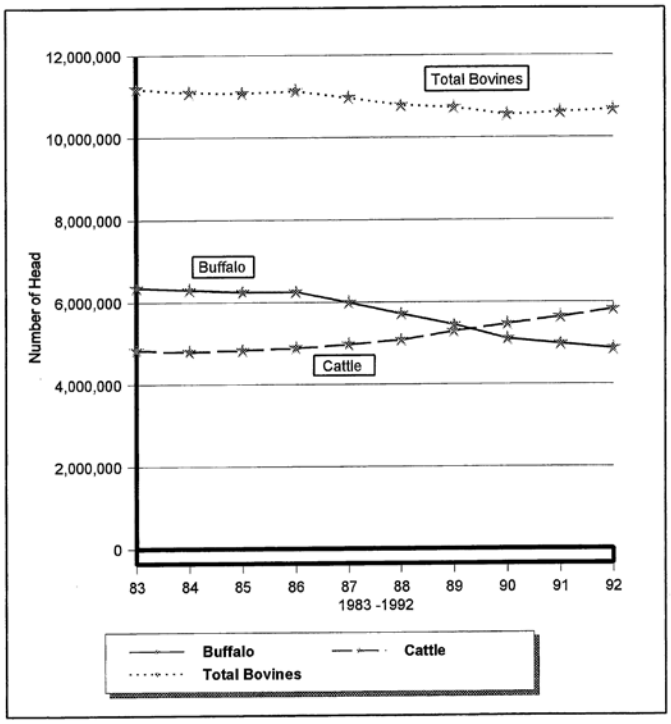
A significant development in recent years is the rapid expansion of the Thai dairy industry. In 1990, the numbers of dairy cattle in Thailand were over 140,000 and they accounted for about 3 per cent of the total stock of cattle. In comparison to Australia, Thai dairy herds are very small and Thai farmers are on a learning curve as far as this industry is concerned.

Although cattle numbers have risen both in absolute terms and relative to buffalo, total bovine numbers actually declined between 1983-92 (see Table 10 and Figure 8). However, the decline has been stemmed in recent years and indicators are that the total numbers of bovines in Thailand is rising.

Table 10: Official statistics on reported number of buffalo, Cattle and total: Thailand 1983-1992

Total stock numbers for Thai Buffalo and Cattle 1983 - 1992			
Years	**Buffalo**	**Cattle**	**Total**
1983	6,354,349	4,832,570	11,186,919
1984	6,300,896	4,788,989	11,089,885
1985	6,249,926	4,828,983	11,078,909
1986	6,256,854	4,878,741	11,135,595
1987	5,988,423	4,968,845	10,967,268
1988	5,708,270	5,072,024	10,780,294
1989	5,442,614	5,284,960	10,727,544
1990	5,094,270	5,458,680	10,552,950
1991	4,976,730	5,631,130	10,607,860
1992	4,861,910	5,815,470	10,677,380

Source: Office of Agricultural Economics (1993) p. 156.



Source: Based on Office of Agricultural Economics, 1993

Figure 8: Official statistics on reported number of buffalo, cattle and total bovines: Thailand 1983-1992

Most bovines are raised in Thailand by villagers with individual farmers keeping 2-4 animals which may also be used for draught purposes. A few farmers also have herds of local breeds of small stature. These are used exclusively for meat and are generally grazed for a part of the year away from the villages in forested areas.

Thailand’s scope for increasing its stock of bovines using grazing land is severely limited. All such land is already utilised. It is possible however, that improved pastures could raise carrying capacity. Furthermore, Thailand's scope for increased feed-lotting of cattle is limited. While adequate supplies of carbohydrate are available, high protein cattle meal is in short supply and cattle feed-lotting must compete against other users such as the commercial poultry and pig industries. For the bulk of Thai’s the cost of grain fed beef is too high at present. It therefore seems likely that Thailand will remain a substantial net importer of beef. Furthermore, with incomes continuing to rise, its beef imports can be expected to increase. Some of its cheaper beef imports have come from Myanmar (Burma) and Vietnam as well as from Laos (and southern Yunnan).

The more effective closing of Thailand's border with Myanmar is expected to reduce the cross border trade from Myanmar. In addition, Malaysia has reached an agreement with Myanmar and Vietnam to ship cattle directly to Malaysia and this can be expected to further reduce nearby supplies to Thailand. With economic growth occurring generally in East Asia, local supplies of beef throughout the region are likely to be subject to increasing competition.

As for dairy products, it also seems likely that Thailand will remain a net importer of these and that imports of its dairy products are likely to rise. While local dairy production has risen greatly, it has not kept pace with growing local demand for milk products.

Considerable improvement in the health of bovines in Thailand is possible. This provides one way to add to local supply of beef and dairy products. Nevertheless, it does not seem that Thailand is likely to become self-sufficient in the supply of these products in the foreseeable future. The lack of growth in total bovine numbers in Thailand since 1983 (see Figure 8) indicates the constraints on expansion of bovine stocks in Thailand.

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