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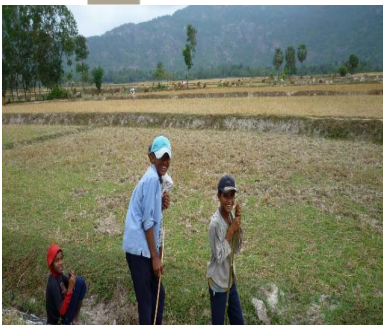


Cattle keeping among Khmer people in Vietnam

**Case study in Chau Lang commune,
Tri Ton district, An Giang province**

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ABSTRACT

This study aimed to explore the role of cattle keeping in livelihoods of people in Khmer community as well as the reasons for farmers remaining in cattle production as a significant component in their agriculture structure. Both qualitative and quantitative methods were used to collect data and information, to study perceptions and make assessments of 45 Khmer cattle keepers in Chau Lang commune, Tri Ton district, An Giang Province, Vietnam. Findings of this study showed that cattle keeping contributes to livelihood of Khmer people through many aspects including income generation, tools for agricultural production and social capital. The social functions of cattle keeping, which could provide advantages for cattle keepers' access to finance, prestige and trust from local people, were among the most important reasons for the Khmer people remaining in cattle production. The local cattle keepers established a strong relationship among themselves through the activities of cattle management and feed collection. A simple linear regression analysis indicated that the number of cattle in the survey significantly correlated to the number of people in households and number of cattle at the beginning of their cattle keeping. A scarcity of natural grasses and labor sources for cattle management were considered to be the barriers to development of the cattle population in commune.

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LIST OF ABBREVIATIONS

AFFEC	Agricultural Forestry and Fishery Extension Center
AI	Artificial Insemination
AusAID	Australian Agency for International Development
DFID	Department for International Development
FAO	Food and Agriculture Organization
ILRI	International Livestock Research Institution
MDOL	Ministry Department of Livestock
VND	Vietnamese dong (19,000 VND = 1 USD in 2010)

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CHAPTER I. INTRODUCTION

1.1. General introduction

The Mekong Delta of Vietnam is favorable for agriculture development with great potentials in natural and human resources. It is the largest agricultural area and contributes an important role in national income of Vietnam. It is considered as a rice bowl of Vietnam by occupying 32% of total agricultural land, 46% of national food production, 51% of national rice production, 80% of national aquaculture production and 80% of national rice export, as stated by De (2005). The agricultural production value in Mekong Delta contributes 33.2% of total national agriculture production values in Vietnam. At national level, livestock sector contributes about 27 percent of total GDP from agriculture production while that value in Mekong Delta is 21%, reported by General Statistics Office of Vietnam (GSO) (2010). More than 80% of total rural households have small-scale livestock production as an income generating and employment source. Moreover, livestock supplies protein sources and leads to improve the nutrition of rural population, especially for women and children reported by Phuong (2008). In agriculture sector, cattle production has become a means of poverty reduction and hunger eradication as well as a tool for sustainable development. Cattle production allows farmers to utilize optimally the locally available natural feed resources (Nguyen Xuan Trach, 2008).

Furthermore, an argument by Herold & Zarate (2008) and Egunienta et al., (2002) showed the important roles of cattle keeping in livelihoods of people living in mountainous areas in Vietnam. Cattle keeping is one of the most important activities for livelihoods and a traditional production in An Giang Province, especially for the 90,000 Khmer households. Performance of cattle in terms of power for ploughing, transportation, trading and meat supply in An Giang got the highest values compared to others Provinces in Mekong Delta, claimed by Vietnam news agency (2010). Besides, Van (2008) studied about the livelihood of Khmer in An Giang province, she stated that agricultural activities contributed nearly 40% of total income of Khmer people. A study by Bao Tran (2005) reported that the livelihood of Khmer people in An Giang depended on crop planting and livestock activities. However, as a statement argued by Doan *et al.*,(2006) there is a lack of large natural pastures in Vietnam. We are facing with a shortage of grass for feeding livestock because of the increase in human population and the expansion of economic zones.

In addition, according to the report of the Australian Agency for International Development (AusAID) (2004) the Khmer people are poorer and more low-educated than others in Mekong Delta. They stated that the situation of landlessness and lack of land was expanding in Khmer community. Khmer people had to work with off-farm activities or move to the city to find jobs. It leads to a shortage of labor sources for cattle management. Besides, grassland is more and more narrowed because of development of industrial and agricultural sectors. Local people had to face with difficulties in terms of collecting fresh grass for cattle. The development of “Dieu” trees *Anacardium occidentale L* (industrial tree) affected negatively to natural grass for cattle keeping, during two periods. In 1978-2003, 865 ha of “Dieu” trees were planted. 2004-2009, local people expanded another 1.253 ha. In the past, cattle had an important role for agricultural production via supplying power for ploughing. At the era of mechanization, machines are used commonly in agricultural production, thus the functions of cattle in agriculture do not remain like before. Moreover, in crop-livestock integration systems, Egunienta *et al.*,(2002) analyzed the negative

impact of cattle in this system. In mountainous areas in Vietnam, rice straw, which was one main cattle feed, was not sufficient to feed the cattle in the winter. In this situation, cattle and crop compete for space in the hillside. Cattle could damage crops leading to conflict among households and villages. It was a reason of indirectly harming inter- and intra-village social relationships. Over-grazing by cattle caused soil compaction leading to decrease of crop productivity. Moreover, hygienic problems caused by livestock also affected on the livelihood of cattle keepers. We can see that cattle keeping of Khmer people had to face with more constraints but it was surprising that more than 80% of Khmer cattle keepers remained and tended to expand cattle production in daily activities. The objective of our research is to understand reasons for why the Khmer people still remain with cattle production, while they have to face with increasing difficulties in terms of finding feed sources for cattle and the reduction of their roles to draught power for crop production as well as reduced income and impacts of diversification of production activities. The research is done as a case study in Chau Lang commune, Tri Ton district, An Giang province, which is a Khmer commune, with a high poverty rate (25.4%, while the average value for the province was 13%), and most of local people keep cattle.

1.2. Introduction of the research site

1.2.1. An Giang Province:

An Giang Province is located in the Southwest Vietnam and borders with Cambodia through 95km borderline. In Mekong Delta, An Giang borders with Dong Thap, Kien Giang and Can Tho Provinces. An Giang has eleven administrative units comprising Long Xuyen City, Chau Doc Town and nine Districts. Natural area is about 3,536km². The average temperature is 27⁰C with two seasons separately which are the dry season and the rainy one. The rainy season lasts from May to November and the dry season lasts for from December to April of the next year. The economy of An Giang province depends mainly on agriculture with more than 73% of the total working population, but this rate is reducing in recent years. The main labor force of agriculture, especially the young people, prefers coming to big districts and cities to find jobs with high income. The proportion of population working in trading sectors and services occupied about 20% of the total, whereas the proportion of population working in industrial sectors and construction was 7%. The 2005 population of An Giang was 2.200.000 people of four ethnic groups, including the Kinh, which is the biggest group; the Chinese, the Khmer and the Cham (Muslim). The Khmer migrated into the two mountainous districts - Tri Ton and Tinh Bien where livelihoods were based on cultivating and raising animals (Bao Tran, 2005) (Thanh Van, 2008).



Figure 1. An Giang's administration map

1.2.2. Selected study site

Tri Ton district is the largest district in An Giang Province with the lowest population density. Tri Ton has 3 ethnic minority groups including Kinh, Khmer and Hoa (Chinese). This area has mountainous areas with natural and planted forests (7,568ha). In dry season, the ambient temperature is from 36 to 38⁰C, especially in April it is the highest. This period was more difficult for agricultural production because of water shortage. The number of cattle population in Tri Ton was the highest in An Giang Province. Besides cattle production, Tri Ton has potential to develop industrial crops as “Dieu” trees (*Anacardium occidentale L*). Khmer people in this area live in groups that called “Thon” or “Soc”. More than 80% households in Tri Ton breed cattle. Cattle are grazed on grasslands in hills, mountains and rice fields after harvested. When there’s a shortage of grass in dry season, farmers store rice straw for feeding cattle. At this time farmers also have to buy grasses from others or go to collect the natural grasses by groups in Kien Giang Province. Many festivals are annually celebrated by Khmer people in Tri Ton such as cattle-race, Chol Chonam Thmây and Ok Om Bok (Vietgle, 2009).

Chau Lang commune belongs to Tri Ton District, borders with Tan Lap commune of Tinh Bien district in East, Luong Phi commune in West, Tri Ton district in South and An Hoa commune of Tinh Bien district in North. Total natural area of the commune is about 3258 ha that includes 2756 ha for agricultural productions and 628.82 ha for forestry. The commune is divided into 9 hamlets with 15,266 inhabitants, and Khmer people occupy 61.45% in total population. Educational levels of local people is low with 20% population illiteracy, 30% not yet completed primary school, 30% access secondary school and 20% labors at high school level. The poverty rate in the commune was 25.4%, approximate 830 households. Livelihood of local people depends on agricultural activities such as rice cultivation, crops and cattle production (2,700 cattle heads in 2009). In addition, many provincial roads across the commune creates favorable conditions for trading and service to develop (Tri Ton, 2009).

1.2.3. Cattle production and its extension programs in An Giang Province

Cattle production is a long-standing traditional activity in An Giang. Local people started raising cattle with spontaneity, small scale in order to use for plough, reproduction, and slaughter for food consumption. Breed was taken random and selected basing on experiences by local people in real production. Breed has been local yellow. Breeding facilities was simple and cursory. Local people have used agricultural by-products and grass in fields or mountainous areas. Especially, cattle keepers did not use vaccination for cattle, thus producers could face with high risk. Because of low breeding and feeding quality, the raising time lasted too long and the benefits were reduced. In order to improve the local breeding productivity, the provincial People’s Committee is implementing a policy of “Sind hoa dan bo (crossbred with Sind breed)” since 1993. Besides, a policy of enlarging the planted pasture areas was promoted. However, the productivity of the pastures was slowly increased while the number of cattle was more and more accelerated. The Sind crossbred cattle is about 19.1% of the total population of province.

Table 1. Cattle population (head) in An Giang Province from 2003 to 2008

Number	District	2003	2004	2005	2006	2007	2008
01	Long Xuyen	1,220	855	1,031	1,183	923	1,018
02	Chau Doc	578	578	752	1,033	743	717
03	An Phu	1,095	1,120	1,691	1,667	1,385	1,271
04	Tan Chau	1,586	3,195	3,588	3,566	3,164	2,731
05	Phu Tan	932	1,132	1,621	1,599	2,032	1,614
06	Chau Phu	2,609	2,957	3,383	5,629	4,579	4,572
07	Tinh Bien	15,815	17,875	18,101	19,949	20,460	18,728
08	Tri Ton	18,432	19,286	20,593	18,138	21,062	21,221
09	Chau Thanh	2,118	2,973	3,695	3,589	3,505	3,076
10	Cho Moi	6,899	10,513	13,131	15,083	12,674	14,591
11	Thoai Son	1,548	1,596	2,179	2,645	2,368	1,585
	Total	52,832	62,080	69,765	74,051	72,895	71,124

Source: An giang Province statistics office (2010)

From 2005 to 2006, thanks to the decrease of epidemic and the increase of beef price (approximate 7,000-8,000VND/kg), the cattle population accelerated, mainly in Chau Phu, Cho Moi and Tinh Bien districts. The reasons for this increase were less epidemic and increasing beef price. Cattle keepers could benefit from 1.5 to 2 million VND per cattle head after 5-6 months fattening. In addition, more policies and projects of the provincial government were supported and implemented at that time. They also created a motivation for cattle keepers. However, the local breeding cattle breeds still made up a high percentage (80.9%) of total cattle population, because the costs of artificial insemination was high. This cost free in project time, but cattle keepers had to pay about 50,000VND for AI per time now and Sind crossbred heads did not satisfy the requirements of the projects. From 2007 to 2008, the number of cattle heads decreased due to that most of the developing projects and the supporting policies ended.

1.2.4. Cattle production extension programs in An Giang province

In order to get the goals of the “Sind crossbreeding” policy, the Agricultural Extension Center of the Province used the annual budget to continue this policy. The activities included:

- Technical transferring to the cattle keepers on selecting good Sind bulls, reproductive cows and calves, which were better than the local breeding ones in terms of growth and reproductiveness.

- Training the technicians on artificial insemination (A.I.) for working in the rural areas. In addition to this, the programs also used Sind bulls direct mating with local cows to improve their

productivity. In 2005, there was 215 Sind crossbred calves born by artificial insemination (A.I.). Then from 2005 to 2009 there also were 600 Sind crossbred calves born.

- Implementing the programs for reproductive cows which increased quality of local cattle breed, particularly, reproductive cow keeping with rotation of a female calf from household to household was done. First household gave a reproductive cow, when it produced female calf; this calf was transferred to another farmer and so it continued.

- Organizing training courses for cattle keepers to fatten cattle by using local roughages and supplemented concentrates and food residues.

These programs and policies were implemented in most districts of the province, especially in Tri Ton and Tinh Bien, which had a lot of Khmer people and the biggest cattle herd in the province, as reported by the Agricultural forestry and fishery extension center of An Giang Province (AFFEC, 2010).

Table 2. Cattle production extension programs were conducted from 2005 to 2009

Programs	2005	2006	2007	2008	2009
Improving productivity for local cattle (calf) (1 Sind bull/40 cow)	455 - Artificial insemination: produced 215 calf - Direct mating: 240 calf	320	440	80	120
Fattening (head)	-	450	170	160	-
Grass planting	-	8	16	-	-
Reproductive cow (head)	-	-	6	9	23

Source: AFFEC (2010)

1.2.5. Khmer people in An Giang Province

An Giang Province has a special culture with the combination of four cultural backgrounds including Viet-Hoa, (Chinese)-Khmer and Cham (Muslim). Each culture with specific traditional values are maintained and linked following historical change in order to create unique culture of An Giang Province. Khmer people in An Giang Province settle mainly in Seven Mountains areas belong to Tinh Bien and Tri Ton districts with about 90,000 inhabitants (occupy 4% of provincial total population). They live in groups into specific communities called “Phum” or “Soc”. Most of them follow Theravada Buddhism and live by agricultural production with cattle production and rice cultivation. In recent years, the socioeconomic status has been growing fast, leading to a better physical and spiritual life for the population, especially for Khmer people. Since 1998, more investment policies and programs for socioeconomic development of Khmer people have been conducted, as the ‘135’ and ‘134’ programs of Government, and ethnicity programs of Province. Thanks to these programs, the infrastructural systems comprising transportation, irrigation,

electricity, water, school, housing for the poor and so on, have been improved that creates a new face in the life of Khmer people in An Giang Province (Bang, 2009).

1.3. Research questions

The general objective in this study was to understand factors related to the choice of cattle production as a rural enterprise by Khmer people in Vietnam including socio-cultural aspects of cattle farming, and to identify the opportunities and constraints for such farming. The specific objectives include:

1. To describe characteristics of cattle production
2. To identify factors influencing the practice of cattle keeping among Khmer people
3. To identify opportunities and challenges of cattle production of Khmer people

Based on research objectives, the main research question in this study was ‘What factors affect the choice of cattle keeping practice among Khmer people in An Giang Province? This question was investigated through the following sub-research questions:

1. What were the characteristics of cattle production among Khmer people?
2. What factors affected the choice to maintain cattle production among Khmer people? Why did Khmer people raise cattle for their livelihood?
3. What were the opportunities and challenges to develop cattle production further by Khmer people?

1.4. Structure of the study:

This thesis is arranged in five chapters as follows:

- Chapter 1: introduces the topic of study, research objectives and research questions
- Chapter 2: literature review of livestock production and its roles on rural people in the world and in Vietnam
- Chapter 3: present methodology used to collect data and results for the study
- Chapter 4: express and discuss household characteristics and cattle keeping in study site
- Chapter 5: provides conclusion of the study

CHAPTER II. LITERATURE REVIEW

This chapter reviewed theories related to livestock production and its role on poverty reduction and hunger eradication in the world in general as well as current status of cattle production in Vietnam. In addition, the characteristics of Khmer people in Mekong Delta in Vietnam also were explored.

2.1. Livestock production in the world

2.1.1. Current status

Nowadays, the living standard of 1.3 million people is below one USD per day. In that, agriculture production is the main livelihood activity of 50-75 percent of the extreme poor. Livestock keeping, which three of four farmers in developing countries maintain, provides high-value agricultural production as a way to create income and poverty reduction. The world population, income generating and urbanization have been increasing over time and these are also reasons why the world demands of food have increased. The consumption of foods of animal origin has increased 20 percent in twenty years (1970-1990) (Kristensen *et al.*, 2004). The agricultural production in general and production of animal meat in particular has regular increased to satisfy food demands. Livestock provides over half of the global agricultural product values and one-third in developing countries (Upton, 2004).

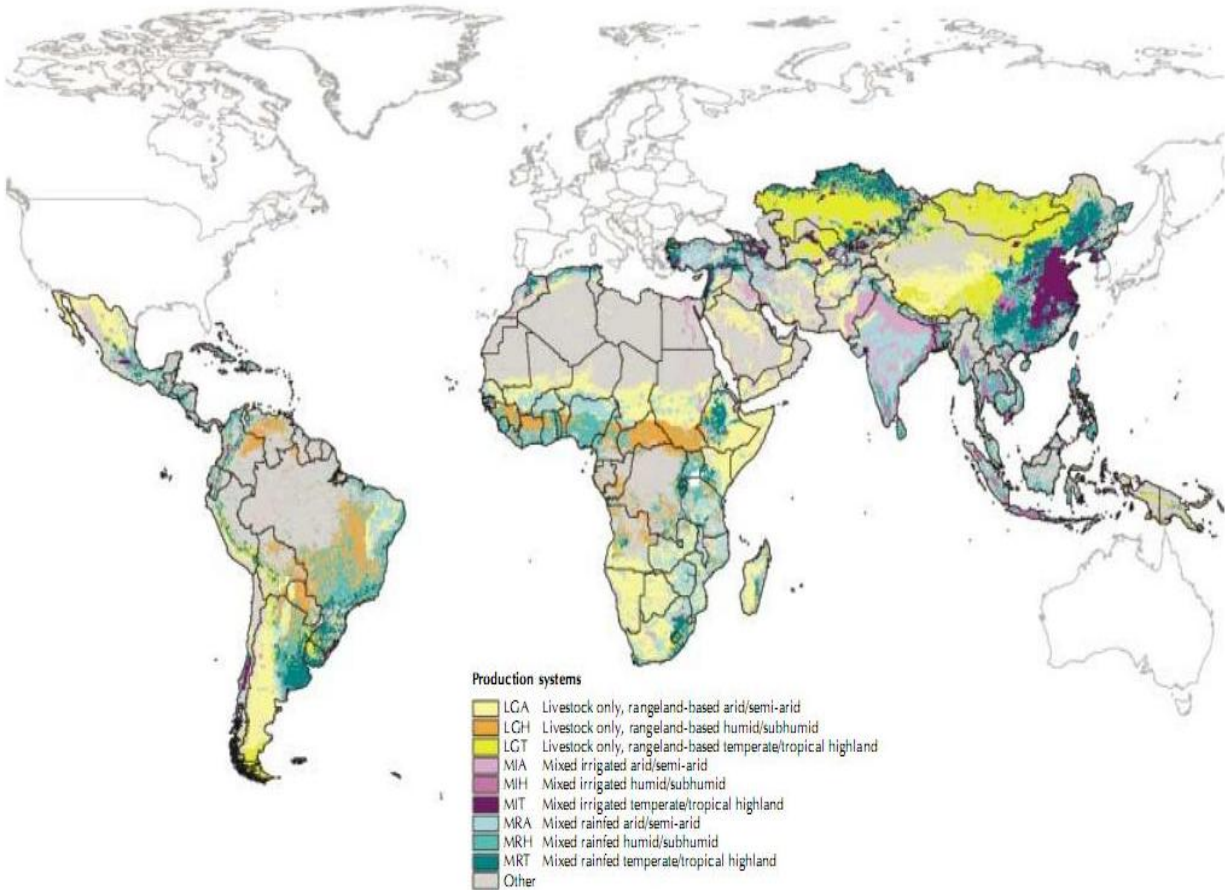


Figure 2. Global livestock production systems (Source: ILRI (2010))

Table 3. Summary of livestock systems, priority production systems and major issues across regions

Livestock systems	Priority production system	Regions					Major issues
		Asia	SSA	CA	WANA	LAC	
Landless	• Peri-urban/urban dairy production	√	√		√	√	• Surface water contamination
	• Peri-urban/urban poultry and pig production	√	√	√	√	√	• Zoonoses • Waste disposal
	• Feedlot (cattle or small ruminants)	√	√	√	√	√	• Nutrient flows
	• Goat and sheep production	√	√	√	√	√	• Overgrazing
Crop-based mixed	• Integrated systems with annual crops (ruminants and non-ruminants plus fish)	√	√	√	√	√	• Food-feed systems
	• Integrated systems with perennial crops (ruminants)	√	√			√	• All year feeding systems • Nutrient flows/soil fertility
	• Beef and dairy production	√	√	√	√	√	• Productivity enhancement
	• Goat and sheep production	√	√	√	√	√	• Intensification and specialisation • Overgrazing
Agro-pastoralist	• Cattle		√	√	√		• Feed supplies/drought strategies
	• Goat and sheep production		√	√	√		• Property regimes • Overgrazing • Trypanosomiasis
Range-based	• Sheep and goat production	√	√	√	√	√	• Drought strategies • Overgrazing • Property regimes • Marketing

Note 1. SSA = Sub-Saharan Africa; CA = Central Asia; WANA = West Asia and North Africa; LAC = Latin America and the Caribbean.

Note 2. √ indicates that both the production systems and animal species are the most important within the region.

Note 3. Major issues inter alia are those that currently merit R and D attention. Across regions, the issues are broadly similar as is the case with dairying.

Note 4. Dairy production includes buffalo and cattle, especially in Asia.

Source: Owen et al., (2005)

The livestock systems maintained are in different types at different regions in the world and are considered as a function of the agro-ecological conditions and farming systems. In these systems, the growth of natural grass, which is the main feed of livestock, depends on climatic, edaphic and biotic conditions. Livestock growing performance has close relationship with the quality, quantity and distribution of natural grass. There are many classifications of livestock systems by many authors because of differences and variation of climate, farming systems, animal species, production goals and external factors. Owen (2005) summarized that Nestel (1984) described types of livestock systems according region while Wilson (1995) used farming system as an indicator to classify crop-livestock systems. Total of types of livestock systems was eleven and mixed farming systems occupied six types among of them. In 2000, ILRI defined livestock systems into three groups that included grassland-based system, mixed crop-livestock systems and industrial systems. Pursuance of the UN Millennium Development Goals, based on the specialization of resource-poor keepers, DFID's Livestock Production Program (LPP) re-classified livestock systems as landed milk producers; crop/livestock farmers and small stock keepers; landless urban livestock keepers; and pastoralists and transhumant.

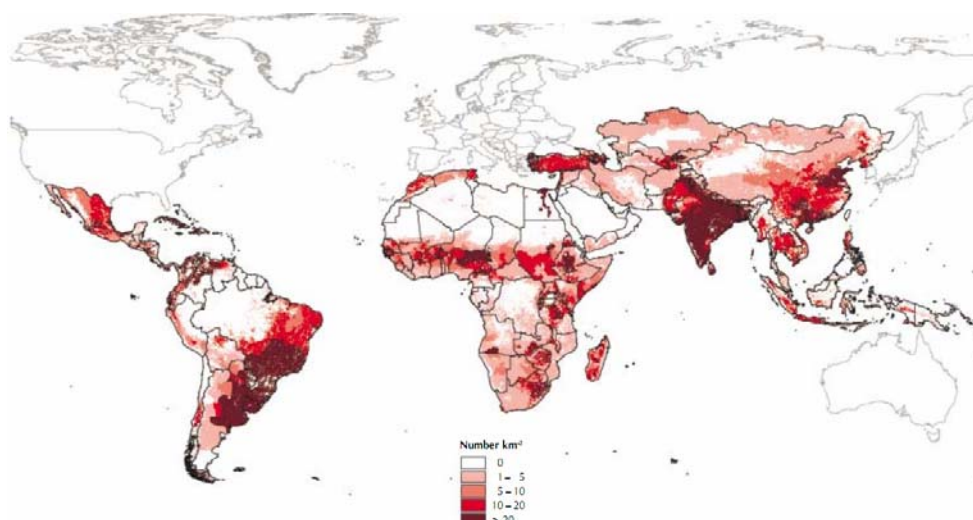


Figure 3. Cattle density in the world (Source: ILRI (2010))

Table 4. Meat production in the world and Vietnam in 1999-2007

Meat production (1000 tones)	World				Vietnam			
	1999-2001	2005	2006	2007	1999-2001	2005	2006	2007
Cattle	56,304	59,493	58,758	59,852	93	142	159	206
Sheep and goat	11,248	12,584	12,812	13,132	5	9	11	11
Pig	90,025	99,197	100,339	99,212	1,414	2,288	2,505	2,553
Chicken	58,674	71,412	72,396	75,826	289	322	344	359
Milk	579,847	647,794	665,277	679,207	83	229	247	266
Eggs	55,138	61,137	62,155	63,411	186	197	226	254

Source: FAO (2010)

Meat production of the world in general and Vietnam in particular increased year after year in period 1999-2007 in order to satisfy the increasing food demand of global population and nutrient balance in human diets. Cattle meat was the second source supplying protein for global population. In Vietnam, pig meat was main source for proteins providing to people and cattle meat was the third.

2.1.2. The role of livestock production in livelihoods of the poor and poverty reduction

Livestock production has become a main sector in poverty reduction policies in developing countries. Blench *et al.*, (2003) studied on the role of livestock production for the poverty reduction strategies of sixty-one developing countries as well as issues affecting livestock development in relation to poverty alleviation, which indicated that most poor people in those countries lived in rural areas where agricultural production was the main activity. Governments considered the roles of the agricultural sector in poverty reduction, but contribution of livestock was not reasonably acknowledged, although they knew that livestock had an important role to poverty alleviation through national data. Pica-Ciamarra (2005) stated that the governments in developing countries

were using livestock production as a way to carry out poverty reductions. They had policies to “kick-start domestic market” and “expand livestock markets.” Why did they assess livestock production as a sector for poverty reduction? In a study of Preston (1977), he claimed that objectives of livestock production in developing countries included producing meat and eggs to enhance nutrition and satisfy food demands for local people; saving and/or earning foreign exchange; creating more employment; improving living standard; contributing to regional development; and developing systems in terms of biological, economical and ecological contexts.

The roles of livestock production in the livelihoods of the poor comprised many aspects, as follows:

2.1.2.1. Food security

Many papers indicate that the contribution of livestock to household food security varies among rural people. In the article “why keep livestock if you are poor” of Kitalyi et al., cited by *Owen et al.*, (2005), they explored that the role of livestock has been to provide food for people over hundreds of years. The ancients raised livestock to address the problem of unpredictability of food supply associated with unpredictable weather. Now, livestock keeping of the poor is related to food security in terms of protein supply sources as well as essential micronutrients and energy supply sources. They use animal products especially small animals such as poultry for food or might sell animal products to buy cereals in order to provide nutrition for the daily meals. They demonstrated that poor people who raised livestock tended to consume more livestock products than the poor without raising livestock. Moreover, Kristensen *et al.*,(2004) argued that food requirements increased day by day as a result of the increase in population, household income and urbanization. Livestock played a key role to satisfy this requirement. One livestock project that was described in the paper showed that livestock products consumption of farmers in the project increased two times compared to farmers who were not members of project. Fresco & Steinfeld (1997) explained that livestock related directly and indirectly to three aspects of food security, which were food production, stability of supply and access to food. Livestock provided high animal protein products; supported draught power and manure; and created income and stored wealth for households.

2.1.2.2. Contribution to increase agricultural production

In many poor countries, draught animals are important assets especially in mountainous areas, arid and semi-arid land. Ruminants can be used for draught in order to expand agricultural land and make land more fertile, with over sixty percent of the different zebu cattle types were used. In addition, animals are used as a mean of transportation to move agricultural inputs and outputs for farmers in geographically complicated regions. In some countries, not having draught animal leads to delay in planting, low crop productivity and high production cost (*Owen et al.*, 2005). Animal manure is a crucial source to supply nutrients for soil in remote areas where farmers have difficulties to access to inputs (fertilizer). Lekasi *et al.*, (1998) stated that manure management practice could improve agricultural productivity and income for farmers in Kenya. Barrett (1992) reported that the role of cattle production in Zimbabwe had close interrelation with crop production through providing power, manure and transport.

Table 5. Main crop-animal interactions in crop-based livestock systems

Crop production	Animal production
Crops provide a range of residues and by-products that can be utilized by ruminants and non-ruminants	Large ruminants provide power for operations such as land preparation and for soil conservation practices
Native pastures, improved pastures and cover-crops growing under perennial tree crops can provide grazing for ruminants	Both ruminants and non ruminants provide manure for the maintenance and improvement of soil fertility. In many farming systems it is the only source of nutrients for cropping. Manure can be applied to the land or, as in South-East Asia, to the water which is applied to vegetables whose residues are used by non-ruminants
Cropping systems such as alley-cropping can provide tree forage for ruminants.	The sale of animal products and the hiring out of draught animals can provide cash for the purchase of fertilizers and pesticides used in crop production. Animals grazing vegetation under the tree crops can control weeds and reduce the use of herbicides. Animals provide entry-points for the introduction of improved forages into cropping systems. Herbaceous forages can be under-sown in annual and perennial crops and shrubs or trees established as hedgerows in agro forestry-based cropping systems

Source: Devendra and Thomas (2002) edited by Owen *et al.*, (2005)

2.1.2.3. Livestock as investment, insurance and tokens of relationship

Beside the functions in food security and agricultural production, literature shows that livestock has a role as saving, investment and insurance of the poor in various ways. “Consumption smoothing” is a term used by economists to understand livestock roles, because livestock can generate products during the whole year. Livestock keepers could sell their products to get money at any time of the year, unlike crop production. Livestock was a popular way to accumulate wealth over the years. The number of animals showed the wealth level and social position in some remote areas. Animal keeping is a factor to create and maintain social relationships through traditional customs as married payments, festival. It is considered as collateral for loan money, although just spirit aspect (Owen *et al.*, 2005). In developing countries, credit accessibility of poor households is more difficult because the banks required collateral from farmer. In that case, livestock was used as property function. Moll (2005) described the livestock was kept not only for physical products but also for insurance, financing and to display status. Social aspects of livestock showed on using cattle for ritual purpose and cattle could express social status and pleasure in ownership (Barrett, 1992).

2.1.2.4. Livestock in climatically marginal environments

Marginal environments are often located in mountainous areas and arid zones where the poorest live. Literature shows that livestock is particularly important for livelihoods of local people and was showed by mobility characters of livestock. Castella *et al.*, (No year) studied in mountainous areas in Northern Vietnam, where local people used traditional slash-and-burn cultivation practices and to develop their livestock herd, crop-livestock integration in farm could improve and maintain land fertility.

2.1.2.5. Livestock and social capital

Normally, when analyzing the roles of livestock keeping of household livelihood, the researchers focus more on economic function and integration of livestock to agricultural production. The social functions of livestock were received with the lesser concern. In Southern Africa, livestock production is considered a means of creating and maintaining social relationship among local people through many activities such as wedding payments, inherited assets and traditional form of getting loans. The poor people often received livestock loans from lenders, who did that activity in order to show their social solidarity or charity to the poor (Owen et al., 2005). These authors also argued that livestock keeping enhanced gender equity. He and his partners analyzed that children and women had priority access to livestock products because they owned mainly and related closely to animals. Addition, the using of cattle power for draught also reduced much of the drudgery for women. According to Irungu (2000) it was argued that cattle were central to the culture of Orma people, ethnic minority in Kenya. Cattle would be slaughtered at weddings and funerals. The groom's family had to give cattle for bride's family as party payments. All time of their life focused on cattle production. This opinion was also supported by Bayer *et al.*, (no year), one cattle breed called "Nguni" in South Africa contributed various socio-cultural functions in the community. The pure white Nguni, which was kept as a Royal herd, played a significant cultural function in weddings. These cattle were the *lobolo*, the animals that groom's family paid for bride's family.

In some countries in Southeast Asia, where livestock are an integral part of different types of farming systems, Sombilla and Hardy (2005) gave some arguments to explore the social function of livestock keeping. In Cambodia, livestock production was divided along different lines of ethnicity because different groups had specific religious beliefs. Cattle production of Khmer people, the main ethnic group in Cambodia, had strong impacts by their Buddhist religion. They believed that one person could get a bad thing in future if she or he behaved badly with animals. Thus, they supervised cattle in good ways. On the other hand, ethnic minority in Northeastern Cambodia used animals mainly for sacrificial purposes because they believed on natural environmental power, which had strong effects on fortunes of the people. In Vietnam, the H'mong, the Dao people, ethnic minority migrated in mountainous areas, raised livestock in order to use for special events relating to religious occasions or festivals. The social function of livestock production in Indonesia was expressed in different ways. Farmers considered cattle as a form of saving and as a social indicator or an asset to show welfare status in community. The rich farmers, who owned more animals, could take more advantages on accessibility and availability of feed than poor farmers, who had animals through tenancy. Animals contributed as a charity fund in order to motivate livestock production in rural areas. This was found in Thailand. The King in Thailand has promoted and established a livestock bank to help the poor people. The gender equity was analyzed as a social function of

livestock keeping in Philippines. The women in families related closely to animals and participated significantly in decision-making in production systems.

2.1.3. The roles of livestock in falling into, remaining in, and pathways out of poverty

The livestock not only help the poor escape from poverty but are also as a reason to make the poor fall into as well as remain in poverty. Kristjanson *et al.*, (2004) analyzed clearly the reasons why livestock could have positive and negative impact on the poor, with case studies for each situation. The authors showed that the traditional custom in funerals was a main reason to make livestock keepers falls into poverty. Farmers had to slaughter or sell their animals to cover the funeral costs and supply food for mourners. In some developing countries, local people were extremely influenced by traditional customs such as weddings or funerals. They had to organise a big party at such times. For the poor, assets, which they could use to create money and food, were livestock. Below are some examples of case studies by Kristjanson *et al* (2004):

Box 1. Case Study 1: Leah Ationo Oyugi in Western Kenya: Losing livestock due to funerals and becoming poor

Leah was born in 1918. She attended primary school for only one year. She married Oyugi Madara of Madara village, Siaya district, in 1948. They had 18 children (16 girls and 2 boys). 13 girls died in early childhood and 2 died as adults after getting married. Her two sons also died as adults. One was killed in an accident and the other after a long illness. By 1978, her husband had taken up tailoring as a profession, which he continued until his death in 1999. Leah lives in a semi-permanent house that was constructed for her by her late son who was a police officer. She works on her husband's plot, which she says very productive. In 1978, her household was not poor, and they had many livestock. However, most of them have since died and many were slaughtered. Two bulls were slaughtered when her husband died. A bull was slaughtered for each of her two sons' funerals, and a cow was slaughtered when her daughter in-law died. The only type of livestock remaining in Leah's compound is some local chickens. She attributes that she fell into poverty due to the deaths and related loss of livestock assets that hit her family so hard. Now she subsists by making and selling charcoal, as there is nobody left to help support her.

On the other hand, livestock can help the poor to not fall into poverty when they have health problem and health-related expense. If farmers lose their animals by theft or disease, they could not escape poverty (see next box).

Box 2. Case study 2: Gaudencia Anyika in Western Kenya: livestock thefts made her household poor

Gaudencia is 75 years old widow. She lives in Udin village in Siaya district and did not go to school due to illness during her childhood. By 1978, she was staying at home practicing subsistence farming since her husband, the family breadwinner, had died some 4 years back. In 1985, her brother gave her money to start a petty business. This business enabled her to pay for her children's primary education. In 1992, she fell ill and could not continue with her business. In 1993, 8 of her cattle were stolen. This weakened her economic status considerably. Later she restocked with four cattle paid as bride wealth when her two daughters got married. However, in 1997, two bulls were stolen from her kraal and she is now left with only two cows. She subsists and supports her 6 grandchildren on 1/16 ha piece of land.

How can livestock help the poor escape from poverty? Authors indicated that on-farm diversification of income sources, of which livestock was a main component, is a reason for escaping poverty.

Box 3. Case Study 3: Bwana Lupalo escapes from poverty by dairy

Bwana Lupalo is 55 years old. He lives in Buronya Village in Vihiga district. 25 years ago, he was still a student in secondary school. He came from a very poor family. His parents were peasant farmers who owned a very small piece of land (0.3 ha) and had no livestock. After his graduation from secondary school, he joined the police force. With his salary from the police force, he managed to buy 1.5 ha of land where he has established his compound. On this piece of land, he grows tea, maize, bananas and fruit trees. He has 4 crossbred dairy cows and uses a semi-zero grazing system. His dairy cows produce enough for his families' consumption needs, and he has extra milk to sell every day. Dairy farming has been his main source of income since his retirement from the police force. In fact, Lupalo mentions that he earns more from dairy than he did as a policeman. His status has very much improved compared to 25 years ago. Furthermore, he has two daughters in the police force. When they got married, their wealth were paid to him.

In general, livestock had an important role in livelihood of people in Western Kenya. It could create income for poor through farm diversification and was also a key factor related directly to poverty reduction. In case farmers had benefits from raising livestock, they could escape from poverty. On the contrary, they still maintained poor and fell into poverty if the benefits from livestock was lost.

2.2. Cattle production in Vietnam

2.2.1. Current status:

In Vietnam, the number of cattle in 2007 was more than 6.7 million heads with 25.6 percent of them for ploughing and 1.5 percent of dairy cows. In recent five years, the average annual growth of cattle has been 6.29 percent; there was increase from 3.89 million heads in 2001 to 5.54 million heads in 2005. At present, fifteen provinces have policies of high-yielding cattle with thousands of heads of imported Sind breed to satisfy cattle production requirement of farmers, reported by Vietnam Ministry Department of Livestock (MDOL, 2009).

Table 6. The number of cattle and growth rate annually 2001-2005 in Vietnam

Items	Number	Unit	2000	2001	2002	2003	2004	2005	Growth 01-05 (%)
1	Cattle	million	4.13	3.89	4.06	4.39	4.91	5.54	
2	Growth rate	%		-5.74	4.37	8.12	11.84	12.83	6.29

Source: MDOL (2009)

Cattle production contributes to livelihoods of rural people in many ways. It creates income for farmers to build houses, buy accommodation equipment and pay for education fees. Besides, cattle are used for ploughing agricultural land in remote areas. Rural people use cattle for transportation. Herold and Zarate (2008) indicated that cattle production played a major role as ‘bank’ saving of people who live in the highland areas of Vietnam. Eguienta *et al.*, (2002) from a study in the North mountain areas of Vietnam, concluded that cattle production was a vital activity of farmers through offering draft power, capital and meat to farmers.

2.2.2. Cattle production system

2.2.2.1. Extensive farming

This system is popular in most cattle keeping households in Vietnam. Cattle production is a long-standing activity following the wet rice culture and cattle is an indispensable animal. Vietnam has fourteen millions farmers and four millions of them keep cattle, following an extensive farming and utilization system with an average size of 1.5 heads per household. More than ninety percent of the cattle in Vietnam are raised in this system in which the power of cattle is used to plough in agricultural production. Cattle used in this system are normally local and Zebu species (MDOL, 2009).

2.2.2.2. Semi-intensive farming

Small and medium farms in Vietnam use semi-intensive farming for cattle production. In this system, cattle are allowed to range freely on mounds, grass-lands, forest margin, riversides, dike edges and rice fields after harvested. Cattle will be supplied fifty percent of nutrient requirement through grass and agricultural by-products at night. Farmers use crossbred Zebu and pure Zebu species in this system (MDOL, 2009).

2.2.2.3. Intensive farming

Intensive farming is a new model in Vietnam and just developed in recent years. This system requires high technique and expense. Vietnam has about 0.5 percent cattle keeping farmers using this system mainly for breed production and fattening for selling with more than one hundred heads per household. Crossbred species with high meat production are used in this system. Farmers prepare large pastures and divide it into many parts. Cattle will eat rotationally on a small part of pasture or are kept in modern stalls to feed with nutritionally balanced diets (MDOL, 2009).

2.2.3. Cattle meat market and policies intervention

According to FAO (2008), on average 4.7 people had one cattle and average cattle meat per caput per year was 5.5kg in general the world. In Vietnam, corresponding figures were 15.5 people and 1.71kg, respectively. In 2005, Vietnam produced 142,000 tons cattle meat equivalent to 5.03 percent of the total meat production. The cattle meat consumption has a high potential with the highest price compared to other meat. Cattle meat production of the country does not meet the demands of consumers in the domestic market. Vietnam has to import cattle meat for local people and tourists. The main business type is middleman who comes to remote or rural areas to collect cattle at village and sell in districts or city. Cattle are transported from mountainous areas to deltas, rural to city and the North to the South of Vietnam. Not only consumed in the domestic market, cattle also are exported through border gates. With the estimates of experts, the cattle meat demands will increase in the coming time because of the increase in household's income. This can be seen as an opportunity for cattle keeping households in Vietnam.

In the last decade, the government of Vietnam has had many policies and programs to develop cattle production in various ways. New breeds with high productivity as well as production technique have been supported in many provinces. In addition, grass, feed processing, veterinary services and vaccine also were supported for difficult areas. Training programs and extension services in cattle production have been conducted. Moreover, many credit programs were promulgated to help the poor raise cattle. Land policies for helping farmers expand their farm without limitation of farm size and cattle heads were realized. One important policy related to consumer markets to help farmers sell their products with suitable prices was done. The poor people could get cattle free of charge to improve their livelihoods. Especially, cattle festivals as cattle races were celebrated annually to encourage cattle production in the country (MDOL, 2009).

2.2.4. Constraints in cattle production in Vietnam

Cattle production brings more benefits for local people but there are still some constraints that barrier further development. MDOL (2009) indicated that lack of local government organization of cattle production in some provinces; lack of high productivity breed, technique, experience and infrastructure; and lack of grassland and high quality grass are some constraints that affected negatively to cattle production.

2.3. Khmer people in Mekong Delta

In Mekong Delta, Khmer occupied for 6.49% total population in this area with 1.05 million habitants. The Khmer had higher poverty rate than average of population (23% people in Mekong Delta was poor compared to 32% of Khmer). Besides, the number of poor Khmer who could escape from poverty was also not as many as others in same location (AusAID, 2004).

2.3.1. Landlessness

Agricultural production, which effected directly on livelihoods of Khmer people, was considered as a traditional activity of them. However, more and more poor Khmer were landless or lacked land, thus they had to change their activities from self-employed agricultural production to hiring out their labor. As a result, more than eighty percent of Khmer income came from off-farm activities (AusAID, 2004).

2.3.2. Education and employment

Poor Khmer people had low education levels and were even illiterate in Khmer language and Vietnamese. The number of Khmer people attending secondary school was below one-fifth the average of the Mekong Delta. At the upper secondary school levels, this number was one-third. As a result, poor Khmer people tended to work in unstable and inadequate off-farm employments. They found manual employment with low incomes and less training courses. Several of them worked at local enterprises and went overseas in forms of labor export (AusAID, 2004).

2.3.3. Marginalization

AusAID (2004) stated that poor Khmer people were marginalized from villages and district government organizations due to the language difference, other official behavior and their lack of understanding about the personnel and apparatus of local office. A survey conducted by AusAID showed that two-thirds of Khmer households were not aware of the programs or policies which had been implemented in their commune, although those programs related directly to them.

2.3.4. Lack of access to government program

Khmer people have received less or no benefits from the government's policy of hunger eradication and poverty reduction because they did not understand the goals of programs or policy thoroughly. Some of them were lazy or fatalistic and had little appreciation of their cultural values and strengths (AusAID, 2004).

On the whole, livestock production is an important and indispensable component in livelihood of poor people in different regions in the world. It contributes to food security, income generation, agricultural production as well as social capital of livestock keepers. Livestock sector has received more and more concern and attention from policy makers on hunger eradication and poverty reduction strategies. In Vietnam, cattle keeping relates closely to cash income resources, using power for agricultural production and as a 'bank' in some rural region. Khmer people, who often own cattle in their production structure, have more difficulties than other ethnic groups, in terms of human- and social capitals. These difficulties caused the poverty situation in Khmer community. The theoretical framework used for this study will be analyzed in next page (figure 4)

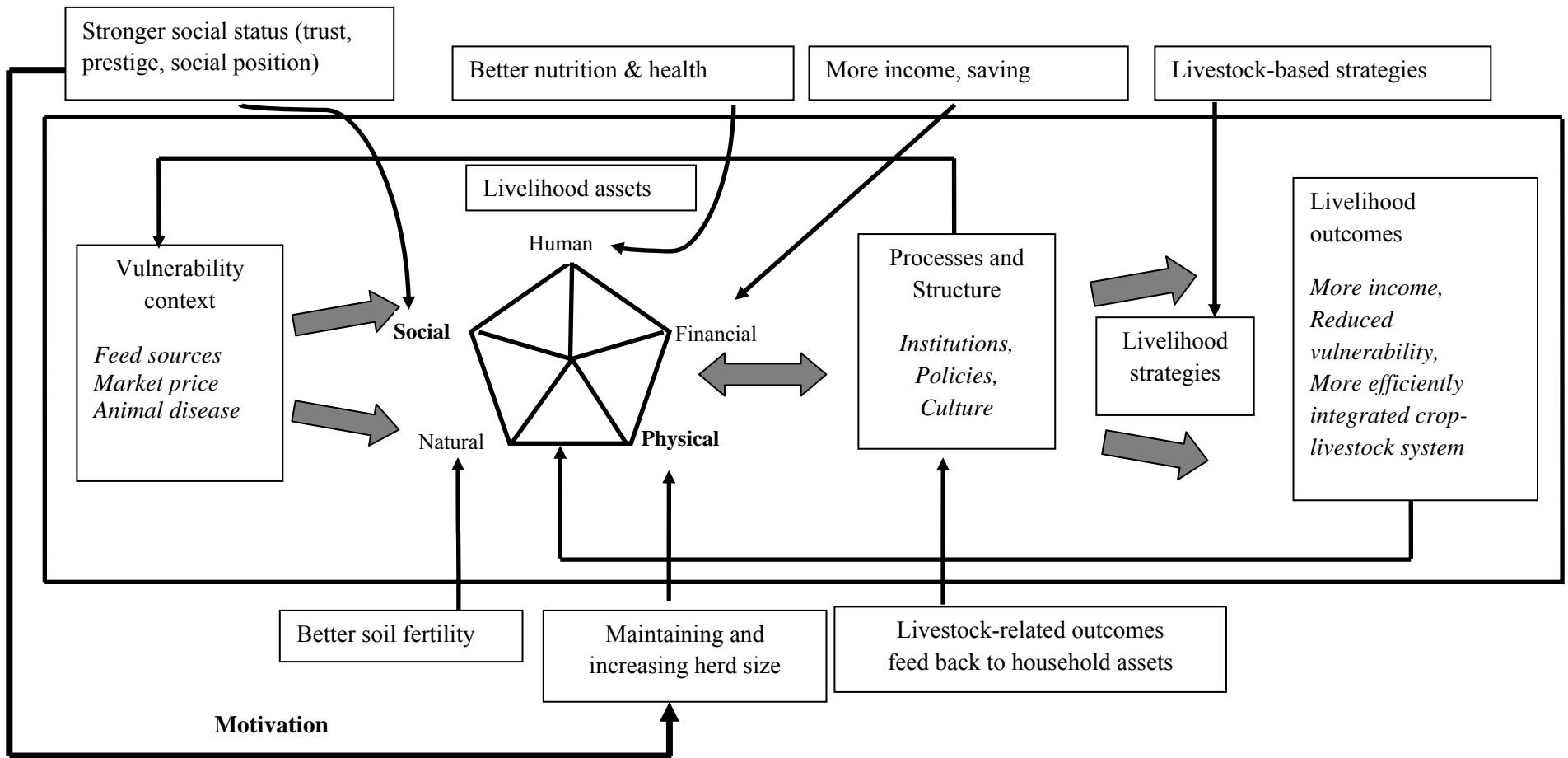


Figure 4. The framework for analyzing the contributions of livestock keeping in farmer livelihood, particularly on social capital

Based on the previous studies and sustainable livelihood framework, with contribution of livestock to strengthening the asset base, of Carney (1998) edited by Randolph *et al.*, (2007), this study hypothesizes that a stronger social status by cattle keeping is a motivation for remaining or increasing herd size of cattle keepers. The cattle, physical capital, affect on financial (income, saving), natural (better soil fertility), human (better nutrition and health) and social capitals (trust, prestige, social position) especially. Beside, cattle keeping are affected by local and provincial institutions, policies and cultural values. Based on using positive impacts of them, livestock keepers have livelihood strategies in order to enhance income, reduce vulnerability (feed sources, market price and animal disease) as well as improve efficiently integrated crop-livestock system.

The next chapter would introduce what tools and methods that we use to collect data for this study as well as how we conduct them by logical ways in order to get useful and valuable data and information.

CHAPTER III. METHODOLOGY

3.1. Data collection

The data collected in this study includes:

- Household information: Age, gender, education (grade levels that household members completed), family size, labor, housing land, agricultural and mountainous land areas, job (farm, non-farm), routine daily activities, social networks (relationship of household to neighbors, community offices, input and output suppliers)
- Historical progress of cattle keeping and its roles in different periods of time in terms of number of cattle head, ways of feeding system, management and market information.
- Household incomes and expenditure in 2009
- Current conditions of cattle production and policies intervention in commune at surveyed time.

3.2. Data collection methods

This study combined both qualitative and quantitative methods

3.2.1. Secondary data

Secondary data was collected from local administration authorities and officers, the statistics of districts, provinces and previous research (cattle production of commune over time, policies related to cattle production, households name lists of cattle keepers, history of commune, festivals and customs related to cattle, cattle meat consumption market ...). In addition, the information about Khmer people and cattle keeping in commune were also found on the internet and publications of science websites.

3.2.2. Primary data

a. Group discussion

In fieldwork, group discussion was done with cattle keepers within commune with ten farmers in a group. During group discussion, research workers guided the farmers through the contents of the research such as the present situation of cattle keeping, reasons for remaining in cattle keeping, advantages and disadvantages of cattle keeping as well as their perception about the future of cattle keeping. In group discussion, some PRA tools were used as follows.

- Timeline: this tool was used to understand historical progress of cattle production in local commune since the Khmer migrated into the commune, through discussing with key informants (local officers responsible for agricultural production) and elder member in community. By using this tool, we recognized the development of cattle keeping and roles of cattle in different periods.
- Seasonal calendar: through seasonal calendar we knew different activities, problems and opportunities that happened in different periods of time. With this tool, we understood when people did agricultural production or non-farm activities; when they could create incomes and food easily; when they faced to lack of food; when they used maximum cattle performance for their production; when their cattle lacked of feed; when they used cattle for festivals and so on.

- Scoring and ranking: before conducting this tool, we had interviews with 45 cattle keepers. Based on the answers of local people, we synthesized all factors affecting on decision making of cattle keeping in Khmer community. At the time, when we reported initial results to local cattle keepers, we used scoring and ranking tool. Each cattle keeper would decide by themselves which reason was the most important factor affecting their decision making of their cattle production maintain. The most important reasons were showed at number 1 value and at number 5 for the less. The increase of the number corresponded to the gradual decrease of the importance of reasons. This tool was applied with 7 cattle keepers. And then, we summed up the value of each reason. The most important reason had the lowest value and vice versa. With this tool, we knew what item was important to local people compared to others. Factors that have affected cattle production of local people would be explored.
- SWOT analysis: to understand the cattle keeping system in commune, we used table for SWOT analysis. This table showed strengths, weakness, opportunities and threats on cattle production base on local perceptions of local people.

b. Household interview

This study interviewed 45 cattle keepers. Households were chosen randomly by using households list in communal office. On the way of preparation of the questionnaire the researcher would discuss with commune leaders to fit the content with economy-society-environment-cultural conditions of local people. The questionnaire was pre-tested with 5 households before real conducting. Besides, 1 input supplier, 1 output supplier (middleman) and 1 veterinary service supplier were interviewed to understand different perceptions of them regarding cattle keepers.

c. Deep interview

Deep interviews were conducted with each of ten cattle keepers for two hours in turn. No questionnaire was prepared. The content of interview was about everything related to cattle production. As a result, we deeply understood the roles of cattle in different economic status and basically about the differences among households. Their stories were good examples to express about cattle production system in the commune.

3.3. Data analysis

After cross-checking information by triangulating, we used tables, figures and diagrams to present the results of PRA tools. The data from interview was analyzed by computer programs and software such as Excel and SPSS. The descriptive and frequency analysis were done to show statistical information of household's characteristics and factors related to cattle keeping of Khmer people. Moreover, a simple linear regression modeling was done to investigate the interrelationship between various factors of household's characteristics and cattle keeping. The following equation was estimated:

Number of cattle at present = f (Education levels of household head, the number of people in one household, land areas of one household, agricultural land area, mountainous land area, time of raising cattle, number of cattle at initial time of cattle keeping, participation extension programs)

The following chapter will present the results of this study. By combination of both qualitative and quantitative methods, the characteristics of cattle keepers as well as local cattle production through overall understanding of the cattle keeping system were described; factors affecting on

the decision making of remaining with cattle as well as the advantages and constraints of local cattle keeping were analysed.

CHAPTER IV. HOUSEHOLD CHARACTERISTICS AND LOCAL CATTLE KEEPING

4.1. Information of household characteristics of the surveyed households

The findings of information of household characteristics of the surveyed households gave basic information in order to supply initial understanding about local people as well as cattle keeping in community.

Table 7. Mean of some human and production resources of cattle keepers based on feeding systems

Household characteristics	Feeding systems			
	Hand-feeding completely (n=15)		Mix-feeding (n=30)	
	Mean	SE	Mean	SE
Age of household head, year	51.5	6.95	51.1	8.65
Number of people per household	4.67	1.59	4.73	1.55
Land areas per household, m ²	92.5	37.7	85.9	28.3
Agricultural land area, cong	4.07	4.25	4.70	2.09
Mountainous land area, cong	1.60	1.80	1.88	2.41
Time of raising cattle, year	38.7	7.67	39.7	7.87
Number of cattle at initial, head	2.07	0.59	1.83	0.91
Number of cattle at present, head	2.40	0.63	3.37	1.27

SE: standard error, cong: 1300m²

Table 8. Education levels of cattle keepers in Khmer commune

Households education level				
	% within system	% of total	% within system	% of total
Illiteracy	13.3	4.4	3.30	2.20
Primary	66.7	22.2	66.7	44.4
Junior	20.0	6.70	26.7	17.8
Senior	0.00	0.00	3.30	2.20

The results of table 7 showed that the number of cattle at present of mix-farming system cattle keepers was higher than of that of hand-feeding system (3.37 cattle head compare to 2.40). Mix-feeding system cattle keepers need labor to manage cattle and land areas for grazing in the field. Those aspects were expressed through the data in table 7 that the number of people per household, agricultural land area and mountainous land area of mix-feeding cattle keepers were higher than of those of hand-feeding system cattle keepers (4.73 vs 4.67, 4.70 vs 4.07 and 1.88 vs 1.60, respectively). In fieldwork, local cattle keepers claimed that they would graze cattle in the field when they had labor for management or their mountainous land was rather large (more than 2 cong) because they grew normally crop in small cultivated area (about 1 cong, due to they had a lack of capital to invest). The residual areas were used for grazing cattle. The time of cattle keeping was long (average 39.3 years), corresponding to the age of heads of households, compared to cattle producers in Phuong (2008) study in Quang Ngai Province in Vietnam, which was about 7.35 years. It implied that farmer's experience to cattle keeping was much broader in time. The local people had land for cultivation and animal husbandry. Most of cattle keepers had low education level with 66.7% of households attending only at the level of primary school, for both feeding systems, while 13.3% of cattle keepers in hand-feeding system were illiterate and that value was 3.3 % in mix-feeding system. There's nobody in hand-feeding system who has reached on senior levels and only 3.3% of the 'mix-feeding system cattle keepers' accessed to this levels. This factor could have negative effect in their access to technical knowledge transfer in relation to cattle production among farmers.

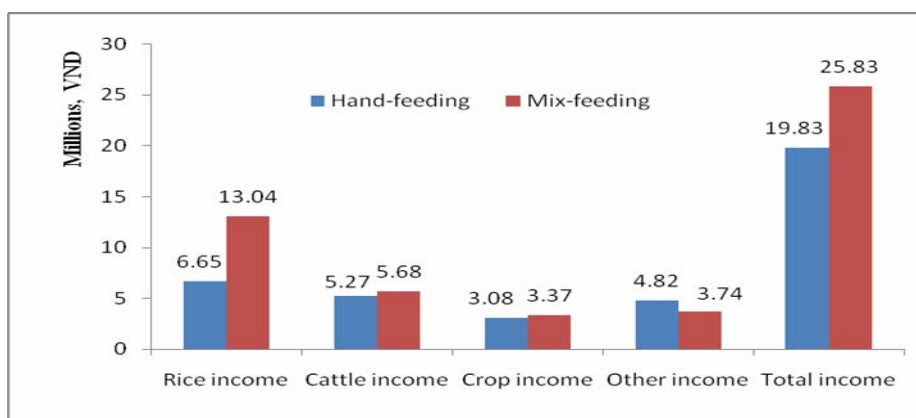


Figure 5. Cattle keepers' income sources in a year

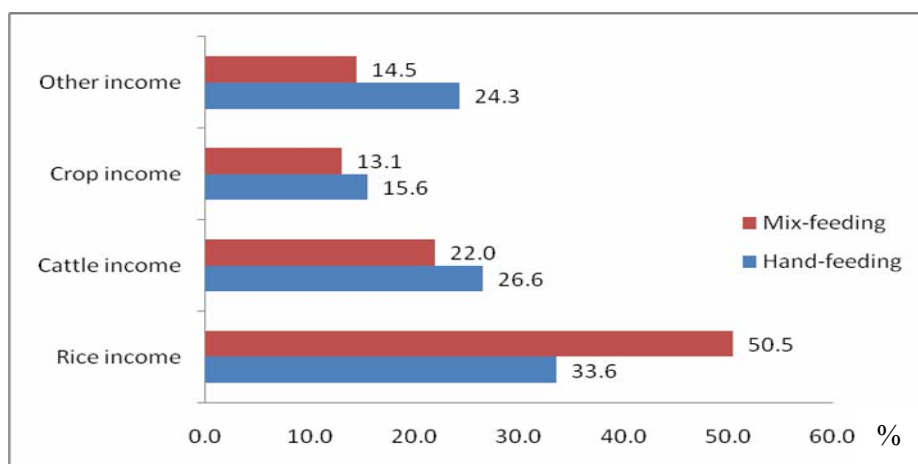


Figure 6. Contribution of rice, crop, cattle and other income on total income of households

In spite of having larger agricultural land area, the rice income of mix-feeding cattle keepers was higher than that of hand-feeding cattle keepers that led to the total income of mix-feeding cattle keepers was higher than compare to hand-feeding cattle keepers. However, contribution of cattle income in total income of hand-feeding cattle keepers (26.6%) was higher than of that of mix-feeding system (22.0%). The hand-feeding cattle keepers used their labor to find others job to earn income instead of using that labor for grazing cattle. Because of that, their other income (24.3%) was rather higher than the value of mix-feeding system cattle keepers (14.5%). The highest income was coming from rice production, with twice the value compared to the income from cattle production. This difference between farmers' perception and the figures for this year obtained from the survey could be explained by the fact that Vietnam had to face more difficulties with rice export in 2009. Due to this, larger than usual quantities of rice was stored in farmer's house. They could not sell their rice because the government did not permit export of more rice in order to retain food security for the country. At the end of 2009, government allowed internal companies to sign more contracts for rice exporting, thus the price and demands of rice products increased. Additionally, the government had introduced a big policy scheme (Tam Nong, which focused on agriculture, farmer and rural areas) to help farmers for selling their products with better prices to get more profits. Consequently, in this year, farmers have sold rice with prices higher than those of last year by about 2,000VND per kg. This led to rice contribution to total income of households being higher than usual, as shown in the survey.

Table 9 described the various activities of local people. We can see that their activities related to agricultural production. The local people owned two kinds of land for rice cultivation, including lowland and upland. In upland, they could cultivate two rice crops and one vegetable crop per year, while one rice crop per year for lowland was applied. Local people had two places for vegetable production. They were able to grow crops in agricultural land or mountainous land areas. Mountainous land areas were only used for crop production. After harvesting the first rice crop, some local people went to different places or within the commune, working as hired labors such as bricklayer, tapping palm sugar, and quarrying to get cash incomes. The local people enjoyed many festivals in a year. All of them agreed that they lacked grasses during three months (August, September and October) of a year.

Table 9. Seasonal calendar of production activities of cattle keepers

Activities/Items	Solar calendar											
	1	2	3	4	5	6	7	8	9	10	11	12
Rice cultivation-first season	■									■		
Rice cultivation-second season				■								
Crop production on agri. land	■											
Crop production on mountainous land							■					
Hire labor		■										
Cattle production	■											
Festivals			■	■			■	■	■	■	■	

Lack of fresh grass for cattle										
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4.2. Cattle production systems

4.2.1. Historical progress of cattle keeping in commune

Table 10. Historical progress of cattle keeping in commune

Periods	1975-1979	1979-1980	1980-1985	1985-2000	2000-2009
Main purpose of having cattle	Plough, pull, to draw a rake, transportation	Plough, pull, to draw a rake, transportation, food security	Plough, pull, to draw a rake, transportation	Plough, pull, to draw a rake, transportation	Selling, plough, pull, to draw a rake, transportation
Feeding system	Free-grazing completely	Free-grazing completely	Free-grazing completely	Free-grazing completely	Free grazing and hand-feeding
Agricultural production	1 rice crop/year	Hire labor	1 rice crop/year	2 rice crop/year, 1 crop cultivation	2 rice crop/year, 1 crop cultivation
Average cattle head/hhs	5-6	1-2	3-4	3-4	2-3

The purpose, feeding system, average cattle head per households of cattle keeping and agricultural production of cattle keepers is showed in the table 10. 1975, the year when Vietnam attained independence, was used a landmark of historical progress of cattle keeping of Khmer community. The cattle keeping in community is divided in six periods to correspond with the changing of main purpose, feeding system, agricultural production structure and the number of cattle in households. The changes were caused by historical events as well as the economic development progress of Vietnam. In 1975-1979, cattle were used to plough, pull, to draw a rake and for transportation. Each households kept 5-6 cattle head with free-grazing system. The average number of cattle per farmer in 1979-1980 decreased to about 1-2 cattle head because the border war happened between Vietnam and Cambodia. Cattle keepers sold some cattle and only kept good cattle. The good cattle became a means to transport household equipments and assets for evacuation to other provinces. In that time, the main livelihood activities of Khmer people was hired labor. When the border war finished in 1980, they came back to their village and tried to increase their cattle herd by cooperation with Kinh or Khmer people, who still had more cattle. The irrigation system was built in the commune in 1985, local people remained with free-grazing cattle, and the functions of cattle were unchanged, but they could grow 2 rice crops and 1 other crop per year. In general, cattle were a tool for agricultural production from 1975 until 2000. From 2000, Khmer people kept cattle mainly for selling because more machines were used in the field, meat requirement increases due to enhancement of human population and living standard. Beef meat, which has high nutrients, was high in demand. Thus, cattle keepers could sell their cattle with high price and got high income. But, more constraints appeared in that time. The development of industrial plants in the commune led to shortage of grass land for grazing cattle. Local people utilized the grass land to grow trees, plants or crops. In result, some cattle keepers had a shortage of land for free-grazing cattle. They diminished the number of cattle head and kept hand-feeding for cattle by cutting grass or used rice straw and agricultural

by-products. Some cattle keepers had large land areas, where they combined both free-grazing and hand-feeding (mix-feeding) for their cattle. The ways of feeding system will be explored in coming sections.

4.2.2. Breeding and size of cattle herd in Khmer community

The social requirements of hunger eradication and poverty alleviation based on techniques for livestock production had the important impacts on breed quality and sizes of cattle herd in Khmer community in recent years. In Tri Ton district in general, Bang Ro hamlet has maintained cattle keeping for a long time with local yellow breed. A research on cattle keeping in the Northern mountains of Vietnam of Herold and Zarate (2008) stated that local people in that area used local yellow breed and Sind crossbreds for raising. In my study site, local breed of cattle has been improved to increase productivity by using Zebu and Sind breed since 1993. At the present, local yellow and Sind crossbreed cattle occupies 19.1% of the total amount of cattle in the province and 9.15% in the community (Chau Lang-Commune, 2009). Like in the other parts of Vietnam, Khmer people raised cattle on small scale with numbers ranging from 2 to 3 heads per household. Table 7 indicated that the average of cattle head per household in community was about 3. In the past, local people had the advantages for keeping cattle because of available fresh grass in the fields and labor for cattle management. Those conditions were more and more difficult during the time of conducting this survey. Due to rice cultivation expanding and industrial development, the areas of natural pasture land have been narrowed, so it led to lack of grass for cattle. In addition, labor sources for industrial sectors took a large number of labors in community. Consequently, most households did not have enough labor to manage cattle. Most of the interviewed households explained that they would increase herd size if their family had enough labor for cattle management. The number of cattle in the commune decreased in recent years but the number of households, who kept cattle, was stable. It showed that local people try to maintain cattle in their production activities and adjust the number of cattle head in their house in order to fit and satisfy with cattle keeper's conditions that were affected by the change of modern society conditions.

4.2.3. Feeding and multi-purpose cattle keeping in Khmer community

Feeding systems of cattle keeping in Khmer community depended on many factors such as purpose of cattle keeping, labor available and number of cattle heads in farmer's house. Feeding cattle in commune expressed the basic characters of integration among components of upland intensive mixed farming systems. Crop products and by-products were used for feeding in the systems. In general, Khmer people have maintained a traditional feeding systems for cattle by using natural grasses, rice straw and other agricultural by-products (Bao Tran, 2005). This author claimed that feeds for ruminant were collected at locally available resources and grasses were mainly used to feed cattle. In case households had labor to manage cattle, cattle were grazed in grasslands or rice fields after harvesting or in mountainous areas in the daytime. Cattle were supplied rice straw by night after going back their houses. The results in table 9 indicated that 100 percent of local people had hand-feeding for their cattle and 66.7 percent of household had grazing. This result expressed that 66.7 percent cattle keepers combined both hand-feeding and grazing in cattle keeping and 33.3% famers only used hand-feeding for their cattle. Herold and Zarate (2008) argued that most of feed sources for cattle in the Northern mountainous areas of Vietnam were from grazing lands. The percentage of households for grazing cattle in the research site was lower than that of their results (66.7%), while the average number of cattle head between two study sites was similar. This difference could be explained that the pasture areas in Herold and Zarate's research still remained hundreds of hectares, while in Chau Lang, the hill land for livestock keeping was about 133 ha. Pasture for grazing cattle in Khmer

community seemed to be gradually lost by increasing crop and industrial production. Khmer people grazed their cattle in rice fields or forestry cultivation lands. It implied that cattle keeping in Khmer community have faced more difficulties in their grazing feeding systems. Khmer people kept cattle for different purposes such as for income sources and for agricultural production so that they could raise cattle efficiently in the integrated farming systems. The multi-purposes of cattle keeping was showed clearly in mix-feeding cattle keepers. They utilized cattle for more purposes and activities than the hand-feeding cattle keepers. The roles of cattle included beef production, draft power for transportation, land preparation for crops and fertilizers. The better off farmers used cattle for feasts in special events. A few households kept cattle for calf production purpose. All interviewed local people (100%) admitted that they kept cattle for selling because they could get cash benefit for selling cattle. Cash seemed to be a main motivation of cattle keeping. Cattle keeping for transportation of agricultural products and goods of local people in harvesting and production seasons occupied 20% and 33.3% in hand-feeding and mix-feeding systems of cattle keepers, respectively. Using draft power for agricultural production had an enormous role in the past but it has become less important according to the survey (33.3% for mix-feeding system and 6.7% for hand-feeding system). Twenty years ago, production conditions of agricultural sector were conducted with simple equipments produced by the local communes. Animal power was a main force for agricultural activities. The survey found that mechanizations, machines and imported equipments were commonly used in rural areas of Vietnam. Most agricultural lands are now prepared by tractors. Khmer people in the study site followed that trend for their production. They used the tractors for cultivation but some households still maintained the using of cattle power for draft, because this reduced production cost and suited the muddy and narrow land areas or the sloping lands, where the tractors were not able to work well. At provincial level, racing cattle festival is organized annually in one district per year. During the racing cattle festivals, the cattle raced in the fields and then their owners with the winning cattle could be given the prizes of big cash. Therefore, a few mix-feeding system cattle keepers in commune also kept cattle for the racing festival (6.7%). In general, purposes of cattle keeping in commune were diversified based on household conditions. However, cash generation was the first option by the Khmer community.

Table 11. Feeding system of cattle keeping in community (n=45)

Items	Number of households (answered yes)	% households (answered yes)
Mix-feeding (free-grazing and hand-feeding)	30	66.7
Hand-feeding completely	15	33.3

Table 12. Purposes of cattle keeping in community (n=45)

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding
Agriculture land preparation	1	10	6.7	33.3	2.2	22.2
Sale	15	30	100	100	33.3	66.7

Transportation	3	10	20	33.3	6.7	22.2
Racing festivals	0	2	0	6.7	0	4.4
Other purposes	0	1	0	3.3	0	2.2

Hand-feeding (n=15), mix-feeding (n=30)

Box 4. Hand-feeding cattle keeping

Mr. X- had 2 cattle heads. Every morning at 6 am, he went around community by bicycle to cut grasses for his cattle 10-20km far away from his house. The cut grass was about 30 kg. When going back home at 12 am, he fed grass for cattle. If by the evening, the grass was finished, he would supply rice straw for them. He kept cattle within his house, no free-grazing because he explained that he could cut enough grass for 2 cattle. His family included his wife, his mother and him. There was no labor in his family available to manage cattle for grazing. Also he did not have the cultivation land, so it was difficult for him to find the place for his cattle grazing.

Box 5. Combination of hand-feeding and free-grazing of cattle keeping

Mr. Y- household head was 40 years old with 3 children, raised 3 cattle in his house. Normally, he collected feces and waste of cattle for storing. Then he would take them to his cultivated land. He went to his land in morning after feeding rice straw for cattle. On the way to his land, he also collected fresh grass for his cattle about 10-20kg. When his children came back from school, they took all cattle for grazing in the field. Then they returned with gorged cattle at 5.00 PM. In the evening, cattle were fed by grass which he cut in morning or rice straw.

4.2.4. Cattle health care, management and disease prevention

Khmer people has raised cattle based on their custom and traditional knowledge, which were inherited and unchanged through many generations although they have received a lot of concern and promotion of livestock programs and policies of the province. Their life connected closely to cattle. They spent more time for taking care of cattle more than their family members (farmer's perception). They made wooden barrels to hold feeds for cattle. Their cattle keeping way was depended on the amount of cattle head, land areas and labor source in their house. In general, farmers had two models for keeping cattle. The first one was that farmers making cattle stables outside their house if they had more land and more cattle heads. The second one was that farmers kept cattle inside their houses. Because Khmer people lived in groups, their houses were very near to each other. There was not enough space to build stables for the animals. Most Khmer people used a part of space of their house as cattle stables. People and cattle lived together in the same house. In addition, cattle were the valuable unique assets in their house, they were afraid of the thieves. This indicated that cattle keeping in Khmer community were affected by their traditions and could influence on local people health. Children were a main labor sources for cattle grazing and management after going back from school. They supervised the cattle in groups and played traditional games, while their cattle were grazing in the fields. Consequently this was a good evidence to show the difficulties of labor source for cattle management. The adult people in commune had to work for other activities to get income for their own family. Cattle keepers used vaccination to prevent common disease such as foot and mouse disease with support of veterinary network of local government while parasite disease, common disease on cattle, did not receive more concern of cattle keepers. Khmer people lack knowledge and information on veterinary issue. They have applied indigenous and traditional

understanding to treat cattle disease by using plants. This implied that Khmer people could face to high risk on cattle epidemic that threatened to profits of cattle keepers.

4.2.5. Economic returns of cattle keeping in Khmer community

Incomes from cattle keeping had enormous roles in the livelihood of Khmer community because of its contribution for building house, paying school fee of children, daily food and other expenses for the families. Most of farmer's houses were built by money from cattle raising (85.7%). In group discussions during the survey, local cattle keepers claimed that cattle production always brought the cash benefits for them. They would sell their cattle when they considered the cash benefits were acceptable. Cattle create incomes for farmers in many ways. Farmers hired draught power of cattle in cultivation seasons for crops. Besides using cattle manure as fertilizers for the crops, farmers could also sell it for other farmers to get income. The bigger income of cattle keepers was from selling the calves or cattle for slaughter houses. Cattle keeping gave income for not only cattle keepers but also the poor people, who cut natural grasses and sold to cattle keepers. The markets of grasses in the survey site were always available in every morning. It could be concluded that cattle keeping created incomes for local people by both direct and indirect ways.

Table 13. Activities for income creation of cattle keeping

Activities	Income (VND)
Drawing a rake from morning to 3-4pm	100,000/2 cattle
Pull products	300,000-400,000/2 cattle/day
Cattle manure bag	3,000/one
A bunch of grass (about 10kg)	2,000

Table 14. Money sources for building house of cattle keepers (n=42)

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding
Rice production	12	26	85.7	92.9	28.6	61.9
Pig production	2	9	14.3	32.1	4.8	21.4
Cattle production	10	26	71.4	92.9	23.8	61.9
Loan of bank	4	5	28.6	17.9	9.5	11.9
Non-farm income	4	8	28.6	28.6	9.5	19.0
Others	2	2	14.3	6.90	4.7	4.7

Hand-feeding (n=14), mix-feeding (n=28)

4.2.6. Cattle exchange agreements in the community

Social capital was a core factor of cattle exchange agreements, technical production transfer; market and feed access of farmers in community. The trust among local people was considered as a necessary element for cattle exchange. The cattle owners gave a cow to a recipient, who could raise it until giving a calf without any money and collateral security requirement between the cattle's owner and the recipients. The trust between cattle owner and recipient was a core factor for this exchange. The way of cattle exchange agreement in my study site had not been considered and mentioned in any previous study of cattle keeping. It was a specific situation on cattle keeping in Khmer community. In study on "why keep livestock if you are poor" of Aichi Kitalyi et al. edited by Owen *et al.*, (2005), they argued that lenders gave livestock loans to the recipients, who were poor, because they wanted to spread risk or attract labor. Livestock loans were considered as a form of charity or for social solidarity with the poor from better-off households. In that case, the recipients could use the cattle products including manure and draught power; and right to a portion of the offspring (calf). In Khmer community in Vietnam, most cattle owners were Kinh people, who had a good financial capital, cooperated with Khmer people in the past. They gave their cattle for Khmer people and paid all cost relating to cattle such as artificial insemination, vaccinations and disease treatments. The Khmer people only used their labor sources to cut grasses and feed the cattle. In recent years, this has had some changes. Khmer people cooperated with Khmer people for doing this. The advantage of this cooperation was that more and more poor Khmer people could get benefits from cattle keeping. The social relationship among households in Khmer community was enhanced. In summary, the trust was an important factor of cattle exchange agreements in Khmer community.

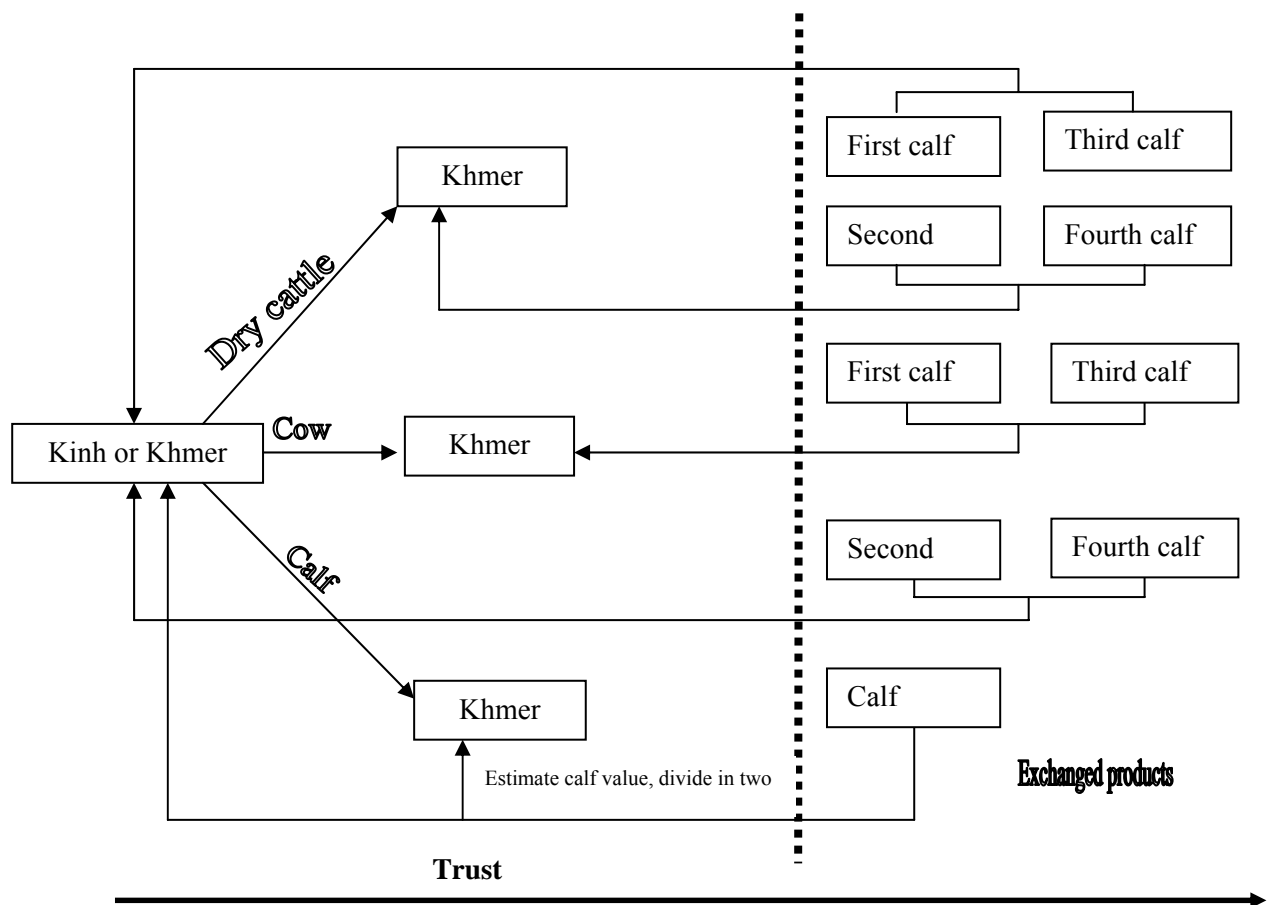


Figure 7. Cattle exchange agreements in community

4.3. SWOT analysis

In data collection processing, the analysis of Strengths, Weaknesses, Opportunities and Threats of cattle keeping in Khmer community were conducted based on the results synthesis of group discussion and interview. The results were showed as follows.

Table 15. SWOT analysis of cattle keeping in Khmer community

<p>Strengths</p> <ul style="list-style-type: none"> - Local people had more experiences in cattle keeping due to a long historical cattle production - Farmer attached closely to cattle in their livelihood, they raised cattle with high attention - Market of cattle products was convenient, and easy to access - More concern and intervention from the government 	<p>Weaknesses</p> <ul style="list-style-type: none"> -Cattle production followed traditional ways with low productivity -Barriers of language and culture with Kinh people, difficulties in technical training course -Using inefficiently feed resources for cattle -Lack of financial capital to invest in cattle production -The coordinate between local people and local government was not so close
<p>Opportunities</p> <ul style="list-style-type: none"> - Apply new techniques to improve cattle productivity through enhancing feed and breed quality - Expanding cattle production by using efficiently by-products - Strong social relationship among local people, we could use it as a useful tool for new approach of training programs - Cattle products market was high potentially, active and dynamic 	<p>Threats</p> <ul style="list-style-type: none"> - Development of urbanism and industrialism lead to lack of quality grass and by-product feed in dry and flood seasons - Cattle could lack protein and energy for normal growth - Lack of labor for cattle management because the young labor force preferred industrial sector -Children had to face with risk of disease due to the environmental pollution - Middleman could control price of cattle products - Difficulties in controlling cattle production programs or policies

Table 16. Advantages of cattle keeping in Khmer community

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding
Give profits	7	27	46.7	80	15.6	53.3
Easy control disease	10	14	66.7	46.7	22.2	31.1
Easy for selling	12	26	80	86.7	26.7	57.8
Easy to do	4	10	26.7	33.3	8.9	22.2
Easy for management	6	11	40	36.7	13.3	24.4

Hand-feeding (n=15), mix-feeding (n=30)

Table 17. Difficulties of cattle keeping in Khmer community

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding
Grass collection	14	27	93.3	90	31.1	60
Labor for management	9	13	60	43.3	20	28.9
Control cattle disease	3	6	20	20	6.7	13.3
Selling	1	1	6.7	3.3	2.2	2.2
Housing for cattle	0	2	0	6.7	0	4.4

Hand-feeding (n=15), mix-feeding (n=30)

The advantages and difficulties of cattle keeping in Khmer community were shown in tables 16 and 17. Most of people (80% cattle keepers in hand-feeding system and 86.7% in mix-feeding system) claimed that it was easy to sell cattle products and 46.7% and 80% cattle keepers in hand-feeding and mix-feeding system, respectively, admitted that cattle keeping gave benefits to them. They always gain benefits by cattle rearing. Because most of local people had a long experience in cattle keeping and they believed that they could control easily cattle diseases (66.7% in hand-feeding system and 46.7% in mix-feeding system). On the other hand, lack of grasses during three months every year was a common difficulty of almost cattle keepers (more than 90% cattle keepers of both systems claimed that). Another difficulty was the lack of labor for cattle management (60% in hand-feeding system and 43.3% in mix-feeding system). The difficulties of grass also happened in Cambodia where cattle were fed by native grass and crop residues because of increasing the number of animals, while cultivated area led to shortage of feed sources (Pen *et al.*, 2009). The constraint of grass at some times of the year at dry season

was considered as difficulties of cattle keeping in Laos. This reason led to poor nutrition in diets and reduced livestock productivity (Stür *et al.*, 2002). It could be stated that cattle keeping in developing countries face more and more difficulties of natural grass available under pressure of national economic development.

4.4. Paradoxes between breeding and fattening systems

There was a basic contradiction between breeding and fattening system of cattle keeping in Khmer community in terms of management, feeding, labor force and market. The core reason of this contradiction was the differences in economic and labor situation among households. Better-off farmers could raise more cattle. A labor in one day could collect enough grasses for feeding 2-3 cattle. They had to graze cattle in grass fields because they could not find and cut grasses for all their cattle. Their children could manage cattle herd and they did not need spending a lot of time for cutting grass. On the contrary, the poor people and households, who had a few labors, often kept 1-3 cattle heads in their houses and cut grasses for them. They spent a half day in the morning for collecting grasses and did other activities in the afternoon. Most calves of breeding purpose were sold and given for local people but fattening cows were bought by outside people. It could be explained that not only the demand of increasing cattle herd of local people was available but also social relationship among Khmer people was strong. The calves of breeding purpose were used for cooperation through cattle exchange within Khmer people in commune in order to increase the number of cattle head for local people. Another way, fattening cattle were sold to outside consumers for meat consumption. The exchangeable cattle agreements among local people were not through money (see more in next chapters).

Table 18. Contrast between breeding and fattening systems

Indicators	Systems	
	Breeding	Fattening
Management	Extensive	Intensive
Feeding	Free-grazing, hand feeding	Zero-grazing, hand feeding
Labor	Almost by children	Almost by adult
Market	Inside community	Outside community
Cattle heads	More than 3	1-3

The cattle production system in this study, showing the components in system as well as interaction among them, will be described in next page (figure 8)

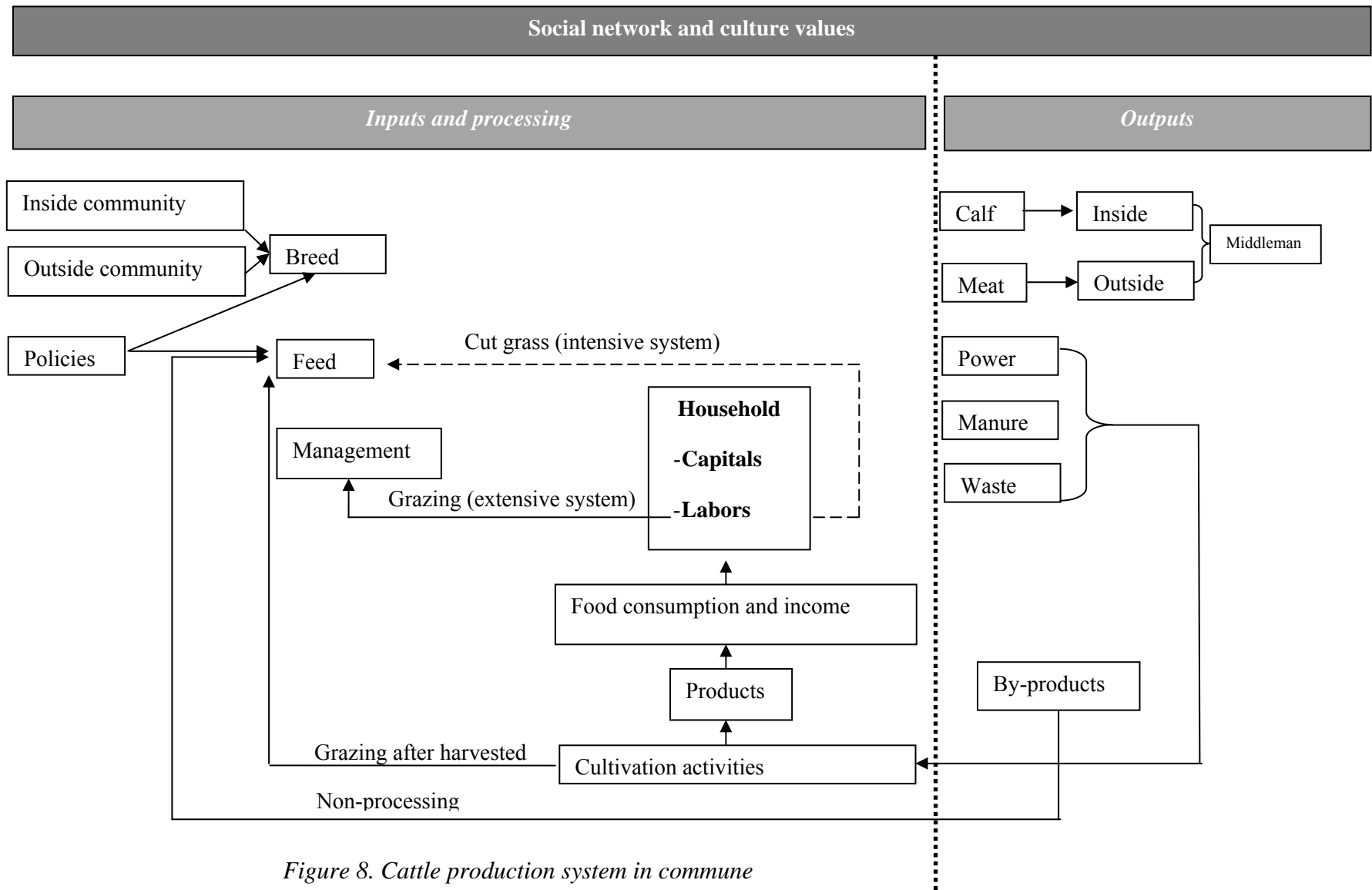


Figure 8. Cattle production system in commune

4.5. Social capital- a motivation of maintaining cattle keeping

Table 19. Reasons for maintaining cattle keeping

Reasons	Cattle keepers							Total
	1	2	3	4	5	6	7	
Creating jobs	4	4	4	1	5	1	4	23
Social position	3	1	1	3	3	2	1	14
Income	2	5	3	4	1	4	3	22
Association to cattle	1	2	2	2	2	3	2	14
As a bank	5	3	5	5	4	5	5	32

In general, cattle keeping decision-making of Khmer people were affected by both internal and external factors. Internal factors were shown by Khmer's habits, traditional activity, and perception. External factors included easiness of market access, policy intervention and natural resources. Although there were many reasons why Khmer people still remained in cattle rearing as a part of their life, the results in group discussion expressed surprising information. It indicated that priority of cattle keeping in Khmer community was different from normal priorities of production system which based on economic profits. Normally, people ran and maintained a production system because of its benefits, but cattle keeping system in Khmer community was different completely. The fact remained that cattle keeping created a lot of cash for local people but it was not the most important reason for maintaining cattle keeping. Two factors, which had the most impacts on deciding of cattle remaining of Khmer people, were social position and association to cattle. The social function of cattle was often ignored when considering the contribution of cattle in livelihood of local people because of difficulties to measure the value, but nevertheless it should be assessed (Ouma *et al.*, 2003). In fact, social status of cattle keepers in pastoralist community were evaluated and considered higher than of that of mixed farming system. There were some different aspects between two systems. In pastoralist community, cattle were central to their societies, as a main production activity and were the most valued animal by local people. The households, who keep a large number of cattle heads, tended to have more power in controlling grass fields for grazing and price of selling cattle products. On the other hand, cattle had a lot of functions in mixed farming system; one of them was social function. Cattle's contribution to social household asset was considered as a networking mechanism (SFSPN-Human, no year). Trevor Wilson *et al.*, edited by Owen *et al.*, (2005) classified outputs of livestock keeping according to three families comprising immediate, intermediate and indeterminate products. The indeterminate product was providing status or prestige in the immediate community. The social function of cattle keeping in my research site showed at specific aspects. The local people stated that they could receive trust, prestige and respect from other farmers by cattle keeping. Local people used these advantages to access easily to credit sources, loans and debts. Loan was important for Khmer people when they needed money for food consumption, health care and education. The main income comprised rice, and cattle income required long time to get. Thus, local people had to get loan at non-harvested time. They would get the loan from a lender and repaid to them when their production was harvested. The banks seem to be uneasy canal for them to get the loan because of complex procedure. And they could get the loan easily when they had cattle. It could be explained simply

that cattle was considered to be the collateral of loaners. It also showed the capacity of loaners that they had the ability to repay for creditors. It implied that cattle seemed to be a tool to create and enhance trust and belief among people. They still remained in cattle keeping although they could suffer losses by cattle epidemics or low products market sometimes. Cattle was not a simple product, it became a main character in daily stories of Khmer people. As I mentioned in the previous part, social capital has been considered as a tool of cattle exchange agreement in Khmer community and as a main reason for maintaining cattle keeping. Cattle keeping created and enhanced social position for local people in view of community. Cattle brought local people in community close together. For example, the establishment of groups for collecting grass at other provinces. When the grass is not sufficient for feeding cattle (August, September, October), tens of farmers rent a boat and came together to go to Kien Giang province which is thirty kilometers away from their village. They prepared food for two days, time of trek, and gathered money to pay for boat owner. They helped and shared difficulties together through the trip. Thus, their relationship and assistance were enhanced day by day, not only in collecting grasses but daily activities.

It could be argued that cattle were a string to connect local people. Data in quantitative analysis showed that 100% cattle keepers in hand-feeding system and 93.3% in mix-feeding cattle collected grass at communal land and 66.7% cattle keepers of both systems had to go other provinces for cutting grass. Only cattle keepers in mix-feeding system admitted that there were conflicts among farmers happened (6.7%). When we discussed with local people a situation that their commune had to face with the lack of grasses and the decrease in natural pastures, while there were still more people collecting grass. Normally, competition among collectors happened. They said that “oh, no” because they had to go far from their houses, thus they went together for sharing and helping. As argued by Ouma and Abdulai (2009), livestock keepers who were resource constrained are more likely to engage in collective action initiatives. Through collective group, their cattle’s productivity could be enhanced by using bulls of genetic merit of a member in the group. They also collaborated in term of management, feeding, reproduction and housing in order to reduce cost of production and increase benefits. The findings in fieldwork showed that 60% and 80% of cattle keepers of hand-feeding system and mix-feeding system, respectively, got cattle at initial time of cattle keeping by cooperation. In addition, 100% of local people in both systems admitted that they accessed technical information of cattle keeping as well as other agricultural activities via their neighbors. It could be argued that social capital and cattle keeping had mutual effects. Moreover, many rural areas in the world, where livelihood of local people related closely to cattle keeping, also indicated that there was a strong relationship between cattle keeping and social capital. A study of Raish and McSweeney (2003) recognized that livestock ranchers played an important role in teaching children about traditional values and heritage in community. The children learned how to take care of the cattle as well as get natural resources in their lands through grazing cows. In another way, cow keeping had a role in maintaining traditional culture and family values for local people. The children in the community feel livestock in their blood at the time when they were born. Cows became a motivation which made the children attach closely to their families and community. An argument of Barrett (1992) claimed that cattle have spiritual and cultural role in Zimbabwe society. Cattle were bride wealth payments (*lobola*) and ancestral spirit (*mudzimu*). In summary, cattle keeping create a special social relationship among local people in Khmer community.

Table 20. Grass collection action and its conflict (n=45)

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding
Cutting grass in community land	15	28	100	93.3	33.3	62.2
Cutting grass in other province	10	20	66.7	66.7	22.2	44.4
Conflict among household in grazing and cutting grass	0	2	0	6.7	0	4.4

Hand-feeding (n=15), mix-feeding (n=30)

Table 21. Channels of information access of cattle keepers (n=45)

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding
Extension workers	6	8	40	26.7	13.3	17.8
Neighbors	15	30	100	100	33.3	66.7
Input or output suppliers	9	14	60	46.7	20	31.1
Relatives	13	22	86.7	73.3	28.9	48.9
Media	8	18	53.3	60	17.8	40

Hand-feeding (n=15), mix-feeding (n=30)

In addition, they remained raising cattle because they had more association to cattle. Cattle keeping are a traditional and indispensable production activity of Khmer. It was a long-standing career which was inherited from generation to generation. According to an earlier study by Millar and Photakoun (2008), it was argued that ethnic groups in Lao (Hmong) had a strong historical association with cattle. Their production activities often connected to cattle keeping. Authors discovered that ethnic minority tried to retain their traditional livestock production while applying new activities in order to diversify household income. The third factor affecting the cattle keeping decision of farmers was that cattle could create cash income for local people. Cattle production brought about benefits in daily activities and income sources by selling, transportation, land preparation and other agricultural activities. Another reason was that cattle keeping created jobs for local people. Cattle production was convenient and suitable to livelihood conditions of Khmer people, because Khmer people had low educational levels, they wouldn't be able to find the good jobs with better salaries. They just used their labor to find natural grasses for cattle in case they raised cattle. In case they cut grasses with some surplus, they could sell it to other farmers in the available grass markets. Besides, it was due to the perception of local people that cattle were easy to be raised and difficult to die.

Cattle keeping were one movable assets and a bank for saving cash for their families. Farmers believed that cattle production always brought benefits and an insurance asset for them. Cattle are an insurance due to that cattle seem as a unique asset that farmers can sell when they need more money for sudden and urgent situations. In a study of Beckman (2004), she claimed that free-grazed cattle production in upland has been important for the poor in Vietnam. Cattle contributed as an important form of savings that could be used in essential situations such as crisis or major events. Similar to this, Thang (2010) argued that social contribution of cattle keeping were the major asset on small and medium sized farms by providing emergency finance to rural households in Vietnam. This argument was also admitted regarding cattle keepers in Thailand (Sombilla & Hardy, 2005). A research of Stür *et al.*,(2002) on the roles of livestock keeping in Lao claimed that livestock were a means of accumulating capital and a safety net for in case they needed cash. Their long-term investments, such as pursuance of high education, planting industrial trees and buying agricultural products processing machine only conducted when they felt financially secure by accumulate enough livestock. Another study in Zimbabwe, cattle was used for saving of capital. In hazard or domestic crisis, cattle might become a major asset for selling to get income (Barrett, 1992). An argument by Ntshona & Turner,(2002) indicated that 92% and 76% interviewed households in Maluti and Mkemane district in South Africa, respectively, answered that saving was a reason for keeping cattle. Like the results of group discussion of the present study, interviewed households claimed that the association to cattle was the most important reason for cattle keeping in community (80% of cattle keepers in hand-feeding system and 83.3% farmers in mix-feeding system admitted that). The next reason was income of cattle (80% and 63.3% corresponding to hand-feeding and mix-feeding system). Social position achievement through cattle keeping was the third reason for maintaining cattle keeping in local people's house (66.7% for both systems). This information was a little different to that of group discussion. The most important reason for maintaining cattle keeping, in both group discussion and interviews, were the social function of cattle keeping and association to cattle of Khmer people. Income of cattle was the third important reason for cattle remaining in group discussion while it was the second important reason in interview households. That difference could be explained by the difference of sample size between the two methods. The information of table 12 which showed purposes of cattle keeping, indicated that 100% households in community kept cattle for selling. This implied that income of cattle keeping or economic purpose affected directly to the decision of cattle keeping of Khmer people beside the social factors. Besides, authorities at different levels from the communal to the central had expressed their concerns about cattle keepers. The policies of cattle raising of the government were conducted in Khmer communities. The policies for promoting cattle production were also associated with the hunger eradication and poverty alleviation policies. In addition, local people could access market easily. They were able to contact with input suppliers and output consumers conveniently through cell phone. The Khmer people just stayed at home, the middleman could come and discuss about the prices of cattle for sales. Furthermore, the surveyed areas located near the border gate with Cambodia where cattle markets were available. Finally, the highland areas with fields and mountains are stable natural condition for cattle production.

Box 6. Association to cattle of local people

Mr. A- household head was 50 years old, raised 3 cattle heads in his house. He told that he became fond of cattle for a long time. When he grew up and knew surrounding environment, the first thing in his memory was cattle. And he started keeping cattle when he was 10 years old. In the early morning, as a habit of farmers, they met and talked together in coffee shop of the hamlet. Cattle were a main topic through their story. Where they could find grasses for cattle, how they could treat diseases for cattle, where they could sell cattle. He remembered that sometimes he had no cattle in his house because his cattle died. At that time he did not want to go to the coffee shop because he had nothing to discuss. Moreover, he felt uncomfortable and fidgety because he had nothing to do.

Table 22. Reasons for maintain cattle keeping of Khmer people

Reason	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding
Association to cattle	12	25	80	83.3	26.7	55.6
Income	12	19	80	63.3	26.7	42.2
Social position	10	20	66.7	66.7	22.2	44.4
As a bank	2	5	13.3	16.7	4.4	11.1
Creating jobs	7	17	46.7	56.7	15.6	37.8

Hand-feeding (n=15), mix-feeding (n=30)

Table 23. Influence of factors of household characteristics on the number of cattle at present of general cattle keepers (heads)

Factors	Coefficients	SE	T	Sig.
(Constant)	-1.16	1.05	-1.10	.277
Education levels of household head, grade	.088	.056	1.57	.125
Number of people in household	.315	.097	3.25	.002
Land areas of house, m2	.001	.005	.272	.787
Agricultural land area, cong	.084	.057	1.47	.149
Mountainous land area, cong	.004	.071	.060	.953
Time of raising cattle, year	.016	.021	.760	.452
Number of cattle at initial time of cattle keeping, head	.486	.186	2.62	.013
Participation extension programs	.435	.313	1.39	.174

$R^2 = 0.49$

Dependent Variable: Number of cattle at present, head; cong: 1.300m², SE: standard error

In general, the number of people in households and the number of cattle at initial time of cattle keeping affected on the number of cattle at the surveyed point of time (P<0.05). The findings of

fieldwork could explain for this result. Firstly, local people thought that cattle keeping could give benefits to them by simple ways and zero-cost production. They just grazed cattle in the field and supplied rice straw for cattle in the afternoon. In order to graze cattle in the field, farmers needed labor for management. If there were few people in their families, they did not want to expand cattle production and vice versa. Secondly, grasses inside community faced with more difficulties in terms of availability and competition. They had to move some days per time for grass collection. It needed labor to do that. Most of Khmer people were in low living standard. Normally, their cattle at initial time of cattle keeping were from the cooperative and dowry. They claimed that cattle were considered as a precious asset and only sold in urgent situations. Most of them tried to keep and increase the number of cattle head. In another way, the number of cattle in the past could show household capitals by some ways. In case that the owners started with a large amount of cattle heads, this implied that they had a high financial capital or good social relationship. The effects of those conditions could extend and remain until the surveyed time.

Table 24. Influence of factors of household characteristics on the number of cattle at present of hand-feeding system cattle keepers (heads) (n=15)

Factors	Coefficients	SE	T	Sig.
(Constant)		1.22	1.98	.094
Education levels of household head, grade	.046	.067	0.17	.872
Number of people in household	.098	.132	.298	.776
Land areas of house, m2	-.260	.007	-.626	.554
Agricultural land area, cong	.354	.051	1.03	.341
Mountainous land area, cong	.410	.103	1.40	.212
Time of raising cattle, year	-.329	.024	-1.13	.303
Number of cattle at initial time of cattle keeping, head	.397	.336	1.26	.255
Participation extension programs	-.189	.334	-.693	.514
$R^2 = 0.66$				

Dependent Variable: Number of cattle at present, head; cong: 1.300m², SE: standard error

Table 25. Influence of factors of household characteristics on the number of cattle at present of mix-feeding system cattle keepers (heads) (n=30)

Factors	Coefficients	SE	T	Sig.
(Constant)		1.08	-1.71	.102
Education levels of household head, grade	.178	.057	1.36	.187
Number of people in household	.590	.103	4.70	.000
Land areas of house, m2	.192	.006	1.46	.158
Agricultural land area, cong	.099	.091	.661	.516
Mountainous land area, cong	-.027	.071	-.205	.840
Time of raising cattle, year	.003	.023	.018	.986
Number of cattle at initial time of cattle keeping, head	.409	.180	3.17	.005
Participation extension programs	.206	.381	1.69	.106

$$R^2 = 0.75$$

Dependent Variable: Number of cattle at present, head; cong: 1.300m², SE: standard error
 Table 26. Ways of getting cattle at initial time of cattle keeping

Ways	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding
Bought	5	4	33.3	13.3	11.1	8.9
Inherited	9	12	60	40	20	26.7
Cooperated	9	24	60	80	20	53.3
Government	1	4	6.7	13.3	2.2	8.9

Hand-feeding (n=15), mix-feeding (n=30)

4.6. Barriers for development cattle keeping in Khmer community

4.6.1. Marketing chain of cattle keepers in Khmer community

Duplicity of marketing chain of agricultural products in general, cattle products in particular in commune were shown through a lot of evidence. Marketing chain figure indicated that all local people accessed to middleman as a main market channel of cattle products. The middleman was available all time and could contact directly to farmers through mobile phone. The trading activities was only the negotiation between a farmer and a middleman about the value of cattle in cash by the estimation of cattle live weight which farmers did not know how to do it. This was only estimated by the middleman by somehow. In group discussion, local people claimed that information of cattle prices from middleman was the easiest channel to access although these prices were lower than that of other channels such as the price of the wholesaler in districts. It had some reasons to explain why most of local people sold cattle for middleman in villages. Firstly, the relationship between Khmer people was just within their community where they lived and worked. Thus their ability to access to market channels was limited. Moreover, some of them were not able to communicate in Vietnamese for trading and marketing while almost of middleman in villages was the Kinh people who could communicate in both Khmer and Vietnamese. They could buy cattle anywhere and at every time from the Khmer community. In addition, local people sold their cattle in urgent situations for the need of money for treating disease, party and building house in their family. They could quickly receive money because the middleman could buy their cattle immediately. For these reasons, middleman in village was the first priority of market channel of cattle products of Khmer people. Secondly, local people sold only one or two cattle once; this could not satisfy the trading requirement of wholesalers who wanted to buy a large quantity of cattle. Wholesalers often bought more than ten cattle heads in one time. They collected and fattened before selling them to the big cities. For those reasons, local people could not access to the information of prices from the wholesalers. In general, local people access the information of middleman in village as a main market channel, because middleman could solve the limitation of farmers in term of marketing and production.

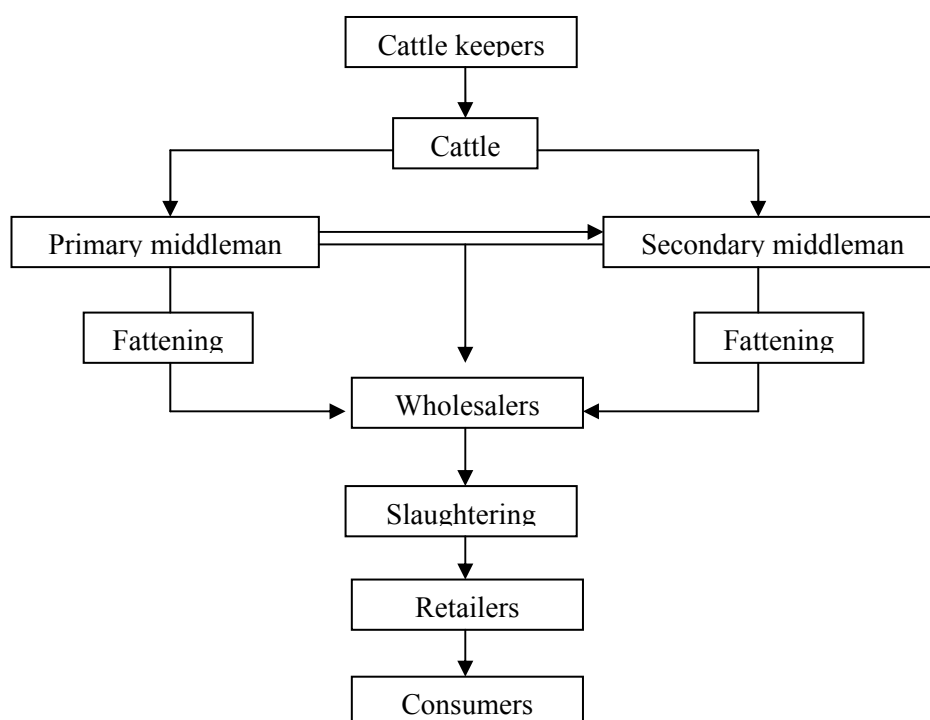


Figure 9. Cattle market chain in community

Apart from giving more conveniences for local people for trading, the middleman in village also caused the negative impacts to market of Khmer people, particularly in controlling prices of selling cattle products. Because of being a unique market channel in commune, middleman has more power to control the price of selling cattle in order to get higher profits. The Khmer people did not calculate carefully the money which they could get from their cattle in real market. They sold their animals when middleman set up the price as being higher than of that at the initial start of raising cattle. Moreover, the middleman could reduce the price of cattle due to the bad appearance of the cattle like dirty or not good body condition, especially in case cattle are got diseases and died.

4.6.2. Feed supply, nutrient demands, performance of cattle and technical application in the community

Table 27. Nutrient requirement, offering and percentage of adaptation of cattle in commune

Cattle	Weight (kg)	Requirement (*)			Offering			% Adaptation		
		DM, kg	CP, g	ME, MJ	DM, kg	CP, g	ME, MJ	DM	CP	ME
1	87.2	2.62	218	23.6	2.25	158	21.5	85.9	72.3	91.3
2	68.4	2.05	171	18.5	1.69	118	16.1	82.1	69.1	87.3
3	96.1	2.88	240	25.9	2.55	173	23.7	88.6	72.2	91.2
4	110.2	3.31	276	29.8	2.80	200	27.3	84.5	72.5	91.6
5	71.0	2.13	178	19.2	1.69	118	16.4	79.2	66.6	84.2

* NIAS: National Institute of Animal Sciences; DM: dry matter, CP: crude protein, ME: metabolism energy

Feeding is one of the most important components in livestock production and assures certainly that animal can grow with the good performance. To evaluate whether feed supply for cattle in community could satisfy nutrient demands, I selected five households who fed cattle as shown in the table to get all data for a calculation. It could be argued that feed supply for cattle in Khmer community did not meet nutrient demands in terms of DM, CP and ME. DM intake satisfied from 79.1% to 88.6%, while from 66.6% to 72.5% and 84.2% to 91.6% for CP and ME requirements, respectively.

Table 28. Participated in extension programs and using supplemented feed status of cattle keepers

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding	Hand-feeding	Mix-feeding
Participated extension programs	7	24	46.7	80	15.6	53.3
Supplementation	1	2	6.7	6.7	2.2	4.4

Hand-feeding (n=15), mix-feeding (n=30)

Beside the staple grass feeding, the cattle keepers could also use supplement feeds for supplying essential nutrients of protein, minerals, etc in order to improve quality of diets. A nutrient balance diet will make the animals in good growth and disease prevention. That seemed not to receive more concern and attention of local people in research site. Only a few households used water of rice cooking mixing with salt to feed for cattle before selling. Although there were many training courses for improving the feeding quality conducted in community, the local Khmer perception did not change. They still used traditional feeds such as rice straw because they thought that it seemed to be waste of time, money and labor for applying those new techniques. Many people said that their cattle still survived and created benefits without those techniques. The number of Khmer people using supplemented feeds for cattle was low, that was about 6.7 percent of households in both systems in community, while the number of local people participating in extension programs was about 46.7% at hand-feeding system and 80% at mix-feeding system. No one used feed processing techniques to improve feed quality. In group discussion and transect walk, we saw some by-products in the fields and farmer's houses such as residue of maize, bean pods residue, and leaves of Palmyra. We asked for local people purpose of using by-products. The only answer was for burning. They were very surprised when we told that those feed could be used for cattle. One more reason of limitation in livestock technique applying in Khmer community was social relationship barriers of Khmer people. They were shy to contact with technicians or extension workers. In addition, the language barrier was considered as a main problem for transferring knowledge in training courses. The cattle keepers, who were chosen to follow extension programs, usually had good relationship with community officer or good ability of speaking Vietnamese well. It implied that cattle keepers in Khmer community seemed to use un-optimally the feed sources from agricultural production for their cattle.

4.7. Advices of using efficiently resources for cattle keeping in Khmer community

The cattle keeping in community has brought about more advantages and difficulties as well as more concerns of farmers (80% farmers in hand-feeding system and 96.7% in mix-feeding system claimed that they will expand cattle production). In general, cattle production in research

site was similar to that in integrated crop-livestock system but still different in some details. The interaction between crops and animals provided an opportunity for farmer to diversify risks in their production, use labor efficiently and enhance their income. Moreover, environmental aspects of this system were considered that maintaining soil fertility by nutrient cycle and reducing wastes to natural conditions. In order to get those objectives, farmers needed using by-products from agricultural activities in efficient ways. In our research site, farmers used very effectively cattle functions for agricultural production such as power, manure and waste but it is not good in opposite site. The products and by-products from agricultural activity were not utilized in optimal ways. They had a limitation of using crop residues for feeding cattle, mainly rice straw with only a very small amount. A large amount of rice straw was burnt in the field although they were lack of feed for cattle. It could be understood that local people did not receive more knowledge and skills from the extension activities, or the approach methods which extension worker instructed Khmer people were not suitable. The Khmer people's cultural belief was considered to be a barrier to the development of cattle keeping in community. Thus, in order to help farmers to use efficiently agricultural residue, not only rice straw but also others such as leaves and peel of green beans, the agricultural extension workers should focus on training courses and extension activities for young people and at the same time encourage the participation of Khmer people in some demonstration sites or train some people in the commune to be extension workers. The agricultural extension programs could take advantages of this relationship among cattle owners and recipients to make programs successfully. The extension worker should focus on owner group. The owner group could set up a condition of cooperation in which the partners had to apply new techniques in cattle production. This would enhance the productivity of cattle keeping in community. The cattle keeping system would be better and more sufficient in saving labor if the cattle keepers paid more attentions to improve the feed quality by using feed processing technique, which enhanced the nutrient supply and balance in the cattle's diets. The income generation of Khmer people could be improved through cattle keeping and became a tool for poverty reduction in Khmer community.

Table 29. Future perception of cattle keepers on cattle production

Items	Number of households (answered yes)		% households (answered yes) within system		% households (answered yes) of total	
	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding	Hand- feeding	Mix- feeding
Expand cattle production	12	29	80	96.7	26.7	64.4

Hand-feeding (n=15), mix-feeding (n=30)

In summary, in spite of being impacted by socio-economic development following modern trend, cattle keeping still remained and played an important role in the livelihood of Khmer people. This study shows that cattle keeping in Khmer community are on a small-scale of production using a local breed, with feed supply and limitation of applying new techniques in livestock as main concerns. In addition, the role of cattle keeping to agricultural production in crop-based livestock system is shown clearly by maintaining soil fertility via using cattle manure for rice fields. The feeding system of Khmer's cattle keeping has followed traditional way with the combination of free-grazing and hand-feeding in order to use the natural grass in the fields and agricultural by-products. However, cattle keepers have not used an efficient and optimal way of agricultural by-products for their cattle because strong cultural beliefs led to difficulties on technical transferring of extension center to them. Besides, local people have not

paid much attention to the housing for cattle, their children have to suffer from disease caused by environmental pollution. Moreover, local people are acquainted with the way of traditional production instead of applying new technique to enhance the animal productivity and the living condition as well.

There are many factors existing that affect cattle keeping as a choice of Khmer people. Apart from the association to cattle, one of the main factors is the social capital. Most of Khmer people admit that cattle keeping can create and enhance strong social relationships among household in the commune through the common activities that relate directly and indirectly to cattle such as grazing, grass collection, cooperation and festivals. Cattle are not only a means for creating income for Khmer people but cattle are seen also as a friend. In rural areas of some developing countries like Vietnam, Laos, Cambodia and some countries in Africa, where farmers live in low living standard and high poverty rate, cattle are seen as an asset showing wealth characteristics of local people. On the whole, social capital is the strongest factor that affect directly on maintaining of cattle keeping in Khmer community.

Cattle keepers in An Giang province gain more advantages because of concern for livestock development investment of government in both central and local levels. Cattle keepers have accessed a lot of extension programs and policies, the purposes of which is to support and assist production technique, breed, feed processing and house for cattle in order to enhance feed quality and animal productivity. However, those programs and policies seem to be not promoting more efficient yet at present. Cattle keepers are inattentive in applying new technique. Perhaps, Khmer people need new approach of extension programs to make them interested in accepting and applying new knowledge and skills in real production. This issue needs to be considered in both policy and practice perspectives.

CHAPTER V. CONCLUSION

Experiencing a long history, cattle keeping links closely to livelihood of farmers in An Giang province, especially to Khmer people. Despite being affected by the developments of industrial and service sectors in combination with the mechanism in agriculture, cattle keeping are still a noticeable activity in production structure of Khmer people. Besides, cattle keepers have faced to the difficulties of cattle production, which included lack of feed sources and labor, higher cost of housing and lower income than in the past. The findings in fieldwork indicate that cattle keeping are one of the most important activities in Khmer community in term of economical and social aspects. Cattle keepers can get income and use this money for building their house, buying equipments and spending for daily activities. Particularly, cattle keeping reflect profoundly social capital in Khmer community. The social function of cattle keeping among Khmer people keeps a special way which is different with other countries and even with other ethnic groups in Vietnam as a country. The research on cattle keeping among rural people should concern carefully on its social aspects in order to understand the root contents of whole systems, which is useful for extension workers and policy makers to improve the cattle production and income for local people in order to achieve poverty reduction, particular in the Khmer communities.

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APPENDICES

Appendix 1. Questionnaire for interviewing cattle keepers

1. Household code:

2. Interviewer:

3. Date interviewed

I. General information:

1. Name of household head:

2. Name of interviewee:

3. Address:

4. Household telephone:

5. Household composition:

No	Relation (code)	Sex (code)	Age	Health status (code)	Years of school	Main jobs
1						
2						
3						
4						
5						
...						

Relation: 1. Head of household; 2. Wife/husband; 3. Children; 4. Grandchildren; 5. Parents; 6. others

Sex: 1. Male; 2. Female

Health status: 1. Healthy; 2. Disable

Main jobs: 1. Rice cultivation; 2. Forest products collecting; 3. Worker in office; 4. Hire labor; 5. Retailers; 6. Housework; 7....

6. Household asset:

6.1. House:

Built by: households (1), government (2) and others (3)

When:

If answer is (1), continue: money for building house from mainly:

- (1) Selling agricultural
- (2) Nonfarm income
- (3) Loan from the bank
- (4) Others

6.2. Land:

6.2.1. Land for living:

Area: m², including: house.....m², garden.....m², other.....m²

6.2.2. Other land:

No	Land area (m ²)	Distant from homestead (m)	Land tenure (code)	Land use (code)	Present value (millionVND)
1					
2					
...					

Land tenure: 1. Own; 2. Inheritance; 3. Rented; 4. others:

Land use: 1. Rice; 2. Forest; 3. Aquaculture; 4. Livestock; 5. Crop; 6. others

7. Cattle production

7.1. When did you raise cattle? With how many cattle?

7.2. How did you get cattle?

(1) Buy; (2) inheritance; (3) Borrow cow from neighbor; (4) government; (5) others

If (1) or (3) or (4), why did you choose raising cattle?

Reason 1

Reason 2

Reason 3

If (2), do you still keep cattle or sell cattle to earn money in order to do another activity?

Why do you choose keep cattle (or sell)?

Reason 1

Reason 2

Reason 3

7.3. Where do you find grass for your cattle?

(1) Buy; (2) my field; (3) community grassland; (4) forest; (5) others

7.4. Do you have any conflict among households of collecting grass for cattle?

If yes, please how?

7.5. What purposes of cattle keeping in your family?

(1) plough; (2) sell cattle products; (3) transportation; (4) using at festival; (5) others

7.6. What are advantages of cattle keeping in your house?

Advantage 1

Advantage 2

Advantage 3

.....

7.7. What are difficulties of cattle keeping in your house?

(1) Lack of grass; (2) lack of labor; (3) disease; (4) sell products; (5) others

7.8. Who do you get and apply advices for agricultural production?

(1) Extension workers; (2) neighbor; (3) input or output or service suppliers; (4) kinship; (5) media; (6) others

8. Household income in 2008

No.	Income sources	Number	Price (VND)	Income (1000VND/year)	Notes
1	Rice				
2	Cattle				
3	Pig				
4	Forest products				
.....					
Total					

9. Household expenditure in 2008

No.	Items	Expend (1000VND/day)	Expend (1000VND/month)	Expend (1000VND/year)	Notes
1	Production material				
2	Food				
3	Clothes				
4	Health care				
5	Education				
6	Parties and worship				
7	Saving				

Total					

10. Did you participate to any programs or projects about cattle production?

If yes, how did it conduct?

11. What are your plans of cattle keeping in future?

Appendix 2. Questionnaire for interviewing input suppliers

1. Name of input supplier:
2. Interviewer:
3. Date interviewed
4. Place:
5. What kinds of products which you sell?
6. How customers pay money for you? (by cash or debt or ...)

If debt, why do you let them having a debt?

7. Do you choose farmers, whom you permit debt, because they have cattle?

If yes, why do you do that?

8. Do farmers ask advices for cattle production from you?

If yes, what kinds of information that farmers need?

Appendix 3. Questionnaire for interviewing output suppliers (middleman)

1. Name of output supplier:
2. Interviewer:
3. Date interviewed
4. Place:
5. What kinds of products which you buy?
6. How do you pay money for customers? (by cash or debt or ...)

If debt, why do customers let you having a debt?

7. Do farmers get a loan from you?

If yes, do you choose farmers, whom you give a loan, because they have cattle?

If yes, why do you do that?

8. Do farmers ask advices for cattle production from you?

If yes, what kinds of information that farmers need?

Appendix 4. Questionnaire for interviewing vet service suppliers

1. Name of vet service supplier:
2. Interviewer:
3. Date interviewed
4. Place:
5. What kinds of services which you provide for farmer?
6. How customers pay money for you? (by cash or debt or ...)

If debt, why do you let them having a debt?

7. Do you choose farmers, whom you permit debt, because they have cattle?

If yes, why do you do that?

8. Do farmers ask advices for cattle production from you?

If yes, what kinds of information that farmers need?