



## **Cattle Feeding and Management Practices of Small-holder Farmers in Kampong Cham Province, Cambodia**

**MIRANDA PEN**

*Royal University of Agriculture, Phnom Penh, Cambodia*

*Email: penmiranda2005@yahoo.com*

**DARRYL SAVAGE**

*University of New England, Armidale NSW, Australia*

**WERNER STÜR**

*CIAT, Vientiane, Lao PDR*

**SOPHAL LORN**

*Department of Agriculture, Kampong Cham, Cambodia*

**MOM SENG**

*Royal University of Agriculture, Phnom Penh, Cambodia*

Received 31 December 2009

Accepted 5 March 2010

**Abstract** Almost all cattle in Cambodia are produced by small-holder farmers. The cattle are raised in an extensive way for draught power and wealth accumulation purposes. Feed availability is a major challenge for farmers associated with poor management which limits cattle productivity. This study reports a survey which was conducted to describe the cattle feeding and management practices of small-scale farmers in Cambodia. Sixty farmers raising cattle in Kang Meas and Tbong Khmum districts in Kampong Cham Province were randomly selected for an interview in 2008. On average the interviewed farmers raised 4-5 cattle per household. Most of them had cows aged older than 3 years which were mainly kept for breeding. More than 80% of cattle in Kang Meas were crossbred, but about 40% of cattle in Tbong Khmum were local breed. Very few farmers practiced weaning and none timed the date for their cows to calve. However, most of them selected a bull in their village for mating to cows. No artificial insemination was practiced in the village. The majority of farmers vaccinated their cattle to prevent the Hemorrhagic Septicemia (HS) while very few de-wormed their cattle. Cattle feed was mainly based on grazing in dry and rainy seasons. During the flooding season farmers in both districts relied on cut-and-carry native grasses and crop residues. Lastly, 60-70% of farmers sold cattle while only 10-20% bought cattle during the last year. In conclusion, cattle management by small-holder farmers was assessed as very low in terms of management and feeding. Farmers still raise their cattle in the traditional way with low health care intervention. Better housing of cattle with proper health care and improved feeding systems are recommended to farmers as ways to improve cattle production.

**Keywords:** Cattle feeding, management, small-holder farmers, production, Cambodia

### **INTRODUCTION**

In Cambodia, livestock accounts for 20.9% of agricultural GDP and contributes 7.6% to overall GDP (FAO, 2005). Most livestock, including cattle, poultry and pigs are produced by small-holder farmers. According to Ballard and Thun (2007) small-scale farms produce nearly 85% of total livestock and meat in the country. Moreover, small-scale producers own 75% of the pig population, 85% of poultry and nearly all cattle and buffalo. As most Cambodian people are engaged in crop production, cattle are mainly used for draught power in the household.

Cattle are raised in an extensive way in small-holder production systems in Cambodia and there are several breeds of cattle. Native yellow cattle are the most common breed while other major breeds are Haryana and Brahman (Harding et al., 2007). There is not proper genetic improvement program as the natural breeding is widely practiced by farmers. Then the feeding systems for cattle are characterized by the use of a wide diversity of feed resource. These are based largely on the use of crop residues, forages and other resources. Rice straw and other crop residues including grasses, weeds and shrubs are the dominant feedstuffs.

Harding et al (2007) reported that there are two basic systems of cattle production in Cambodia, but each has the same constraint. In lowland areas, the land is dominated by rice which creates significant constraints for feeding cattle. There is more land available in upland areas; however, most of this land is unavailable for cattle production because the government has conceded it to private companies. There is a relationship between the labor constraint faced by small-holders and the availability of grazing land. The severity of feed shortage varies between regions, but poor nutrition is a common problem. Poor nutrition also contributes to a higher incidence of cattle diseases and parasites. The major diseases that affect cattle and buffalo in Cambodia are HS, Foot and Mouth Disease (FMD) and blackleg (MAFF, 2006). Other major health problems experienced are parasites, with liver fluke being the major internal parasite (Soun et al., 2006) and ticks and flies the major external parasites. Animal health is recognized to be the source of production losses such as low weight gain, draught performance, fertility and lactation (Copeman and Copland, 2008).

Kampong Cham province accounts for 13% of cattle population of the country and has great potential for cattle development with small-holder farmers. In 2003, the use of forage fodder banks was introduced by CIAT through the Livelihood and Livestock Systems Project in this province. To improve cattle production of small-holder farmers in Cambodia, the project “Improved Feeding Systems for More Efficient Beef Cattle Production in Cambodia”, which is funded by the Australian Center for International Agriculture Research (ACIAR), is being carried out from 2008 to 2011. The research reported in this paper is a baseline study of the above project with the aim of describing the cattle feeding and management practices of small-holder farmers in Kampong Cham Province.

## **METHODOLOGY**

Two districts in Kampong Cham, Kang Meas and Tbong Khmum, were selected for this study as they are the target area of the project. Geographically, these districts are different with Kang Meas being a lowland area along the Mekong River receiving flooding every year while Tbong Khmum is a high land area. Thmey Kor village located in Roka Koy commune in Kang Meas district was chosen as research site 1 and Chroy Ko village located in Chiro Pi commune in Tbong Khmum district as research site 2. The stratified random sampling method was used for the sample selection for an interview. First, a list of all households of each survey site was assembled with the help of the chief of village, showing which households raised cattle and which households have planted forages. Sixty farmers raising cattle (30 from each research site) were randomly selected for the interview using a semi-structured questionnaire. The questionnaire was designed to understand cattle herd size and structure, husbandry practices, feed management and cattle buying and selling practices. All data from the survey, both qualitative and quantitative data, were stored in Windows Excel and analyzed using SPSS version 13.0.

## **RESULTS AND DISCUSSION**

### **General characteristics of cattle production in studied areas**

Large scale cattle production was not typical in the studied areas. Farmers kept a small number of cattle as they did not have enough capital to invest more in cattle production. About 60% of farmers in both districts raised their own cattle, but 40% also raised cattle for other rich farmers by

sharing the returns. Cattle production contributed about the same proportion to household income (about 20%) in both studied sites, even though the income from crop production was different.

Most farmers in the study areas kept their cattle under the house during the night, with or without mosquito nets. The cattle were not kept under the house during the day; they may be tied under a tree or kept in the surrounding field, although this provides no shade to cattle. Cattle are grazed in the field when there are no crops. Farmers also spent a lot of time cutting and carrying native grasses or crop residues to feed their cattle. They rated the lack of feed and disease as the most challenging factors in cattle production. The cows had low productivity because the inter-calving was too long while growing cattle had low growth rate.

**Cattle herd size structure**

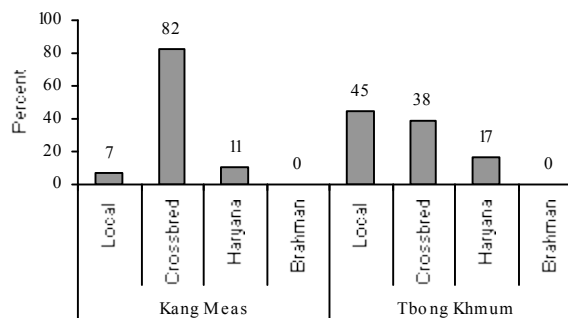
The percentage of the households raising different types of cattle and average number of cattle per household are shown in Table 1. Farmers in both studied sites raised on average 4-5 cattle per household. Most households (more than 80%) had cows older than 3 years, but the average number of cows was higher (P=0.042) in Tbong Khmum (2.33) than in Kang Meas (1.57). However, bulls were more important for farmers in Kang Meas (43%) than in Tbong Khmum (3%). The number of bulls per household was significantly higher (P=0.000) in Kang Meas (0.97) than in Tbong Khmum (0.07). Furthermore, around a half of farmers in both sites raised young bulls and heifers in their farm, with more heifers than bulls. Only one third of farmers in both sites had male or female calves in their household.

**Table 1 Percentage of farmers raising different type of cattle and average number per household**

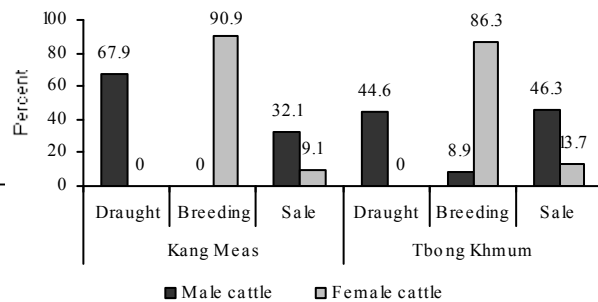
Types of cattle	Kang Meas		Tbong Khmum		P-value
	Percent	Mean	Percent	Mean	
Bulls >3 years	43	0.97	3	0.07	0.000
Young Bulls 0.5-3 years	37	0.43	50	0.8	0.125
Male Calves 0-0.5 years	13	0.17	37	0.47	0.062
Cows >3 years	80	1.57	87	2.33	0.042
Heifer 0.5-3 years	43	0.7	57	1.27	0.178
Female Calves 0-0.5 years	20	0.23	33	0.38	0.297
Total	-	4.3	-	5.3	0.230

**Breeds of cattle and production purpose**

Fig. 1 shows that most farmers in Kang Meas (82%) had crossbred cattle in their farm while very few raised local or Haryana cattle. However, local cattle were the most common for farmers in Tbong Khmum (45%) followed by crossbred and Haryana. No farmers in the studied area had Brahman cattle.



**Fig. 2 Percentage of farmers keeping different cattle breeds**



**Fig. 1 Percentage of purpose of cattle production by sex of cattle**

The purpose of cattle production by sex of cattle is illustrated in Fig. 2. The result shows that the majority of female cattle in both studied sites were raised for breeding purpose (up to 90%) while very few were sold. Breeding cows refers to the cow that produce calves for keeping in the farm or selling when farmers needed money. On the other hand, male cattle were primarily used as draft power by farmers. More cattle in Kang Meas (68%) were draught animals than in Tbong Khmum (44.6%). Apart from draught purposes, male cattle were also kept for sale (32.1% in Kang Meas and 46.3% in Tbong Khmum). Finally, only 8.9% of male cattle in Tbong Khmum were breeding cattle.

### Cattle husbandry practices

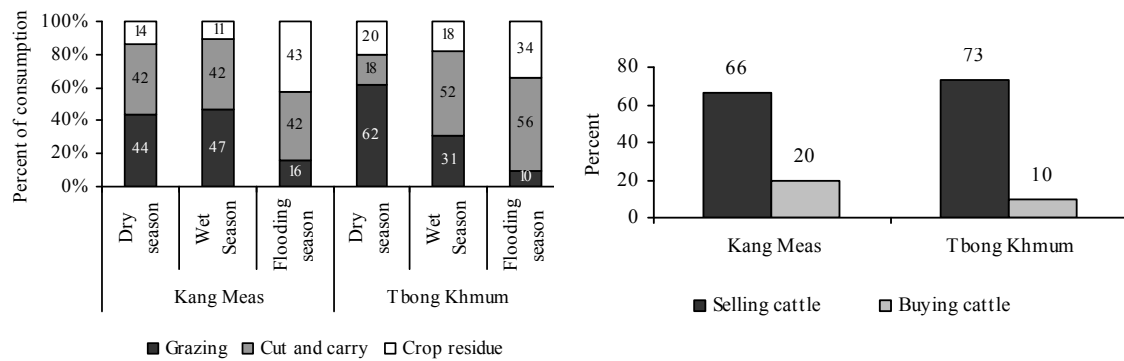
The cattle husbandry practices of farmers are summarized in Table 2. There were only 17% of farmers in Kang Meas who separated (weaned) a calf from its mother. Farmers allowed the calf to suckle the cow until it stopped spontaneously (up to 12 months). Very few farmers timed the date for their cow to calve as only 10% considered this important. Castrating male cattle was more common. More than half the farmers in Kang Meas castrated bulls while one third did so in Tbong Khmum. Most farmers (more than 80%) chose and paid for a bull for mating their cows. Artificial insemination was not used as this technology had not been introduced in the study areas. The bulls chosen for mating were mostly sourced within the village as it was easy for farmers to manage cow mating. Around 80% of farmers led their cows to a bull in the village when they observed the peak of the heat period. Besides breeding, more than 80% in both sites vaccinated the cattle and only 20% did not. The disease which was the most preventive was HS. The rate of farmers vaccinating for FMD in Kang Meas was twice that in Tbong Khmum, 46% and 21% respectively. Black leg was a minor preventive disease for which only 4% in both sites undertook vaccination. No farmers had thought about Anthrax vaccination. Lastly, the rate of farmers de-worming their cattle was low - only 23.3% of the farmers in Kang Meas and 63% in Tbong Khmum.

**Table 2 Cattle husbandry practice of farmers in the survey sites**

Information	Kang Meas (%)	Tbong Khmum (%)
Weaning calves	17	0
Castrating male cattle	53	37
Timing of calving	7	3
Paying a bull for mating cows	87	93
Source of bulls for mating cows		
Own bull	0	0
Within village	84	79
Within district	8	0
Outside district	8	21
Using artificial insemination	0	0
Vaccinating their cattle	80	80
Kinds of vaccination		
HS	87.5	100
FMD	46	21
Black leg	4	4
Anthrax	0	0
De-worming their cattle	23	63

### Feeding management

The cattle feeds were mainly natural grasses and rice straw. The grasses were provided by grazing and cut-and-carrying and the rice straw was used during scarcity of natural grasses. Farmers also used some other crop residues such as maize stems and sweet potato stems as additional feeds for their cattle. As shown in Fig. 3 the main source of cattle feed consumption in dry season was grazing on the field (45% in Kang Meas and 62% in Tbong Khmum).



**Fig. 3 Feed consumption by different season Fig. 4 Percentage of farmers buying and selling cattle during the last one year**

There was more dependence on ‘cut and carry’ of native grasses in Kang Meas (42% compared to 18% in Tbong Khmum). In the early wet season, cattle feed was grazing (47%) and ‘cut and carry’ (42%) in Kang Meas. By contrast in Tbong Khmum ‘cut and carry’ was more important (52%) because more land was available for collecting native grasses. Farmers in both sites depended on ‘cut and carry’ and crop residues for cattle feed in the flooding season. More than 80% of feed was sourced from these two kinds of feeds. The farmers in Kang Meas utilized rice straw, maize stem and sweet potato stem for their cattle while the farmers in Tbong Khmum also used other crop residues such as bean stem, peanut stem and rice bran. Lastly, there was more native grass cut for cattle in Chroy Ko (56%).

### Cattle buying and selling

The percentage of cattle sold and bought by the farmers in the studied areas during the last 12 months is shown in Fig. 4. Sixty to seventy percent of farmers sold their cattle while only 10-20% of them bought 1 or 2 cattle during the last year. Cattle selling and buying occurred most commonly between farmers with female cattle. Female cattle were bought for cow-calf production. However, sometimes small traders or market sellers came to the village to buy cattle. These traders mostly bought male cattle for slaughter and sale in the local market or for transport to other provinces and neighboring countries. The money from selling cattle was not used to buy more cattle, but farmers used the funds for different purpose.

### DISCUSSION

In small-holder cattle production systems, cows were most important for farmers because they were used for breeding to produce calves. However, bulls were used for draught purposes, especially in the areas along the Mekong River (Kang Meas). In the last 10 years, it was reported that cattle were mainly kept as draught animals rather than for meat production as they were concentrated in the rice growing areas (Maclean, 1998). Cattle were also raised for selling indicating that farmers were responding to market demands. Cattle along the Mekong River were almost all crossbred, however, more local breed cattle were found in the upland area (Tbong Khmum). Harding et al (2007) found that cattle were concentrated along the Mekong because more forage was available.

Cattle husbandry intervention of farmers was low in terms of health and disease control. Windsor (2008) reported that farmers had little knowledge of husbandry and did not have funds to improve husbandry. The breeding program was absent in small-holder cattle production systems. Breeding was done by selecting a bull within the village to mate cows. Inbreeding could be a problem if no records were kept of breeding and management. Vaccinations in the studied sites were only available for some diseases such as HS and FMD. Some farmers did not have access to vaccines and some were not concerned. Since cattle were generally grazed in the fields for farmers

were not able to provide best cattle management practices. Management of cattle in pens is a better way to control the condition and health of cattle and to provide necessary treatments. Vaccination to prevent some common diseases must be provided to cattle to minimize the economic losses.

Cattle feeds were mainly natural grasses and rice straw. The grasses were provided by grazing and cut-and-carrying, which required high labor input. Windsor (2008) reported that more than 4 hours were required for those activities. Because of feed scarcity, especially during the flooding and dry seasons, farmers fed rice straw to their cattle which had very low nutritive quality. There are some options for farmers to improve the feeding system of their cattle. First, supplementing traditional feed resources with planted forages is a simple solution (Stür and Horne, 2001). Forages are grasses and legumes that can be used for feeding animals and for better management of the environment (Stür and Horne, 1999). Planting forage can help farmers to solve problems such as general feed shortages, dry season feed shortages, and freeing up labor for feeding animals. Second, to increase the quality of crop residues such as rice straw, farmers can provide small amounts of protein and mineral supplementation such as sugar, salt, urea, oil cakes, fish meals and rice by-product. Another option to improve the quality of available feed resources, such as maize stems, sweet potato stems and sugar cane stems, is to make them into silage for cattle feed. Even though these options require extra inputs, farmers can choose the best option for them based on to their resources.

Small-holder farmers do not think about the time of calving and weaning. According to Petit et al. (1992), cows should be managed to calve before the grass growing season and calves weaned at the end of the season. During this season, cows eat more than the requirement for maintenance and lactation and use the extra nutrient to recover their body weight and fat reserves. Then the cycle of oestrus and ovulation is stimulated.

Lack of feed is a serious problem for cattle productivity which limits the ability to expand cattle numbers (Harding et al., 2007). Farmers had less opportunity to participate in cattle markets. Selling and buying of small-holder cattle mostly occurred between farmers. Others such as local traders, market sellers and slaughterhouses sometimes come to the village to purchase cattle. Ramsay and Maclean (1998) found that cattle were less frequently brought to town to sell directly to slaughterhouses or to consumers.

There are two options for small-holder farmers to improve the cattle production in order to increase their income. The first option is to fatten cattle for 2-4 months before sale to increase the meat yield and enable farmers to receive a higher sale price. Fattening refers to keeping cattle in pens and feeding them good quality forages and water. It is easy for farmers to check the condition and health of animals in the pens and provide treatments including de-worming and vaccinations (Stür and Varney, 2007). The second option is to improve cow-calf production which is the most important production cycle in small-holder system. More efficient cow-calf production means that cows can produce as many calves as possible by reducing the inter-calving period. Underfeeding during lactation may reduce the milk yield of the cow and the growth rate of its calf (Hodgson et al., 1980), especially when the cows are already thin at calving. So good quality feeds must be provided to cows during lactation. Weaning of calves at age of 40-70 days will help cows to return to oestrus and conceive during the breeding season (Laster et al., 1973). However, the weaning time is depended upon the condition of calf and the good quality and adequate feed should be provided to the weaned calf.

## **CONCLUSION**

The cattle production of small-holder farmers was assessed as very low in terms of management and feeding. Farmers raised their cattle in the traditional way with low health care intervention. Moreover, there was no breeding program to manage the genetic improvement in small-holder cattle production systems. Cattle feeds were mainly based on natural grasses and rice straw. Providing locally available feeds was a major challenge for farmers which required high labor input, especially during the dry and flooding seasons. Lack of feed was a critical factor limiting the ability of farmers to expand cattle numbers. As a result, farmers had less opportunity to participate in

cattle markets. Better housing of cattle with proper health care and improved feeding system is recommended to improve cattle production. Planting forages including grasses and legumes is a simple solution for farmers to respond to the lack of feed. Keeping cattle in pens for fattening before sale and improving cow-calf production can help improve management of cattle in order to increase income and expand the number of cattle to respond more to market demand

## **ACKNOWLEDGEMENTS**

The financial support of ACIAR for this research is gratefully acknowledged. The authors are grateful to Dr Sar Chetra, Dr Tim Purcell, Dr Troung Tan Khanh and Dr Archut Kubota for their contribution to our research.

## **REFERENCES**

- Ballard, B.M. and Thun, V. (2007) Livestock production and veterinary services in Cambodia. Annual development review 2006-2007, Cambodia Development Resource Institute, Cambodia.
- Copeman and Copland, R.S. (2008) Importance and potential impact of liver fluke in cattle and buffalo. Overcoming Liver Fluke as a Constraint to Ruminant Production in South-East Asia. ACIAR Monograph, 133, 1-155.
- FAO (2005) Livestock sector brief - Cambodia. Food and Agricultural Organization, Italy.
- Harding, M. Quirke, D. and Werner, R. (2007) Cattle and buffalo in Cambodia and Laos, The economic and policy environment for small-holders. Project final report, ACIAR, Australia.
- Hodgson, J., Peart, J.N., Russel, A.J.F., Whitelaw, A. and Macdonald, A.J. (1980) The influence of nutrition in early lactation on the performance of spring-calving suckler cows and their calves. *Animal. Prod.*, 30, 315-325.
- Laster, D.B., Glimp, H.A. and Gregory, K.E. (1973) Effects of early weaning on postpartum reproduction of cows. *J. Anim. Sci.*, 36, 734-740.
- Maclean, M. (1998) Livestock in Cambodian rice farming system. Cambodia-IRRI-Australia project, Cambodia.
- MAFF (2006) Agricultural statistics 2005-2006. Department of planning and statistics, Ministry of agriculture, forestry and fishery, Cambodia.
- Petit, M., Jarridge, R., Russel, A.J.F. and Wright, I.A. (1992) Feeding and Nutrition of the suckler cow. *Beef Cattle Production*, World Animal Science, C5, Elsevier, 199-205.
- Ramsay, M. and M. Maclean (1998) Ratanakiri, where Cambodia meets Laos, Livestock raising in Cambodia's upland province. *Upland Farming Systems in the Lao PDR - Problems and Opportunities for Livestock*, ACIAR Proceedings, 87.
- Soun, S., Hol, D., Siek, S., Mclean, M. and Copeman, B. (2006) Seasonal differences in the incidence of infection with *faciola gigantica* in Cambodian cattle. *Tro. Anim. Health Pro.*, 38(1), 23-28.
- Stür, W.W. and Horne, P.M. (1999) Forage technology development with small-holder farmers, How to best varieties to offer farmers in Southeast Asia. ACIAR Monograph, 62.
- Stür, W.W. and Horne, P.M. (2001) Developing forage technology with small-holder farmers, How to grow, manage and use. ACIAR Monograph, 88.
- Stür, W.W. and Varney, G. (2007) Best practice guide, Cattle and buffalo fattening. CIAT, Laos.
- Windsor, P. (2008) Identifying research priorities for development of the beef industry in Cambodia and Lao PDR with special references to animal health interventions. Final report, ACIAR.