J Intl Cooper Agric Dev 2017; 15: 42–47

Journal of
International Cooperation for
Agricultural Development

Working Paper

Characterization of Smallholder Livestock Farming in Kampong Cham Province, Cambodia

— A Pilot Study in Prey Chhor District —

Nahoko Ieda[1)], Youki Watanabe[1)], Chan Bun[2)], Vutha Pheng [2)], and Yoshihisa Uenoyama[1)]

1) Graduate School of Bioagricultural Sciences, Nagoya University, 464-8601, Nagoya, Japan

2) Asian Satellite Campus-Cambodia, Nagoya University, Phnom Penh, Cambodia

Received: January 31, 2017 Accepted: February 24, 2017

Abstract. Livestock production plays an important role in rural development. In Cambodia, inclusion of rural smallholder farmers in the development of the livestock industry is key. This case study aims to describe integrated livestock farming practices in small-scale farms and to raise awareness on the potential and constraints of the livestock industry in rural areas of Cambodia. The study was implemented on the 5th and 6th March 2014 in Prey Chhor District in Kampong Cham Province, using questionnaires with close-ended questions. At the study site, cattle were kept for sale and/or labor and poultry were kept for sale and/or home consumption, whereas the purpose of keeping pigs was exclusively for sale. It was also indicated that swine production requires more investment compared to cattle, in terms of livestock shelters, feeds and vaccination. The majority of the informants recognized avian influenza from TV or radio, while they processed sick or dead animal bodies and livestock manures following traditional practices without special care for infectious disease control. The present results characterize the current common practice of livestock production in rural areas of Cambodia. This case study will also serve as a pilot study to refine the methods for larger-scale survey in the future.

Keywords: Livestock, Smallholder, Zoonosis, Rural Development, Cambodia

Introduction

Livestock production plays an important role in rural development. Livestock reduce vulnerability and enhance productivity in smallholder farmers[1)], and contribute to national economic growth[2)]. It is also encouraged to enhance livestock production in response to increasing demands, because the consumption of nutritional food obtained from animal sources increases is as per capita GDP grows[3)].

The Cambodian government has advocated that the development of livestock production is one of the prioritized goals for the overall development of the country[4)]. Indeed, estimated production for livestock products, such as pork and beef, has been increasing in Cambodia (Figure 1, data from FAOSTAT, http://www.fao.org/faostat/en/, accessed 30th. Jan 2017), attracting expectation for growth of the industry in near future. The majority of the livestock farming practice in rural areas of Cambodia is smallholding, approximately three or four cattle per household, as shown in the recent studies conducted in Kampong Cham, Takeo and Kandal Province[5, 6)]. Therefore, the inclusion of rural smallholder farmers in the development of the livestock industry is expected. However, previous studies on smallholder livestock farming mainly focused on cattle production, and descriptions of other livestock production such as swine and poultries are rather sparse. It is important to describe integrated livestock farming practices, because in

Corresponding author: Yoshihisa Uenoyama, E-mail: uenoyama@nagoya-u.jp

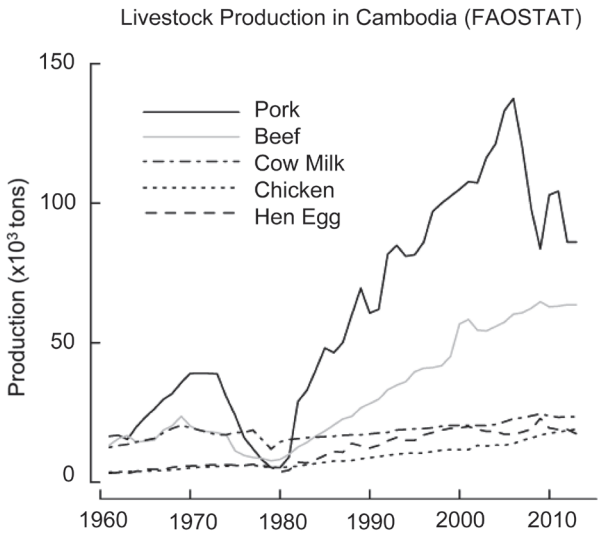

Figure 1. Livestock production in Cambodia from FAOSTAT. Production of pork (solid black line), beef (solid grey line), cows milk (dashed dotted line), chicken (dotted line) and hen eggs (dashed line) from 1960 to 2013 are shown. Pork and beef show a rapid increase since 1980.

general, the smallholder farmers keep multiple livestock species and, therefore, income may be generated not only from one species of livestock in smallholder farms.

It is also important to consider that outbreaks of zoonosis can threaten human health and the development of the livestock industry. Transmittable diseases between human and livestock have been globally emerging during the last two decades[7]. Significant numbers of infectious diseases such as haemorrhagic septicaemia and foot-and-mouth disease have been reported in Cambodia between 2008 and 2011[8]. More involvement in veterinary and livestock discipline into zoonosis control as well as capacity development in these fields, are necessary in the country[9], especially at the producer-level.

This case study aims to report the current situation of livestock farming in small-scale farms in rural areas of Cambodia and discuss on the potential capacity for the development of the livestock industry. To address these issues, we surveyed livestock farmers in a representative rural province in Cambodia to examine the style of livestock farming and the purpose of keeping each livestock species. In addition, to induce awareness on potential and constraints of livestock industry in this area, we also examined the difference of the investments between the cattle and pigs, and the knowledge of farmers about the zoonosis and disease control among livestock.

Materials and Methods

Study Site

This study was conducted in Prey Chhor District (12°3'27" N, 105°15'19" E), Kampong Cham Province, Cambodia (Figure 2). A national report from the Cambodian government indicates that Kampong Cham Province holds the fourth largest number of farmers in the country that own livestock[10]. Prey Chhor District was the site of interest because it holds large number of cattle and pigs according to the information provided by local authorities. Indeed, the latest record obtained from the General Directorate of Animal Health and Production indicates that the largest number of cattle among all ten districts in Kampong Cham Province (51,019 cattle) are kept in Prey Chhor District, which covers approximately 25% of all cattle kept in Kampong Cham Province (206,632 cattle) in 2016. The climate in the study site belongs to the tropical zone, which typically shows two seasons; a dry season from November to April and a rainy season from May to October. The average monthly temperature of Cambodia from 1990 to 2012 was between 25.6°C minimum and 29.2°C maximum and rainfall between 15.4 mm minimum and 307.8 mm maximum, according to the World Bank Climate Change Portal (http://sdwebx.worldbank.org/climateportal/index.cfm, accessed 30th. Jan. 2017).

Survey Methods

The study was implemented on the 5th and 6th March 2014. Interviews and observations were performed at the informants' houses located in the following four villages: Samraong, Prey Romdeng, Banteay Thmey and Prasart. All informants were adult-members of each household who were knowledgeable about the agricultural activity and communicated in local language with interviewers.

The survey was implemented using questionnaires with close-ended questions. Additional information was given from informants as open-ended responses. Species of livestock that are raised in the household, number of animals in each species in the household and purpose of raising each species were asked to twenty-three households who keep any livestock. After collecting basic information, a more detailed household-level survey was conducted aiming to obtain information on livestock raising practices, such as type of feeds, type of livestock shelters, disease control and main resource of income in the households. The household-level survey was implemented in ten households that were targeted in the animal-level survey.

Although buffalo and fish farming were observed during the survey (one household for each out of 20 households), these are excluded from the data in the present study be-

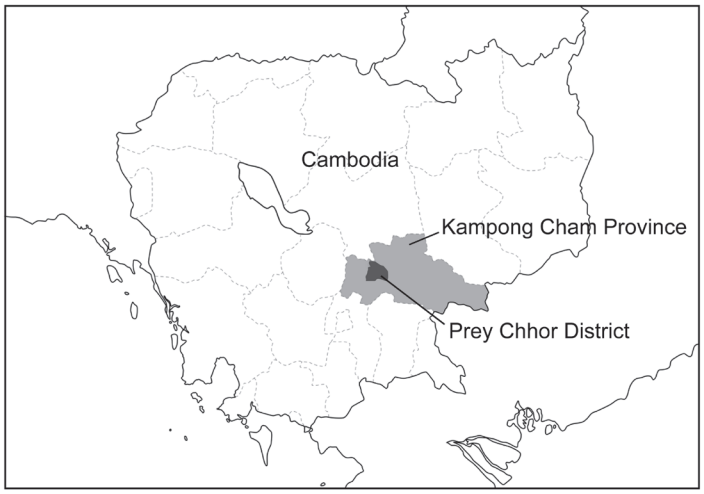

Figure 2. Map of the study site. Pale grey-shaded area and grey-shaded area show the location of Kampong Cham Province and Prey Chhor District, respectively. The map was downloaded from http://www.freemap.jp (accessed 30th. Jan. 2017) and modified.

Table 1. Style of livestock farming

Species of livestock	No. of households
Cattle, pigs and poultry	4
Cattle and pigs	1
Cattle and poultry	11
Only cattle	4
Only poultry	3
Total	23

Table 2. Purpose of keeping each livestock species

	For sale	For home consumption	For labor	For sale and home consumption	For sale and labor	Other	Total
Cattle (74)	11	0	4	0	4	1	20
Poultry (175)	5	6	0	7	0	0	18
Pig (55)	5	0	0	0	0	0	5

Data shows numbers of households.
The numbers in brackets indicate the total numbers of the animals observed in the survey.

cause of the small sample size. When chicken and ducks are observed, they are referred to as "poultry" in the present study. No other poultry were observed in the studied households.

Results

Mainstream Practice of Livestock Farming

The majority of the households kept cattle in combination with pigs and/or poultry as shown in Table 1. The most popular practice was keeping cattle and poultries (eleven households), followed by keeping cattle, pigs and poultry, and keeping only cattle (four households, respectively). Three households kept only poultry and one household kept cattle and pigs. Medians of the numbers of cattle, pigs and poultry that are kept in one household were 4 (ranging 1 to 8), 12 (ranging 1 to 26) and 4 (ranging 1 to 50), respectively.

Table 2 shows the number of households who indicated purposes of keeping each livestock species. Cattle were kept for sale (n=11), for labor (n=4) or both for sale and labor (n=4). The purpose of keeping pigs was exclusively for sale (n=5). Most households kept poultry both for sale and consumption at home (n=7), while the rest kept them only for sale (n=5) or only for consumption at home (n=6). One household kept cattle for other reasons, which was to "follow the custom", according to an informant. Note that the eight other households also raised "custom" or "family tradition" as a reason in addition to the purposes (data not shown in the table).

Swine-production as Source of Income and Necessary Investment

Figure 3 shows the major source of income in households. Three households out of four who kept pigs answered they earn more than 50% of income from livestock, whereas five out of six households without pigs (therefore with only cattle and poultry) indicated crops or other (e.g. working as constructer) as their source of major income.

Table 3 shows differences in investments on livestock

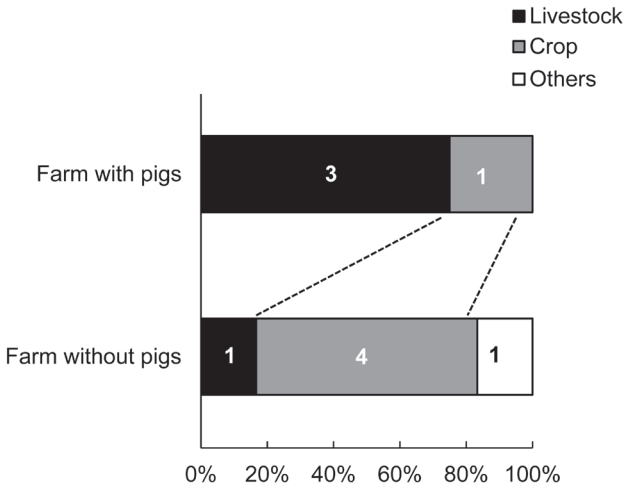

Figure 3. Difference of major income sources between pig producers and non-pig producers. Closed bar, shaded bar and open bar indicate the percentage of households whose major source of income was livestock, crop, and non-agricultural activity. The number in each bar shows the number of households.

shelter and feeds between cattle and pigs. Four households kept their cattle in livestock shelter separated from houses for humans, while another four kept their cattle underneath the first floor of stilt houses for their families. One household used a stanchion with no shelter to keep its cattle. On the other hand, all pig-raising households kept their pigs in livestock shelters. All interviewed households fed their cattle with locally available foods, such as straw, whereas three out of four pig-farmers fed their pigs with industrial feeds. In addition, several informants mentioned that the vaccination is free for cattle, supported by the General Directorate of Animal Health and Production (previously known as Department of Animal Health and Production when the interview was implemented), Ministry of Agriculture, Forestry and Fishery of Cambodia, but it is charged for pigs. Note that the question and answer on vaccination were not included in the original structured questionnaire and, therefore, not included in the quantitative analysis.

Zoonosis and Disease Control among Livestock

Nine out of ten informants recognized the word zoonosis and all of them raised either H1N1 (also called "*H1N1*" in local language) or bird flu ("*phdassay baksay*" in local language, literally translated "*flu-avian*") as the name of any disease they knew (Table 4). Note that "*H1N1*" and "*phdassay baksay*" are separately indicated in the table to show the farmers' recognition of the two different terms. Eight out of the nine informants raised TV or radio as the

Table 3. Difference of investments on raising cattle or pigs

	Livestock shelter			Feed	
	Separate shelter	Under house	Stanchioned, no shelter	Locally available food	Industrial food
Cattle	4	4	1	9	0
Pig	4	0	0	1	3

Data shows numbers of households.

Table 4. Recognition of zoonosis and commonly known disease name

Recognition on zoonosis	No. of households	Recognized disease name (Open-ended response, " " in local language)	No. of households
No	1	-	-
Yes	9	H1N1 "*H1N1*"	6
		Bird flu "*phdassay baksay*"	3

Local terms for disease names are indicated in double quotations.

Table 5. Practice of processing sick/dead animal bodies and livestock manure

	Bury	Burn	Sell	Use as fertilizer	Eat	Other
Sick/dead animal body	5	2	1	1	3	1
Livestock manure *	0	4 (as fuel)	1	10	-	-

Data shows numbers of households.

* Note: Practices for livestock manure are of daily/regular treatment and not related to animal diseases.

source of their knowledge on zoonosis. The number of informants who raised training courses as the source of their knowledge was two.

Table 5 shows the practice of treating the animal bodies when disease is apparent and/or livestock dies. The most common practice was to bury the bodies (n=5), followed by eating (n=3) or burning (n=2). Practice of the utilization of livestock manure on regular basis is also shown in Table 5, indicating that most households utilize it as fertilizer (n=10) or fuel (n=4).

Eight out of ten informants indicated that they have observed disease in livestock, although specific disease names were not identifiable in the present study. All informants recognized that there was public animal health care service available in the village and nine of them had had their cattle and/or chicken vaccinated by the service provider.

Discussion

Among the three major livestock species in the study site, cattle, pig and poultry, pig was suggested as the development base of livestock industry in rural areas in Cambodia, because the majority of swine farmers indicated livestock as the main income-source while the farmers who did not apply swine production relied on non-livestock farming activity in terms of income in the present study. Constraints, or necessary investment, of swine-production in smallholder farms were also suggested in the present study, as the most common practice of swine-production applied separate livestock shelters, industrial feeds and charged vaccinations, unlike cattle.

It is likely that each livestock species was preferred for different purposes from others in smallholder livestock production in Cambodia. In addition to the most prominent role as livestock, as a safekeeping financial resource, cattle also serve as labor in overall agricultural activity and chicken serves as protein source for family members in the present study site. Pigs, on the other hand, are kept exclusively for selling, which suggests that keeping pigs in smallholder farms is the closest practice towards an industrialized form of livestock production in rural Cambodia. Given that GDP earned from agriculture in Cambodia was 28.2% in 2015 (World Bank, 2017) and that production of pork is most rapidly increasing among other livestock products such as beef, chicken, eggs or cows milk (FAOSTAT) in the country, development of swine-production may contribute as one of the bases of economic growth in Cambodia.

Zoonosis control is a critical issue, especially in resource-limited developing countries[11]. It was an encouraging finding that the smallholder farmers identified the specific terms, H1N1 or bird-flu, as one of their concerns of animal disease. Since the present results suggested that TV and radio are two of the most effective methods to disseminate agricultural information in rural villages in Cambodia, as shown in the present study, such media can be utilized for the further capacity development of the farmers. Specifically, promoting the knowledge of treating infected animal bodies or manure among smallholder farmers is urged to prevent outbreaks of zoonosis, because it is still a common practice in the study site to utilize them as fertilizer or fuels on a daily basis. In addition, disease control among pigs may be the next challenge to pursue development of livestock industry, because vaccination for pigs are still costly for the farmers unlike cattle as shown in the present study.

This case study was conducted as a pilot study for the larger scale survey on livestock production in Cambodia. To this end, the contents of the survey will be refined in the future study. More detailed animal-level survey, describing age, sex, breeds, and reproductive parameters of individual animals, will be required to estimate the productivity of each livestock species under the environment of smallholder farms. Estimation of overall household income by calculating inputs and outcomes regarding the agricultural activities and/or off-farm activity will also be recommended.

In summary, the present study characterizes livestock production in Prey Chhor District, Kampong Cham Province in Cambodia and raises awareness on potential and constraints of livestock industry. In particular, swine production could provide economic value for the farmers although it requires more investment than other livestock species such as cattle and poultry. Further capacity development for the farmers via the effective extension source, TVs or radio, are recommended for zoonosis control during the further development of the livestock industry in near future.

Acknowledgement

We are grateful to Lei Shi from Graduate School of Medicine, Nagoya University, and Shiori Minabe, Takashi Kondo, Kana Ikegami from Graduate School of Bioagricultural Sciences, Nagoya University, for their technical support. We also thank Taing Keanghuot from Royal University of Agriculture for local linguistic assistance during the survey. This study was conducted in part as overseas fieldwork training supported by Program for Leading Graduate School "Women Leaders Program to Promote Well-being in Asia", Nagoya University.

References

1) Otte J, Costales A, Dijkman J, Pica-Ciamarra U, Robinson T, Ahuja V, Ly C, Roland-Holst D. (2012) Livestock sector development for poverty reduction: an economic and policy perspective —Livestock's many virtues. FAO Pro-Poor Livestock Policy Initiative: 161.
2) Upton M. (2004) The Role of Livestock in Economic Development and Poverty Reduction. FAO Pro-Poor Livestock Policy Initiative: Working Paper No. 10.
3) Gerbens-Leenes PW, Nonhebel S, Krol MS. (2010) Food consumption patterns and economic growth. Increasing affluence and the use of natural resources. Appetite 55: 597-608.
4) Royal Government of Cambodia (2014) National Strategic Development Plan 2014-2018 —For Growth, Employment, Equity and Efficiency to Reach The Status of An Upper-Middle Income Country—.
5) Nampanya S, Suon S, Rast L, Windsor PA. (2012) Improvement in smallholder farmer knowledge of cattle production, health and biosecurity in Southern Cambodia between 2008 and 2010. Transbound Emerg Dis 59: 117-127.
6) Young JR, O'Reilly RA, Ashley K, Suon S, Leoung IV, Windsor PA, Bush RD. (2014) Impacts on Rural Livelihoods in Cambodia Following Adoption of Best Practice Health and Husbandry Interventions by Smallholder Cattle Farmers. Transbound Emerg Dis 61: 11-24.
7) Gibbs EP. (2005) Emerging zoonotic epidemics in the interconnected global community. Vet Rec 157: 673-679.
8) Sothoeun S, Young J, Windsor P. (2011) Livestock infectious disease status in Cambodia. Cattle health, production and trade in Cambodia 138: 44-49.
9) Grace D, Gilbert J, Lapar ML, Unger F, Fevre S, Nguyen-Viet H, Schelling E. (2011) Zoonotic emerging infectious disease in selected countries in Southeast Asia: insights from ecohealth. Ecohealth 8: 55-62.
10) National Institute of Statistics, Ministry of Planning in cllaboration with the Ministry of Agriculture, Forestry and Fisheries (2015) Census of Agriculture of the Kingdom of Cambodia 2013 National Report on Final Census Results.
11) Zinsstag J, Schelling E, Roth F, Bonfoh B, de Savigny D, Tanner M. (2007) Human benefits of animal interventions for zoonosis control. Emerging Infectious Diseases 13: 527-531.