

Cattle Production and Lumpy Skin Disease of Smallholder Farmers in Svay Rieng Province

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Abstract: The cattle production in Romeas Haek district, Svay Rieng province, was developed remarkably, since there were some households raising cattle in large number, more than 20 heads. The grazing method of cattle was tethering and free grassing in the commune grass, since the natural grass and rice straw were the main source of cattle feed, however some of them supplemented their cattle with crop-byproducts, planting grass or concentrated feed. For the majority, BCS (Body Condition Scoring) of the cattle in those areas was 3 accounting for 52%-73.33%, but it was found the thin cattle has low BCS of 2 accounting for 11.11% to 40.00% and also fat cattle has BCS of 4 up to 27.78%. However, the average BCS varied with village which ranged from 2.68 to 3.17, but is not different in term of commune and sex of cattle. Besides facing with shortage of feed, the experience with diseases was also another concern, since 85.71% to 95.83% of the households faced this problem last year. Among the clinical signs found, lumpy skin was 100%, i.e. no one escaped from this problem, thus making them aware of vaccinating their cattle against some diseases such as FMD (Foot and Mouth Disease), HS (Hemorrhagic Septicemia) and LSD (Lumpy Skin Disease), but mostly vaccination was used against FMD. Because the LSD has occurred in these areas since 2020, then the seroprevalence was found in high positive up to 72.62% by Enzyme-Linked Immunosorbent Assay (ELISA) test. This positive rate was also varying by villages, ranging from 53.3% to 94.44%. But there was no association between positive cattle with commune, BCS, sex and age of cattle. In conclusion, the cattle production in Romeas Haek district, Svay Rieng province had developed markedly, however the shortage of feed and disease occurrence are the main challenges for farmer cattle producers, especially LSD outbreak last year. However, most of the farmers have been aware of the benefit of vaccination and had vaccinated their cattle against those main disease, such as FMD, HS and LSD.

Key words: Cattle production, lumpy skin, smallholder farmers, seroprevalence.

1. Introduction

Cambodia is developing in all sectors, in which the agricultural sector has played an important role in renovating the national economy and as a basis source to sustain food supply and generate the livelihoods of farmers. Most of Cambodian farmers raise cattle to support their families and other people. Cattle is ruminant animal that consumes most of agricultural by-products such as rice straw, peanuts straw, corn stalk, sugarcane top, cassava leaves and is easy to raise. Cattle production provides many benefits to farmers,

such as additional income, draught power, providing manure for fertilizing crop fields and biogas, saving money and as gift for their children when they marry and have a family [1]. At the same time, there is good contingency plan and response team to work for disease surveillance and investigation and also reliable report system for animal health and disease outbreaks to take measurement promptly. The most important emerging transboundary animal disease, in last 2 years outbreak in cattle of Cambodia, was LSD (Lumpy Skin Disease), severely affecting the economy and cattle production,

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having negative impact on cattle trade and movement [2]. The increasing cases of cattle LSD, made farmers highly aware of this new emerging disease. Since October 5, 2019, there have been outbreaks in 20 parts of northern and central Vietnam. According to the report [3], there were 17 provinces in Thailand, four of which bordered Cambodia. Cambodia is also affected by the epidemic in some provinces. First detection of LSD in domestic cattle in Cambodia was in June of 2021 and rapidly spread throughout the country. Then in the next 3 months till September 2021, a banteng in Phnom Tnout Phnom Pok Wildlife Sanctuary was observed the clinical signs of LSD [4]. In Svayrieng Province, LSD attacked about 1,000 cattle in 7 districts with huge and serious effect on cattle production [5]. Rapid vaccination and strict movement control of susceptible animals should be carried and vector control was also included to get high impact of measurement [6].

2. Material and Method

2.1 Study Area and Period

This survey was conducted in four different villages in Ampil and KoKi commune, Romeas Haek district, Svay Rieng province. These villages were Prey Kdoey and Tropeang Skoun in Koki commune, and Romeas Hiaek and Prey Rousey in Ampil commune (Table 1).

The Eighty households were selected based on criteria as following:

- (1) Own at least 2 heads of cattle;
- (2) Willing to join our interview;
- (3) Allow researchers to collect blood sample from their cattle.

Each participating farmer was selected using snowball sampling technique.

The blood was collected from cattle from the jugular vein of cattle in villages. The procedures of ELISA test were conducted at NAHPRI (National Animal Health and Production Research Institute), General Directorate of Animal Health and Production, Phnom Penh, Cambodia (GIS: 48P 487258.82 E, 1275360.17 N).

The total study period is from June 2022 until January 2023.

The semi-structural interviews were applied by individual household with designated questionnaire. The information/data were collected through questionnaire as following: demography, feed cattle management and cattle health management. Along with the interview, the cattle were scored based on their BCS from 1 to 5. The serology test was analyzed for antibody of LSD.

2.2 Data Management and Data Analysis

The collected data were recorded and analyzed using Microsoft Excel for descriptive statistics, including frequency and distribution, in order to describe the dataset. Some tools for inferential statistics were used, such as parameter test and non-parameter test.

Table 1 The distribution of sampling in each village.

Commune	Village	Total number		Number of sampling	
		# Household	# Cattle	# Household	# Cattle
Ampil	Romeas Haek	80	142	16	18
	Prey Rousey	103	210	21	26
Koki	Tropeang Skoun	116	121	24	15
	Prey Kdoey	94	195	19	25
Total		393	668	80	84

3. Result

3.1 General Cattle Production Status

3.1.1 Number of Cattle per Householder

Normally, around 81%-84% of households owned cattle less than 5 heads in both communes, while there also some farmers who possessed more than 10 heads (Fig. 1).

3.1.2 Raising System and Cattle Feed

Most of households applied different raising systems, however, most of them let cattle graze in day time and kept in the pen at the night. For grazing method, the tethering method was applied in half amount of interviewed households, then tethering and free grazing combined method. The free grazing is still applied, especially after rice harvesting (Fig. 2).

The natural grass was the main feed for cattle in both communes, followed by rice straw and crop by-product, while there were 5.41%-9.30% of them who had planted the grass for supplementing. The concentrated feed from market was also used to supplement for those who were fattening cattle (Fig. 3).

3.1.3 BCS (Body Condition Scoring)

In general, the BCS of those cattle ranged from 2 to 4, while the score of 3 was most occupied accounting for 52% to 73.33% (Fig. 4). However, Prey Kdoey village has lower average of BCS than others (Table 2).

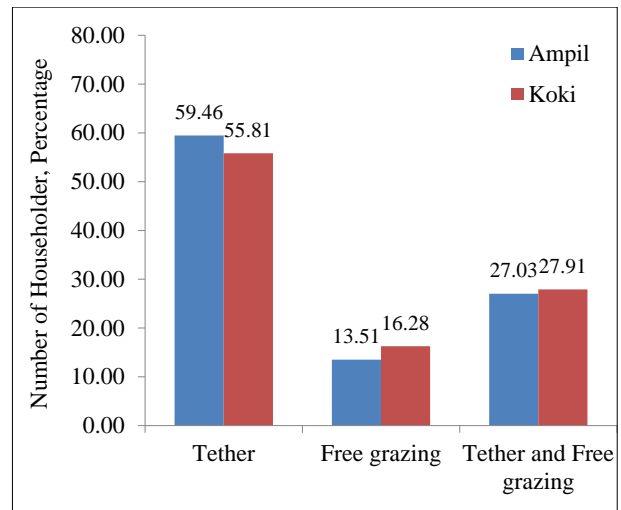


Fig. 2 Raising cattle method.

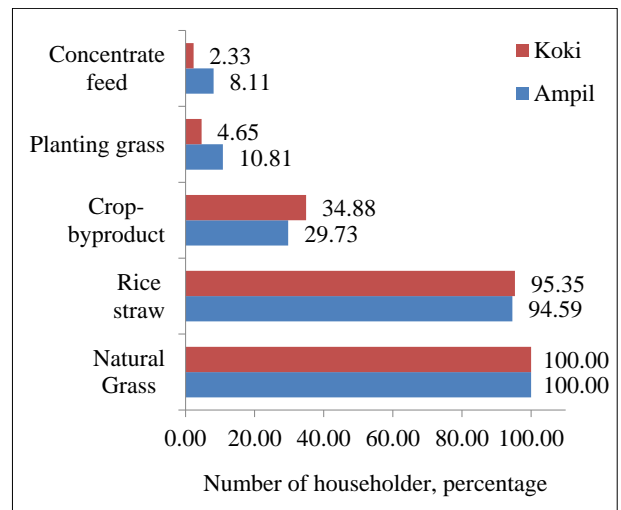


Fig. 3 Cattle feed.

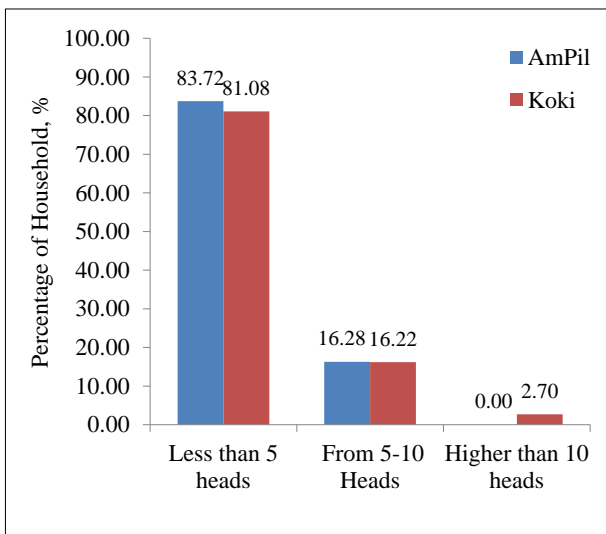


Fig. 1 Cattle owned per household.

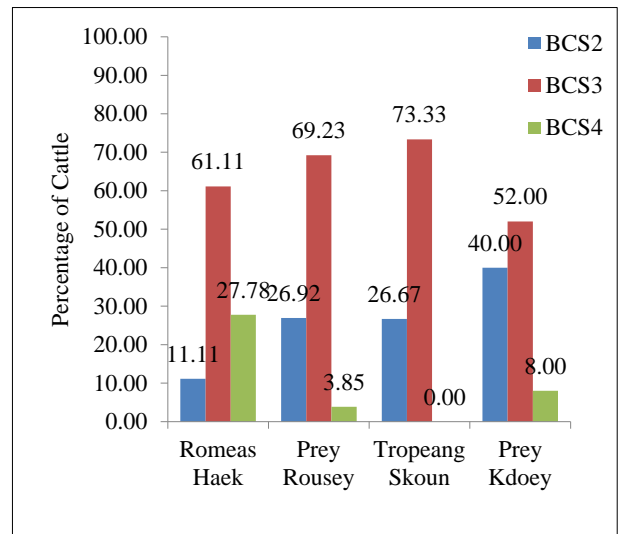
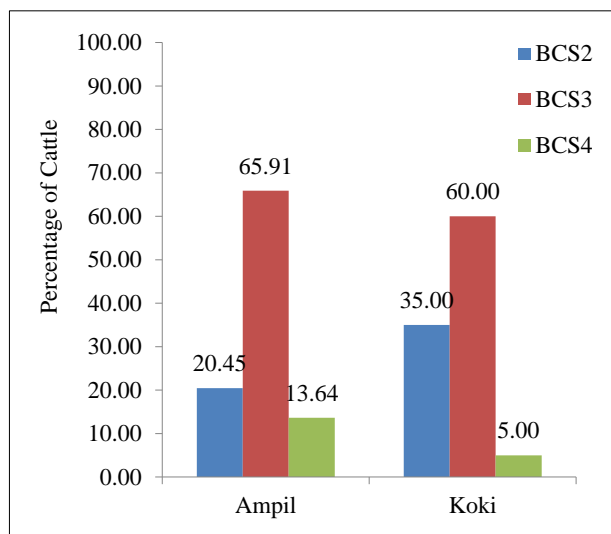


Fig. 4 BCS by village.

Table 2 Average BCS in villages.

Village	BCS mean	SE mean
Romeas Haek	3.17 ^a	0.133
Prey Rousey	2.77 ^a	0.111
Tropeang Skoun	2.73 ^a	0.146
Prey Kdoey	2.68 ^b	0.113
<i>p</i> value	0.037	

Significant in column, $p < 0.05$, a>b.

**Fig. 5 BCS by commune.****Table 3 Average BCS in communes.**

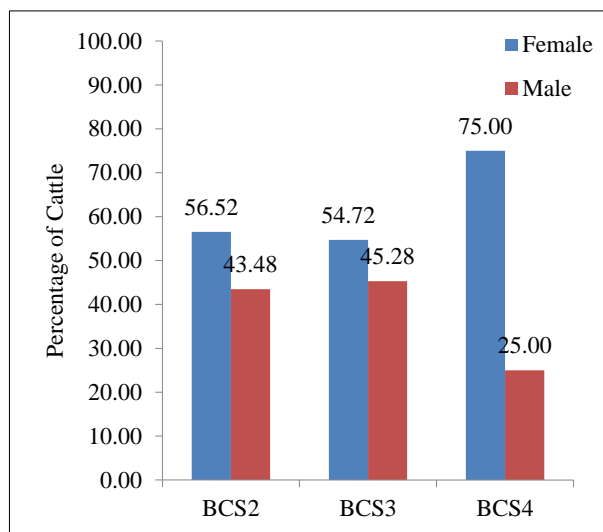
Commune	BCS mean	SE mean	<i>p</i> value
Ampil	2.93	0.088	0.069
Koki	2.70	0.089	

The cooperation of both communes, Ampil and Koki, showed that the BCS of 3 accounted for 65.91% and 60.00% respectively, while the BCS of 4 in Ampil commune seemed to be higher than Koki commune, 13.64% and 5.00% respectively (Fig. 5).

The average BCS in both communes, Ampil and Koki, had showed no significant difference accounting for 2.93 and 2.70 respectively (Table 3).

Cattle BCS by gender of cattle, female and male, was similar rate for BCS 2 and BCS 3, while the percentage of BCS 4 for female was higher than male, accounting for 75 and 25 percent respectively (Fig. 6).

However, the average BCS of female and male cattle was not significantly different, accounting for 2.85 and 2.78 respectively (Table 4).

**Fig. 6 BCS by cattle gender.****Table 4 Average BCS by gender of cattle.**

Cattle gender	BCS mean	SE mean	<i>p</i> value
Female	2.85	0.085	0.556
Male	2.78	0.098	

3.1.4 Experiencing with Diseases

According to Table 5, most farmers who raised cattle have experienced diseases the last year and there was no different significance between disease occurrence and villages, accounting for 85.71% to 95.83%.

It was similar result for commune level with no association of disease occurrence and commune level (Table 6).

Table 5 Farmers experienced disease in each village.

Village	Total respondents	Experienced with disease	
		No.	%
Romeas Haek	16	14	87.50
Prey Rousey	21	18	85.71
Tropeang Skoun	24	23	95.83
Prey Kdoey	19	17	89.47
Chi_square value	-	1.453	
<i>p</i> value	-	0.693	

Table 6 Farmers experienced disease in commune level.

Parameters	Koki	Ampil
Experienced with disease, %	93.02	86.49
RR (Risk Ratio)	1.076	
<i>p</i> value	0.346	
CI 95%	0.92-1.25	

Table 7 Clinical signs on cattle among experienced farmer with disease.

Villages	Fever	Lumpy Skin	Thin
Romeas Haek	7.14	100.00	7.14
Prey Rousey	11.11	100.00	5.56
Tropeang Skoun	4.35	91.30	8.70
Prey Kdoey	5.88	94.12	11.76

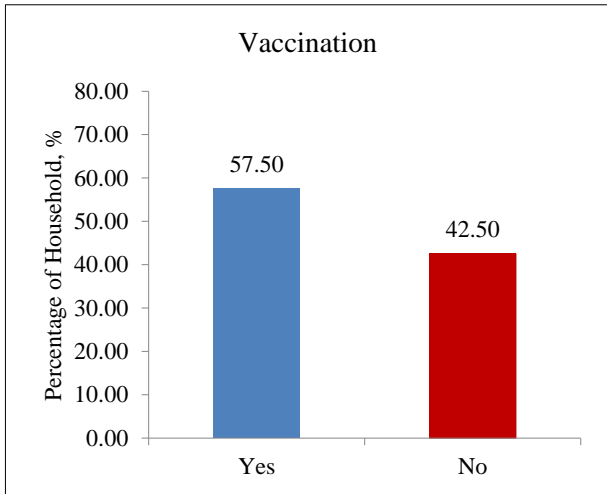


Fig. 7 Vaccination status of farmers.

Last year, the LSD had broken out in these areas, where most of famers faced this problem and feared losing their cattle production (Table 7).

3.1.5 Vaccination for Cattle

More than half of participating households had vaccinated their cattle to prevent some critical disease (Fig. 7). Those diseases were FMD (Foot and Mouth Disease), HS (Hemorrhagic Septicemia), LSD.

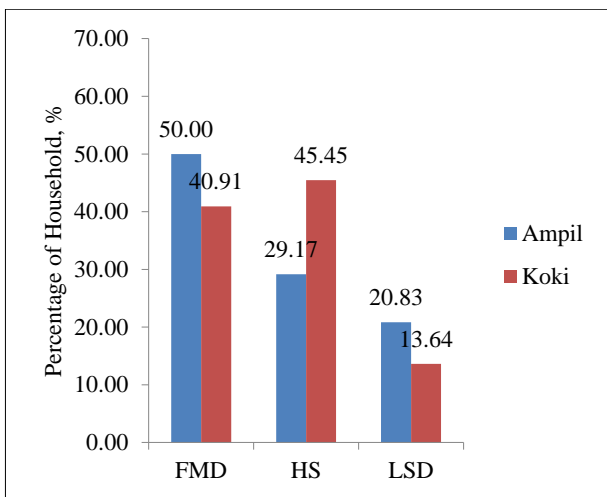


Fig. 8 Types of vaccine used in both commune.

However, the percentage for vaccinating against those diseases varied between commune; such as in Ampil commune, half of them vaccinated FMD followed by HS and LSD. While in Koki commune, HS vaccine was popular (45.45% of famers), followed by FMD and LSD (Fig. 8).

3.2 Seroprevalence of LSD

In general, the positive seroprevalence in both communes was found in high percentage, accounting for 72.62% (Fig. 9).

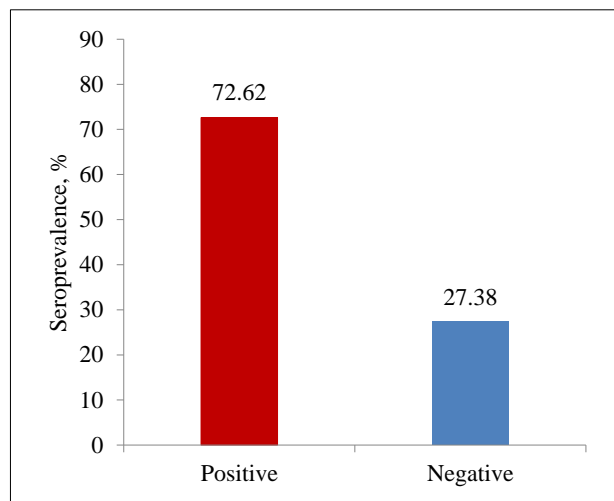


Fig. 9 Seroprevalence of LSD in both communes.

Table 8 Association between positive test and villages.

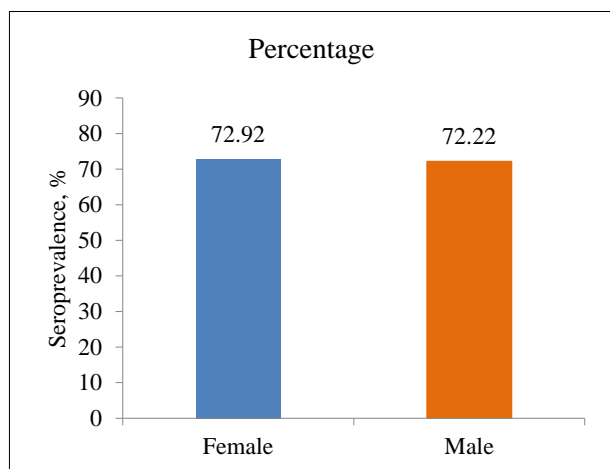
Village	Total sample	Positive test	
		Sample	%
Romeas Haek	18	17	94.44
Prey Rousey	26	16	61.54
Tropeang Skoun	15	8	53.33
Prey Kdoey	25	20	80.00
Chi_square value	-	9.41	
p value	-	0.024	

According to Table 8 it showed that the positive test associated with the villages. In this result, Romeas Haek village had highest percentage of positive test, with 94.44%.

However, the positive test did not associate with communes, since both communes, Ampil and Koki, had similar percentage of positive result, accounting for 75% and 70% respectively (Table 9).

Table 9 Association between positive test and communes.

Commune	Total sample	Positive test	
		Sample	%
Ampil	44	33	75.00
Koki	40	28	70.00
Chi_square value	-	0.263	
p value	-	0.608	

**Fig. 10 Positive test result by gender of cattle.****Table 10 Positive test result by BCS of cattle.**

BCS	Total sample	Positive	
		Sample	%
BCS2	23	16	69.57
BCS3	53	37	69.81
BCS4	8	8	100.00

Table 11 Positive test result by age of cattle.

Age	Total sample	Positive test	
		Sample	%
1 year	24	18	75.00
2 years	25	18	72.00
≥ 3 years	35	25	71.43
Chi_square value	-	0.098	
p value	-	0.952	

Both female and male cattle were detected the positive result in similar percentage, which consisted of 72.92% and 72.22% respectively (Fig. 10).

The seropositive test result of LSD was not affected by BCS level, which ranged from 69.57% to 100% for BCS2 to BCS4 (Table 10).

There were no association between age and seropositive test result of LSD, all age categories had similar percentage which ranged from 71.43% to 75.00% (Table 11).

4. Discussion

The percentages of households that possessed cattle less than 5 heads, 5-10 heads and more than 10 heads were 82.5%, 10.42% and 1.30% respectively, thus the majority was less than 5 heads per household. This finding contrasted with the study in Kampong and Pursat province [7] where only 29.97 owned less than 5 heads/household, while the majority of the farmers possessed 5-10 heads accounting for 61.32%, while more than 10 heads per household with 8.71%. The main factor caused this variation may come from the land and feed availability, especially the free land and commune grassing area, since Pursat had lower density of people, while Kampong Cham was cropping area where a lot of crop by-products exist. However, the free grazing, tethering and herding were also applied across the country. The cattle production also depended on natural grasses and crop residues. In this paper it was found that the BCS by sex for female and male was 2.85 and 2.78 respectively, which is higher than in the previous finding, 2.05 and 2.21 [8]. The genetic, environmental factors, and calving season had affected the BCS [9, 10]. The management (herd-level) factors such as stocking rate [11], feeding levels [12], and diet type [13] have also been reported to affect cow BCS. There were also many studies focusing on the factors that affect BCS, and in general, the consensus was that BCS was particularly influenced by season and feeding [14].

The priority issue of the Cambodian government was animal health services and disease prevention and control [15]. Thus, experiencing with disease in the production cycle was similar and happened frequently for farmer cattle producers, especially FMD and HS, while LSD was recently introduced [4]. FMD had a higher outbreak from 81.82%-94.44% and HS was about 42% of farmers, which had been reported that it occurred in the last 3 years [7]. There was report about FMD outbreak in one province in 2011 [16].

The vaccination program for cattle seems to become more popular, most of the farmers in both provinces

have vaccinated their cattle against FMD and HS [7]. However, in our finding, besides those two main diseases, the LSD was also vaccinated since its outbreak recently in 2019 [4]. FMD and HS vaccination programs were implemented according to the subsidy from the Government or project [16].

The examination of serology of cattle was applied using commercial ELISA kit, the true seroprevalence of LSD was very high up to 72.62% and higher than Refs. [17] and [18] which found only 6% and 19.50% respectively. Since, our sampling area is where the place was getting outbreak last year. The factors that affected the prevalence of LSD could be season, insect vector activity, the health status and breed of the animals [19, 20].

5. Conclusion

In conclusion, the cattle production in Romeas Haek district, Svay Rieng province had developed markedly, however the shortage of feed and disease occurrence are the main challenges for farmer cattle producers, especially LSD outbreak last year. However, most of the farmers have been aware of the benefit of vaccination and had vaccinated their cattle against those main disease, such as FMD, HS and LSD.

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