

Table of Contents

Serial No.	Chapter list	Name of the Chapter	Page No.
1		Acknowledgements	
2		List of table	
3		List of figures	
4		Abstract	
5	Chapter 1	Introduction	01
6	Chapter 2	Materials and methods	02-03
7		Description of the study area	02
8		Time of data collection	02
9		Sample size and data collection procedures	02
10		Figures	03
11	Chapter 3	Results and discussion	04-08
12	Chapter 4	Conclusion	09
13		References	10-12
14		Annexure	13-17
15		Biography	18

Acknowledgements

All praises are due to the Almighty Allah, the creator and supreme authority of the universe, who empowers me to strength and opportunity to complete the report successfully. Completion of any work or responsibility gives nice feelings. Standing at this opening, it is an honor to revoke the names of the person and the Organization I am grateful to.

I would like to extend my gratitude to my supervisor, **Dr. Abdul Ahad**, Professor, Department of Microbiology and Veterinary Public Health, Chattogram Veterinary and Animal Sciences University. My heartfelt thanks to him for valuable guidance, suggestion, supervision and encouragement during the entire period of this study to complete the clinical report.

I express my sincere gratitude and thanks to **Professor Dr. A. K. M. Saifuddin**, Director of External Affairs, and for his supervision and kind cooperation during the period of internship.

Thanks to owners of farm and staff members of **Upazila Livestock Office and Veterinary Hospital, Gaibandha Sadar, Gaibandha**, who helped me in collecting data for this study. Special thanks to ULO sir, **Dr. Md. Sirazul Islam**, Upazila Livestock Office and Veterinary Hospital, Gaibandha Sadar, Gaibandha.

I also want to express thank to all my friends for their help and co-operation during the tenure of the writing of this report.

Last but not least, I am profoundly grateful to my family members for their endless sympathies, kind cooperation, sacrifices and prayers.

The Author

November 2021

List of tables

Serial No.	Name of the tables	Page No.
1.	Association among educational status between Lumpy Skin Disease (LSD) Positive and Negative	06
2.	Association among vector mosquito prevalence between Lumpy Skin Disease (LSD) Positive and Negative	06
3.	Descriptive statistics of farmer cattle number	07
4.	Proportion of purchased animal in different sources (n= 72 farmers)	07
5.	Proportion of LSD affected animal (n=10) in different season	08
6.	Proportion of LSD affected animal with different symptoms (n=10) in different season	08

List of figures

Serial No.	Name of the figures	Page No.
1.	Collecting data through questioning the farm owner	03
2.	Farmers age Distribution in Box Plot	04
3.	Farming experience in months	05

Abstract

Lumpy skin disease (LSD) is a highly infectious eruptive viral disease of cattle, caused by LSD virus (LSDV) under the family Poxviridae and transmitted by direct contact or through biological vectors such as mosquitoes, flies and ticks. Previous cases of LSD have been observed in cattle in Gaibandha district of Bangladesh. The aim of the present study was undertaken to evaluate the present scenario of LSD at different house-holds at northern part of Bangladesh. A structured questionnaire was developed and data were collected from the Gaibandha Sadar upazila Gaibandha district. A total of 72 small cattle farms and 274 cattle were observed the study period from 02 February to 29 March, 2021. LSD was diagnosed on the basis of present clinical signs guided by the OIE manual. All data were recorded in Microsoft excel and analyzed by STATA SE 12 ,statistical software. Analyzed data revealed that Rainy season worked as one of the main a risk factors to this disease. Poor intra-herd hygienic conditions and managerial practices, introduction of new animals in the farm coming from different sources, lack of farming experiences of the farmers could aggravate the disease manifestation. Contrarily, no significant difference was observed in between good and medium quality intra herd level hygienic environments. Different treatment protocols were applied for recovery of the affected cows like aopathic, homeopathic, jharfuk, kobiraji etc; where no significant differences were estimated among the treatment protocol in contrast to recovery from LSD. However, Goat pox vaccine showed apparently good results done by the Government. Interestingly, most of the household in this study area never used mosquito curtains at their cattle house at the night. From this data, it was concluded that LSD affects both sex of animals. Poor intra-herd hygienic conditions and managerial practices could act as a cofactor for disease occurrence. Further researches are needed to find out better clinical management of LSD, identification of risk factor and molecular characteristics of this disease in Bangladesh.

Key words: *Lumpy Skin Disease, Mosquitoes, Poxviridae*

Chapter 1: Introduction

Lumpy skin disease (LSD) is a viral disease caused by *LSD virus* (LSDV) that belongs to the family *Poxviridae* and genus *Capripoxvirus*. The disease affects a wide range of domestic animals including cattle, buffalo, sheep and goats (Alkhamis & VanderWaal, [2016](#); El-Nahas *et al.*, [2011](#)), and the main symptoms are fever and nodular lesions on the skin, mucous membrane of respiratory and digestive tracts (Coetzer & Tuppurainen, [2004](#)). The World Organization for Animal Health (OIE) included the disease in notifiable transboundary disease list due to its substantial economic losses in terms of reduced productivity, poor hide quality, poor growth rate, infertility and even death (Anonymous, [2021](#); Tuppurainen *et al.*, [2017](#); Tuppurainen & Oura, [2012](#)). LSDV is believed to be transmitted mainly biting arthropods such as mosquitoes, flies and ticks (Magori-Cohen *et al.*, [2012](#)). Higher incidence of this disease is observed in crossbred young animals with communal grazing and during the wet season when the arthropods vectors are abundant. Introduction of new animals is another important risk factor (Al Rammahi & Jassim, [2015](#); Alemayehu *et al.*, [2013](#); Chihota *et al.*, [2001](#); El-khabaz, [2014](#); Kiplagat *et al.*, [2020](#); Ochwo *et al.*, [2019](#)). Although many countries have experienced the outbreak of LSD, In Bangladesh, an outbreak of an unknown syndrome with nodular skin lesions was reported by local veterinary services authority in mid-2019 in commercial and backyard cattle population in some locations (Anwara, Karnaphuli and Patiya) of Chattogram district (Anonymous, [2019](#)). Same pattern of clinical onset was reported later in different districts of the country (Giasuddin *et al.*, [2020](#); Khalil *et al.*, [2021](#)). The outbreak report was preliminary confirmed based on clinical signs and later using the reverse transcription polymerase chain reaction (RT-PCR) test by the Department of Livestock Services (DLS), Bangladesh and notified the disease as LSD to OIE in August, 2019 (Anonymous, [2019](#)). Therefore, a cross-sectional surveillance study was undertaken on clinically affected LSD cases throughout Gaibandha district; the northern part of Bangladesh. The aim of the present study was to confirm the disease occurrence based on clinical sign, presence of arthropodal vector, introduction of new cattle into the farm and farming experience of the farmer in maintaining the total managerial procedures of the farm etc.

Chapter 2: Materials and Methods

Description of study area:

Gaibandha, a district of Bangladesh situated at north part of the country. The district comprises with seven upazila (sub district), among them Gaibandha Sadar upazila was selected for the current study. This district is situated in the most northern part of Bangladesh and near very close to the Bramhaputra, Teesta and Ghaghot rivers. The climate of this area is extremely intriguing and rainfall is high. No mineral resources has been found yet in this country.

Time of data collection:

The experiment was conducted for a period between 02 February, 2021 and 29 March, 2021 from different areas of Gaibandha Sadar Upazilla of Gaibandha district. The area was selected on the basis of availability of cattle farm.

Sample size and data entry procedures:

72 cattle farms were selected for the study. Farmers having atleast experienced of two years of farming was considered as data for this study. Therefore, 39 cattle from 10 cattle farms were found to be affected with Lumpy Skin Disease virus. Others 62 cattle farms were immuned against Lumpy Skin Disease virus through mass vaccination process named Goat Pox vaccine which was done by the Government. A pre-structured questionnaire was developed and used as data recording tools during field work. One questionnaire was administered per affected farm or house-holds through questioning to the owner or responsible person of the subsequent farm or household by the investigator. Farm's demographic information included the total number of cattle on the premises, the number of LSD affected cattle and the number of cattle that died due to the disease. Individual sick animals information included the age of animal, sex, the type of animal, average body coverage with skin nodules, limb swelling, intra herd farm hygiene, use of mosquito curtain and any treatment etc. The questionnaire used for data recording tools is given below:

Figures



Figure 1: Collecting data through questioning from the farm owner

Chapter 3: Result and Discussion

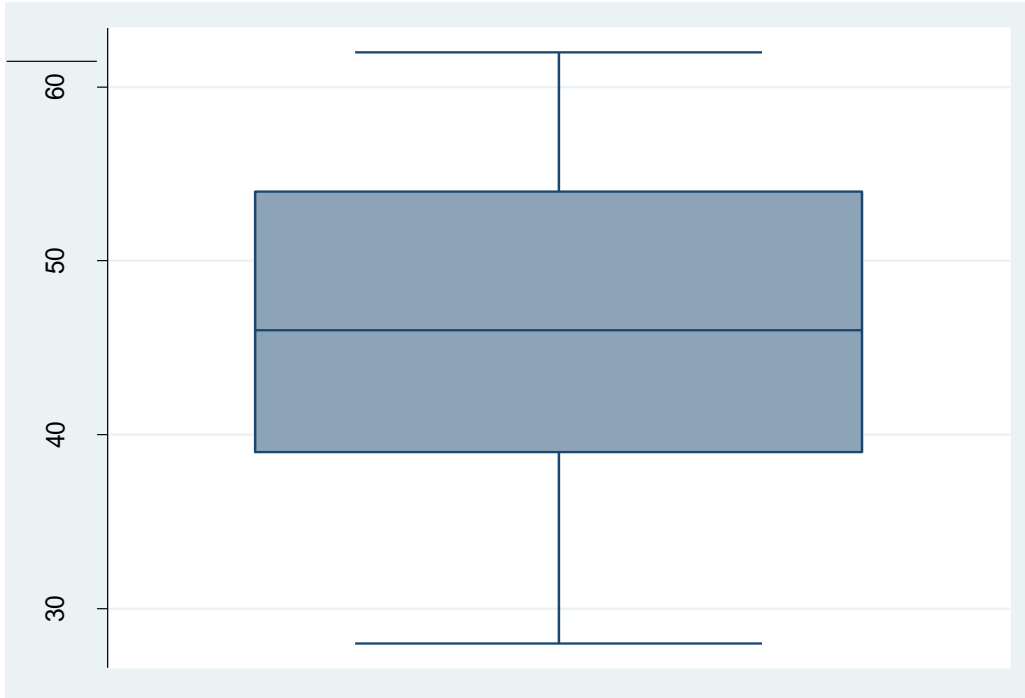


Figure 2: Farmers age Distribution in Box Plot

After collecting all the information, data was recorded in an excel sheet and descriptive analysis was performed by STATA SE 12. In figure number 2, the farmer's age distribution graph is shown according to the data record sheet. Most of the farmers at the age between 38 years to 55 years have chosen cattle farming as their extra earning source. There is also found one farmer who is about 60 years of old and one who is about below 30 years of old. Farmer's age Distribution graph is shown in Box plot method.

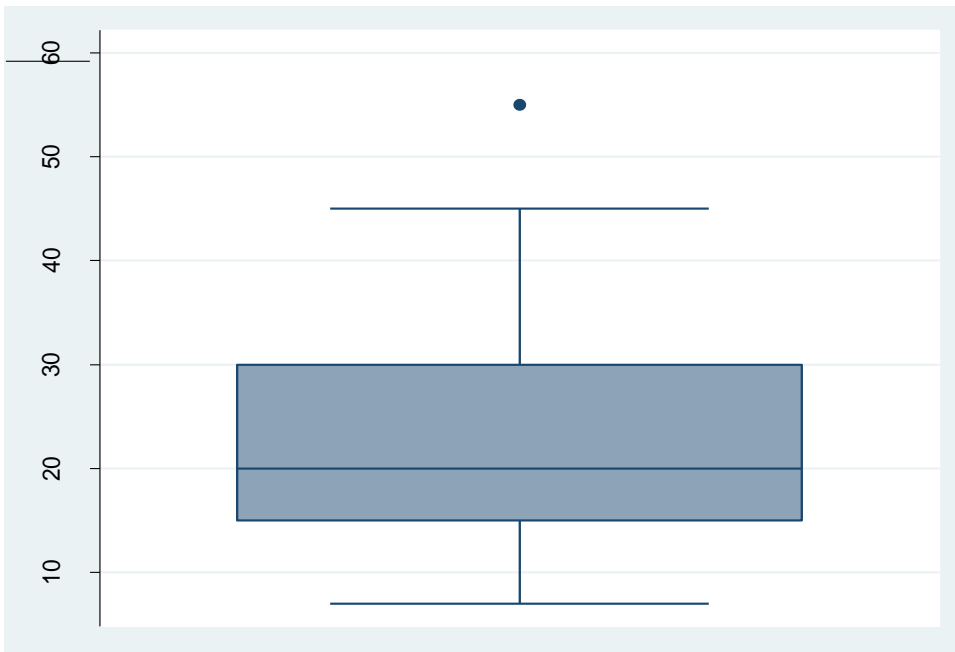


Figure 3: Farming experience in months

Farming experience graph from the data recording sheet is shown in box plot method. Month is used as the unit in this graph. In this graph, most of the farmer's experience data was recorded in between 15 to 30 months. Exceptional data was recorded for two persons. One having experience of cattle farming about 45 months and one having experience of 5 months also found here.

In the statistical data analysis by STATA SE 12,

Criteria	Illiterate	Literate	Educated
LSD Positive	5 (13.51%)	3(11.54%)	2(22.22%)
LSD Negative	32 (86.49%)	23(88.46%)	7(77.78%)

X² test

N= 72 farmers, P= 0.72

Table 1 : Association among educational status between Lumpy Skin Disease (LSD)

Positive and Negative

This result is associated with educational status of farmers between Lumpy Skin Disease (LSD) Positive and Negative. Here, about 10 cattle farms were found LSD positive from 72 farms. Among them, 13.51 % illiterate people from 5 farms was found LSD positive, 11.54 % literate people from 3 farms was found LSD positive, 22.22 % educated people from 2 farms was found LSD positive during statistical data analysis.

62 cattle farms were found LSD negative. In this statistical data analysis, 86.49 % illiterate people from 32 cattle farms was found LSD negative, 88.46 % literate people from 23 cattle farms was found LSD negative and 77.78 % educated people from 7 cattle farms was found LSD negative.

X² test

Criteria	Huge Mosquito	Low mosquito
LSD Positive	10 (100%)	0 (0%)
LSD Negative	0(0%)	23(88.46%)

N= 72 farmers, p=0.00

Table 2: Association among vector mosquito prevalence between Lumpy Skin Disease (LSD) Positive and Negative

Here, mosquito acted as an important vector for causing LSD virus infection. Huge mosquito population caused 100 % infection of LSD in the farms where low mosquito population caused no infection in the cattle farm.

Observation	Mean	STD	Min	Max
72	3.66	± 3.04	1	13

Table 3: Descriptive statistics of farmer cattle number

From 72 cattle farms, average number of cattle was about 3.66 and having minimum cattle data record of the farmer was about 1 in number and maximum was 13 in number. In statistical descriptive data analysis, standard deviation was about ± 3.04.

	Proportion	Standard error
Market	15.27 %	± 0.04
Other	13.88 %	± 0.04
Farmer	70.83%	± 0.05

Table 4: Proportion of purchased animal in different sources (n= 72 farmers)

Most of the cattle about 70.83 % were brought from other farmers into the farm and 15.27 % was brought into the farm from market source. There were also cattle brought into the farm from other sources about 13.88 %. The SE from statistical data analysis of market source, other source and farmer source was counted ± 0.04±, 0.04±, 0.05.

	Proportion	Standard Error
Winter	20%	± 0.13
Rainy	80%	± 0.13

Table 5: Proportion of LSD affected animal (n=10) in different season

In most of the cases, 80 % of LSD occurrence was recorded during Rainy season and SE was found about ± 0.13 . And 20 % of disease occurrence was recorded during winter season.

Symptoms	Proportion	Standard Error
Nodule with lameness	20%	± 0.16
Nodule in the whole body	30%	± 0.15
Nodule with respiratory problems and other distress	50%	± 0.13

Table 6 : Proportion of LSD affected animal with different symptoms (n=10) in different season

There were found 20 % of LSD affected cattle had shown nodule with lameness as clinical sign and SE was recorded about ± 0.16 , 30 % of LSD affected cattle had shown nodule in the whole body as clinical sign and SE was recorded about ± 0.15 and 50 % of LSD affected cattle had shown nodule with respiratory problems and other distress as clinical sign and SE was recorded about ± 0.13 .

Chapter 4: Conclusion

In conclusion, both sex of the cattle were most susceptible to LSD infection. Poor intra-herd hygienic conditions and managemental practices, introduction of new animals in the farm coming from different sources, lack of farming experiences of the farmers could aggravate the disease manifestation . It is not possible to halt the disease spread by culling of all infected animal. So, national awareness program should announced about this newly emerging LSD infection in dairy industry. The data generated in this study would be beneficial to the field veterinarians and animal health decision makers in the country as well as it will aid in taking appropriate measures to prevent further relapse or outbreak of this disease in future.

References

- Al Rammahi, H. M., & Jassim, A. (2015). Epidemiological and diagnostic study of first lumpy skin disease outbreak in southern Baghdad district. *Asian Academic Research Journal of Multidisciplinary*, 1(30), 196–205.
- Alemayehu, G., Zewde, G., & Admassu, B. (2013). Risk assessments of lumpy skin diseases in Borena bull market chain and its implication for livelihoods and international trade. *Tropical Animal Health and Production*, 45(5), 1153–1159. 10.1007/s11250-012-0340-9 .
- Alim, M. A., Das, S., Roy, K., Masduzzaman, M., Sikder, S., Hassan, A. Z., & Hossain, M. A. (2012). Prevalence of hemoprotozoan diseases in cattle population of Chittagong division, Bangladesh. *Pakistan Veterinary Journal*, 32(2), 221–224.
- Alkhamis, M. A., & VanderWaal, K. (2016). Spatial and temporal epidemiology of lumpy skin disease in the Middle East, 2012–2015. *Frontiers in Veterinary Science*, 3, 19. 10.3389/fvets.2016.00019 .
- Anonymous(2019). Situation Report: Lumpy skin disease in Bangladesh.https://fscluster.org/sites/default/files/documents/sitrep_lsd_20191210.pdf .
- Chihota, C. M., Rennie, L. F., Kitching, R. P., & Mellor, P. S. (2001). Mechanical transmission of lumpy skin disease virus by *Aedes* . *Epidemiology and Infection*, 126, 317–321. 10.1017/S0950268801005179 .
- Coetzer, J. A. W., & Tuppurainen, E. (2004). Lumpy skin disease. *Infectious Diseases of Livestock*, 1268–1276 .

- El-khabaz, K. A. S. (2014). Rapid laboratory diagnosis of lumpy skin disease by using PCR technique. *Assiut Veterinary Medicine Journal*, 60(143), 37–41.
- Giasuddin, M., Yousuf, M., Hasan, M., Rahman, M., Hassan, M., & Ali, M. (2020). Isolation and molecular identification of Lumpy Skin Disease (LSD) virus from infected cattle in Bangladesh. *Bangladesh Journal of Livestock Research*, 26(1–2), 15–20. 10.3329/bjlr.v26i1-2.49933 .
- Khalil, M. I., Sarker, M. F. R., Hasib, F. M. Y., & Chowdhury, S. (2021). Outbreak investigation of lumpy skin disease in dairy farms at Barishal, Bangladesh. *Turkish Journal of Agriculture - Food Science and Technology*, 9(1), 205–209. 10.24925/turjaf.v9i1.205-209.3827 .
- Kiplagat, S. K., Kitale, P. M., Onono, J. O., Beard, P. M., & Lyons, N. A. (2020). Risk factors for outbreaks of lumpy skin disease and the economic impact in cattle farms of Nakuru County, Kenya. *Frontiers in Veterinary Science*, 7, 259. 10.3389/fvets.2020.00259.
- Magori-Cohen, R., Louzoun, Y., Herziger, Y., Oron, E., Arazi, A., Tuppurainen, E., Shpigel, N. Y., & Klement, E. (2012). Mathematical modelling and evaluation of the different routes of transmission of lumpy skin disease virus. *Veterinary Research*, 43(1), 10.1186/1297-9716-43-1.
- Ochwo, S., VanderWaal, K., Munsey, A., Nkamwesiga, J., Ndekezi, C., Auma, E., & Mwiine, F. N. (2019). Seroprevalence and risk factors for lumpy skin disease virus seropositivity in cattle in Uganda. *BMC Veterinary Research*, 15(1), 236. 10.1186/s12917-019-1983-9 .

Tuppurainen, E. S. M., & Oura, C. A. L. (2012). Review: Lumpy skin disease: An emerging threat to Europe, the Middle East and Asia. *Transboundary and Emerging Diseases*, 59(1), 40–48. 10.1111/j.1865-1682.2011.01242.x .

Wolff, J., Moritz, T., Schlottau, K., Hoffmann, D., Beer, M., & Hoffmann, B.

(2020). Development of a safe and highly efficient inactivated vaccine candidate against lumpy skin disease virus. *Vaccines*, 9(1), 4. 10.3390/vaccines9010004 .

Annexure

Questionnaire Form

Appendix 1. Questionnaire form for the isolation and characterization of lumpy Skin Disease Virus LSD circulating in Bangladesh

Selected study areas :

The study will be conducted in cattle farms of selected study areas.

A. General information of the farmer/interviewee/respondent

Name :

Address :

Age :

Sex ; Male/Female :

Educational status : Illiterate /Literate /Educated :

Total Land :

Total Monthly income:

Income source :

Main Profession :

Other Profession if:

Income from cattle rearing:

B. Questions

1. Do you live in your own home ? yes no

2. Nature of farm : Family based/ Commercial/.....
3. How long have you been engaged in cattle farm ?
4. What type of breed do you have ?
5. How long do you engage in cattle farming in a year ? 3 months 6 months 12 months6.
Have you taken any training on cattle rearing ? yes no
6. Have you taken any training on cattle rearing ? yes no
7. If yes , from where ?Jubaunnayan / Livestock department / NGO.....
8. Do you rear sheep / goat / buffalo with cattle ? yes no
9. Site of cattle house : Isolated house / own dwelling house
10. System of cattle rearing : Intensive / Semi intensive /.....
11. Nature of farm : Case / Semi-building / Hut / Tin-shed / Temporary house by thripal ,
plastic , polythine etc.
12. Area of cattle farm :..... square ft.
13. Number of cattle in the farm : Total, Adult....., Calves.....
14. Number and age of male and female cattle :Male Age Female....., Age
.....
15. Please, mention the breeds of cattle those you are rearing : Holstein-Fresian / Shahiwal /
Redsindi / Cross-breed / Local breed
16. Do you use light , fans etc to regulate temperature of the farm ? yes no
17. Do you have any idea about Lumpy Skin Disease of cattle ? yes no
18. Can you identify disease of cattle ? yes no
19. Is there any diseased cattle in your farm right this moment ? yes no
If yes , No. of Male ; Adult / Calves, Age, Female ; Adult / Calves, Age
.....
20. Did any cattle died recently ? yes no
21. Source of cattle : Market / other farmer / any other source
22. Introduction of new cow with old cow : after quarantine / no quarantine followed .
23. Symptoms observed in diseased and dead cattle ;
(please give tick(√) only to the positive symptoms)

Serial no.	Symptoms	remarks
1.	Nodular lesions on the skin	
2.	Corneal opacity	
3.	Udder lesions	
4.	Skin lesions	
5.	Lesions on the skin of scrotum	
6.	Lesions on external vulvar region	
7.	Purulent discharge from nasal cavity	
8.	Deep ulceration on the leg	
9.	High fever	
10.	Marked reduction in milk in lactating cattle	
11.	Lameness in the forelimb	
12.	Lameness in the hindlimb	
13.	Enlarged superficial lymph nodes	
14.	Animal to be reluctant to move due to oedematous swelling of limbs and other ventral parts of the body .	
15.	Lesions in the mucous membrane throughout GI tract	
16.	Respiratory distress	
17.	Depression , conjunctivitis and excessive salivation .	

24. In which season more cattle get affected or died ? Winter / Summer / Rainy / Autumn / Late autumn / Spring season.

25. Please mention the presence of mosquitoes , flies and ticks at present in your locality . Huge / Moderate / Small in number or absent.

26. Date of last onset of disease in your farm :

Total number of cattle :

Age :

No. of affected cattle :

No. of death cattle :

27. How many survived / reared the recovered cattle ?

28. Was there any loss of milk production ? Yes No

29. Do you vaccinate your cattle regularly ? Yes No

30. What type of vaccine is given recently ? FMD vaccine / Anthrax vaccine / BQ vaccine / HS vaccine / Goat pox vaccine / None .

31. When did you vaccinate your cattle last ? 4 months / 6 months / 1 year ago

32. Do you think that the vaccine give protection against the disease ? Yes No

33. Where from do you collect the vaccine ? Livestock department / Distributor / Drug house / NGO / Others

34. Which method do you follow to collect the vaccine ?

35. Is cool chain of vaccine maintained properly ? Yes No

36. Who give the vaccine in your cattle ? Self / Trained personnel / Self trained / Person without training

37. Do you have any experience about Lumpy Skin Disease virus infection in cattle ?

38. Do you have any idea how Lumpy Skin Disease is spreaded ?

39. Do you have any idea about bio-security of farm ? Yes No

40. Is there easy entrance of people into your farm ? Yes No

41. Are the floor and equipments of the farm cleaned regularly ? Yes No

If yes, how many days of interval ?days.

42. Do you disinfect your farm regularly ? Yes No If yes ,
how many days of interval ?days

43. What type of chemicals are used for disinfection of farm ? PPM / Formalin / Virkon-S /

44. Do you take care of the diseased and healthy cattle separately ? Yes No

45. Do you have isolation room for sick cattle ? Yes No

46. Do you use protective cloths , gumboots etc regularly ? Yes No

47. Do you use footbath in your farm ? Yes No

48. Is there easy entrance of other animals / birds into your farm ? Yes No

If yes , which animal / birds ? Dog / Cat / Fox / Snake / Frogs /

49. Is there any animal disease diagnostic centre nearby in your farm ? Yes No

If yes , do you get any service from there ? Yes No

50. Do you need any diagnostic centre in your locality ? Yes No

51. Where from do you take advice if cattle get sick or died ? Veterinarian /VFA /NGO worker

/Chemist / Quack / Self .

52. What type drugs are used during sick period ? Alopatic / Homeopathick / Herbal / Kobiraji /

Jarfuk /

53. Do you supply vitamin , mineral permix with their feed ? Yes No

54. Do you store cattle feed for long time ? Yes No

If yes , how many days ?days

Signature of farmer..... Date

Signature of interviewe..... Date

Biography

I am **Kamrun Nahar Shimu**, daughter of **Md. Kaziul Islam** and **Most. Sarifa Sultana**. I have passed the Secondary School Certificate Examinations in 2012 followed by Higher Secondary Certificate Examination in 2014. I enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University (CVASU), in 2014-2015 session. At present, I am an intern veterinarian under the Faculty of Veterinary Medicine in Chattogram Veterinary and Animal Sciences University. I would like to work as a veterinary surgeon.