Research Article

Epidemiological Investigation of Duck Plague Virus: Prevalence and Associated Risk Factors in Sylhet Sadar Upazila, Sylhet District, Bangladesh

Mohammad Lalmoddin Mollah*, Prateeti Roy, Robin Bapary, Dipa Rani Pal, Ferdous Jannatul

Department of Medicine, Surgery and Obstetrics, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Babugonj, Barishal-8200, Bangladesh.

Abstract | Duck plague, caused by *Anatid alphaherpesvirus-1*, remains a major threat to duck farming in the Sylhet region of Bangladesh. This cross-sectional study was conducted in Sylhet Sadar Upazila from July 2024 to June 2025 to assess the prevalence and associated risk factors of the disease. A total of 9,020 duck cases were recorded irrespective of age, sex, breed, feeding and drinking habits, rearing system, or locality. Among them, 2,568 ducks were clinically diagnosed with duck plague, showing symptoms such as anorexia, photophobia, greenish diarrhea, and sudden death. The overall prevalence was 28.47%. Age-wise, ducks aged 1–3 months showed the highest prevalence (30.61%). Females (29.13%) were slightly more affected than males (27.24%). Crossbred ducks (China + local) showed the highest infection rate at 40%, followed by local (29.33%) and China (25.71%) breeds. Ducks fed with commercially ready feed had a higher prevalence (33.33%) than those foraging loose feed (18.66%). Ducks drinking pond water had a significantly higher prevalence (32.34%) than that using river water (15%). Semi-intensive housing systems had a higher prevalence (30.00%) than free-range systems (26.65%). Prevalence varied greatly by area, peaking at 70.90% in Saheb Bazar and dropping to 10.37% in Raynagar. The distribution and proportionate occurrence of diseases in ducks of Sylhet indicated that the diseases frequently occurred in the winter season (32.47%), followed by the rainy (26.48%) and summer seasons (23.99%). Smaller flocks (<100 ducks) were more affected (32.46%) than larger ones. The findings highlight the need for improved biosecurity, timely vaccination, and targeted farmer education to mitigate duck plague in endemic regions like Sylhet.

Editor | Muhammad Abubakar, National Veterinary Laboratories, Park Road, Islamabad, Pakistan.
Received | November 03, 2025; **Accepted** | December 01, 2025; **Published** | January 27, 2026
***Correspondence** | Mohammad Lalmoddin Mollah, Department of Medicine, Surgery and Obstetrics, Faculty of Animal Science and Veterinary Medicine, Patuakhali Science and Technology University, Babugonj, Barishal-8200, Bangladesh; **Email:** belalcnu6@pstu.ac.bd
Citation | Mollah, M.L., P. Roy, R. Bapary, D.R. Pal, F. Jannatul. 2026. Epidemiological investigation of duck plague virus: Prevalence and associated risk factors in Sylhet Sadar Upazila, Sylhet District, Bangladesh. *Veterinary Sciences: Research and Reviews*, 12(1): 31-38.
DOI | https://dx.doi.org/10.17582/journal.vsrr/2026/12.1.31.38
Keywords | Duck plague, Sylhet district, Prevalence, Risk factors, Epidemiology

Introduction

Duck rearing plays a crucial role in the economic well-being of rural communities in Bangladesh, particularly in wetland-rich areas such as Sylhet. For small-scale farmers, ducks offer a significant source of protein (meat and eggs) and income, especially benefiting women and landless families. Current data indicate that Bangladesh has a substantial duck population, exceeding 48 million, with the highest concentrations observed in regions like Sylhet. The haor-based ecosystems in these areas create favorable conditions for duck production (Ahamed *et al*., 2020). Utilizing these wetlands as natural foraging grounds significantly reduces the cost of feed, making duck farming a practical and profitable activity for those with limited financial resources (Islam *et al*., 2012).

The abundance of water resources in the Sylhet District of northeastern Bangladesh, including rivers, haors, and beels, creates a favorable environment for raising ducks. While the prevalent semi-scavenging and free-range duck farming practices in this region are economically advantageous, they also increase the potential for disease to spread. Consequently, local officials and veterinary professionals have expressed concern over the increasing reports from farmers in Sylhet Sadar Upazila regarding sudden and significant deaths in recent years.

Duck Plague (DP), also known as Duck Viral Enteritis (DVE), stands out as a major infectious disease impacting duck populations in Bangladesh. This disease is caused by Anatid alphaherpesvirus-1, which belongs to the Herpesviridae family. First identified in the Netherlands in 1923, duck plague has since been reported in many duck-farming countries across North America, Asia, and Europe (Sandhu and Shawky, 2003). Duck Plague was initially detected in Bangladesh in 1980 and has become an endemic issue, with frequent outbreaks, particularly in the haor regions (Chowdhury *et al*., 2009).

Domestic and wild ducks, geese, and swans are the main victims of Duck Plague, an acute, infectious, and frequently lethal disease. Depression, photophobia, ruffled feathers, bloody diarrhea, and a high death rate are clinical indicators of duck plague. Direct touch, tainted water, feed, and fomites can all spread the virus. The virus is known to be carried by migratory waterfowl, which frequently visit the wetlands of Sylhet and frequently infect domestic duck populations (Shivachandra *et al*., 2009; Akter *et al*., 2021).

The persistence and spread of the duck plague virus in Sylhet are caused by several risk factors. These include the use of shared water bodies by several flocks, inadequate disease awareness among farmers, lack of vaccination, and poor biosecurity management. Furthermore, increased duck migration and interaction with wild birds, as well as seasonal fluctuations such as pre-monsoon and monsoon periods are thought to affect the occurrence of outbreaks (Rahman *et al*., 2020).

Despite the elevated risk, nothing is known about the true incidence of Duck Viral Enteritis and the risk factors that go along with it in Sylhet Sadar Upazila. Developing effective preventative and control tactics becomes challenging in the absence of adequate epidemiological data. Therefore, to comprehend the current situation and identify actionable risk factors, a field-level investigation is desperately needed. The present study was undertaken with the following objectives: To estimate the prevalence of Duck Plague virus infection among ducks in Sylhet Sadar Upazila. To identify and analyze the potential risk factors associated with the occurrence and spread of duck plague and to provide recommendations for disease prevention and control based on the findings of this study.

Materials and Methods

Study area and duration

The research took place in Sylhet Sadar Upazila, a significant administrative division within the Sylhet district of northeastern Bangladesh (Figure 1). Geographically, this area is defined by its low, flood-prone land, dotted with many haors (wetlands that flood seasonally), rivers, canals, and ponds. The climate here is cool and dry in winters (November-February), hot in summers (March-May), and monsoon season with heavy rainfall (June-October). Sylhet Sadar is a vital area for duck farming because of its plentiful natural water sources, which offer ideal living conditions for ducks. This cross-sectional study was conducted in Sylhet Sadar Upazila from July 2024 to June 2025.

Study design

A cross-sectional study to determine the prevalence of the duck plague virus and its risk factors. This timeframe coincides with the winter season in Bangladesh, which is generally acknowledged to be a time when duck plague outbreaks are more likely to occur because of environmental stress, a higher concentration of birds, and possible virus persistence in colder climates. The study population consisted of domestic ducks of various breeds and age groups, raised in a range of management settings, including semi-intensive and free-range systems. In all, 9020 ducks from various upazila locations were inspected and evaluated for any clinical indications of duck plague. Ducks were chosen based on their availability during farm inspections, past reports of illness, and recommendations from nearby veterinary service providers, rather than depending on a certain number of farms. Flocks suspected of having duck plague that had lately displayed clinical symptoms or had been brought to the district and upazila veterinary hospital, Sylhet, were given special attention. To guarantee a representative sample and thorough coverage of potential risk scenarios throughout the region, additional data were obtained from nearby farms using a combination of direct field visits, community-based identification, and local veterinary outreach initiatives.

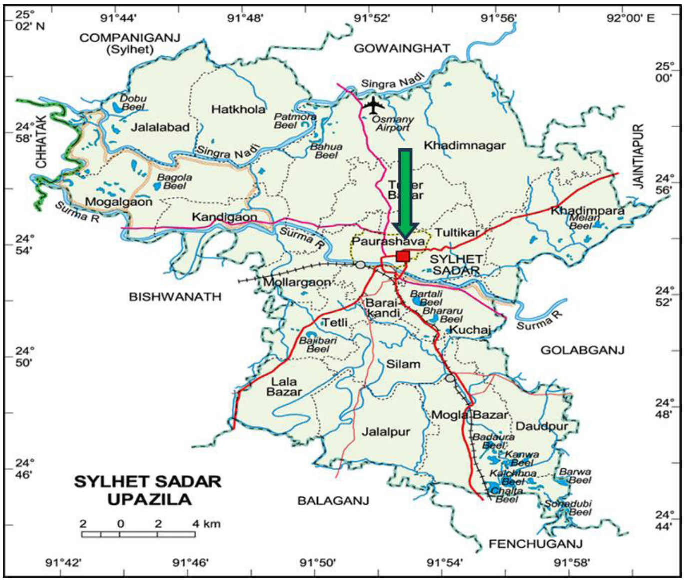

Figure 1: *Study area map.*

Sample and sample size

The study was conducted on naturally occurring duck plague virus suspected of being brought to the various veterinary hospitals during the study period. During the study period, about 9020 cases were treated in the veterinary hospital and around the upazila due to different disease conditions. Among them, the total number of duck plague virus-affected ducks was 2568.

Data collection

A structured questionnaire was designed to collect both qualitative and quantitative survey data from participating farmers, and the amount of data of clinically suspected 2568 duck plague cases was recorded. All interviews were conducted in person by the principal investigator. Responses were confirmed by cross-checking flock records when available. Visual inspection of the flock was also performed, when possible, to validate reported symptoms. The total number of ducks, number affected, and number dead were recorded to calculate disease prevalence at the flock level, by area, age, sex, breed, season, feeding habit, etc.

Clinical and physical examination

All the studied ducks presented at the farm and veterinary hospital underwent physical examination by using the methods of inspection. Diagnosis of a duck plague case was performed considering the general and specific signs of duck plague, including anorexia, photophobia, greenish diarrhea, and sudden death. Along with the clinical examinations, drugs that were prescribed by clinical treatments against the duck plague virus were also recorded.

Diagnoses of duck plague cases

Among all diseased cases of duck plague brought to the veterinary hospitals for treatment, presumptive diagnosis of duck plague in ducks was made based on the owners' complaints, clinical history, and clinical signs and post-mortem lesion.

Vaccination history of duck plague

Each owner was asked about previous vaccination history of his/her ducks suffering from duck plague virus.

Statistical analysis

The data generated were entered into a Microsoft Excel 2010 spreadsheet. Data were cleaned, coded, sorted, and checked in MS Excel 2010. The prevalence was calculated by considering the total number of samples screened for duck plague and the number of samples that tested positive, as per the formula: Duck Plague prevalence (%) = Number of positive cases/ total number of screened samples x 100. Data was also analyzed by the Chi-square test to observe the significant influence of parameters.

Results and Discussion

Overall prevalence of duck plague virus

This study involved the collection of extensive data to determine how duck plague virus prevalence varied across the studied duck population. The resulting information was organized according to several important variables: Age, breed, diet, water source, location (area), flock size, and the month the samples were taken. A general overview of duck plague virus occurrence within the entire examined duck population. Of the 9020 ducks included in the study, 2568 were identified as positive for the virus, resulting in an overall prevalence rate of 28.47%. This figure establishes a key benchmark for comparing the prevalence observed across the specific categories detailed in subsequent tables, as shown in Table 1. This cross-sectional study, conducted in Sylhet Sadar Upazila over the winter months of December 2024 to February 2025, found a duck plague virus prevalence of 28.47% among the duck population. It indicates that duck plague virus was a notable health concern within the studied group, affecting approximately one in every three to four ducks during the investigation period. This broad prevalence emphasizes the importance of further analyzing the factors that may influence the disease's distribution patterns. This proportion is consistent with prior findings in Bangladesh and other parts of Asia, where prevalence rates have ranged between 20% and 35% in endemic areas (Rahman *et al*., 2020). A systematic study and meta-analysis found that the pooled prevalence of duck plague in Asian nations is around 35% (95% CI: 14-59%), highlighting the ubiquitous nature of duck plague virus infections in duck populations (Sarkar *et al*., 2023).

Table 1: *Overall prevalence of duck plague.*

Total ducks	No. of infected ducks	Prevalence (%)
9020	2568	28.47

Prevalence of duck plague virus in different ages of ducks

The following table (Table 2) represents prevalence in relation to age. The youngest age of 1-3-month-old ducks exhibited the highest infection rate at 30.61%, slightly exceeding the overall prevalence. This observation may suggest an increased susceptibility to the virus in younger ducks, potentially linked to their still-maturing immune systems. The middle-aged group of ducks aged 4 months to 1 year showed a prevalence of 28.31%, closely aligning with the overall rate. Notably, the oldest population of ducks, between 1.5 years and 2 years, presented the lowest prevalence at 26.14%. This finding could imply that older ducks have either acquired some level of immunity through prior exposure or possess a greater inherent resistance to the virus. These results indicate that age is a contributing factor influencing the likelihood of duck plague virus infection within this population. The study discovered a greater infection rate in younger ducks (1-3 months, 30.61%), with a decrease in later age groups. This tendency is consistent with research from Bangladesh and other countries, which shows that younger ducks are more vulnerable to DPV because of weak immune systems (Islam *et al*., 2012; Akter *et al*., 2021). Similar age-based sensitivity has been found worldwide, with younger ducks frequently being the first to die during outbreaks (Dhama *et al*., 2017).

Prevalence of duck plague virus by sex

The analysis of duck plague virus prevalence was conducted with a breakdown by the sex of the ducks. Out of 3157 male ducks, 860 were affected, resulting in 27.24% prevalence. For females, 1708 out of 5863 ducks were affected, showing a prevalence of 29.13%, as shown in Table 3.

Table 2: *Prevalence of duck plague virus by age.*

Age group	Total ducks	No. of infected ducks	Prevalence (%)	P value
0-3 months	2280	698	30.61	0.20
4-1 year	4980	1410	28.31	
1.5-2 years	1760	460	26.14	

Table 3: *Prevalence of duck plague virus by sex.*

Sex	Total ducks	No. of infected ducks	Prevalence (%)	P value
Male	3157	860	27.24	0.16
Female	5863	1708	29.13	

Table 4: *Prevalence of duck plague virus by breeds.*

Breed	Total ducks	No. of infected ducks	Prevalence (%)	P value
Local	4090	1200	29.33	0.21
China	3290	846	25.71	
Khaki Campbell	1030	278	26.99	
China + Local	610	244	40.00	

Prevalence of duck plague virus in different breeds of duck

An examination of duck plague virus prevalence across different duck breeds reveals considerable heterogeneity, as illustrated in Table 4. The crossbreeds (China + local) exhibited the highest prevalence at 40.00%, closely followed by China breeds at 25.71%

and local at 29.33%. Conversely, the Khaki Campbell breed's prevalence of 26.99% was also below the average. These significant variations among breeds strongly suggest a potential role for genetic factors in determining susceptibility or resistance to duck plague virus. Future research could explore the specific genetic traits underlying these differences. The elevated prevalence in crossbreeds might reflect a combination of vulnerabilities inherited from the parent breeds. It is important to consider that the prevalence estimates of crossbreeds should be interpreted with caution due to their smaller sample sizes, which may make them more susceptible to random variation. Breed analysis revealed that local ducks and crossbreeds had higher prevalence rates (29.33% and 40.0%, respectively), whereas China breeds had a lower infection rate (25.71%). These findings indicate that certain breeds may lack key disease resistance features, rendering them more vulnerable to DPV. Similar breed-specific susceptibility has been documented in research from India and other areas, emphasizing the role of genetic variables in disease resistance (Sarkar *et al*., 2023).

Prevalence of duck plague virus by different feeding habits

Analyzing the prevalence of duck plague virus in relation to the feeding habits of the ducks reveals potential associations as given in Table 5. Ducks primarily consuming ready feed (likely commercially prepared) exhibited the highest prevalence at 33.33%. Ducks receiving both ready feed and other sources showed a prevalence of 28.23%, closely approximating the overall rate. Interestingly, ducks with a loose feeding habit (likely involving foraging) displayed the lowest prevalence at 18.66%. Ducks with a mixed feeding habit showed a prevalence of 27.64%. These findings suggest that the type of feed and feeding practices may influence the risk of duck plague virus infection. The higher prevalence in ducks fed ready feed could potentially be linked to factors such as feed origin or storage, or perhaps the management protocols associated with this feeding method. The lower prevalence in loose-fed ducks warrants further investigation to identify potential protective factors associated with their natural foraging environment. These findings are consistent with previous research emphasizing the relevance of feeding behaviors in illness transmission (Dhama *et al*., 2017).

Prevalence of duck plague virus by different sources of water

The source of water appears to exert a notable influence on the prevalence of duck plague virus, as shown in Table 6. Ducks utilizing both river water and pond water as their water source showed a prevalence of 28.14%, consistent with the overall rate. However, ducks using only pond water exhibited a higher prevalence of 32.34%, while those using only river water had a considerably lower prevalence of 15.00%. Ducks using other water sources showed a prevalence of 24.32%. These results suggest that the type of water source may be a significant factor in disease transmission dynamics. The higher prevalence associated with pond water could be attributed to stagnant water potentially harboring a greater concentration of the virus or facilitating its prolonged survival. The lower prevalence in ducks using river water might be due to the flowing nature of the water, which could dilute or effectively remove the virus. This is consistent with worldwide data showing that common water bodies contribute to rapid viral propagation (Dhama *et al*., 2017). A study in southern China found a DPV prevalence of around 3.8% in duck populations, highlighting the importance of environmental factors in disease dynamics (Li *et al*., 2022). Further investigation into the water quality characteristics of these different sources could yield valuable insights. Tenzin *et al*. (2020) emphasized that one of the main causes of DPV spread throughout farms is environmental contamination, especially in communal water sources used for drinking and bathing. Müller *et al*. (2003) and Gough *et al*. (1992) observed similar outbreaks in European duck farms, particularly in areas where ducks have access to natural water bodies. These outbreaks shared common

Table 5: *Prevalence of duck plague virus by feeding habit.*

Feeding habit	Total ducks	No. of infected ducks	Prevalence (%)	P value
Ready	1920	640	33.33	0.21
Both	4350	1228	28.23	
Loose	670	125	18.66	
Mixed	2080	575	27.64	

Table 6: *Prevalence of duck plague virus by source of water.*

Source of water	Total ducks	No. of infected ducks	Prevalence (%)	P value
River water + Pond water	6780	1908	28.14	0.20
River water	200	30	15.00	
Pond water	1670	540	32.34	
Other	370	90	24.32	

features with South Asian patterns seasonal peaks, rapid transmission, and high case fatality. Wu *et al.* (2020) highlighted the function of migratory wild birds as vectors and reservoirs, particularly in wetlands where domestic and wild ducks often coexist.

Prevalence of duck plague virus by different housing systems

Duck Plague Virus prevalence based on different housing systems in Table 7. For semi-intensive systems, 1470 out of 4900 ducks were affected, leading to a 30.00% prevalence. In free-range systems, 1098 out of 4120 ducks were affected, indicating 26.65% prevalence. Gupta *et al.* (2014) found that flocks reared in semi-scavenging or free-range systems had a considerably greater prevalence of duck plague than flocks raised in confined or intensive systems. This finding emphasizes the importance of environmental exposure and interaction with wild birds as key risk factors.

Table 7: *Prevalence of duck plague virus by housing system.*

Housing system	Total ducks	No. of infected ducks	Prevalence (%)	P value
Semi-intensive	4900	1470	30.00	0.15
Free-range	4120	1098	26.65	

Prevalence of duck plague virus by different areas of Sylhet Sadar Upazila

The prevalence of duck plague virus demonstrated considerable variation across different areas, indicating a strong geographical component to the disease's distribution, as mentioned in Table 8. Saheb Bazar exhibited the highest prevalence at a striking 72.22%, followed by other areas. Several other areas, including Mogolgaon and Sharisharak, also showed relatively elevated prevalence rates (above 42%). These areas are close to wetlands and have a high concentration of semi-scavenging ducks, which may lead to higher transmission rates. In contrast, Raynagar displayed a remarkably low prevalence of only 9.63%, and Kandigaon also had a low rate of 15.00%. These substantial differences between areas likely reflect variations in factors such as duck population density, husbandry practices, biosecurity protocols, environmental conditions, and potentially the presence of disease reservoirs. Identifying the specific factors contributing to these high and low prevalence clusters could be critical for implementing targeted disease control strategies. It is important to acknowledge that the prevalence estimates for areas with smaller sample sizes (e.g., Kustormurt, Lamagaon, Saheb Bazar, Machimpur) may be subject to greater statistical variability. Other research has found similar geographical differences, underlining the role of local environmental factors in disease dynamics. Islam *et al.*, (2012) and Gough *et al.* (1992) indicated that ducks reared in free-range systems or with access to shared water sources are at significantly higher risk globally. Sylhet's environmental conditions abundant natural water bodies and minimal housing mirror these high-risk factors.

Table 8: *Prevalence of duck plague virus by areas.*

Area	Total ducks	No. of infected ducks	Prevalence (%)	P value
Chikhagul	2400	600	25.00	0.24
Kandigaon	500	170	34.00	
Raynagar	2700	280	10.37	
Nayapara	1200	400	33.33	
Mogolgaon	600	280	46.66	
Lamagaon	400	148	37.00	
Saheb Bazar	550	390	70.90	
Sharisharak	350	160	45.71	
Machimpur	320	140	43.75	

Prevalence of duck plague virus by season of occurrence during the study period

Examining the prevalence of duck plague virus across the three seasons of the study period (winter, rainy, and summer) indicates a relatively stable pattern, as shown in Table 9. The winter season exhibited a prevalence of 29.03%, the rainy season 24.35%, and the summer season 17.54%. These rates are all closely aligned with the overall prevalence of 28.47%, suggesting that there was no significant seasonal variation in the occurrence of duck plague virus during this timeframe. This might imply that the underlying factors driving the disease are relatively consistent during these months, or that the study's duration did not capture more substantial seasonal fluctuations that might occur over a longer period. Globally, DPV poses a severe threat to duck populations, with outbreaks documented in a number of nations. Migratory waterfowl play an important role in DPV transmission by acting as carriers and aiding the virus's spread across regions (Dhama *et al.* 2017). The persistence of DPV in the environment, particularly in contaminated water sources, emphasizes the importance of comprehensive control strategies, including immunization, biosecurity, and environmental management. A study in southern China identified genetic similarities between local DPV strains and those found in Bangladesh, implying potential transboundary transmission routes (Li *et al*., 2022).

Table 9: *Prevalence of duck plague virus in season.*

Season	Total ducks	No. of infected ducks	Prevalence (%)	P value
Winter	3920	1273	32.47	0.19
Rainy	2870	760	26.48	
Summer	2230	535	23.99	

Prevalence of duck plague virus by different flock size

An analysis of duck plague virus prevalence based on flock size categories reveals a relatively consistent trend. Small flocks (less than 100 ducks) showed a prevalence of 32.46%, medium flocks (containing 100-500 ducks) had a prevalence of 28.02%, and large flocks (more than 500 ducks) exhibited a prevalence of 28.46%, as shown in Table 10. While a minor elevation in prevalence was observed in smaller flocks, the rates across all flock sizes were generally similar. This suggests that flock size may not be a primary determinant of duck plague virus prevalence in this study population, although the slightly higher rate in smaller flocks could warrant further examination of management practices specific to these flock sizes.

Table 10: *Prevalence of duck plague virus by flock size.*

Flock size category	Total ducks	No. of infected ducks	Prevalence (%)	P value
Small (<100)	650	211	32.46	0.20
Medium (100-500)	5770	1617	28.02	
Large (>500)	2600	740	28.46	

Conclusion and Recommendation

This study investigated the prevalence and risk factors for duck plague virus in Sylhet Sadar Upazila and found a significant prevalence of 28.47% during the winter months. The data show that younger ducks, specific breeds, and farms that use pond water or ready-made feed are more prone to illness. Village-level variations highlighted the importance of environmental and managerial factors, such as hygiene standards and proximity to wetlands. The findings are consistent with national and international studies, confirming that poor biosecurity, polluted water supplies, and a lack of disease knowledge all contribute significantly to duck plague virus transmission. This study gave unique real-world insights into flock-level risk variables by conducting a field survey with a thorough questionnaire. These findings highlight the need for increased vaccine coverage, farmer education, duck population density, and environmental conditions and focused biosecurity strategies. Therefore, broader, multi-district surveillance would be necessary to draw more comprehensive conclusions about the national DPV status. Addressing these issues is critical for reducing disease load and ensuring the sustainability of duck farming in Sylhet and other high-risk areas.

Acknowledgments

The authors are grateful to the Sylhet Sadar Upazila Veterinary Hospital and the farmers.

Novelty Statement

Addressing these issues is critical for reducing disease load and ensuring the sustainability of duck farming in Sylhet and other high-risk areas

Author's Contribution

All authors contributed to the experimental design, wrote down and examined the manuscript, and were confirmed liable for any aspect of the manuscript.

Generative AI and AI-assisted technology statement

The authors declare that no Genrative AI was used in the creation of this manuscript.

Conflict of interest

The authors have declared no conflict of interest.

References

Ahamed, M., Akter, T. and Sultana, N., 2020. Duck farming and its impact on rural livelihoods in Bangladesh. J. Adv. Vet. Anim. Res., 7(2): 300–308.

Akter, S., Hossain, M.T. and Rahman, M.M., 2021. Epidemiology and molecular detection of duck plague in haor areas of Bangladesh. Bangladesh J. Vet. Med., 19(1): 45–52.

Chowdhury, E.H., Hossain, M.M. and Rahman, M.M., 2009. Duck viral enteritis in Bangladesh: Pathological investigation of outbreaks and virus detection by PCR. Bangladesh Vet. J., 26(2): 35–40.

Dhama, K., Kumar, N., Saminathan, M., Tiwari, R., Karthik, K. and Malik, Y.S., 2017. Duck virus enteritis (duck plague) a comprehensive update. Vet. Quart., 37(1); 57–80. https://doi.org/10.1080/01652176.2017.1298885

Gough, R.E., Collins, M.S., Borland, E. and Keymer, I.F., 1992. Duck virus enteritis (duck plague): A review. Vet. Rec., 130(3): 45–48.

Gupta, V. K., Dhama, K. and Kataria, J.M., 2014. Pathology and molecular diagnosis of duck plague. J. Vet. Sci. Technol., 5(5): 1000217.

Islam, M.R., Khatun, M.J. and Sarker, M.S.K., 2012. Duck production strategies in Bangladesh: Constraints and potentials. Bangladesh J. Anim. Sci., 41(2): 101–108.

Li, H., Wang, J., Zhang, J., Guo, J., Yuan, S., Cheng, Q., Zhang, X., Liu, Z., Wang, C., Li, Z., Hou, B., Huang, S. and Wen, F. 2022. Pathological and molecular characterization of a duck plague outbreak in Southern China in 2021. Animals, 12(24): 3523. https://doi.org/10.3390/ani12243523

Müller, H., Ehlers, B. and Teifke, J.P., 2003. Duck virus enteritis: Molecular characterization and diagnosis. Avian Pathol., 32(1): 27–35.

Rahman, M.M., Hossain, M.T. and Das, K., 2020. Seasonal prevalence of duck plague and associated risk factors in Bangladesh. Asian J. Med. Biol. Res., 6(2): 300–307.

Sandhu, T.S. and Shawky, S., 2003. Duck virus enteritis (Duck Plague). In: Saif, Y. M. (Ed.), Diseases of Poultry (11th ed., pp. 660–668). Iowa State Press, USA.

Sarker, M.A., Rahman, M.M. and Hossain, M.I., 2023. Community health education as a tool for duck plague prevention. Bangladesh J. Ext. Educ., 35(1): 44–52.

Shivachandra, S.B., Kumar, M. and Kataria, J.M., 2009. Duck virus enteritis (duck plague): A review. Vet. Res. Commun., 33(6): 1045–1052.

Tenzin, T., Dorji, J. and Dema, T., 2020. Environmental and behavioral risk factors in the spread of duck plague. J. Vet. Epidemiol., 24(1): 29–36.

Wu, H., Song, Y. and Zhang, B., 2020. Role of migratory birds in the ecology of duck plague virus. Int. J. Poult. Sci., 19(4): 144–150.