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ORIGINAL ARTICLE

Effects of COVID-19 on poultry and livestock health in Bangladesh

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Abstract

Background: Poultry and livestock are a leading sub-sector of agriculture, playing an important role to fulfill the protein requirements of the human diet and contributing to the national economy in Bangladesh. This sub-sector is often vulnerable due to frequent outbreaks of diseases in animals and unrest situations worldwide that hamper earning a profit up to the expected mark. Due to pandemic COVID-19, the Bangladesh government was bound to announce a countrywide lockdown and periodical restriction of movement in March 2020 to minimize the spread of the infection. This study aimed to evaluate the impact of COVID-19 on poultry and livestock health.

Methods: This study was conducted at Keshabpur, Jashore before 3 months of lockdown, during lockdown and periodical restriction of movement in Bangladesh. Data on livestock and poultry were collected from the upazila livestock office register book. The impact of Covid-19 was calculated by comparing the number of animals brought to the veterinary hospital for treatment before, during, and after lockdown.

Results: The effect of COVID-19 was most severe in the poultry and livestock sub-sector from April to May 2020, as animals were not being advised or treated at the upazila livestock office and veterinary hospital. In poultry, Newcastle disease, parasitic infestation, duck plague, and pigeon pox were mostly recorded, whereas deficiency diseases, non-specific diarrhea, non-specific fever, and endoparasitism were frequently recorded in livestock. We do not know exactly how many poultry and livestock died due to failure of management and treatment during the period of lockdown, but certainly, COVID-19 hampered the health of animals and farmers were affected due to the outbreak of the pandemic COVID-19.

Conclusion: It might be concluded that the pandemic situation significantly hampered poultry and livestock health in Bangladesh.

Keywords: Economic loss, diseases and disorders, mortality, production

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Introduction

Due to industrialization and modernization of the agricultural sector in Bangladesh, the country has gained faster economic growth over the past decades. Despite the vast contribution of the readymade garment sector in the national economy, the agriculture based sector is still considered to be a primary sector in Bangladesh (Rahman, 2017). Poultry and livestock are integral parts of the agricultural sector and contribute to improve food security through delivery of protein rich eggs, milk, and meat. It also contributes to the creation of employment opportunities, participation in the national economy and poverty reduction in rural and urban areas of Bangladesh (Hamid *et al*., 2016).

The sector often faces problems due to outbreak of diseases and unrest at national and global level. We encountered one of such situation due to pandemic Covid-19 that was reported in late December 2019 at Wuhan, China (Ciotti *et al*., 2020) and March 08, 2020 in Bangladesh (Islam *et al*., 2020). The Bangladesh government declared a lockdown and restricted movement of people for several months since the outbreak of Covid-19. The farmers were not able to bring their poultry and livestock to upazila livestock office and veterinary hospital during the period of lockdown. The world economic balance has been interrupted due to devaluation of national currency and closure of business. It is predicted that the effects of COVID-19 will remain for several years (Abuselidze and Slobodianyk, 2021; Chaplyuk *et al.*, 2021). In Bangladesh, the effects of COVID-19 on individual sectors are estimating and yet to be finalized on a sector basis. Several researches were carried out to estimate the economic loss on the employment sector (Mottaleb *et al*., 2020; Hossain, 2021and Shahriar *et al*., 2021), but the research work on impacts of COVID-19 on poultry and livestock sector is limited.

To observe the effects of COVID-19 outbreak on poultry and livestock, data were collected from Keshabpur upazila before the onset of lockdown, during lockdown and after lockdown in Bangladesh. Moreover, the occurrence of the diseases in animals was also reported during the study period.

Materials and methods

Study Area and duration

The study area was located at 22.9042°N 89.5667°E and total area was 258.53 km^2. Environmental temperature of the area varied from 15^o C to 39^o C and the annual average rainfall was 1244.3 mm (BBS. 2019). Duration of the study period was twelve (12) months from January 2020 to December 2020.

Study population and sources

We collected data from the upazila veterinary hospital case register book. Usually, animals are brought to the upazila livestock office and veterinary hospital for treatment. A presumptive diagnosis is made by the state veterinarian on the basis of history, clinical findings and sometimes laboratory tests.

Statistical analysis

The collected data was recorded and coded in Microsoft excel sheet. The proportion was expressed as percentage (%). The impact of Covid-19 was calculated by comparing the number of animals brought to the veterinary hospital for treatment before, during and after the lockdown. The association among the number of animals brought to hospital in different time periods was calculated by correlations coefficients in statistical program for social science (SPSS) software (SPSS® Version 22.0).

Results and discussion

The pandemic COVID-19 originated from China has affected almost every sector of human life worldwide. In this study, we tried to show the effects of the pandemic COVID-19 on the poultry and livestock sector. As farmers are used to bring their sick poultry and livestock to their nearest

upazila livestock office and veterinary hospital, we selected Keshabpur upazila as a test basis to get the status of an upazila. Figure 1 represents the reported animals before lockdown, during lockdown and after lockdown or periodical restriction in Bangladesh. Due to countrywide lockdown or restriction of movement in Bangladesh from April to the 3rd week of May, the upazila livestock office and veterinary hospital were closed. The animals were not treated during that period. We found a significant difference ($p < 0.001$) between the numbers of animals that were brought to the hospital before lockdown and during lockdown (Figure 1). The correlation coefficient between these two groups was found to be a perfectly negative (value -1.000) (Table 1). The perfectly negative correlation indicates the number of animals will be decreased, if the duration of lockdown is increased. The numbers of animals brought to the hospital during the lockdown and after lockdown or periodic restriction were also significantly ($p < 0.001$) different and negatively correlated. It was also demonstrated that the periodic restriction of movements was not significantly ($p > 0.05$) correlated before the lockdown situation. It is interpreted that people's tendency to bring their sick animals to the hospital during lockdown was significantly lower than that of before lockdown. It does indicate that people of that upazila abide by the government rules during the pandemic situation. The trends of animals recorded per month before and after lockdown (Figure 1) indicate farmers might have sick animals which were not possible to bring at upazila livestock office and veterinary hospital. Those animals were not advised and probably deprived from getting proper facilities and treatment due to pandemic COVID-19. It is possible that several animals failed to return to normal production or died without proper treatment. Many poultry farms were closed due to continued loss. In fact, we do not have the data of how many poultry and livestock died or failed to get back into normal production cycle after suffering from diseases and disorders. Research results indicate that diseases and disorders hamper production even if the animal becomes normal after treatment. Besides the treatment facilities, other regular activities like vaccination, artificial insemination, research, training and extension programs were closed in the upazila livestock office and veterinary hospital during the pandemic period. The regular activities were hampered for a prolonged period of time and it is predicted that a negative impact will appear on poultry and livestock production at a subsequent time. The loss was estimated during countrywide lockdown with a minimum loss of 1.35 billion USD (Rahman and Das, 2021). COVID-19 affected approximately 65-70 thousand commercial poultry farms in Bangladesh. The poultry sector in Bangladesh also faced a financial crisis due to rumors on transmitting COVID-19 through poultry and poultry products (Sattar *et al*., 2021). As large numbers of people are engaged in this sector and many people are involved in the poultry production channel, all levels of people were affected due to the pandemic COVID-19. Although there was periodic restriction after lockdown, the upazila livestock office and veterinary hospital were open and farmers brought their animals after withdrawal of lockdown. Except for the period of lockdown, the month-wise observation of animals seems to be similar.

In addition to the effects of COVID-19, we studied the diseases and disorders of the reported animals for one year. Several species of animals were reported such as cattle, goat, sheep, chicken, duck, pigeon and quail. During the one year COVID-19 period, a total of 3771 animals were registered, diagnosed and treated in the upazila livestock office and veterinary hospital. Table 2 demonstrates species wise observation of animals. Among the species, cattle and goats reported comparatively more than other species in the upazila. Considering the total livestock population in Keshabpur upazila, approximately 2% cattle, goat and sheep of respective populations were exposed to several diseases and disorders in one year.

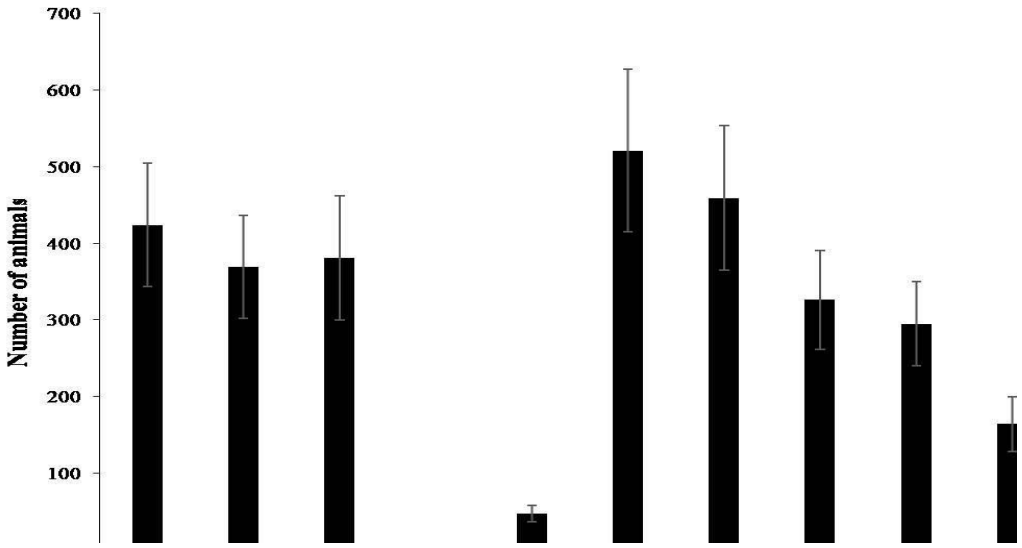

Figure 1: Occurrence of diseases and disorders between January 2020 and December 2020

Table 1. Correlation among the number of animals brought to hospital in different time period

Group	Before pandemic	Pandemic	Restriction
Before lock down	1	-1.000**	.590
During lockdown	-1.000**	1	-1.000**
After lockdown	.590	-1.000**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2. Number of animal species recorded, diagnosed and treated in 2020

Species	n (%)
Cattle	1704 (45.19)
Goat	1495 (39.64)
Sheep	3 (0.08)
Chicken	363 (9.63)
Duck	88 (2.33)
Pigeon	116 (3.08)
Quail	2 (0.05)
Total	3771

n = number of observations, % = on the basis to total observations

Table 3. Occurrence of diseases and disorders in cattle, goat and sheep during the study

Diseases and disorders	Cattle n(%)	Goat n(%)	Sheep n(%)
Abscess	6 (0.35)	10 (0.67)	-
Allergic dermatitis	5 (0.29)	1 (0.067)	-
Anemia	3 (0.18)	6 (0.40)	-
Anorexia	39 (2.29)	20 (1.34)	-
Bloat	-	12 (0.80)	-
Castration	-	5 (0.33)	-
Calf scour	3 (0.18)	-	-
Coccidiosis	4 (0.23)	-	2 (33.33)
Coughing	34 (1.99)	32 (2.14)	-
Weakness	20 (1.17)	13 (0.87)	-
Deficiency disease	138 (8.1)	149 (9.97)	-
Dystocia	-	1 (0.067)	-
Non specific diarrhea	401 (23.54)	318 (21.27)	3 (50.00)
Dog bite	11 (0.65)	28 (1.87)	-
Dry Cow	5 (0.29)	-	-
Eye infection	2 (0.12)	-	-
Ear infection	-	3 (0.2)	-
Non specific fever	131 (7.69)	445 (29.77)	-
Foot and mouth disease	18 (1.06)	1 (0.067)	-
Fracture	5 (0.29)	17 (1.14)	-
Hernia	1 (0.06)	-	-
Joint ill	-	20 (1.34)	-
Ectoparasitism	57 (3.35)	35 (2.34)	-
Mastitis	3 (0.18)	5 (0.33)	-
Navel ill	11 (0.65)	-	-
Infertility	5 (0.29)	-	-
Repeat breeder	1 (0.06)	-	-
Nephritis	6 (0.35)	-	-
Lameness	65 (3.82)	23 (1.54)	-
Skin disease	41 (2.41)	25 (1.67)	-
Tympany	83 (4.87)	55 (3.68)	-
Urolithiasis	-	10 (0.67)	-
Poisoning	-	5 (0.33)	-
Pneumonia	-	7 (0.47)	1 (16.67)
Colic	-	1 (0.067)	-
PPR	-	8 (0.54)	-
Tumor	-	3 (0.2)	-
Tetanus	-	11 (0.74)	-
Endoparasitism	605 (35.53)	217 (14.52)	-
Wound	-	9 (0.6)	-

Table 4. Occurrence of diseases and disorders in poultry

Diseases and disorders	Chicken n(%)	Duck n(%)	Pigeon n(%)
Avian influenza	1 (0.28)	-	-
Salmonellosis	25 (6.89)	-	5 (4.31
Coccidiosis	19 (5.23)	-	5 (4.31)
CRD	2 (0.55)	-	-
Fowl pox	26 (7.16)	2 (2.27)	-
Gumboro	3 (0.83)	-	-
Infectious coryza	5 (1.38)	-	-
Marek's disease	1 (0.28)	-	-
Mycoplasmosis	16 (4.41)	3 (3.41)	10 (8.62)
ND	201 (55.37)	5 (5.68)	34 (29.31)
Parasitic infestation	64 (17.63)	9 (10.23)	23 (19.83)
Duck cholera	-	7 (7.95)	-
Duck plague	-	62 (70.45)	1 (0.86)
Pigeon pox	-	-	38 (32.76)

The proportionate prevalence of diseases and disorders in livestock has been shown in Table 3. Several diseases and disorders were observed in cattle, goats and sheep. Deficiency diseases, non-specific diarrhea, non-specific fever and endoparasitism were most frequently reported in Keshabpur upazila. Table 4 represents the diseases and disorders in poultry. Newcastle diseases, parasitic infestation, duck plague and fowl pox were most frequently occurring in chicken, duck and pigeon. Newcastle disease and parasitic infestation were mostly recorded in chicken and pigeon. The occurrence of duck plague and fowl pox was predominant in ducks and pigeons, respectively. The prevalence of diseases and disorders may vary from region to region due to variation of management strategies and climatic conditions in Bangladesh. In the coastal region of Bangladesh, the prevalence of parasitic diseases and digestive disorders were recorded comparatively higher than other diseases (Rahman *et al*., 2013). The parasitic infection throughout the country is considered to be a major problem in Bangladesh and it occurs approximately in 75% of cattle (Islam *et al.*, 2014; Aktaruzzaman *et al.*, 2013).

The occurrence of parasitic diseases seems to be season dependent and high during rainy seasons (Akanda *et al.,* 2013). In the dairy industry, the prevalence of diseases and disorders depends on the milk production capacity of animals in a particular region. High milk production areas like the Baghabari milking zone of Bangladesh demonstrates high incidence of mastitis and milk fever compared to present study (Sarker *et al*., 2013). In poultry, the prevalence of poultry diseases might also vary in various regions of Bangladesh as high incidence of infectious bursal disease in Sylhet region (Islam *et al.,* 2003) and, salmonellosis in Gazipur region (Hassan *et al*., 2016). In farming conditions, the prevalence of aflatoxicosis was high in Bangladesh (Giasuddin *et al.,* 2002). Although the prevalence of diseases and disorders varies on the basis of geographical location, the common diseases and disorders prevail throughout the country.

Conclusions

COVID-19 is not only a concern of human health security, but it is hampering almost every sector of human life. Poultry and livestock are also affected due to this pandemic. Farmers were not able to bring their poultry and livestock at the

service center which ultimately hampered poultry and livestock production up to the mark.

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Author's contribution

A.K.P. designed the experiment, supervised the study, analyzed the data and revised the final draft of the manuscript. K.M.K. Hossain directly involved doing the experiment, collection of data and reviewing the literature and P.K.S. tabulated the data and wrote the draft of this manuscript.

Conflicts of interest: The authors declare no conflict of interest.

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