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Research

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Vincent Mensah, Raphael Deladem Folitse, Esther Amemor, Patrick Mensah Amponsah, Stephen Debrah, Benjamin Obukowho Emikpe

Corresponding author: Benjamin Obukowho Emikpe, School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. banabis2001@yahoo.com

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Retrospective analysis (2018-2021) of respiratory diseases in poultry, diagnosed at the Veterinary Services Laboratory, Kumasi, Ghana

Vincent Mensah[1], Raphael Deladem Folitse[1], Esther Amemor[1], Patrick Mensah Amponsah[2], Stephen Debrah[1], Benjamin Obukowho Emikpe[1,&]

[1]School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, [2]Kumasi Veterinary Laboratory, Amakom, Kumasi-Ghana

[&]Corresponding author

Benjamin Obukowho Emikpe, School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Abstract

Introduction: *in the poultry industry, respiratory diseases are a major concern that has a negative impact on growth performance and egg production. This retrospective study was conducted to determine the prevalence of common poultry respiratory diseases diagnosed at the Veterinary Services Laboratory, Kumasi, Ghana from January 2018 to December 2021.* ***Methods:*** *the study was retrospective in nature which obtained required data on poultry diseases from laboratory records available at the Regional Veterinary Services Laboratory, Kumasi- Ghana that were diagnosed using history provided by the poultry farmers, necropsy findings, and specific laboratory investigations.including culture, isolation and identification of pathogens in poultry birds from January 2018 to December 2021. Data obtained was descriptively analysed using Microsoft Excel version 19.* ***Results:*** *out of the total 6, 747 diagnoses recorded, 29.61% (1998) were respiratory diseases with an overall annual prevalence of 7.22% (n = 487), 7.94% (n = 536), 6.54% (n = 441) and 7.91% (n = 534) for 2018, 2019, 2020 and 2021 respectively. Quarterly prevalence was 4.71%, (n = 318), 5.34% (n = 360), 4.64% (n = 313), and 4.42% (n = 298) for the first, second, third, and fourth quarters respectively. The highest prevalence of 3.62% was recorded in November, followed by 2.70% recorded in June. The most frequently diagnosed respiratory disease was Newcastle disease (64.51%, 1289 cases out of 1998 respiratory diseases) with an overall specific respiratory diseases´ prevalence of 19.10%, (1289/6747) followed by CRD 5.77% (389/6747), Infectious Coryza 2.45% (165/6747), Aspergillosis 1.47% (99/6747), Avian Influenza 0.79% (53/6747) and the least being Infectious Laryngotracheitis 0.04% (3/6747).* ***Conclusion:*** *this study established that the occurrence of respiratory diseases in poultry in the Ashanti of Ghana is high and that Newcastle disease, CRD, Infectious Coryza, Aspergillosis, Avian Influenza, and Infectious Laryngotracheitis, were the common respiratory diseases recorded at the Veterinary Services Laboratory, Kumasi. Accordingly, more attention should be given to their prevention and control measures.*

Introduction

Poultry farming is an essential component of the agricultural sector in many countries. It provides direct and indirect job opportunities, hence an important source of income for many [1,2]; it is a source of animal protein and provides organic manure to crop farmers. The poultry industry is an important component of Ghana´s economic growth and contributes to a reduction in poverty in both urban and rural areas [3,4]. In Ghana for some years now, the growth of the poultry industry has been limited, due mainly to the high cost of inputs, particularly poultry feed [5], and frequent disease outbreaks [1,2]. Other researchers also reported that poultry farming is combated with several diseases, including respiratory infectious diseases, which slow down production [6,7]. Although respiratory infections impact negatively poultry welfare and productivity, they are largely not very much studied in most African countries [8].

Common respiratory infections in poultry worldwide include Infectious Coryza (IC), Mycoplasmosis, Aspergillosis, Newcastle Disease (ND), Infectious Bronchitis (IB), Avian Influenza (AI), and Infectious Laryngotracheitis (ILT). Clinical indicators including gaping, sneezing, coughing, nasal discharge, and respiratory distress result from significant damage to various respiratory tract tissues [9]. In Ghana, the frequently diagnosed respiratory infectious diseases in poultry are Newcastle disease, Avian Influenza, Mycoplasmosis, Infectious Coryza and Aspergillosis. Ashanti region is the second largest poultry-producing region in Ghana, however, information on the prevalence of respiratory diseases in poultry in the region is limited. This study, therefore, determined the prevalence of common respiratory diseases in poultry, and their annual, quarterly and monthly distributions using

records available at the Regional Veterinary Services (VS) Laboratory, Kumasi, Ghana from January 2018 to December 2021.

Methods

Study location

The study was conducted at the Regional Veterinary Services Laboratory located at Amakom in the Kumasi Metropolitan Assembly of the Ashanti Region. Kumasi is the capital city of the Ashanti region of Ghana, and it is situated at the GPS Coordinates: 6.68422, -1.5793 (Longitude, Latitude) as shown in Figure 1 below; with a land area of 254 km² and a human population of about 4.43981 million, according to the 2021 Population and Housing Census [10]. Diagnosis of diseases at the Regional VS Laboratory, Kumasi was based on history provided by the poultry farmers, necropsy findings, and specific laboratory investigations. In some cases, specific laboratory investigations included culture, isolation and identification of pathogens.

Data collection

Required data on poultry diseases from January 2018 to December 2021 was extracted from laboratory records available at the Regional Veterinary Services Laboratory, Kumasi. The extracted data were regrouped into monthly, quarterly, and annual numbers of cases diagnosed.

Data analysis

The extracted data were entered, categorized, and analyzed using Microsoft Excel version 2019. Descriptive statistics were used to interpret the data in the form of frequencies, charts, and percentages.

Results

Annual prevalence

A total of 6, 747 necropsy cases of poultry diseases were diagnosed and documented at Regional VS Laboratory, Kumasi from January 2018 to December 2021. The annual, quarterly, and monthly figures are indicated in the proceeding tables. From Table 1, the total prevalence of respiratory disease recorded during the study period at the VS Laboratory, Kumasi was 29.61% (1998/6747) and the annual prevalence of cases of respiratory diseases was highest in 2021, 32.05% (534/1666) followed by 2019 (30.42%), 2018 (29.25%) and 2020 (26.66%).

Quarterly prevalence

The quarterly distribution and prevalence of respiratory diseases in poultry during the study period are indicated in Table 2. The highest quarterly prevalence was recorded in the 3rd quarter (31.86%, 503/1579) followed by 4th quarter (31.32%, 514/1641), 2nd quarter (28.00%, 504/1800) and 1st quarter (27.62%, 477/1727).

Monthly prevalence

From Table 3, it is indicated that the highest prevalence of respiratory diseases in poultry on a cumulative monthly basis during the study period was recorded in November (34.27%), whilst the lowest was recorded in March (22.97%).

Prevalence of specific respiratory diseases of poultry

From Table 4, it has been established that Newcastle disease recorded the highest cumulative occurrence of 1289 (64.51% of respiratory diseases) of all respiratory diseases diagnosed during the study period, followed by CRD (chronic respiratory disease) of 389 (19.10% of respiratory diseases), whilst ILT recorded the lowest figure of 3 (0.15% of respiratory diseases).

Discussion

Results obtained from this study indicate that, out of the total of 6747 diseases of poultry recorded at the VS Laboratory in Kumasi during the study period, 1998 (29.61%) were cases of respiratory disease. This figure establishes the fact that the occurrence of respiratory diseases in poultry in the Ashanti of Ghana is high. Similar studies conducted by Boakye *et al.* [11] and Awuni *et al*. [12] showed that respiratory diseases were among the main causes of infections in poultry in Ghana.

Regarding quarterly prevalence, the study determined that the prevalence of respiratory diseases in poultry in the study area was highest in the 3rd quarter (31.86%), whilst the lowest prevalence was recorded in the 1st quarter (27.62%). A study previously conducted in Bangladesh by Badruzzaman *et al.* (2015), reported overall quarterly prevalence to be highest in the 2*nd* quarter (39.85%) followed by the 4*th* quarter (32.80%) and 3*rd* quarter (27.35%). The highest cumulative monthly prevalence of 34.27% in this current study was recorded in November, whilst the lowest (22.97%) was recorded in March. This may be associated with weather, in Ghana, this period falls within dry season and aerosol transmission is very important in respiratory disease hence aerosol transmission in the dry season may play significant role.

The current study determined the respiratory diseases recorded during the study period were Newcastle disease (ND), Chronic Respiratory Disorder (CRD), Avian Influenza (AI), Aspergillosis (Asp), Infectious Coryza (IC) and Infectious Laryngotracheitis (IL). Previous researchers [11,12] reported the same diseases, except AI and IL, as the main respiratory diseases having a significant impact on the poultry industry in Ghana. Of the specific respiratory diseases recorded during the study period, ND had the highest cumulative prevalence (19.10%), followed by CRD (5.77%), whilst IL had the lowest (0.04%). Results from several previous studies [12, 13,14] supported the current finding of ND being the most frequently diagnosed respiratory disease of poultry. The high occurrence of Newcastle disease in poultry is mainly due to improper vaccination, inadequate cold chain, maternal antibodies interference and contact with local, wild and migratory birds which are not vaccinated but are disease-resistant [11,14].

Although vaccination schedule for poultry is the responsibility of the Veterinary Service Department in Ghana, the efficiency of the vaccination schedule was evaluated both for layers and guinea fowls and they were found to be adequate (15, 16), however farmers do not often follow the vaccination schedule strictly, coupled with poor biosecurity practices in many farms hence the high prevalence of respiratory diseases observed in poultry in the Ashanti region of Ghana. The limitation of the study include the need to evaluate the poultry host range of the respiratory disease, role of migratory birds including water fowls and role of shedding of vaccine strain.

Conclusion

The prevalence of respiratory diseases of poultry diagnosed at VS Laboratory, Kumasi is high (29.61%), hence could be considered as a major threat to the poultry industry. Newcastle disease, chronic respiratory disease, infectious coryza, avian influenza, and aspergillosis are the main respiratory diseases diagnosed during the study period (January 2018 to December 2021). Newcastle disease is the most prevalent respiratory disease recorded during the period followed by chronic respiratory disease. Improved education of poultry farmers and other stakeholders in the poultry industry on preventive and control measures could reduce the high prevalence of these diseases.

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What is known about this topic

- *Poultry respiratory diseases have been reported in Ghana and to some extent in the Ashanti Region;*
- *These diseases and their prevalence have been reported in isolations in the country with attention geared towards specific diseases that outbreaks have been recorded on.*

What this study adds

- *This study adds to existing literature on the prevalence of respiratory diseases of poultry that have been clinically diagnosed by a reference laboratory in the region;*
- *This study provides significant composite information on the poultry respiratory diseases distribution especially the quarterly and monthly distributions which will guide practitioners on when to focus in the prevention and treatment of diseases.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Raphael Deladem Folitse conceptualised the study and designed it. Data collection and analysis was performed by Raphael Deladem, Patrick Mensah Amponsah, Esther Amemor and Stephen Debrah. Writing of original manuscript was conducted by Raphael Deladem Folitse. Review and editing of the manuscript were performed by Stephen Debrah, Benjamin Obukowho Emikpe and Esther Amemor. The authors have read and agreed to the final manuscript.

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Tables and figures

Table 1: annual prevalence of respiratory diseases of poultry, diagnosed at VS Laboratory, Kumasi (2018-2021)

Table 2: quarterly distribution of respiratory diseases of poultry, diagnosed at VS Laboratory, Kumasi for each year (2018-2021)

Table 3: monthly distribution of respiratory diseases of poultry diagnosed at VS Laboratory, Kumasi, (2018-2021)

Table 4: annual cases of specific respiratory diseases in poultry diagnosed at VS Laboratory, Kumasi, from January 2018 to December 2021

Figure 1: map of Ghana indicating Ashanti region

References

1. Ayim M, Asafu-Adjaye A, Beckley C, Adu-Aboagye G, Owusu-Ntumy DD, Baryeh K, *et al*. Serological survey of Mycoplasma gallisepticum infection in layer chickens in the Ga-East District of the greater Accra region. Journal of the Ghana Science Association. 2012 Jun;14(1): 22-9. **Google Scholar**
2. Balami AG, Ndahi JJ, Zaifada AU, Mustapha M, Jarafu DJ, Asogwa NT, *et al*. A retrospective study of poultry diseases diagnosed in Maiduguri, North-East, Nigeria. Poult Fish Wildl Sci. 2014 Mar 20;2(113): 2. **PubMed**| **Google Scholar**
3. Hamid MA, Rahman MA, Ahmed S, Hossain KM. Status of the poultry industry in Bangladesh and the role of the private sector in its development. Asian Journal of Poultry Science. 2016;11(1): 1-13.

4. Ayim-Akonor M, Owusu-Ntumy DD, Ohene-Asa HE, Oduro-Abrokwa A, Hammond P, Appenteng M, *et al*. Serological and Molecular Surveillance of Infectious Bronchitis Virus Infection in Free-Range Chickens and Guinea Fowls in the Ga-East District of Ghana. J Vet Med. 2018 Aug 6;2018: 4949580. **PubMed**| **Google Scholar**
5. Oppong-Adjei V. 80% of poultry farmers not in operation. National Chairman of Association. 24th December 2022.
6. Jordan F, Pattison M, Alexander D, Faragher T. Diseases of Poultry. 5th ed. WB. Saunders Com. USA. 2005. 571p.
7. Jones RC. Viral respiratory diseases (ILT, aMPV infections, IB): are they ever under control? British Poultry Science. 2010 Feb 1;51(1): 1-1. **Google Scholar**
8. Owoade AA, Ducatez MF, Muller CP. Seroprevalence of avian influenza virus, infectious bronchitis virus, reovirus, avian pneumovirus, infectious laryngotracheitis virus, and avian leukosis virus in Nigerian poultry. Avian Dis. 2006 Jun;50(2): 222-7. **PubMed**| **Google Scholar**
9. Hayder N, Hasan Z, Afrin S, Noor R. Determination of the frequency of carbapenemase producing Klebsiella pneumoniae isolates in Dhaka city, Bangladesh. Stamford Journal of Microbiology. 2012;2(1): 28-30. **Google Scholar**
10. Ghana Statistical Services. Ghana 2021 Population and Housing Census Volume 1 Preliminary Report Ghana Statistical Service, September, 2021.
11. Boakye OD, Emikpe BO, Folitse RD, Bonnah SG, Adusei K, Owusu M, *et al*. Serological detection of Newcastle disease virus antibodies in local chickens and guinea fowls in the area of Kumasi, Ghana. Brazilian Journal of Poultry Science. 2016 Jan;18: 87-92. **PubMed**| **Google Scholar**
12. Awuni JA. Strategies for the improvement of rural chicken production in Ghana. Characteristics and parameters of family poultry production in Africa. IAEA, VIENNA. 2002 Jul 1: 33-7. **Google Scholar**
13. Badruzzaman AT, Noor M, Mamun MA, Husna A, Islam KM, Alam KJ, Rahman MM. Prevalence of diseases in commercial chickens at Sylhet Division of Bangladesh. International Clinical Pathology Journal. 2015;1(5): 00023. **Google Scholar**
14. Vadivoo VS, Arthanarieswaran M, Lakshmikantan U, Hariharan T, Mathivananan R. A Retrospective Study on the Prevalence of Infectious Diseases in Desi Fowls of Tirupur District, India. International Journal of Current Microbiology and Applied Science. 2020;9(06): 721-31. **Google Scholar**
15. Bosiako PA, Boakye OD, Adusei KA, Hamidu JA, Amponsah PM, Emikpe BO. Evaluation of two Newcastle disease vaccination regimes commonly used for commercial layer production in Ghana. African Journal of Biomedical Research. 2022;25: 185-189. **PubMed**| **Google Scholar**
16. Sasu BK, Amponsah P, Yiadom B, Emikpe BO. Evaluation of Newcastle disease vaccination regime for commercial Guinea fowls production in Kumasi, Ghana. African Journal of Biomedical Research. 2020;23: 3. **Google Scholar**

Table 1: annual prevalence of respiratory diseases of poultry, diagnosed at VS Laboratory, Kumasi (2018-2021)			
Year	**Total No. of cases (a)**	**No of Respiratory Cases (b)**	**% of Respiratory Cases (b/a) %**
2018	1665	487	**29.25%**
2019	1762	536	**30.42%**
2020	1654	441	**26.66%**
2021	1666	534	**32.05%**
Total	**6747**	**1998**	**29.61%**

Table 2: quarterly distribution of respiratory diseases of poultry, diagnosed at VS Laboratory, Kumasi for each year (2018-2021)				
YEAR	**Quarter**	**No of Samples Diagnosed (Y)**	**No. of Respiratory Cases (X)**	**% Respiratory Disease ((X/Y) *100)**
2018	1st Quarter	467	96	20.56%
	2nd Quarter	415	118	28.43%
	3rd Quarter	354	112	31.64%
	4th Quarter	429	161	37.53%
2019	1st Quarter	441	151	34.24%
	2nd Quarter	491	136	27.70%
	3rd Quarter	403	135	33.50%
	4th Quarter	427	114	26.70%
2020	1st Quarter	445	117	26.29%
	2nd Quarter	445	119	26.74%
	3rd Quarter	421	124	29.45%
	4th Quarter	343	81	23.62%
2021	1st Quarter	374	113	30.21%
	2nd Quarter	449	131	29.18%
	3rd Quarter	401	132	32.92%
	4th Quarter	442	158	35.75%
Total		**6747**	**1998**	**29.61%**

Table 3: monthly distribution of respiratory diseases of poultry diagnosed at VS Laboratory, Kumasi, (2018-2021)			
Month	**Total No. of Cases (a)**	**No of Respiratory Cases (b)**	**% of Respiratory Cases (b/a)**
January	540	166	30.74%
February	521	158	30.33%
March	666	153	22.97%
April	645	185	28.68%
May	569	137	24.08%
June	586	182	**31.06%**
July	516	160	**31.01%**
August	526	175	**33.27%**
September	537	168	31.28%
October	445	121	27.19%
November	712	244	**34.27%**
December	484	149	30.79%
Total	**6747**	**1998**	**29.61%**

Table 4: annual cases of specific respiratory diseases in poultry diagnosed at VS Laboratory, Kumasi, from January 2018 to December 2021						
Disease	**2018**	**2019**	**2020**	**2021**	**Total**	**Percentage (%)**
ND	321	348	301	319	1289	**64.51%**
ASP	27	22	18	32	99	4.95%
CRD	103	117	70	99	389	19.47%
ILT	0	1	1	1	3	**0.15%**
AI	0	0	10	43	53	2.65%
IC	36	48	41	40	165	8.26%
Total	**487**	**536**	**441**	**534**	**1998**	**100.00%**

Figure 1: map of Ghana indicating Ashanti region