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Research Article

Prevalence of Diseases in Broilers Age Group 1-14 Days at Chitwan District, Nepal

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Abstract

This study was undertaken to find out the prevalence of diseases in broilers age group 1-14 days at Chitwan district, Nepal. This subjective study was carried out using the secondary data retrieved from National Avian Disease Investigation Laboratory (NADIL). Chitwan and Veterinary Teaching Hospital (VTH), Agriculture and Forestry University (AFU), Rampur, Chitwan in last two years viz. June 2016 to June 2018. The cases recorded were categorized and those up-to age 14 days old broiler chicks (n=1112) were selected for the study. Data and Informations were entered in Microsoft Excel 2010 and analyzed using SPSS ver. 22. Results illustrates that the average flock size was 913.51± 918.49 with a range from 30 to 10000 chicks. The case was reported highest in 14th day followed by 12th and 10th day. The prevalence of bacterial disease was found to be highest (57.46%) followed by mycoplasma infection (10.61%) and metabolic diseases (10.16%). Prevalence of Colibacillosis was highest (43.25%) followed by Salmonellosis (12.85%) and Chronic Respiratory Disease (CRD) (10.61%). The level of chicks' average mortality was 2.14% of total flock size. The Pearson's correlation between flock size and mortality was found to be 0.82, which was highly significant ($p<0.01$). The mortality varies significantly ($p<0.01$) with change in seasons, the prevalence of disease was higher in summer (32.28%) followed by winter (29.13%). Prevalence was recorded as 65.19% among age group 8-14 days and followed by 1-7 days age group (34.80%). Thus, disease management during second week followed by the first week can decrease the disease prevalence and mortality of chicks and increase the efficiency of farm.

Introduction

Poultry industry started about 30 years ago in Nepal and started to grow rapidly, to date Nepal is almost self-sustainable in egg and poultry meat. Nepal's poultry industry (meat, egg, chicks and manure) has annual turnover of Rs 33.72 billion, producing chicken meat worth Rs 20.52 billion. Commercial production of broiler meat in Nepal stands at 110690 tons annually and poultry meat fulfils around 13 percent of countries' meat requirement. Nepal had 72 million chickens in 2018, which was contributing in production of 60 thousand MT chicken meat (Subedi & Kaphle, 2018). Chitwan is the largest producer of poultry products in the country making it poultry hub (Karki *et al*., 2015) with the district recording a turnover of Rs 10.17 billion and have 11 percent of the total broiler population of the country (CBS, 2016).

The prevalence of any disease in a particular area depends on various factors like economic status of farmer, location and geography of the area, management practice, biosecurity of farm, hatcheries, immunization, quality of chicks, etc. Age of the bird and seasonal variation or weather of the location are important factors associated with prevalence of disease (Yunus *et al*., 2009). Chitwan district ranks first in all type of poultry products in Nepal and National Avian Disease Investigation Laboratory (NADIL) and Veterinary Teaching Hospital (VTH), Agriculture and Forestry University (AFU) are two major diagnostic centres in Chitwan district. Therefore, data (June, 2016 to June, 2018) of VTH, AFU and NADIL was retrieved to determine the prevalence of diseases of broilers age group 1-14 days.

As chicken meat has become widely popular compared to other meat products, the poultry market has been growing rapidly. Though the commercial broilers farming has been increasing, the mortality rate of broilers has been recorded to be 12.8 % in Nepal. Early chicks' mortality and associated diseases are the causes to decrease the farmer's profitability. Mortality of chicks is a major problem encountered during the first two weeks in broiler farms which possess great economic losses, both in farms as well as in hatcheries (Yassin *et al*., 2009; Chou *et al*., 2004). The early life of broiler chicks is very significant as they grow faster and become double their initial weight in first week. Furthermore, they have-not developed the thermoregulatory system in the first week making them vulnerable to many disease attacks. Therefore, the study was undertaken in a selective age from 1 to 14 days to determine the mortality along with prevalence of diseases.

The objective of this study was to identify the various diseases that might occur and cause mortality during first two weeks of chicks' life and to focus on age and seasonal pattern of disease prevalence. Result of our study will provide the status of disease prevalence and mortality rate in broilers age group 1-14 days in Nepal. This study may assist students, researchers or stakeholders to design, regulate and implement different research on specific disease and to make preventive strategies against the diseases.

Materials and Methods

The subjective study was carried out during the period between June 2016 to June 2018 to find out the prevalence and mortality of broiler chicks (1-14days) using the secondary data retrieved from the case log book of National Avian Disease Investigation Laboratory (NADIL), Chitwan and Veterinary Teaching Hospital (VTH) of Agriculture and Forestry University (AFU), Rampur, Chitwan. All the poultry cases were diagnosed mainly based on clinical history, age of affected flock, clinical signs and symptoms, postmortem examination (gross and microscopic findings), bacterial culture (isolation and identification of bacteria), and rapid test kit for viral diseases. Total 1112 cases were recorded and categorized according to the cause of disease and mortality.

Data were entered into Microsoft Excel and tabulated and analyzed using SPSS ver. 22. Chi-squared test of significance was applied to test the association. Influence of age and season in the prevalence of disease was determined, for that age was categorized in to 1-7 days and 8-14 days. 12 months were categorized in to four seasons i.e. Winter (December-February), Spring (March-May), Summer (June-August), and Autumn (September- November).

Results and Discussion

Prevalence

Prevalence of bacterial disease was found to be highest (57.46%) followed by mycoplasma infection (10.61%), metabolic diseases (10.16%), fungal infection (8%), viral infection (1.98%) and other (2.33%). 9.26% of the cases were undiagnosed due to decomposed poultry brought by farmers. Prevalence of bacterial diseases was 64.02% in a study conducted by Sharma and Tripathi, (2015) from Mid-December 2014 to Mid-June 2015 at National Avian Disease Investigation Laboratory (NADIL), Chitwan, which is slightly higher than our study. In same study conducted by Sharma and Tripathi, (2015), prevalence of viral disease was 15.70% which is higher than our study. This is because of age limitation in our study and viral diseases like New Castle Disease (ND), Infectious Bronchitis (AI), Infectious Bursal Disease (IBD), Avian Influenza (AI) generally affect age group more than 2 weeks. Also, diseases like IB and ND are more frequent in layers than broilers.

Prevalence of disease according to age of chicks is shown in Table 1. As shown in Table 1, prevalence was recorded as 65.19% among age group 8-14 days and followed by 1-7 days age group (34.8%). The case was reported highest in 14^{th} day followed by 12^{th} and 10^{th} day. This shows that diseases were reported higher in 2nd week than the 1^{st} week. Younger broiler chicks are more susceptible to diseases, here in our study, age group 8-14 days are more susceptible than age group 1-7 days. This might be the reason due to extra care of chicks by farmer during 1^{st} week than 2^{nd} week. Use of antimicrobial medication in hatcheries of broilers may decrease the cases in 1^{st} week. Sometime farmer considers few mortalities in 1^{st} week is normal and don't take chicks for postmortem and clinical examination in diagnostic center, which may be the reason behind high prevalence of cases in second week than first week. Badruzzaman *et al*., (2015) found 12.81% prevalence of diseases in commercial chicken of age group 0-8 days at Sylhet Division of Bangladesh, which is lower than our study, this might be because of no age limitation of poultry in their study and land topographic variation.

Table 1: Prevalence of diseases in different age in broilers at Chitwan District during the period from June 2016 to June 2018

Age	Bacterial	Mycoplasma	Metabolic	Fungal	Viral	Others	Decomposed	Total
1	1	0	0	0	0	0	0	**1**
2	4	0	0	1	0	0	1	**6**
3	18	1	2	0	0	0	2	**23**
4	50	0	1	1	2	1	3	**58**
5	89	2	3	1	0	3	8	**106**
6	54	5	3	5	1	3	8	**79**
7	76	9	10	4	0	4	11	**114**
1st Week Cases Prevalence	**292 26.25%**	**17 1.52%**	**19 1.7%**	**12 1.07%**	**3 0.36%**	**11 0.98%**	**33 2.96%**	**387 34.8%**
8	45	9	3	8	0	6	10	**81**
9	42	7	5	6	1	0	6	**67**
10	50	14	11	12	2	3	8	**100**
11	37	10	15	7	0	0	16	**85**
12	68	20	15	20	4	1	11	**139**
13	33	18	20	13	0	3	5	**92**
14	74	23	25	11	12	2	14	**161**
2nd Week Cases Prevalence	**349 31.38%**	**101 9.08%**	**94 8.45%**	**77 6.92%**	**19 1.70%**	**15 1.34%**	**70 6.29%**	**725 65.19%**
Total	**641 57.64%**	**118 10.61%**	**113 10.16%**	**89 8.00%**	**22 1.97%**	**26 2.33%**	**103 9.26%**	**1112**

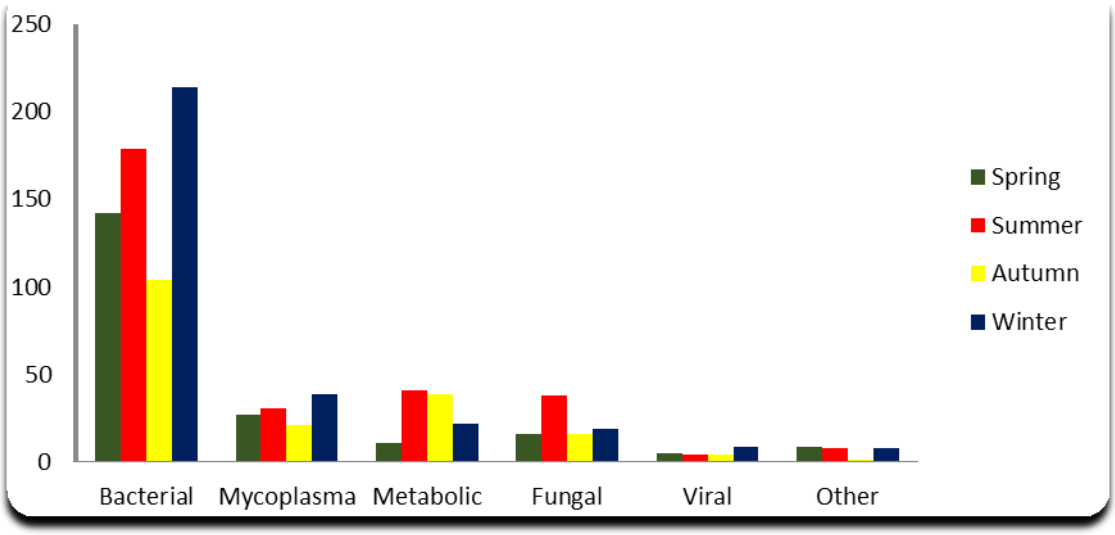

Fig. 1: Seasonal Prevalence of Diseases

Overall prevalence and seasonal variation of diseases in broilers age group 1-14 days is shown in Table 2 and seasonal prevalence of diseases is shown in Fig. 1. According to our result, prevalence of Colibacillosis (43.25%) was highest followed by Salmonellosis (12.85%), CRD (10.61%), Gout (8.9%), Mycotoxicosis (7.1%), IBD (1.43%), Enteritis (1.34%), Ascites (1.25%), Brooder Pneumonia (Aspergillosis) (0.89%), Inclusion Body Hepatitis (IBH) (Litchi Heart) (0.53%) and Fowl Cholera (0.17%). Prevalence of other disease was 2.33% and 9.36% cases were decomposed. Sanhga *et al*., (2019) found Colibacillosis and Salmonellosis as diseases of birds of 0-1 week and Colibacillosis, Salmonellosis, Gout, Enteritis, Caseous nodules in lungs as diseases of birds of 1-2 week. Lists of these diseases in 1st week and 2nd week are similar to our study. Prevalence of disease was higher in summer (32.28%) followed by winter (29.13%), spring (19.78%) and autumn (18.79%). There is significance relationship of occurrence of diseases with season. In Nepal summer season is monsoon or rainy season, so there is high chance of disease outbreak. In the study of Ahmed *et al*., (2009) in Bangladesh, prevalence of poultry disease was significantly highest in summer season (39.85%) followed by winter season (32.80%) which is similar to our study.

Colibacillosis is endemic in Nepal among broiler chickens and its prevalence ranges from 10-60% in Chitwan district

(Subedi *et al*., 2018). Our study reviled highest prevalence of Colibacillosis (43.25%). Prevalence of Colibacillosis was highest in winter (15.28%) followed by summer (10.43%), spring (9.80%) and autumn (7.73%). As in our study, prevalence of colibacillosis was highest during winter (39%) and lowest during autumn (14%) (Gautam *et al*., 2017). Prevalence of Colibacillosis was recorded 25.96% in poultry cases at VTH, AFU, Chitwan, Nepal (Gautam *et al*. 2017). 52.26% prevalence was reported in broiler chicken in Gazipur District, Bangladesh (Ahmed *et al*., 2009). A study found 14.03% of Colibacillosis in commercial chickens at Sylhet Division of Bangladesh (Badruzzaman *et al*., 2015). 24.51% Colibacillosis was reported in the study of mortality in broiler flock in Assam, India (Borah *et al*., 2017). In Jammu, India 12.87% Colibacillosis was recorded in boilers farm (Sanhga *et al*., 2019). Islam *et al*., (2009) reported 17.1% prevalence of Colibacillosis at Gaibandha District in Bangladesh. In South Korea, Tonu *et al*., (2011) recorded 32.6% prevalence of colibacillosis in broiler flock. In most of the study, prevalence of Colibacillosis was highest as in our study.

Prevalence of salmonellosis was 12.85% and occurrence was highest in summer (4.94%) followed by winter (3,68%), spring (2.87%) and autumn (1.34%). In a study, prevalence of salmonella was 12.18% which is almost similar to our study (Badruzzaman *et al*., 2015). During study of various raw meat samples of a local market in Kathmandu, prevalence of salmonella was 11.4% and presence of salmonella in meat was highest in summer season (Maharjan *et al*., 2006). Prevalence of Salmonella in Chitwan was 46.2 % in the study of Bhandari *et al*., (2013), which is higher than our study. This may be due to difference in sample and location of Chitwan district and may be due to categorization of poultry type and age in our study. In a study of poultry raw meat, prevalence of salmonella was 10% (Bhandari *et al*., 2016), which is not very different than our study.

10.61% prevalence of CRD was recorded in our study, in which prevalence was highest in winter (3.50%) followed by spring (2.42%), autumn (1.88%) and summer (0.26%). 6.07% prevalence of CRD was recorded in the study of Gautam *et al*., (2017) at VTH, AFU, Chitwan, Nepal, which is lower than our study. Borah *et al*., (2017) reported 10.93% prevalence of CRD study of mortality in broiler flock in Assam, India, which is very similar to our study. Study of cases and mortality of only broiler flock in both studies might be the reason behind similar prevalence.

Prevalence of mycotoxicosis was 7.10%, where highest cases was recorded in summer (3.23%) followed by spring (1.34%), autumn (1.34%) and winter (1.16%). Gautam *et al*., (2017) reported 16.02% prevalence of mycotoxicosis at VTH, AFU, Chitwan, Nepal. Difference in prevalence might be due to lack of detection and quantitation of the specific toxin(s) in both studies. Ahmed *et al*., (2009) reported 5.53% prevalence, which is slightly lower than our study. Litter management, moisture content and biosecurity measures of farm affect the prevalence of mycotoxicosis in different area.

Prevalence of Gout was 8.90% where maximum cases were recorded in summer (3.41%) and autumn (3.41%) followed by winter (1.43%) and spring (0.62%). Sanhga *et al*., (2019) reported 1.44% occurrence of gout in broilers in Jammu, India, which is very lower than in our study. Poor water management system leading to dehydration and unbalanced protein in feed might be reason of high prevalence of gout in our study. In our study, prevalence of enteritis was 1.34% which is lower than the study of Borah *et al*., (2017) (6.35%) and (Sanhga *et al*., 2019) (4.29%). Prevalence of fowl cholera was 0.17%, poultry which are less than 16 weeks old are relatively resistant to fowl cholera (Christensen *et al*., 2008), this might be the reason behind low prevalence of fowl cholera in our study. Prevalence of IBD (1.43%), Litchi Heart (0.53%), Aspergillosis (0.89%) and Ascites (1.25%) are lower in our study, this may be due to selection of broiler flock of age group 1-14 days in our study.

Table 2: Overall prevalence and seasonal variation of diseases in broilers age group 1-14 days at Chitwan District during the period from June 2016 to June 2018

Causes	Diseases: Cases	Spring	Summer	Autumn	Winter	Total	Prevalence %
Bacterial	Colibacillosis	109	116	86	170	481	43.25%
	Salmonellosis	32	55	15	41	143	12.85%
	Enteritis	1	8	3	3	15	1.34%
	Fowl Cholera	0	1	1	0	2	0.17%
Mycoplasma	CRD	27	3	21	39	118	10.61%
Viral	IBD	5	3	3	5	16	1.43%
	IBH	0	1	1	4	6	0.53%
Fungal	Mycotoxicosis	15	36	15	13	79	7.10%
	Aspergillosis	1	2	1	6	10	0.89%
Metabolic	Gout	7	38	38	16	99	8.90%
	Ascites	2	3	3	6	14	1.25%
Other		10	7	1	8	26	2.33%
Decomposed Body		10	57	23	13	103	9.36%
Total		**220 (19.78%)**	**359 (32.28%)**	**209 (18.79%)**	**324 (29.13%)**		**1112**

Mortality

The average flock size was found to be 913.51 (ranges from 30 to 10000 chicks). The overall chicks' mortality was 2.14 percent (ranges 0% to 60%). The Pearson correlation between flock size and mortality was found to be 0.82 which was highly significant ($p<0.01$). The mortality varies significantly ($p<0.01$) with change in seasons. High broiler flock size up to 10,000 were found in our study indicating that commercialization of broiler farming has been started in Nepal (Gupta *et al*., 2016). All farms were in open housed deep litter system. Close house system is still not practice in Nepal in commercial broiler farming. All farmers used commercial pellet for feeding. Early chicks' mortality is combination of one or more factors and is associated with bio-security, management, nutrition, disease and heat stress (Chou *et al*., 2004). A poor-quality chick is another factor to cause early chicks' mortality. Hygiene status of hatcheries in Chitwan was poor indicating less effective bio-security and management (Bhattarai, 2017). Overall mortality of chicks (1-14days) in our study was 2.14%, while in the study of Badruzzaman *et al*. (2015) in Bangladesh, mortality of commercial chicken of 0-8 age group was 12.18%. In another study, conducted by Janwari *et al*. (2019) in Kashmir, India, mortality of broilers of age group 0-7 days and 8-14 days was 25.59%, 21.06% respectively.

Conclusion

According to our study most prevalent disease in broilers age group 1-14 days at Chitwan district, Nepal include Colibacillosis, Salmonellosis, CRD, Gout and Mycotoxicosis. The findings depict that the second week (7-14) days of chicks is the most sensitive period. Highest disease prevalence of disease was recorded in summer season. The result of our study provides an overall scenario of prevalence and mortality rate in broilers age group 1-14 days at Chitwan district, Nepal. Disease management during second week followed by first week can decrease prevalence of disease and mortality of chicks and increase the efficiency of farm. The findings may assist students, researchers or stakeholders to design, regulate and implement different research on specific disease and to make preventive strategies against those diseases.

Author's Contribution

D. Subedi and M. Kandel designed the research plan; D. Subedi, M. Kandel, and P.L. Mahato performed the experimental works, collected & analysed the required data. D. Subedi and M. Kandel prepared the manuscript, all authors critically revised, finalized, and approved the manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

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References

Ahmed MS, Sarker A & Rahman MM (2009) Prevalence of infectious diseases of broiler chickens in Gazipur district. *Bangladesh Journal of Veterinary Medicine* **7**(2): 326-331. DOI: 10.3329/bjvm.v7i2.5999

B Borah MK, Islam R, Sarma M, Mahanta JD & Kalita N (2017) Prevalence and seasonal variation of certain microbial diseases in Kamrup and Kamrup (Metro) Districts of Assam. *International Journal of Chemical Studies* **5**(3):724-726.

Badruzzaman ATM, Noor M, Mamun MAL, Husna A, Islam KM, Alam KJ & Rahman MM (2015) Prevalence of diseases in commercial chickens at Sylhet Division of Bangladesh. *Int Clin Pathol J* **1**(5): 00023. DOI: 10.15406/icpjl.2015.01.00023

Bahadur DL, Prasad DI, Kumar YS, Md A & Zohorul IM (2016) Prevalence and antibiotic resistance profile of Salmonella from livestock and poultry raw meat, Nepal. *International Journal of Molecular Veterinary Research* **6**(1): 1-22. DOI: 10.5376/ijmvr.2016.06.0001

Bhandari N, Nepali DB & Paudyal S (2013) Assessment of bacterial load in broiler chicken meat from the retail meat shops in Chitwan, Nepal. *International Journal of Infection and Microbiology* **2**(3):99-104. DOI: http://dx.doi.org/10.3126/ijim.v2i3.8671

Bhattarai RK (2017) Hatchery Hygiene Mapping Based on Microbial Load Assessment in Chitwan, Nepal. *Journal of Agriculture and Forestry University* **1**:161-169.

CBS (2016). Nepal Commercial Poultry Survey 2015. Central Bureau of Statistics (CBS).

Chou CC, Jiang DD & Hung YP (2004) Risk factors for cumulative mortality in broiler chicken flocks in the first week of life in Taiwan. *British poultry science* **45**(5):573-7. DOI: 10.1080/000716604000006248

Christensen JP, Bojesen AM & Bisgaard M (2008) Fowl cholera. *Poultry Diseases* **6**: 149-154. DOI: 10.1016/B978-0-7020-2862-5.50015-5

Gautam G, Devkota B, & Thapaliya S (2017) Recent case flow pattern in veterinary teaching Hospital of Agriculture and Forestry University, Chitwan, Nepal. *Journal of Agriculture and Forestry University* **1:** 119-28.

Gupta V, Bhandari BD & Gautam TK (2016) *Choice of Income Generating Activities by Nepalese Farmers* (No. 1376-2016-109605). http://purl.umn.edu/230131

Islam A, Trisha AA, Das M & Amin MR (2009) Retrospective study of some poultry diseases at Gaibandha district in Bangladesh. *Bangladesh Journal of Veterinary Medicine* ***7***(1): 239-247. DOI: 10.3329/bjvm.v7i1.5067

Janwari AQ, Mir MS, Mariam A, Amin U, Kamil SA, Shafi M, Khan HM & Khan AA (2019) Mortality pattern of broiler chicken reared in Kashmir: Effect of season and age. *Journal of Pharmacognosy and Phytochemistry* **8**(1): 686-692.

Karki S, Lupiani B, Budk CM, Karki N, Rushton J, & Ivanek R (2015) Cost-benefit analysis of avian influenza control in Nepal. *Revue Scientifique et Technique* 813-827. No. 26022015-00053-EN

Maharjan M., Joshi V, Joshi DD & Manandhar P (2006) Prevalence of Salmonella species in various raw meat samples of a local market in Kathmandu. *Annals of the New York Academy of Sciences* **1081**(1): 249-256. DOI: 10.1196/annals.1373.031

Sanhga N, Sood S, Taku AK, Nashiruddullah N, Rahman S, Shikha D, Sharma S & Sharma S (2019) An Investigation on the Occurrence of Pathological Conditions Affecting Broilers in Jammu. *Int. J. Curr. Microbiol. App. Sci* **8**(8): 2351-2357. DOI: 10.20546/ijcmas.2019.808.272

Sharma A & Tripathi P (2015) Seasonal prevalence of poultry diseases and their interaction with IBD and mycotoxicosis in Chitwan, Nepal. *The Research Gate*.1-9.

Subedi D & Kaphle K (2019) Highly Pathogenic Avian Influenza in Nepal. *International Journal of Graduate Research and Review* **5**(3): 194-203.

Subedi M, Luitel H, Devkota B, Bhattarai RK, Phuyal S, Panthi P, Shrestha A & Chaudhary DK (2018) Antibiotic resistance pattern and virulence genes content in avian pathogenic Escherichia coli (APEC) from broiler chickens in Chitwan, Nepal. *BMC veterinary research* **14**(1): 113. DOI: 10.1186/s12917-018-1442-z

Tonu NS, Sufian MA, Sarker S, Kamal MM, Rahman MH. & Hossain MM (2011) Pathological study on colibacillosis in chickens and detection of Escherichia coli by PCR. *Bangladesh Journal of Veterinary Medicine* **9**(1): 17-25. DOI: 10.3329/bjvm.v9i1.11205

Yassin H, Velthuis AG, Boerjan M & Van Reil J (2009) Field study on broilers' first-week mortality. *Poultry science* **88**(4): 798-804. DOI: 10.3382/ps.2008-00292

Yunus AW, Nasir MK, Aziz T & Böhm J (2009) Prevalence of poultry diseases in district Chakwal and their interaction with mycotoxicosis: 2. Effects of season and feed. *J. Anim. Plant Sci* **19**: 1-5.