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Sero-Prevalence and Risk Factors for Infectious Bursal Disease in Local Chicken of Backyard Production System in Selected Districts of Ilubabor Zone, South Western Ethiopia

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Abstract

Gumboro is commonly reported from different parts of Ethiopia. However, in local chicken flocks of Ilubabor, there is no known sero-status of the disease. To address this information gap, a cross-sectional study was conducted in local backyard chicken flocks of three districts of Ilubabor Zone where chick mortality and morbidity were a big problem. The objectives of the study were to estimate seroprevalence of IBDV by using Indirect Enzyme Linked-Immune Sorbent Assay and to assess its risk factors. A total of 480 chickens were sampled from randomly clustered 160 flocks and serum samples were processed at Bedelle Regional Veterinary Laboratory Center. Out of 480 serum samples tested, 207 were positive and the overall chicken level seroprevalence of the IBDV antibody in the study area was found to be 43.13% (95% CI: 38.69-47.56) and flock-level seroprevalence was 45.63%(73/160) (95% CI: 37.91-53.34) with almost all test positive flock chickens were seropositive. Multivariable analysis at chicken level showed that the odds of IBDV seroprevalence was significantly high in Metu and Bilo Nopa districts, in purchased chickens, in female chickens, in adult chickens and at flock level in chickens mixed with exotic breeds, in flocks having greater than 5 chickens. This study shows that IBDV is circulating in chicken population of Ilubabor at a high prevalence level. Therefore, further study on serotypes and strains of IBDV identification should be carried out to design suitable control and prevention measures.

Keywords: Cross-sectional • Ethiopia • Backyard chickens • IBD • Risk factors • Seroprevalence

Introduction

Livestock production offers concerning forty seven percent of the agricultural gross domestic product and eighteen percent of the national gross domestic product of Federal Democratic Republic of Ethiopia. Chicken production is an important and essential part of most Ethiopian households in rural, urban, and peri-urban areas. Poultry will play a key role in financial condition reduction and food security. Chickens have a brief production cycle and may be reared flexibly and easily during a form of production systems, creating them an honest candidate to retort to the present inadequacy in animal-sourced super-molecule. Also, as chicken farming is often done by ladies and youngsters, this will play a key role in unit labor productivity and gender authorization. Considering this, the Ethiopian Ministry of Agriculture has recognized chicken production as a key sector to upset food security problems. The intention is to lift the number of meat and eggs created annually by increasing the amount of poultry farms and introduction of improved breeds [1].

The backyard chicken production system that accounts for ninety six percent of Ethiopia's fifty million chicken populations is extremely poor, as scavenging chickens live along side individuals and different species of farm animal. In backyard chicken production system no ways that of dominant the movement and dropping of chickens, since chickens freely rove within the unit compound. Isolation of sick chickens from the flocks and dead chickens disposal has not been practiced. Around 40-60% of the chicks hatched die at the amount of 1st eight weeks of life principally because of diseases and predation. Also, Alamargot according a deathrate of 20-50% in indigenous chickens due to disease. Throughout some periods of epidemics, mortalities as high as eightieth are recorded. Since village backyard chickens habitually exposed to overwhelming numbers of microorganisms, infectious bursal disease virus is one amongst the diseases that cause chick mortality. Infectious diseases like Newcastle disease and Infectious bursal disease are reported to be the key health and production constraints of chickens [2].

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The infectious bursal disease is also known as Gumboro disease is acute, highly contagious, and immunosuppressive viral disease affecting mostly young chicks. The causal virus belongs to the genus Avibirnavirus of the family Birnaviridae. Two serotypes of the virus are identified. Sero sort one virus is infective to chickens. Sero sort two virus is nonpathogenic to chickens however has been isolated from each chickens and Turkes. It constrains poultry industries worldwide. It causes appreciable economic losses ensuing from mortality and immunological disorder that ends up in vaccine failures against different infectious diseases. Additionally, the immunological disorder will increase the status of chickens to different infectious diseases. Maternal antibodies to IBD in susceptible chickens act chicks up to twenty one days [3].

Huge losses are a results of opportunist infections encountered by poultry farmers and particularly crisis in developing countries like Ethiopia. IBD is extremely communicable disease of young chickens (< seventeen weeks of age) during which the tissues of the system, and particularly the bursa of Fabricius, are targeted leading to immunological disorder and status to different infections, such as E. coli, Salmonella, Mycoplasma, coccidia, Marek's disease and others. The disease is unfold through contaminated feed and water. In chickens, severe acute disease, typically in three to six week-old birds, is related to high mortality, however less acute or subclinical infections are common earlier in life.

In Ethiopia IBD incidence was according in 2002 for 1st the time at a personal business poultry farm with a death rate of 45-50% and therefore the incidence of recent strains of IBD became a challenge to the juvenile poultry business in Ethiopia. The primary study on the incidence of IBD in Ethiopian village poultry was in 2 areas within the Amhara region that had received "improved" chicks from an advertisement farm and it has been advised that this was the explanation for the introduction of the disease to village poultry [4].

The seroprevalence of IBD in backyard chickens was studied in numerous components of Ethiopia. Among these: thirty-nine in East Shoa Zone Oromia, 38.4% in 2 districts of Amhara region, Northwest Ethiopia; 76.64% in Waliso, Ambo, and Welmera, 29.4% in Bahir dar, 83.1% in selected sites of Ethiopia, 72.7% prevalence in Gondor, 45.05% around Mekele town North Ethiopia, 51.56% in and around Bahir Dar North West Ethiopia, 84.2% in North Shoa Zone of Oromia and Amhara region 20.7% and 51.7% In Jigjiga and Harrar, East Ethiopia.

Statement of the problem

Due to happening reports of chickens disease mortality and morbidity from the Iluababora zone in 2015 and 2016, a form survey was wiped out 2017 by Bedelle Regional Veterinary Laboratory Center to assess chickens' disease and issues. Chick mortality and morbidity were the foremost outstanding issues and IBD was one amongst the diseases assessed throughout the form survey. However, there was no study on seroprevalence and associated risk factors of infectious bursal in native grounds chickens production during this zone. Therefore, this study was required to be a remedy to chick mortality and morbidity within the study areas with the subsequent objectives [5].

Objectives

- To estimate seroprevalence of IBDV among native chickens in backyard production systems of Hurumu, Metu and Bilo Nopa districts of Ilubabor Zone.
- To assess risk factors for the incidence of IBDV in local chickens of backyard chickens production systems of Hurumu, Metu and Bilo Nopa districts of Ilubabor Zone.

Materials and Methods

Description of study area

This study was conducted in three districts (Hurumu, Metu, and Bilo Nopa) of Ilubabor Zone of Oromia Regional State, Ethiopia. Ilubabor Zone is located in the South-Western part of Ethiopia, 600kms away from Addis Ababa.

Hurumu district is located at a latitude of 08º21´42″ to 08º31´17″ North and 35º05´18″ to 35º 68´30″ East. It comprises 48,395 cattle, 20,938 shoats, 4686 equine, 50,559 local chickens, and 13,834 exotic SASO T-44 and Bovans Brown chicken breeds. There were 6 small scale poultry farm micro-enterprises and 2 private small scale poultry farms in Hurumu district.

Metu district is located at longitude 035°.32' to 040°.29' East and latitude 08°.28' to 010°.54' North of the equator. The livestock population of the Mettu district comprises of 146,635 cattle, 93,012 shoats, 24,372 equines, 134, 132 local and 57,260 exotic SASO T44 and Bovans Brown chicken breeds. There were 17 small scale poultry farm micro-enterprises and 8 private small scale poultry farms in Metu district [6].

Bilo Nopa district is located at latitude of the area ranges from 07° 05.33' to 08°45.33' to North while the longitude of the area ranges from 033°47.57' to 036°52.33' East. This district comprises livestock population of 17,289 cattle, 12,614 shoats, 850 equines, 24,550 local chickens, and 7,440 exotic SASO T-44 and Bovans Brown chicken breeds. There were 7 small scale poultry farm micro-enterprises and 3 private small scale poultry farms in Bilo Nopa district (Figure 1).

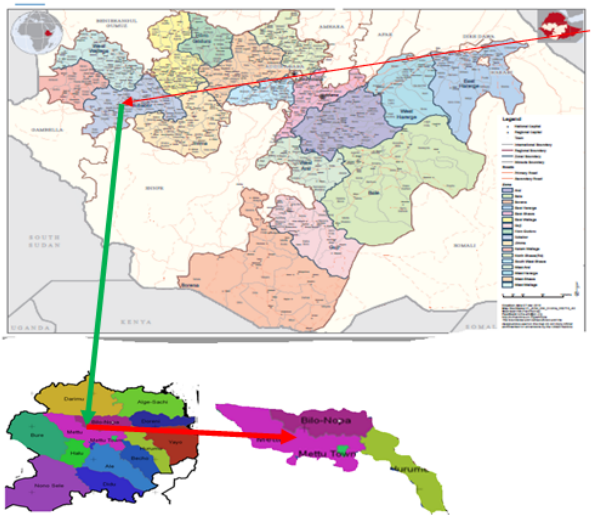

Figure 1: Map of study areas.

Study population and their management

The study was conducted in local chickens raised under the backyard production system of three districts. Most of them were scavenging chickens living together with people and other species of livestock. The chicken movement was unlimited and free-roaming in the household compound. There was no practice of isolating sick chickens from the flocks. The total population of chickens from 160 households were 822 including none sampled chicks less than 3 weeks and the average flock size was 5.14(822/160) chickens per household, while 6.23(467/75), 4.49(206/46), and 3.82(149/39) average flock density in Metu, Bilo Nopa, and Hurumu districts respectively.

The breeds of chickens in study areas were Horo local breed and exotic SASO T-44 and Bovans Brown breeds. More than half of households bought exotic chicken breeds and they scavenge with local breeds with grain commonly maize supplement. Most farmers buy exotic chickens from multiplication centers through the livestock sector while few of them buy from small-scale poultry farm micro-enterprises and open market. Exotic breeds had been believed as they were vaccinated against IBD before distribution to farmers thus that was why samples were only collected from the local chicken breed. Chickens were categorized by age young (< 17 weeks) and adult ≥ 17 weeks) based on the clinical characteristics of IBD disease (WADDL, 2014). Chickens flock were categorized based on chickens numbers greater than five (> 5) and less than or equal to five (≤ 5) which was based on the average number of chickens per flock (5.14) per household in the study area [7].

Study design

The study was cross-sectional from March 2020 to August 2020. Data to assess risk factors related to IBDV were collected using a questionnaire survey and serum sample collection format. In all study kebeles selected poultry owners were interviewed face to face during blood sample collection.

Variables included in the survey were, study area, age (young, adult), sex, cleaning activity of the housing area (regular or daily, irregular or not fixed), flocks mixed wixed with exotic chicken breed (yes, no), number of chickens per flock, source of chickens (home breed, purchased) and flocks housing system (separated house, roost in family dwelling or kitchen) were emphasized as risk factors.

Sample size determination and sampling technique

The sample size was determined according to for cluster random sampling using an expected animal level prevalence of 50% and a desired absolute precision of 5% with 95% CI, since there was no previously expected prevalence in the study area.

Accordingly, 480 local backyard chickens were sampled. First districts were purposively selected based on chicken disease outbreak reports and a questionnaire survey done on backyard chickens mortality and morbidity in 2017. Metu, Bilo Nopa and Hurumu districts have 29, 15 and 14 kebeles respectively. Based on the chicken's population and number of kebele lists from each district; 5 kebeles from Metu district, 3 kebeles from Hurumu, and 3 kebeles from Bilo Nopa districts were randomly selected by lottery method. At the 2nd stage household of each kebele was randomly selected. Finally, except chicks below 3 weeks, all chickens were sampled.

Sample collection and transportation

Blood samples were collected aseptically from the wing vein victimization 3ml disposable syringes. The syringe was placed in an exceedingly slope position for long at temperature to empty sera samples. The separated humor was transferred into a sterile cryovials tube, labeled, and transported to Bedelle Regional Veterinary Laboratory Center underneath cold chain for laboratory analysis. The sera were keep at -20°c till the check is performed. Indirect enzyme-linked-immunosorbent serologic assay was wont to discover IBD virus antibodies employing a commercially ready IBDV enzyme-linked-immunosorbent serologic assay check kit. Individual-level connected risk factors: sex, age, and supply of chickens were collected victimization humor assortment format.

Serological test and laboratory analysis

ID. vet innovative diagnostic indirect enzyme-linked-immunosorbent serologic assay kit (Louis Pasteure-Grabels, France) was wont to discover the presence of anti-IBD antibodies within the chicken humor following the kit manufacturers' suggested protocol. The check sera were pre-diluted by dilution buffer fourteen in an exceedingly pre-dilution plate in keeping with the established protocol or kit directions, and every was distributed into the requested range of small wells. Within the enzyme-linked-immunosorbent serologic assay plate pre-diluted samples and dilution buffer fourteen were another and incubated for 30min ± 3min at 21°C. When incubation, the sera were discarded from the plates, and every well was washed three times by 300µl of laundry answer.

Concerning anti-chicken immunoglobulins oxidase conjugate was distributed into the wells and also the plates were incubated for 30min ± 3min at 21°C. When incubation, once more the sera were discarded from the plates, and every well was washed three times by 300µl of laundry answer. Concerning substrate solutions were distributed into every check well and once more incubated for fifteen min ± 2min at 21○C within the dark place. when a final incubation, the substrate chemical compound reaction was stopped by adding concerning stop answer and also the color reactions were quantified by measure the optical density of every well at 450 nm to ascertain the validity of IBD enzyme-linked-immunosorbent serologic assay result, validity check was done. In valid IBD enzyme-linked-immunosorbent serologic assay result, the mean Optical Density (OD) price of positive management humor is bigger than zero.250, and also the quantitative relation of the mean of the positive and negative management (ODPC and ODNC) is bigger than three. For the interpretation of the result, humor sample positive (SP) management quantitative relation was needed. Consequently, the sample positive quantitative relation was calculated as follows. If S/P price was > zero.3, the IBD protein standing was thought of to be positive however however zero. 3 were taken as negative.

S/P%=OD sample–ODNC/ ODPC–ODNC

Data management and analysis

All data obtained from the field was recorded in the record sheet format and later entered into Microsoft Excel worksheet and Binary Logistic Regression for flock level data and multilevel mixed-effect model (Generalized Leaner Model logit) for chicken level data statistics was used to summarize data by using Stata software version 13. The overall prevalence was calculated by dividing positive samples by the total number of examined samples and multiplied by a hundred. Seroprevalence was categorized into the chicken level (sex, age, source, study area) and flock level (study areas, cleaning activity, presence of exotic breed within flock, number of chickens per flock and housing system of chicken).

Multivariate logistic regression analysis was used to examine the relationship between the outcome variable (seroprevalence) and the different explanatory variables controlling the possible effect of confounders. The Odds Ratio was used to assess the association between the dependent and independent variables. P-value of less than 0.05 ($P < 0.05$) was set for the significance of statistical associations.

Results

Overall seroprevalence of IBDV antibody

Among the 480 chickens serum samples tested for IBD Vantibodies to know chicken level IBD infection, 207 samples were positive for IBDV antibody with an overall seroprevalence of 43.13%(95%CI: 38.69, 47.56) in study areas.

3.2. District and Village level Chicken Seroprevalence of IBDV Antibody

The highest chicken level seroprevalence of IBDV was observed in the Metu district (117/226, 51.77%) followed by the Bilo Nopa district (53/147, 36.05%) and Hurumu district (37/107, 34.58%). The seroprevalence of IBDV was higher in purchased chickens (64.50%) than home breed chickens (32.60%), in females (48%) than males (31.20%), and in adults (53.70%) than in young chickens (31.10%) as illustrated in (Table 1).

Risk factors	Category	No. tested	Positive	P (95% CI)
Districts	Metu	226	117	51.77(45.26-58.28)
	Bilo Nopa	147	53	36.05(28.3-44.38)
	Hurumu	107	37	34.58(25.65-44.39)
Sex	Female	339	163	48(42.76-53.40)
	Male	141	44	31.20(23.67-39.55)
Age	Adult	255	137	53.70(47.61-59.85)
	Young	225	70	31.10(25.06-37.16)
Chicken source	Purchased	158	102	64.50(56.56-71.99)
	Home breed	322	105	32.60(27.49-37.73)

Table 1: Chicken level seroprevalence of IBDV antibody (district, age, sex and source).

Flock level seroprevalence of IBDV antibody

Out of 160 flocks tested for IBDV, 73 flocks were found positive for IBDV antibody and flock level seroprevalence of IBDV was 45.63% (95%CI: 37.91, 53.34%). On average 3 serum samples (480/160=3) were collected per flock and 2.8 chickens per flock (207/73=2.8) were positive for the IBDV antibody which indicated almost all test positive flock chickens were seropositive. The highest flock level seroprevalence of IBDV was observed in Metu district (38/75, 50.66%), followed by Bilo Nopa district (20/46, 43.48%) and Hurumu district (15/39, 38.46%). The seroprevalence of IBDV was higher in flock mixed with exotic chickens (66%) than those not mixed (20%), in flocks greater than five (> 5) 60% than in flocks less than or equal to five (≤ 5) 31%, in an irregularly cleaned house of flocks 49% than a regularly cleaned house of flocks 38% and roost in family dwelling 46% than separated housing 44% chickens as illustrated in (Table 2).

Risk factors	Category	No. tested	Positive	P (95% CI)
Districts	Metu	75	38	50.66(38.86-62.42)
	Bilo Nopa	46	20	43.48(30.21-57.75)
	Hurumu	39	15	38.46(23.36-55.38)
Number of chickens	> 5	82	49	60(48.34-70.44)
	≤ 5	78	24	31(20.81-42.24)
Presence of exotic chicken breed	Yes	89	59	66(55.49-75.97)
	No	71	14	20(11.22-30.86)
Cleaning activity	Irregular	110	54	49(39.43-58.80)
	Regular	50	19	38(24.65-52.83)
Chickens housing	Roost in family dwelling	110	51	46(37.33-55.65)
	Separated house	50	22	44(29.99-58.75)

Table 2. Flock level seroprevalence of IBDV antibody.

Chicken level risk factors associated with IBD

In multivariate logistic regression analysis, sources of chicken (P=0.000), study area (Metu P=0.000, Bilo Nopa P=0.023), sex (P=0.001) and age (P=0.017) were independent predictors of IBD infection. The odds of IBD seroprevalence was more likely higher in females than males, in adult than young, in purchased than home

breed, in Metu and Bilo Nopa districts as compared to Hurumu district (Table 3).

Risk factors	Category	No. tested	Seropositive (%)	Multivariate	
Study area				AOR (95% CI)	P-value
	Metu district	226	117(51.77)	2.52(1.58-4.02)	0
	Bilo Nopa	107	40(37.4)	1.81(1.08-3.05)	0.023
	Hurumu	147	50(34)	RF	
Chicken source	Purchased	158	102(64.50)	3.58(2.60-4.93)	0
	Home breed	322	105(32.60)	RF	
Sex	Female	339	163(48)	2.25(1.38-3.67)	0.001
	Male	141	44(31.20)	RF	
Age	Adult	255	137(53.7)	1.95(1.13- 3.36)	0.017
	Young	225	70(31.10)	RF	

AOR=Adjusted Odds Ratio, CI=Confidence Interval, RF=Reference Factor

Table 3. Chicken level risk factors analyzed by multivariate logistic regression.

Flock level risk factors associated with IBD

In multivariate logistic regression analysis, the presence of exotic breed within the flock (P=0.000), the number of chickens per flock (P=0.004) were independent predictors of IBD infection. The odds of IBD seroprevalence were more likely higher in flock mixed with exotic chicken than flocks did not mix with exotic breeds and in larger flock size (greater than five chicken) than smaller flock size as shown in (Table 4).

Risk factors	Category	No.tested	Seropositive (%)	Multivariate	
Presence of exotic	Yes	89	59	5.02(2.24-11.27)	0
chicken breed	No	71	14	RF	
Number of chickens	> 5	82	49	3.17(1.43-6.90)	0.004
	≤ 5	78	24	RF	

AOR=Adjusted Odds Ratio, CI=Confidence Interval, RF=Reference Factor

Table 4. Flock level risk factors analyzed by multivariate logistic regression.

Discussion

There has been increasing interest to estimate the prevalence of IBD in local backyard chickens production system since 40-60% of the chicks hatched die during the first 8 weeks of life mainly due to disease and predation. The current finding has a role in the reduction of chicken mortality and morbidity ensuring improved chicken production and productivity by generating real-time epidemiological information to the poultry sector.

The overall seroprevalence of IBDV in the local chickens of backyard production system in the present study was 43.13% (CI: 38.69, 47.56). The overall seroprevalence of IBDV in this study is in line with the study done in India 46.2% by, 45% in Taiwan, and around Mekelle town, Northern Ethiopia 45.05% by. In contrast, the overall seroprevalence of IBDV in local chickens of backyard production system in this study was higher than the reports of 33.9%in Cameroon, 30.7% in Sudan, 30% in Bostwana, 39.2% in East Shoa zone, Oromia region Ethiopia, 38.4% in two districts of Amhara region, Northwest Ethiopia, 29.4% in two districts of Amhara region Ethiopia, 7.26% in Nigeria at Zuria, 20.7% in Eastern Shewa Zone Oromia region Ethiopia and 33.4% in Nigeria.

However, the current prevalence is lower than the previous studies reported elsewhere (with the prevalence of 76.64%, 83.1%, 73.5%, 63.5%, 82.2%, 51.56%, 84.2%, 51.7%, respectively in different parts of Ethiopia in backyard chickens production system. Also in other African countries, the overall seroprevalence of IBD in the backyard chickens production system in this study was lower than who reported an overall prevalence of 55% from Zimbabwe and 60% from Nigeria respectively. The current seroprevalence difference with different studies done before in different parts of Ethiopia may be due to less distribution of exotic chicken breeds among backyard chickens than in comparison to other zones, a test kit we used was with 100% sensitivity and specificity, study areas far (600km) away from the central part of Ethiopia where chicken intensification more practiced that in agreement with Zeleke et al. who investigated IBDV was introduced and disseminated into Ethiopia through exotic chicken breeds, the lower human population in comparison to other study areas, there have been lower chicken product demand consumption and lower purchase of live chickens in the open market which was one of the risk factors responsible for the spread of IBDV.

The odds of IBDV seroprevalence was 2.52 (95% CI: 1.58-4.04, P=0.000) and 1.81 (95% CI: 1.08-3.05, P=0.023) times higher more likely in chickens in Metu and Bilo Nopa districts respectively in compare to Hurumu district. This finding was in agreement with the findings of that showed a significant association of IBDV seroprevalence between different study areas. In contrast, studies conducted by Nigussie, 2007 and Kassa and Molla, 2012 reported that no variation was found in the seroprevalence of infectious bursal disease in different study areas. The higher seroprevalence of IBDV in Metu and Bilo Nopa districts as compare to Hurumu district in the present study could be due to larger average flock density per household, larger exotic chicken breeds distributed to farmers, and larger small scale poultry farm enterprises in Metu and Bilo Nopa in compare to Hurumu that agree with previous reports of Farooq et al., who showed overcrowding increase transmission of disease and previous reports of Zeleke et al. who showed introduction and

dissemination of IBDV in Ethiopia through exotic chicken breed importation and distribution to farmers.

The seroprevalence of IBDV was higher in purchased chickens (64.50%) than home breed chickens (32.60%). The odds of IBDV seroprevalence was 3.58 (95% CI: 2.60-4.93, P=0.000) times higher more likely in chickens purchased than those breed at the home. This result was in agreement with that showed the purchase of live poultry from an open market is the main risk factor for IBDV dissemination. In the current study, the higher seroprevalence in purchased chickens than home breed could be due to contacts of hundreds of chickens at local open-air markets from different farmers, villages, towns, kebeles, districts, and zones especially during ceremony which were then taken back to different localities that certainly facilitate spread of IBDV among backyard chickens.

The seroprevalence of IBDV was higher in females (48%) than males (31.20%). The odds of IBD seroprevalence were 2.25 (95% CI: 1.34-3.67, P=0.001) times higher more likely in females than males. This finding is in agreement with a report from Zegeye et al., 2015 who reported 54.18% of females and 27.82% of males. The significant association observed between sex and IBD infection might be because sexual maturity in females corresponds with a reduction in T lymphocyte numbers leading to suppression of cellular immunity so the reproductive demands placed on females may raise pathogen load of frequently encountered infections showed that there was no significant association of sero-prevalence between sexes.

The seroprevalence of IBDV was higher in adults (53.70%) than in young chickens (31.10%). The odds of IBDVseroprevalence was 1.95 (95% CI: 1.13-3.36, P=0.017) times higher more likely in adult chickens than young chickens which are similar to studies of Zegeye et al.,2015; Kebede et al., 2017 and Wahome et al., 2017 that reported an increased seroprevalence of IBD infection as the age of chickens increase. Contrary to this finding reported by Lemma et al., seroprevalence of IBD was not significantly associated with age. The production of backyard chickens of different age groups together might make the infection within a given flock increase exposure as suggested. The significant association of IBD infection with age in the current study might be because adult chickens need enough time and space for scavenging in their surroundings and ingest more contaminated feeds by microorganisms while, chicks below six weeks of age confined in the house

In this study flocks those mixed with exotic chickens and those had not were compared and a higher seroprevalence of (66%) with flock mixed with exotic chickens than those not mixed (20%) with exotic chickens. The odds of IBDV seroprevalence were 5.02 (95% CI: 2.24-11.27, P=0.000) times more likely in flocks mixed with exotic chicken breeds compared to those that do not mixed. The current study agrees with Zeleke et al. who investigated IBDV was introduced and disseminated in Ethiopia via exotic chicken breeds. According to the report of this author Ethiopia had been known to be free from Infectious Bursal Disease until its first occurrence in 2002. It also in agreement with Mazengia et al., who suggested that the first study on the incidence of IBD in Ethiopian village poultry was due to distribution of “improved” chicks from a commercial farm to farmers. The significant variation of IBDV seroprevalence noted between flocks mixed with exotic chicken breeds and none mixed backyard flocks could be related to the dissemination of IBD virus through the distribution of improved breed of chickens from infected poultry breeding and multiplication centers to the backyard village chickens.

Flock size had significant effect on the seroprevalence of IBD in the study area when multivariable logistic regression analysis was carried out. The highest prevalence of IBD antibody was recorded in flocks with chickens number greater than five (> 5) 60% than in flocks with chickens number less than or equal to five (≤ 5) 31%. The odds of IBDV seroprevalence were 3.17 (95% CI: 1.43-6.90, P=0.004) times higher more likely in larger flocks size than that of smaller flock size less than or equal to 5. This result was in agreement with Jarso, who reported higher odds of IBD infection in larger flock size than smaller flock size. In the current study, the higher seroprevalence in larger flock size could be due to no supplementary feed in backyard chicken under backyard chicken production systems and there is higher feed competition in larger flocks as a result chickens need to scavenge for a longer time for survival and routinely exposed to IBD virus.

Conclusion

This study was the first study to be conducted to estimate the seroprevalence and assess associated risk factors of IBD infection in backyard chickens in three districts of Iluababora Zone. The current study indicates that the seroprevalence of IBDV is high and the IBD virus was found circulating in study sites which may cause economic losses in the livestock sector through indirect losses, morbidity, and mortality of chickens and impair the livelihood of larger poor farmers. Furthermore, the present study demonstrated that the seroprevalence of infectious bursal disease virus in local chickens of backyard production system was influenced by study area, source of chicken, sex, age, presence of exotic breeds within the flock, and number of chickens per flock. The seroprevalence of IBDV in the local chickens of backyard production system might be due to field exposure of chickens to the disease and indicated the importance of the further study on the serotype and strains of IBDV that are circulating in the study sites to design appropriate control and prevention measures.

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