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Research Article | SOJ Veterinary Sciences | Open Access

Seroprevalence of Infectious Bursal Disease in Backyard Chickens of Six Districts of North Shewa Zones of Oromia and Amhara Regions, Ethiopia

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Received: 27 February, 2017; Accepted: 07 April, 2017; Published: 17 April, 2017

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Abstract

A cross-sectional study and questionnaire survey was carried from November 2009 up to April 2010 in North Shewa zone of Oromia and Amhara regions to determine prevalence of Infectious Bursal Disease (IBD) in unvaccinated backyard chickens using commercial ELISA kit. The study revealed that IBD was prevalent 84.2% (95% CI= 80.6 - 87.8, n=399) in the study areas. Seroprevalence distribution of IBD were 96.2% (95% CI= 93.5-99.0) and 73.8% (95% CI= 67.9-79.8) in Amhara and Oromia regions, respectively. Chickens in the Amhara region were nine times susceptible for IBD than Chickens of Oromia region. There is no significant difference among sex and age groups of study animals. The study revealed that IBD were common in district of Kewet 98.6% (95% CI= 95.7-101.4), Basena Werena 95.1% (95% CI= 88.4-101.8), Debre Brehan 94.7 %(95% CI= 89.5-99.8), W\ Jarso 78.0% (95% CI= 69.4-86.6), Dagam 71.2% (95% CI= 58.7-83.6) and Kuyu 70.4% (95% CI= 59.7-81.1). It indicates that IBD virus is extensively circulating throughout the study areas. Questionnaire survey revealed that backyard poultry production was suffered from multifaceted diseases which contributed 61% death losses of the chickens at age of a day old to market age. Generally, IBD prevalence among the indigenous chicken was escalated with a possible devastated effect on the vulnerable population of backyard poultry. Therefore, it warrants the vaccine development and implementation for control mechanisms.

Keywords: IBD; ELISA; Seroprevalence; Chicken; Oromia; Amhara

Abbreviations

AGID: Agar Gel Immuno Diffusion; CEF: Confluent Chickens Embryo Fibroblast; CPF: Cytopathic Effect; ELISA: Enzyme Linked Immuno Sorbent Assay; IBD: Infectious Bursal Disease; IBDv: IBD virus; MDA: Maternal Derivative Antibody; NAHDIC: National Animal Health Diagnostic and Investigation Center; OD: Optical Density; OIE: Office of International des Epizootic; OR: Odds Ratio; RNA: Ribo Nucleic Acid; SAN: Specific Antibody Negative; SP: Sample to positive; SPF: Specific Pathogen Free; VN: Virus Neutralization; VvIBD: Very virulent IBDv; µl: Micro liter; AGID: Agar Gel Immuno Diffusion; CEF: Confluent Chickens Embryo Fibroblast; CPF: Cytopathic Effect; ELISA: Enzyme Linked Immuno Sorbent Assay; IBD: Infectious Bursal Disease; IBDv: IBD virus; MDA: Maternal Derivative Antibody; NAHDIC: National Animal Health Diagnostic and Investigation Center; OD: Optical Density; OIE: Office of International des Epizootic; OR: Odds Ratio; RNA: Ribo Nucleic Acid; SAN: Specific Antibody Negative; SP: Sample to positive; SPF: Specific Pathogen Free; VN: Virus Neutralization; VvIBD: Very virulent IBDv; µl: Micro liter.

Introduction

Poultry production in many countries is becoming increasingly organized, specialized and integrated in to an industry of major national and often international importance [1]. A study by Permin and Bisgard (1999) has indicated that Poultry production has undergone rapid changes during the past decades due to the introduction of modern intensive production methods, new breeds and improved biosecurity and preventive health measures [2]. Moreover, the management methods place high demands on proper health, hygiene, and require only small but very skilled labor force. In developing countries poultry production is considerably important. Almost all families in developing countries keep small chicken flocks of 5 to 20 adult chickens. The majority of these animals are kept in free range scavenging systems, where the birds scavenge around the house during day time. Primitive housing of the birds during the night often takes place. Supplementary feed consists mainly of house hold wastes, insects, larvae and seeds.

Traditional poultry production system in Ethiopia out weighted with rapid growing small and large scale chicken farms owing to increase urbanization and increase demands for animal protein [3]. According to Yami and Dessie, rural poultry production contributed to 98.5 and 99.2% of the national egg and poultry meat production respectively, with an annual output of 72,300 metric tons of meat and 78,000 metric tons of egg. It has an important role in supplying villagers with additional income and quality protein [4,5].

Poultry contribute the major source of livelihood in bringing some socioeconomic gapes by supplying food and income

generation [6]. According to Megersa et al. (2010) the traditional poultry dish "Doro Wot" is considered as delicious and legendary food among most Ethiopians with swift increase of large scale poultry farming for this reason there is importation of exotic birds including day old chickens [7]. Accompanying intensification of poultry farming and importation of temperate breeds, which are less adapted to heat stress and disease challenge in the country result in occurrence of newly introduce disease epidemics, or endemic disease such as Gumboro diseases is unavailable fact. A large scale occurrence of infectious Bursal Diseases in the central parts of Ethiopia with intensive and high – density Juvenile farms has been reported for the first time in April 2002 at Debre Zeit, in privately owned commercial poultry farm, in which 45-50% mortality rate was documented [8].

Similarly, W/mariam and Abebe (2007), also reported that, out breaks had occurred at government owned poultry multiplication and distribution center of Andsa in January 2006, It also reported in Gubrie and Sodo poultry farms of Southern Ethiopia Between February and April 2006 [9,10]. Consequently, the disease resulted in Massive death losses and depopulation of the all flocks. Since then, the disease is rapidly spreading from large scale farms to traditionally manage local Birds which are native and vulnerable populations. As a result seroprevalence reports from indigenous birds were increasing progressively [11-13].

Diseases can cause severe losses to production efficiency [14]. Economically IBDV had a severe effect on UK Poultry flocks in 1989/90 and it has caused problems in the developing countries such as Nigeria to which it was in advertently exported, for many years. Because of the nature of the virus and its affinity for replicating in dividing pre- B lymphocytes in the bursa of fabricius, leading to acquired B- lymphocyte deficiency. If the diseases newly introduced to the flock, morbidity approaches 100% and mortality may be up to 90% [15,16].

Infectious Bursal Disease occurs in clinical and sub clinical forms, with most flocks experiencing either an early sub-clinical infection before 3 weeks of age or a mild sub-clinical to severe clinical disease from 3 to 6 weeks of age. The clinical and sub-clinical forms of disease result in great economic loss. On the other hand, the sub-clinical forms of the disease in chicks from day old to 21 days of age, impairs the immune response and renders the chicks susceptible to various infections the effects of late infection from three to ten or more weeks of age result in the clinical disease and survived bird develop and body against the virus [17,18]. Recorded higher death losses in age group above 32 days compared to less than 23 days. IBDV is an RNA virus belonging to *Birnaviridae family*, It is mainly characterized by swollen and hyperemic bursa of fabricious during acute stage (3 and 4 days post infection) and then severe atrophy of the organ, and cause severe immunosuppression by destroying B lymphocyte cells, which leads to an increased susceptibility to other pathogens and reduce the growth rate of surviving animals [8,19].

There is no treatment that recovered and vaccinated birds can carry and shed virus for long periods. Depopulation and rigorous disinfection of contaminated farms have achieved limited success, because of the stability of the virus and its ability to spread readily with infected birds and contaminated fomities, strict quarantine measure and movement should be used live vaccines of chick embryo or cell –culture origin and of varying virulence can be administered by eye drop, drinking water, or sub-cuties (sc) routes at 1 to 21 days of age [20,21].

In Ethiopia, commercial poultry farm now become a lucrative business and a number of people are establishing small and large-scale farms particularly around the urban settings. The investment policy of the country is encouraging and contributing to the development of this sector. Moreover, the government runs poultry breeding and distribution centers targeting the rural society. This practices, introduction and distribution of exotic birds, have coincidence of introduction and dissemination of new diseases for which know how and control measures did not exist before. For a country with poor quarantine systems, concurrent with introduction of exotic breeds as well as new diseases of various natures are the major constraints of poultry production .As a result, such new diseases is widely spreading throughout the country without being noticed and control measures in place with possible devastating effect on indigenous birds. Therefore the objective of this serological survey was to estimate the prevalence of Infections Bursal Disease in selected central parts of Ethiopia and to provide data which might enable an assessment of the possible economic impact of Gumboro diseases [8].

For a country with poor quarantine systems, concurrent with introduction of exotic breeds as well as new diseases of various natures are the major constraints of poultry production. As a result, such new disease as IBD is widely spreading throughout the country without being noticed and poor control measures in place causing threat to indigenous birds. Therefore, this serological survey was intended to determine the seroprevalence status of Infectious Bursal Disease in indigenous chickens of different geographical origins.

Material and Method

Study Area

The study was conducted in 6 districts of North Shewa zones of Amara and Oromia regions representing where poultry developments program is intensively implemented through distribution of day old chicks. This includes Debre Brehan Zuria, Basenawerena, kewet districts (Amara regins), Wara Jarso, Degem, and Kuyyu districts (Oromia regions).

Debre Brehan

It is situated at 130 km from Addis Ababa to North of Ethiopia with altitude of 2750 m a.s.l. the total coverage of the area is 20,625 hectare. The area has humid subtropical weather "Weynadega" High land temperature climate "dega" 1% and 99% respectively with an annual rainfall of 971.36 mm. The mean annual temperature is100c, Soil types of the area that mostly used for cultivation and flora are red, brown black and their % is 19.1, 78.4 and 2.6 respectively. Most livelihoods depend on mixed

farming which is livestock production and cultivation of lands [22].

Basona Werena

It is located at 130km from Addis Ababa to North of Ethiopia. The area has an altitude of 1500-3400 m a.s.l. With climate of "dega" highlands 50% and mid sub tropical 48% and extreme highland "Wurch" 2% the mean annual temperature and rainfall ranges between 100c to 220c and 814 mm to 1800 mm respectively. The major types soil in the area supporting the crops and the flora of the area include Black 10%, Brown 20% and red 20%, the agricultural activities are mainly mixed type with cattle raring and crop production under taken side to side [23].

Kewet

The district is located at 225 km from Addis Ababa. the area has humid 220km sub-tropical weather "weynadega", high land "dega" and low land "Kola" accounting to 23%, 21% and 53% respectively. The mean annual temperature and rain fall ranges between 10 – 350c and 900 mm respectively the altitude of the area is 1200 – m a.s.l. The major types of soil in the area supporting the crops and the flora of the area are 55% Black, 15% red, 22% Brown and others 8% soil. The agricultural activities are mainly mixed type with cattle range and crop production under taken side by side [24].

Kuyu

Kuyu is one of districts in North Shewa zone of Oromia region. The area has humid sub-tropical weather "weynadega" highland "dega" and low land "Kola" with 51%, 34% and 15% respectively. The mean annual temperature and rainfall ranges between 15 0c - 200c and 1600 mm – 1500mm respectively. The area is situated at 153km to North of Addis Ababa. The altitude of area ranges from 1140 – 2730m a.s.l. and the total coverage of the area is 97400 hectar. The major types of soil in the area supporting the crops and the flora of the area are 55% Black, 20% Red, 20% Brown, and 5% others. With mainly mixed type of agricultural activities with rearing of cattle and crop production takes place side by side [25].

Wara Jarso

Wara Jarso is also found in Oromia region. The area has amid sub-tropical weather "weynadega" high land "dega" and "Kola" lowland 43%, 7.13% and 49.5% of the climate respectively. The mean annual temperature and rainfall ranges between 250c to 300c and 100 mm to 1400mm the area is situated 198 km worth of Addis Ababa. The altitude of the area ranges from 2450m a.s.l. The major types of soil in the area supporting the crops and the flora of the area are 60% red, 20% Black, grey 8% and others 12%. The agricultural activities are mainly mixed type with cattle rearing and crop production under taken side by side [26].

Degem

It is one of districts of Oromia region. The area has a mid sub tropical weather "weynadega", high land temperature and low land "Kola" 38%, 30% and 32% of the climate respectively. The mean annual temperature and rainfall ranges between 15 – 220c and 900 mm to 1400 mm. The area is situated at 123km worth of Addis Ababa. The altitude of the area ranges from 1500 -3541m a.s.l. The major types of soil in the area supporting the crops and the flora of the area are 45% red, 10% black, 35% Brown and others 10% soil, the agricultural activities are mainly mixed type with cattle rearing and crop production under taken side by side [27].

Study Design and Study Animals

Cross-sectional study after selection of study units was conducted and questionnaire survey also administered to selected households. Poultry of both sexes that are above 2 weeks of age are randomly selected and their blood sample and clocal and tracheal swabs and some tissues were collected from each randomly selected chicken. The samples were used for serology and viral culture.

Sampling Method and Sample Size Determination

The 6 districts from North Shewa zones of Amhara and Oromia regions were selected purposely as they are included in the poultry development program. From each districts, households were selected randomly, based on their participation on indigenous day old chicken rearing activity. From each districts 17.18% of the flocks were selected randomly for sampling. An attempt was made to obtain appropriate number of sampling units for questionnaire and optimum sample size for seroprevalence of IBD in the study sites. The sample size was estimated using formula for infinite population and considering 50 percent expected prevalence [28].

$$\frac{n = 1.96^2 x\ 0.5\ x\ 0.5}{(0.05)^2}$$

n = 384 birds sampled for back yard production system a total of 402 birds were sampled from 6 districts of North Shewa. However, three samples lost during the laboratory analysis.

Sample Collection

Questionnaire was conducted on different aspects of the backyard poultry production system and its constraints, types of housing, purpose of production, major diseases of poultry in the area, way of controlling and vaccination history. The households also told that the cause of mortalities were disease 100%, predator 67.3%, accident 10.2%, and associated risk factors including housing system, feeding system and hygienic condition of their environment. Serum collected by plucking few feathers from the ventral surface of the humeral region of the wing and wiping the site with cotton damped with alcohol. About 1.5 – 3ml of blood samples were collected from brachial veins using 3g and 21 inch needle and syringes. The blood was allowed to clot over night (24 hrs) in the syringe and then separating the serum to storage vials. Also cloacal swab, tracheal swabs and tissue were collected and using vials and universal bottle, respectively and transported by icebox to NAHDIC Sebeta.

Serological test

Samples were tested using a commercial ELISA kit (ProFLOK® PLUS, IBD Coated ELISA, Symbiotic Corporation, San Diego, USA) at National Animal Health Diagnosis and Investigation Center (NAHDIC), Sebeta Ethiopia. This commercial ELISA kit specially detects IBD antibody and demonstrates excellent correlation with the virus neutralization (VN) test. All conditions were standardized according to the kit manufacturer and conditions described for poultry disease monitoring using ELISA. Briefly samples were exposed to IBD antigen coated well on micro titer plates. The absorbance value (optical density) of each well was read by micro-titer plate photometer at 405nm within 15 minutes after addition of stop solution. Row absorbance data was transferred to a personal computer for further calculation and analysis.

ELISA test validation and Interpretation

After reading of the ELISA results, the test validity was checked for each plate based on two criteria set by the kit manufacturer; the mean optical density (OD) of the positive controls and normal controls on each plate. The test is considered valid of when the mean OD_{405} of the positive control value range between 0.250 and 0.900 and when the mean OD_{405} of the normal (negative) control serum is less than 0.250. The sample to positive (SP) ratio of each test serum was calculated as:

$$SP = \frac{\text{Sample OD}_{405} - \text{Mean OD}_{405}\text{Normal control}}{\text{Mean OD}_{405}\text{Positive control} - \text{Mean OD}_{405}\text{Normal control}}$$

Hence, SP value ≤ 0.299 is Negative while SP value > 0.299 is considered Positive

Antibody titers of test samples were calculated according to Snyder and Marquardt (1989) by applying a linear equation (LOG_{10} TITER = (1.172* LOG_{10} SP) +3.614) generated by the kit manufacturer to define the relationship between LOG10 SP of a single serum dilution and the LOG10 of observed antibody titers. Hence, geometric mean titer calculation was according to Villegas and Purchase (1989) as LOG_{10} titer = (1.172* LOG_{10} SP) +3.614. So, Titer = $10^{\log 10\ \text{titer}}$ or (AntiLOG_{10}).

Data management and Analysis

Data on serum samples results were collected and recorded on Microsoft Excel spread sheet. Prevalence was calculated using Stata version 9 SE (STATA Corp. College station TX) and the results were tabulated. The association of risk factors such as sex and geographical origin of the birds were assessed by logistic regression and P-values < 0.05 was considered significant. The degree of significant association was illustrated using odd ratio. The ELISA test validation was checked for each plate based on two criteria set by the kit manufacturer for the mean optical density (OD) of the positive controls and normal controls. The test is considered valid of if the average OD405 of the positive control value range between 0.250 and 0.900 and the average OD405 of the normal (negative) control serum is less than 0.250.

Results

Questionnaire Survey

Flock size and management

The size of flock per households ranges from 3 to 22 chickens. This variation is reported to be due to loss of birds by disease, predators, and accidents. The flocks have constraints of shortage of medicine, lack of feed, low awareness and insufficient supply of improved breed. As a result, most of the breeds are endogenous /local breeds/. Most of the farmer's utilize share with family housing system with poor hygienic condition. Such stressful conditions expose birds to different disease, and possibly contribute to transmission of disease from birds to human or vice versa. This also can expose the birds to predators, mechanical damage cannibalism, uncomfortable resting etc.

Majority of the farmers (owners) allow them flocks to scavenge rather than supplemented feeds. This is due to low awareness among the society that they consider poultry production as side business and not supplement. However, few of the former follow supplemented feeding system which includes protein, carbohydrate, vitamin minerals etc. According to this survey most farmers utilize source for replacement, parent stock flocks from home breeds. They are considered as resistant to the weather condition and diseases due to maternal derivative antibodies.

Health Care and Constraints

Majority of the farmers do not give attention to health care of their birds, only few of them utilize veterinary extension service, and voluntary to vaccinate against some diseases, but vaccine of Gumboro is still not practiced in backyards of both North Shewa areas. According to the opinion from different owners, chicken death occurs in all age groups, but most of the deity occurs when they reach between 2 weeks to 6 weeks of age. High death losses occur during major wet season (April to September). Disease of chicken that have been frequently mentioned in all districts were *"fungle"* in local name and the symptoms mentioned by the farmer were wing and leg paralysis, yellowish/ greenish diarrhea, vent picking, hyperemic bursae, swelling of bursae, tremor, torticols, swelling of head and faces, Respiratory Problems (Figure 2). Farmers practice were giving dead chicks to carnivores and throwing indiscriminately to the surrounding areas which facilitate dissemination of the disease. To the contrary there were also farmers who burry and burns dead chicks. Majority of the farmers prefer to treat their chicken traditionally instead of using veterinary extension service. Traditional treatments include Herbal treatments "Tenadam", Holly water "Tebel", local "Areke", puncturing brachial vein or wing vein bleeding. They also practice conventional treatment by buying drugs from pharmacies.

It appears that 25% of the hatched chickens are died as result of diseases and accidental cases while the result 75% may reach the market age.

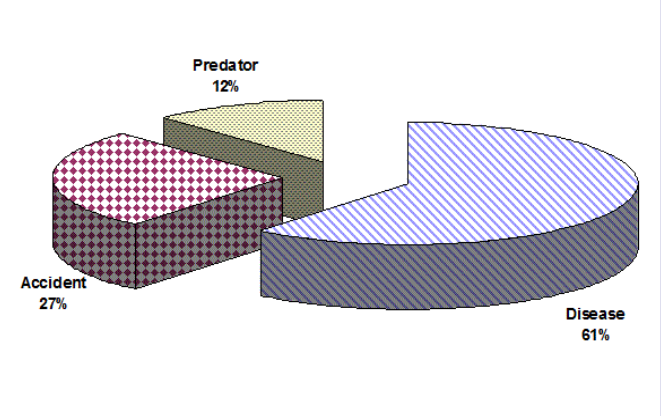

Figure 1: Proportion of causes of deaths in chicken during the period between day one and market age

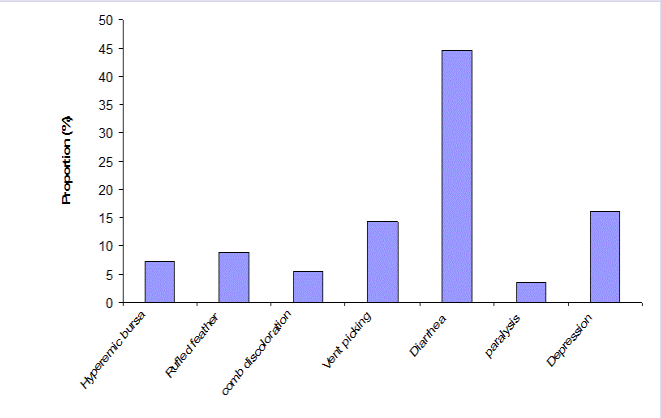

Figure 2: Proportions of clinically manifested symptoms in sick chickens

Table 1 displays the levels of different management factors with respect to mortality rates. There were few apparent differences between different levels of management factors, but none of them showed significant difference. Most of the diseases have been reported to be due to diseases (61%) while accidental deaths and attack by predators also accounted for the rest death proportions (Figure 1).

The socio-economic contributions of chickens

The survey indicated that poultry production under backyard management system is a common practice in North Shewa of Ethiopia. In this system of production, village chickens are raised for egg production, meat consumption, sale income and gifts for relatives. Furthermore, they are used as a source of income especially in rural areas of to fulfill, household needs, such as purchasing, coffee, oil, salt, sugars and other household consumptions. However, most of the formers considered poultry production as a secondary to the other production system as a result of which less attention is given to sub sector.

Serological survey

Seroprevalence distributions of IBD in six studied districts of North Shewa zones of Amara and Oromia regions were displayed by Table 1. The seroprevalence of IBD per studied districts were 94.6% in Debre Berhan, 95.1% in Basena Werena, 71.1% in Degem, 98.5% in Kawat.70.4% in Kuyyu, and, 78% in Wara Jarso. Out of the total sampled birds, 336 (84.2%, 95% CI = 80.6, 87.8, n = 399) were found to be seropositive for IBD virus (Table 2).

Table 1: Average mortality rates of chicken in a period between day old to their market age (6 months) with respect to different management factors.

Management factors	Levels	No of Households	Mortality rate (%)	95% Confidence Interval	
Flock size	≤ 10	18	26.4	11.2	41.6
	> 10	31	25	16.4	33.6
Housing	Cage	7	29.8	5.3	54.2
	separate	21	25.3	12.7	37.9
	family house	21	24.3	13.7	34.8
Feeding	Scavenge	28	29	19.8	38.1
	Scav + supplement	21	20.9	7.7	34
Feed formulation	Yes	19	26.1	15.8	36.4
	No	30	24.5	12.7	36.3
Additional feed	Grain	36	25.2	16.5	34
	protein + vitamin	13	26.2	9.6	42.8
Treatment	Yes	34	25.9	13.3	38.4
	No	15	25.3	15.5	35.1
Medication types	antibiotics	24	27.4	14.9	39.9
	antibiotics + vitamins	25	22	7.9	36.2

From the total tested samples, 107 were from males and 292 were from female chickens with seroprevalence of 81.3% (87/107) and 85.27% (249/292) respectively. Table 3 displays the seroprevalence distribution among male and female birds. There was no significance difference in sero-prevalence of IBD among male and female birds (P > .05). Out of tested 267 were young and 132 were from Adult chickens with sero prevalence of 83.1% (222/267) and 86.4% (114/132) respectively.

Table 2: Seroprevalence distributions of IBD in chicken in six studied districts of North Shewa zones of Amara and Oromia regions.

Zones	Districts	No of samples	IBD Positive	Prevalence (95% CI)
North Shewa of Amara	Basona Werena	41	39	95.1 (88.4 - 101.8)
	Debre Brehan	75	71	94.7 (89.5 - 99.8)
	Kewet	69	68	98.6 (95.7 - 101.4)
	Sub total	185	178	96.2 (93.5 - 99.0)
North Shewa of Oromia	Degem	52	37	71.2 (58.7 - 83.6)
	Kuyu	71	50	70.4 (59.7 - 81.1)
	Wara Jarso	91	71	78.0 (69.4 - 86.6)
	Sub total	214	158	73.8 (67.9 - 79.8)
Total		399	336	84.2 (80.6 - 87.8)

Table 3: Displays seroprevalence of IBD according to sex of investigated chickens.

Sex	No of Samples	IBD Positive	Prevalence (95% CI)
Male	107	87	81.3 (73.9 - 88.8)
Female	292	249	85.3 (81.2 - 89.4)

Table 4 displays the sero-prevalence distribution among Young and Adult ages of chickens. There was no significance difference in sero-prevalence of IBD among young and adult birds (p > 0.05).

The prevalence appears similar among the districts within the same region. However, regional level statistical analysis of the data showed that birds sampled from districts of Amara region had higher seroprevalence than those sampled from districts of Oromia region (OR =0.1, 95% CI = 0.05 - 0.25).

Table 5 displays associations of IBD seroprevalence with potential risk factors. However, statistical analysis of the data should that birds form Kuwat had higher seroprevalence than those the rest. The occurrence of IBD was confirmed on the basis of Clinical signs, and serological tests. Clinical signs of infectious bursal disease were observed in young chicks. These include vent picking, whitish/yellowish diarrhea, depression, inappetence and sudden death.

Table 4: Displays sero prevalence of IBD according to age of investigated chickens.

Age	No of Samples	IBD Positive	Prevalence (95% CI)		
				OR(95% CI)	P-value
Young	267	222	83.1 (78.6-87.7)	1.0	
Adult	132	114	86.4 (80.5-92.3)	1.3(0.7,2.3)	0.408

Table 5: Associations of exposure variables with seropositivity to IBD in investigated chickens.

Variables	Prevalence (95% CI)	OR (95% CI)	P -value
Zones			
North Shewa - Oromia	73.8 (67.9 - 79.8)	1.0	0.000
North Shewa - Amara	96.2 (93.5 - 99.0)	9.0 (3.99-20.35)	-
Districts			
Basona werena	95.1 (88.4 - 101.8)	1.0	-
Debre brehan	94.7 (89.5 - 99.8)	0.9 (0.16 - 5.19)	0.916
Kewet	98.6 (95.7 - 101.4)	3.5 (0.31 - 39.71)	0.314
Degem	71.2 (58.7 - 83.6)	0.1 (0.03 - 0.59)	0.009
Kuyyu	70.4 (59.7 - 81.1)	0.1 (0.03 - 0.55)	0.006
Were jarso	78.0 (69.4 - 86.6)	0.2 (0.04 - 0.82)	0.027
Sex			
Male	81.3 (73.9 - 88.8)	1.0	-
Female	85.3 (81.2 - 89.4)	1.3 (0,74 - 2.39)	0.337
Age			
Young	83.1 (78.6-87.7)	1.0	
Adult	86.4 (80.5-92.3)	1.3(0.7-2.3)	0.408

Discussion

The presence of IBD antibodies in the sera of non vaccinated back yard chicken was an indication of previous exposure of the chicken to natural infection in the field. The current sero prevalence (84.2%) is comparable with findings of 76.5%

by Abrar and 66% by Nigussie from non-vaccinated back yard chickens using ELISA test [11,12] . more importantntly, the current study (84.2%) is in agreement with the finding of Megersa by using ELISA test on three chicken markets of Addis Ababa in unvaccinated local adult chickens [7]. on the other hands, the previous study findings of 39.2% by Tesfaye (2008) from Ethiopia and 49.3% by Ndanyi from Kenya in the non-vaccinated back yard chickens using AGID test is lower than our current study [13,29] .

Results of serological test can vary depending on the sensitivity and specificity of the diagnostic tool applied and other risk factors such as management practice, environmental hygienic conditions, and breed of birds. It is important to notice that ELISA is more sensitive AGID, the test with higher specificity [20]. The ELISA kit applied in this study was shown to be highly sensitive and specific, and it is considered as an ideal serological test in the diagnostic virology all over the world [30].

According to Farooq et al, seroprevalence could vary due to difference in production system, hygienic condition, stocking density and concurrent protozoal and bacterial infection [18].

Our current study of (84.2%) has also slight difference with finding by W\Mariam and Abebe (2007) who reported 98.9%(119/121) and 100%(121/121) by using AGID and ELISA tests, respectively from Andasa chicken multiplication and distribution center, prevalence of IBD varies significantly with geographical origin of chickens, sexes, and age, for instance prevalence was higher in birds from Kewet 98.6%(95.7-101.4), Basona werena 95.1%(88.4-101.8), Debre Brehan 94.7%(89.5-99.8), when compared to Kuyu 70.4%(59.7-81.1), Degem 71.2%(58.7-83.5), and W\Jarso 78.0%(69.4-86.6) areas. This difference could be due to stress factors such as weather condition, management, because stressful condition resulting from different factors can exposed more and any disease attack may be probable [9,18].

Hygienic condition of the environment has a significant effect ($p < 0.05$) on prevalence of IBD. Significantly higher ($p < 0.05$) losses were observed in flocks maintained under poor hygienic conditions (49.9%) than those maintained under fair and good hygienic condition (12.2%) and (40.8%) respectively. The smaller losses in flocks maintained under good hygienic conditions could probably be due to the favorable and healthy environmental condition. However according to our study there is no significance difference, among sexes and age ($p > 0.05$). Since the overall seroprevalence of IBD in these study was 84.2%. The prevalence of IBD variety could be due to risk factors such as housing system, which include cage system (12.2%), separate house (44.8%), and in shared with family (42.8%). Waste disposal system could be risk factor for variety of results. For instance 59.1% of chicken owners dispose dead chicken and waste products by burning or buried it. The rest 40.8% throw it over the ground. Considerably high seroprevalence of IBD was recorded across the investigated geographical origin of the birds. This suggests that IBD is widely distributed throughout the country with swift increase of seroprevalence from the time of its introduction to the country or first report in April 2002; at Debre Zeit in privately owned commercial poultry farm in which 45-50% mortality rate was documented [8]. Similarly outbreak of the disease had occurred at Andasa poultry multiplication and distribution centre, resulted in depopulation of the farms and in Gubrie and Sodo poultry farms between February and April 2006 [9,10]. Consequently, the disease resulted in massive death losses and depopulation of the all flocks. Since then the disease is rapidly spreading from large scale farms to traditionally managed local birds which are naïve and vulnerable populations. As a result, seroprevalence reports from indigenous birds were increasing progressively [11-13].

Infectious Bursal Disease virus causes severe acute disease of 3-6 weeks old birds accompanying with high mortality, where as sub- clinical disease in early age of 0 to 3 weeks old birds causing lymphoid depletion of the bursa and with significant depression of the humeral anti body response [17]. This early sub clinical infection cause severe long lasting immunosupression predisposing to the secondary infections and has synergistic, effect with the prevailing disease burden scavenging poultry. For instance, E-coli infection, Mareks disease, salmonellosis and coccidiosis other opportunistic infection may play role in escalating morbidity and mortality rates. Thus, IBD together with secondary infections causes considerable economic loss through increased morbidity and mortality rates. IBD has been described throughout the world, and the socio economic significance of the disease is considerable worldwide the disease has already caused heavy economic loss to the infant large scale poultry farms in Ethiopia [31]. For instance, IBD has devastated a privately owned commercial poultry farm in which 45-50% mortality rate was documented [8]. Similarly outbreaks of the disease had occurred at Gubre and Andas poultry multiplication and distribution center, and resulted in depopulation of the farms [9]. Therefore, the result of this study warrants an in-depth investigation into epidemiological and economic aspects of the disease so that a feasible control intervention could be developed and implemented.

Conclusion and Recommendations

The present study discussed the most important aspects of unvaccinated local back yard chicken production in North Shewa of both Amhara and Oromia regions. The farmers in both study zones manage chickens under back yard low input system variable flock size. The farmers have been also applying various husbandry practices, management and sanitary practice. However, diseases of various etiologies are seriously affecting the health status and contribution of chicken to the households. The major constraints of poultry production by causing mortality in affected flocks. In the study districts the incidence, mortality and case fatality rates due disease were high. Moreover, various risk factors, which can aggravate the occurrence and transmission of disease, are identified; accordingly, IBD is considered as

a newly appearing disease in many areas of Ethiopia, at present almost all village chickens in Ethiopia are not vaccinated against IBD. Some few village chickens were vaccinated for ND by live attenuated vaccines. However, vaccines are not produced in the country against IBD. Therefore, this study merit the region to pay attention to poultry diseases and to design and implement appropriate disease prevention and or control strategies in the future, so that the sector may remain viable as local chickens constitute the largest segment of poultry production in the country. Moreover, the poultry development schemes might not be, feasible at preventive measures are not instated urgently. The results of this study are inciting and accordingly the following points are strongly recommended:

An in-depth investigation in to epidemiological and economic aspects of the disease could be conducted to the areas of North Shewa of both Amhara and Oromia regions.

A feasible prevention and control intervention could be developed and implemented.

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