



## Clinical and Pathological Investigation on Turkey Diseases in North-Central City of Jos, Nigeria, 2009-2014

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### ABSTRACT

Information on turkey production and disease is rare in Nigeria, possibly because turkeys are seldom raised commercially. Also, turkeys require intensive husbandry and health care after hatching, which backyard poultry producers hardly provided especially, when raised in a disease endemic environment. In an attempt to document the diseases militating against turkey production in Nigeria, clinical and necropsy records were reviewed from veterinary practices in Jos and the Central Diagnostic Laboratory of the National Veterinary Research Institute (NVRI), Vom, Nigeria between 2009 - 2014. A total of 306 turkeys from backyard flocks were presented to the Veterinary clinics between 2009-2014 with various health complaints by backyard flock owners. Viral (Pox and Newcastle disease) and parasitic (Helminthosis, Coccidiosis and Ectoparasitism) diseases were mostly diagnosed. During the same period, 42 samples comprising 25 carcasses and 17 cloacal swabs were submitted for post mortem examination, virus isolation and microbiological test. Colisepticaemia, colibacillosis, pullorum disease, airsacculitis and infectious sinusitis are the main diseases diagnosed at post-mortem examination and microbiological test, while none of the samples were positive for influenza by virus isolation. It was observed that turkey rearing was small-scaled and kept as backyard poultry in North-central Nigeria. It can therefore be concluded from this study that turkeys raised in north-central city of Jos are affected by diseases ranging from viral to bacterial and parasitic, which can adversely affect productivity. This can therefore be improved upon by controlling the diseases mostly affecting turkeys.

**Key words:** Clinicopathologic, Diseases, Nigeria, Turkey

### INTRODUCTION

Nigeria's poultry population is estimated to be 140 million (FAO, 2008), 90% of this poultry is indigenous (local) to Nigeria (Gueye, 1998 and Sonaiya, 1999) that is in the hands of rural and small-scale farmers (Ebangi, 1994). Poultry population in the country is now composed of 84% indigenous and 16% exotic (Adene and Oguntade, 2006 and FAO, 2008). Of this, 52.3 million chickens, 7.6 million guinea fowls, 3.6 million ducks, 0.4 million turkeys and 1.2 million other birds makes up subsistence poultry farming (Adene and Oguntade, 2006 and FAO, 2008).

Up till now in Nigeria there has been no known discriminatory attitude towards the production and consumption of turkeys (Nwagu, 2002), but then they are very scarce to find because they are seldom raised, and mostly as free range turkeys. This was evident by the 60312 turkeys slaughtered in 2006 (Adene and Oguntade, 2006). This is the reason for the paucity of information on turkey production and diseases in Nigeria.

Various diseases have been seen to infect turkeys, this range from viral to bacteria and parasitic. Viral diseases of turkeys recorded in Nigeria were not

limited to Newcastle Disease (ND), Infectious Bursal Disease (IBD) and Avian Pox (AP). Clinical and serological studies of ND in Nigeria have confirmed the particular susceptibility of turkeys (Durojaiye and Adene, 1988, Echeonwu et al., 1993, Gomwalk et al., 1985, Majiyagbe and Nawathe, 1981 and Wakawa et al., 2014) to ND virus manifesting in different organs (Nwanta et al., 2006). The main source of ND virus transmission has been attributed to the movement of live infected village birds (Ibrahim and Abdu, 1992 and Nawathe, 1988). Infectious Bursal Disease has been reported frequently and also the first outbreak of IBD in chickens in Nigeria was reported by Ojo et al. (1973). The virus has been reported to be infectious but not pathogenic in turkeys (Giambrone et al., 1978) and have been isolated from naturally infected turkeys (Lukert et al., 1979). IBD epizootics occurred in the poultry rich southern states of Nigeria with 90-140 outbreaks involving 0.5 million chicks annually (Nawathe and Lamorde, 1982). It has been observed that by their free range and scavenging habits, traditional village poultry are in permanent contact with other flocks, soil and insects which can act as reservoirs

or vectors for a range of bacterial and helminthic diseases (Permin et al., 1997).

An earlier study on the incidence of worms in chicken farms in Nigeria found that the most common species were *Ascaridia galli*, *Prosthogonium spp.*, *Strongyloids avium* and *Heterakis gallinarum* (Tona, 1995). While *Raillietina spp* and *Davainea proglottina* occurred only in free-range chickens. *Tetrameres spp.*, infestation was listed as one of the helminths encountered in local poultry in Nigeria (Fatunmbi and Adene, 1979 and Adene, 2008). Ectoparasites are important for poultry production e.g. ticks, fleas, lice and mites (Abbas et al., 2004) that play an important role in the transmission of certain pathogens which caused heavy economic losses to poultry industry. They cause heavy morbidity by sucking blood and causing irritation to the birds, which adversely affects the economical production of poultry. It is also known that ectoparasites caused weight loss at the rate of about 711 gram per bird and decrease the egg yield to the rate of about 66 eggs per bird in a year (Abbas et al., 2004). Among ectoparasites, fowl mites may cause ruffled feathers, anaemia, emaciation and lowered production (Abbas et al., 2004). In addition, they are also known to transmit certain parasitic (leucocytozoonosis, aegyptianellosis), bacterial (pasteurellosis, borreliosis and fowl cholera) and viral diseases (avian encephalomyelitis).

In Zaria, Nigeria (Ajala et al., 2007), diseases of turkeys were surveyed by questionnaire administration to 50 respondents; the analysis showed that ectoparasitism and fowl pox infections were predominant. Endoparasitism was found in a semi intensive flock of local poultry in Katsina State, Nigeria that caused mortality of 40% in chicken and 57% in turkeys, approaching ND and avian influenza in mortality (Kamani et al., 2010). Infection due to *Tetrameres fessispina* in local poultry population in Taraba State (north-central Nigeria), causing high mortality during the time avian influenza outbreaks were initially confirmed and rampant in both local and commercial poultry flocks in Nigeria (Kamani et al., 2008). No data is available on the production and diseases of turkey in the study area (north-central Nigerian state), this paper seeks to document the diseases affecting turkey production in north-central Nigeria from clinical and pathological stand point and to communicate the overall findings so as to reduce the impact of these diseases on turkey production.

## MATERIALS AND METHODS

### Collaborating institutions and study area

Nigeria, a West African country lies within the latitude 4°–14°N and longitude 2°–15°E and has a land area cover of 923763 km<sup>2</sup>. Nigeria is composed of 36 states (Figure. 1) spread across 6 geographical regions (Akanbi and Taiwo, 2014) with Abuja designated as the Federal Capital Territory. Nigeria has a human population of about 170 million by recent population density estimate from the national bureau of statistics with highly dense cities in the south (Figure 1a). Although, the poultry population has lowered to 140

million (Figure 1b) composed of 60% backyard and 40% commercial (Adene, 2008) (Figure 1c). Subsistence poultry production is further broken down by poultry species (Figure 1d).

To investigate the diseases affecting turkey production in Nigeria, clinical and necropsy records between 2009 and 2014 from the Veterinary Clinic of the Federal College of Animal Production and Health Technology (FCAP&HT) Vom, Plateau State, Veterinary Hospital Jos, Plateau State, Unity Veterinary Clinic Jos, Plateau State, Tropical Veterinary Clinic, Jos, Plateau State and the Central Diagnostic Laboratory of the National Veterinary Research Institute, Vom, Plateau State, Nigeria were reviewed. Briefing on the research objective was made and the guideline on the compilation on turkey diseases for the period under review was proposed to the private veterinary practitioners. Although, no data was provided from the FAO poultry sector country review from which the histogram in Figure 2a was generated on turkey production in plateau state (Figure 2b). This study revealed that mainly, local black indigenous turkey breeds were mostly raised by farmers (Figure 2c), of which 306 live turkeys including white breeds (Figure 2d) raised from subsistence backyard flocks were presented to the veterinary clinics between 2009-2014 for various health complain by backyard flock owners from two local government areas (Jos north and Jos south; Figure 2 b) within the states.

### Postmortem examination and microbiological tests

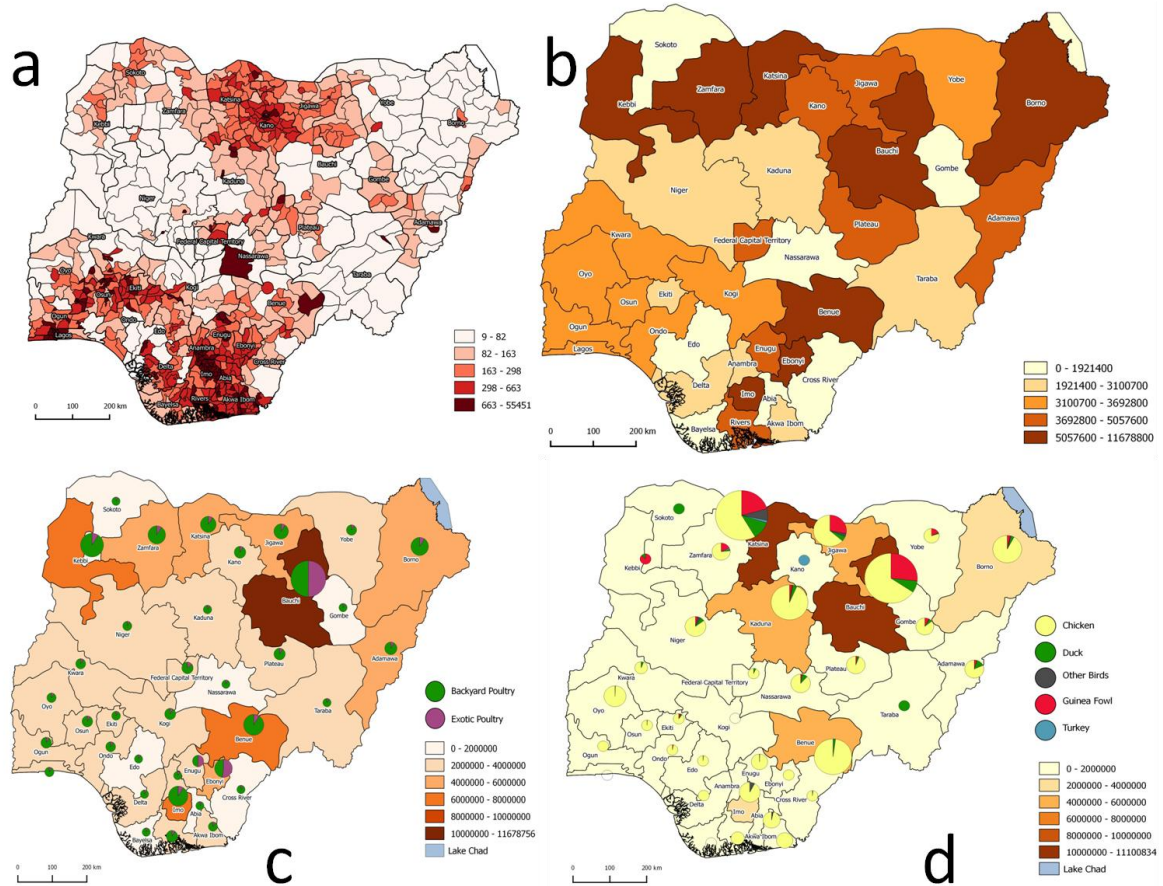
During the period under review, 25 turkeys that died in different flocks were submitted for postmortem examination at the Central Diagnostic Laboratory, National Veterinary Research Institute, Vom, Nigeria. Sera from live turkeys sent for virus isolation (AI/ND screening) was run as previously described by Meseko et al. (2010). The sera were analyzed by Agar Gel Immuno Diffusion test (AGID) and tested by haemagglutination inhibition with standard monoclonal antisera to H5 and 1% chicken RBC as indicator (Office for International Epizootics (OIE) reference laboratory for avian influenza and ND, Padova Italy). Antigen and antisera were also sourced from OIE Reference laboratory for avian influenza and ND, Padova, Italy. For bacteria isolation, postmortem samples of liver, spleen and heart were cultured aerobically and anerobically at 37°C on blood agar and mcConkey agar using standard procedure as previously described (Kumbish et al., 2006). While parasitic conditions were diagnosed by physical identification and microscopic examination.

### Analysis

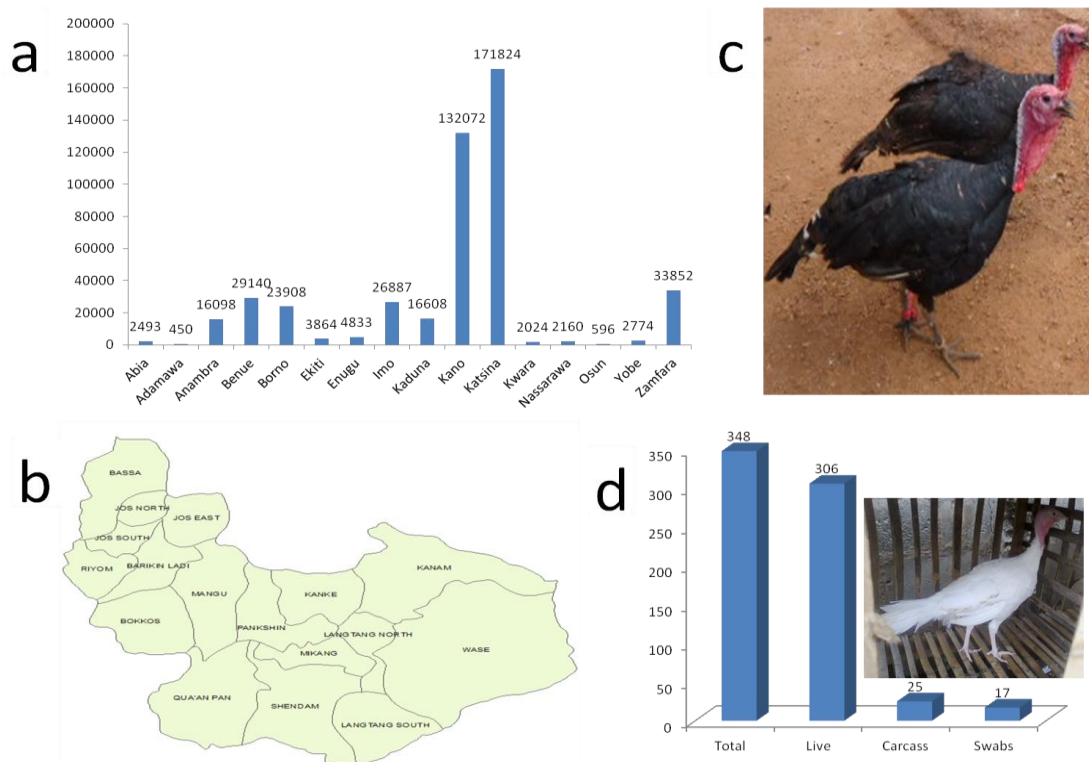
The feedback was analyzed in Microsoft Excel spreadsheet® 2011 (Microsoft Inc., Seattle- WA, USA) to generate the histograms and percentages at 95% confidence intervals calculated using MedCalc (SAS Institute Inc., Cary-NC, USA). All the spatial data were added to a Geographical Information System (GIS) using Environmental Systems Research Institute (ESRI) ArcGIS 10.3 (ESRI®, California, USA) and Quantum

GIS (QGIS) 2.8.2 Desktop (OSGeo, Oregon, USA) to generate the maps used. The spatial data was visualized

using QGIS.



**Figure 1. a:** Human Population Density map; **b:** Poultry Population Density map **c:** Geographical Distribution of Poultry in Nigeria; **d:** Geographical distribution of subsistence poultry map in Nigeria (Adene and Oguntade, 2006 and FAO, 2008).



**Figure 2. a:** Poultry distribution in Nigeria; **b:** spatial map of North-Central City of Jos, Nigeria; **c:** indigenous black turkey breeds mostly raised by farmers; **d:** Samples submitted to veterinary clinics, diagnostic laboratory and inset of white turkey

## RESULTS

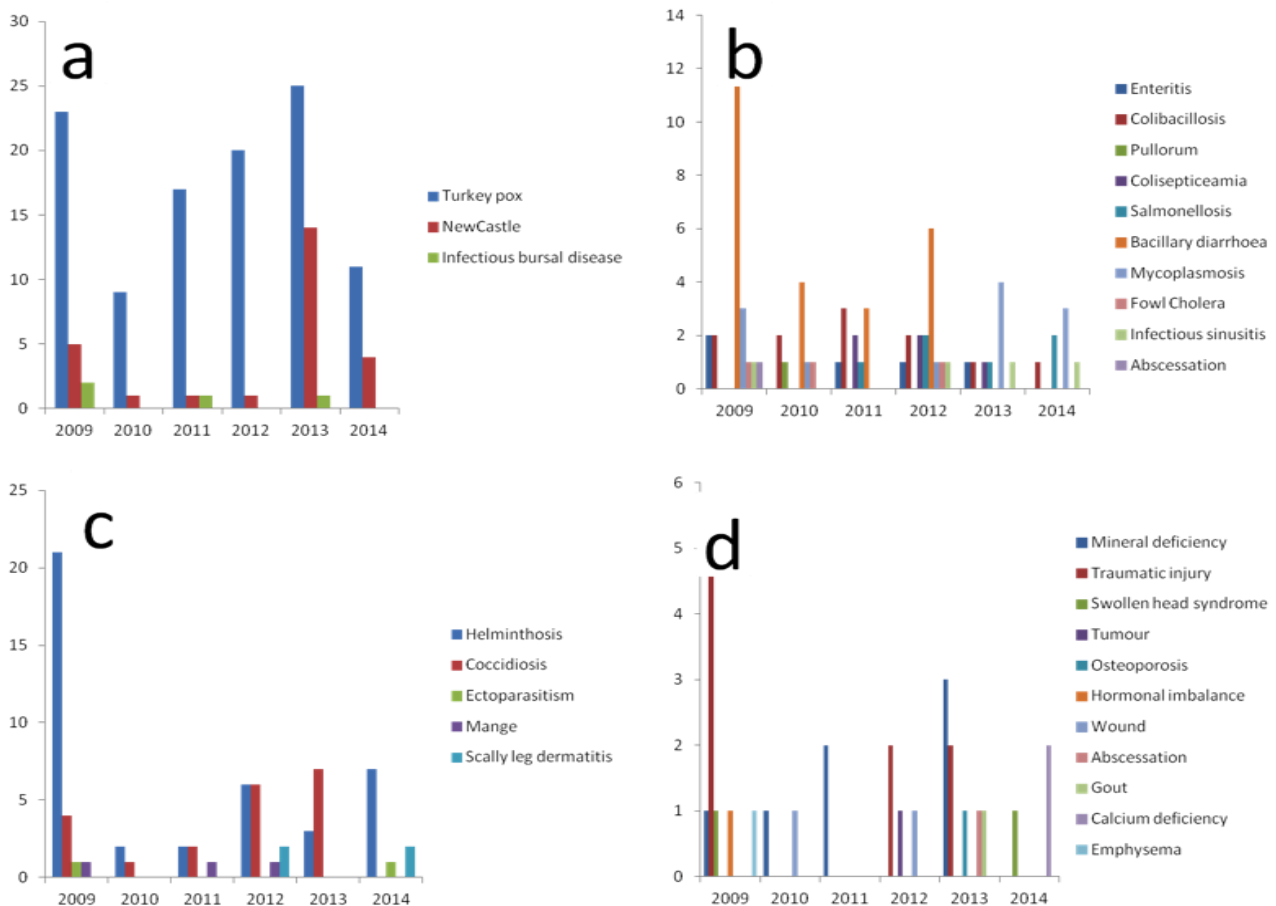
Viral diseases frequently diagnosed by virus isolation in 9-11 days embryonated eggs included avian pox and ND (Figure 3a); bacterial diseases diagnosed by bacteria isolation on media were bacillary white diarrhea, pullorum and mycoplasmosis (Figure 3b). While parasitic conditions diagnosed by physical identification and microscopic examination were helminthosis, coccidiosis and ectoparasitism (Figure 3c). Other disease conditions diagnosed by clinical examination and biochemical tests are depicted (Figure 3d).

From the 42 samples comprising of 25 carcasses and 17 cloacal swabs submitted for post mortem examination and virus isolation (Influenza screening) respectively (Figure 2d), colisepticaemia, colibacillosis, pullorum disease, airsacculitis, infectious sinusitis were the main diseases diagnosed at post-mortem examination (Table 1) and bacterial isolation on blood agar, McConkey agar, selenite F and mycoplasma agar gross lesions included excess of abdominal fat deposit, fibrinous polyserositis, granulomatous splenitis, traumatic oesophagitis, fibrinous pancreatitis with fat necrosis and haemorrhage (Figure 4a-e).

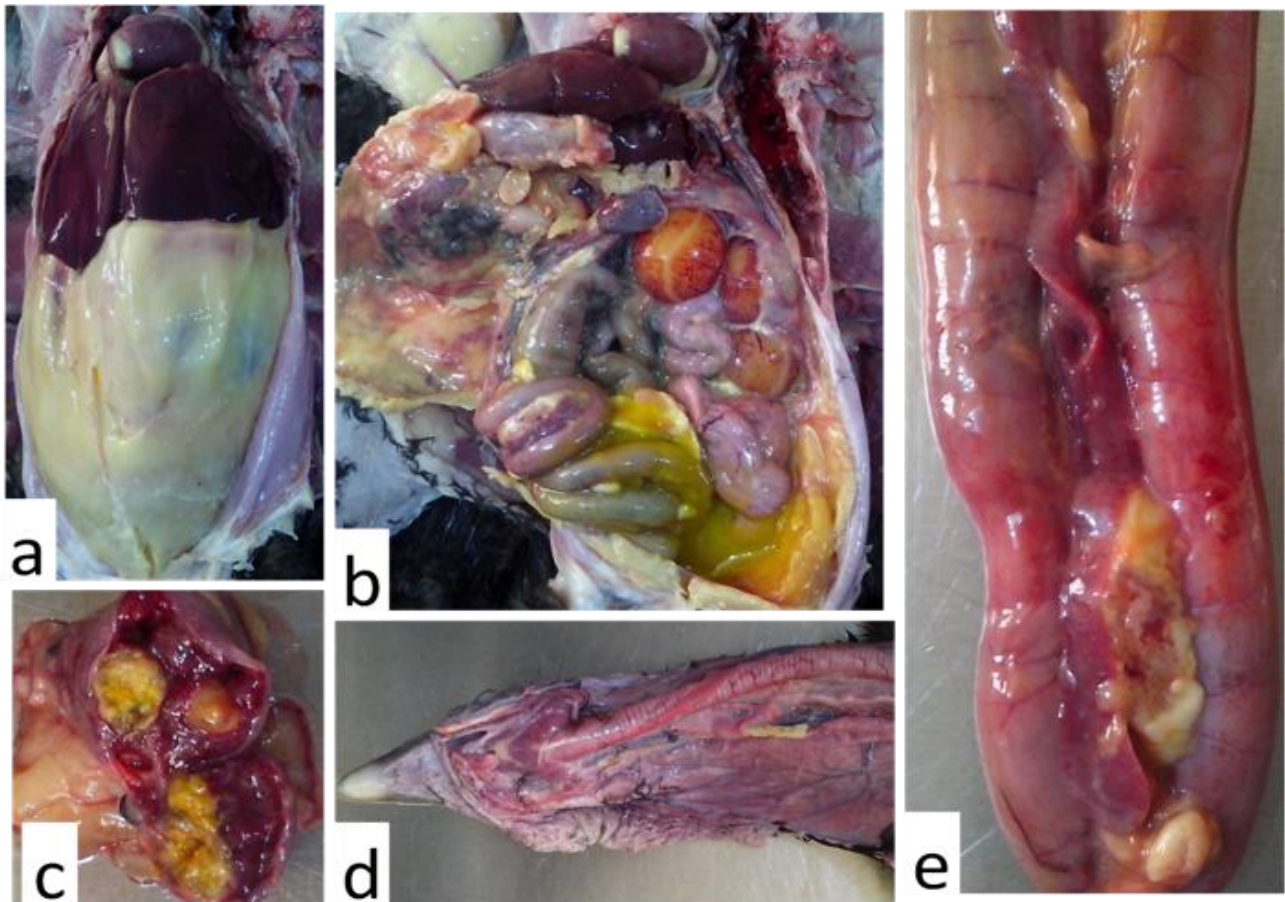
**Table 1.** Turkey diseases diagnosed by postmortem examination and bacterial isolation on blood agar, McConkey agar, selenite F and mycoplasma agar and viral isolation in 9-11 days embryonated eggs at NVRI, Vom, Nigeria, 2009-2014.

Year	Age	Number	Sample	Test	Disease
2009	-	-	-	-	-
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2010	Adult	1	Swab	ND/AI	ND/AI Negative
2011	2days	1	Carcass	Necropsy	Colisepticaemia
2012	-	-	-	-	-
2013	Adult	1	Carcass	Necropsy	Infectious sinusitis
2013	Adult	1	Live	Necropsy	Colisepticaemia
2013	Adult	2	Live	Necropsy	ND/AI Negative
2013	16 weeks	3	Carcass	Necropsy	Colisepticaemia
2013	Adult	8	Carcass	Necropsy	Pullorum/colibacillosis
2013	Adult	1	Carcass	Necropsy	Pullorum/colibacillosis
2013	8-12 weeks	7	Carcass	Necropsy	Pullorum/colibacillosis
2013	3 weeks	1	Carcass	Necropsy	Sudden death/Nil
2014	-	-	-	-	-

ND/AI: Newcastle disease/Avian Influenza



**Figure 3.** a: viral Diseases; b: bacterial Diseases; c: parasitic diseases; d: non-infectious diseases of turkeys diagnosed at veterinary clinics in north central Nigeria, 2009-2014.



**Figure 4.** Some lesions of turkey diseases seen at postmortem examination: **a:** slight abdominal fat deposit; **b:** fibrinous Polyserositis; **c:** granulomatous splenitis; **d:** traumatic oesophagitis; **e:** fibrinous pancreatitis with fat necrosis and haemorrhage

## DISCUSSION

The poultry sector country review for Nigeria by Adene and Oguntade (2006) and FAO (2008) did not capture some species of poultry in some states, for example, turkeys were not captured in plateau state (Fig. 1d and 2a), the area of this study, as is found from this study that subsistence turkey production exists in the state. It was observed that turkey rearing was small-scaled and kept as backyard poultry in North-central Nigeria. Most turkey health cases were recorded at veterinary clinics and rarely brought as carcass to the diagnostic laboratory. Although there is no known discriminatory attitude towards the production and consumption of turkeys (Nwagu, 2002), they are very scarce and seldom raised mostly as extensive backyard and subsistence poultry. This may be attributable to the fact that turkey requires intensive husbandry and health care after hatching, which backyard poultry producers often cannot provide especially, when they are raised in disease endemic environment. Also, there is a large frozen turkey market in Nigeria, from which consumers can buy as little as a kilogram of turkey instead of patronizing the turkey live bird market which sell at exorbitant prices due to high cost of production and losses.

Diseases such as Newcastle disease have been identified as major constraint to traditional chicken production, particularly local breeds which are affected

during dry and cold seasons of the year (Anjum et al., 1993; Lambert and Kabar, 1994 and Saidu et al., 2006). This study showed that diseases might constitute constraint to subsistence turkey production. In this study, avian pox among viral diseases was the most common accounting for more than 70%. While ND accounts for approximately 20% and IBD 2.9% of the diseases diagnosed in turkeys brought to the clinics. The susceptibility of turkeys to viral diseases such as ND virus has been attributed to mixed species farming, encouraging cross infection (Saidu et al., 2004). This may also be the case for the high pox infection rates in turkeys observed in this study, which increased steadily from 2010 to 2013. This is especially the case in backyard rearing of turkey with other poultry species (Akanbi and Taiwo, 2013) in Nigeria. Bacillary diarrhea and helminthosis were the most important bacterial and parasitic diseases respectively of the turkeys presented to the clinics. Infections with bacterial and parasitic organisms have been observed to be linked with their mode of life on free range, and scavenging habits, as traditional village poultry are in permanent contact with other flocks, soil and insects which can act as reservoirs or vectors for a range of bacterial and helminthic diseases (Permin, 1997). Although, bacillary diarrhea was the most important bacterial condition observed in the turkeys at the clinic, postmortem examination of 25 carcasses of turkeys of different sexes and ages showed that bacterial

conditions are the main cause of death (Table 1) and responsible for postmortem requests. The entire 17 swab samples presented for avian influenza and ND screening proved negative by virus isolation. Colisepticaemia, colibacillosis, pullorum disease, airsacculitis, infectious sinusitis are the main diseases diagnosed at post-mortem examination. It was observed that turkey rearing was small-scaled and kept as backyard poultry in North-central Nigeria and most turkey health cases were recorded at Veterinary clinics and rarely brought as carcass to the diagnostic laboratory. Turkey production has not been fully exploited in the developing countries in spite of having greater potential than the chicken (Shingari and Sapra, 1993, Peters et al., 1997, Perez-lara et al., 2013). Turkeys thrive under arid conditions, tolerates heat better, ranges long distances and has higher quality meat (Fisinin and Zlochevskaya, 1989).

## CONCLUSION

The findings from this investigation suggest that turkey production in Nigeria can be improved upon by controlling the diseases affecting them. It is recommended that, small scale turkey producers should be enlightened to vaccinate against viral disease such as pox viral disease, Newcastle disease, and against bacillary diarrhoea and *Escheria coli* infections so as to reduce the impact of these diseases on turkey production.

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