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KARSHIMA

Review Article

The Roles of Veterinarians in the Safety of Foods of Animal Origin in Nigeria: a Review

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Abstract

Foods of animal origin are necessary for the attainment of the 65 g daily requirements of animal protein by humans. However, contamination of these products by biological and chemical agents poses serious threats annually to hundreds of millions of people in developing countries including Nigeria. These public health threads arising from animal products are presently international issues as a result of global trades. The production of safe animal products that will in turn protect the consumer requires the integration of all processes of production from the farm, through slaughtering, primary and secondary processing, storage, distribution, sale, cooking and serving of food in hygienic manners. This review outlined the roles of veterinarians in the production of safe foods of animal origin in Nigeria.

Keywords: Roles, veterinarians, food safety, animal origin, food-borne zoonoses.

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Introduction

Foods of animal origin can serve as potential threats to human health if not properly handled. Contamination of these foods with pathogenic microbes and chemical residues can result from production at the farm level, transportation, storage, distribution and preparation for consumption. These contaminations may arise from diseased animals and unhygienic handling of animal products such as milk and meat. Common food vehicles in Nigeria include meat and meat products, milk and milk products, eggs and egg products, as well as fish and fish products.

It is estimated that hundreds of millions of people are affected by food-borne diseases of animal origin annually especially in developing countries including Nigeria (Abdou, 2002; Slorach *et al*., 2002). During the last decade, a number of extremely serious outbreaks of food-borne diseases occurred on all continents. In Europe, hormones, dioxins, bovine spongiform encephalopathy, *Listeria*, antibiotic resistance and chemical residues in foods, have made consumers increasingly concerned about the health risks from hazards in foods (Potter and Tauxe, 1997).

The traditional systems for food protection such as the examination of samples from the end products and the inspection of processing and catering establishments for hygienic practices as well as the removal of such contaminated foods from the market could not ensure food safety, because they were not preventive in nature (Ahl and Buntain, 1997). The risk of food-borne diseases greatly reduced with the present approaches to food safety that targets prevention of contamination from the farm level through processing, storage and distribution of foods of animal origin (Gelders, 2001).

Food safety and quality are best assured by an integrated, multidisciplinary approach, considering the whole of the food chain. Eliminating or controlling food hazards at source (i.e preventive approach) is more effective in reducing or eliminating the risk of unwanted health effects than relying on control of the final product, traditionally applied via a final 'quality check' approach. Approaches to food safety have evolved in recent decades, from traditional controls based on good practices (Good Agricultural Practices, Good Hygienic Practices, etc), via more targeted food safety systems based on hazard analysis and critical control points (HACCP) to risk-based approaches using food safety risk analysis (McKenzie and Hathaway, 2006).

Contaminated foods of animal origin in producing countries may cause food-borne disease outbreaks in importing countries. This globalization of trade has made food safety an international issue (Hathaway, 1999). This review therefore emphasizes the roles of veterinarians in ensuring the safety of foods of animal origin in Nigeria.

Some common endemic food-borne zoonoses of animal origin in Nigeria

Bovine tuberculosis

Bovine tuberculosis is a chronic infectious and contagious bacterial zoonosis of domesticated animals, wildlife species and humans (Radostits *et al*., 2007). It is caused by *Mycobacterium bovis;* a member of the *Mycobacterium tuberculosis* complex (Collins and Grange, 1983; Pfeiffer, 2003). The disease is characterized by the formation of granulomas in tissues especially in the lungs, lymph nodes, intestines, liver and kidney (Shitaye *et al*., 2007). Although commonly defined as a chronic debilitating disease, bovine tuberculosis can occasionally assume a more progressive course. Majority of human tuberculosis are caused by *M. tuberculosis*, however zoonotic tuberculosis caused by *M. bovis* is also prevalent in humans.

Zoonotic tuberculosis caused by *M. bovis* in humans often occupies sites other than the lungs and the causative pathogen is resistant to the available chemotherapeutic agents used against *M. tuberculosis.* This link between human and animal tuberculosis was reported long ago by the works of Villemin in 1865 (Davies, 2006) and Koch in 1882 (Calmette, 1923). The disease which has been controlled in most developed countries still poses serious threats in developing countries (Amanfu, 2006).

Bovine tuberculosis is becoming increasingly important because of the public health thread of the causative pathogen (Kleeberg, 1984; Thoen *et al*.,

2006), and there is increasing evidence that *M. bovis* infection may be much more significant than generally considered (Shitaye *et al*., 2007). The current increasing incidence of tuberculosis in persons with immunocompromised conditions, particularly HIV/AIDS has renewed interest in the zoonotic importance of *M. bovis* especially in developing countries (Radostits *et al*., 2000; WHO, 2006).

Human infection with *M. bovis* is primarily associated with the ingestion of unpasteurized milk or dairy products, consumption of undercooked beef and meats of other infected animal, aerosols and via breaks in the skin (Cousins, 2001). Human infection may result in asymptomatic infections, pulmonary tuberculosis or disseminated infections. The symptoms of pulmonary infection can include fever, cough, chest pain, cavitation, haemoptysis and fibrosis (Garner and Saville, 2001).

Reports of several workers established the existence of *M. bovis* in milk of animal origin (Shehu, 1988), humans (Shehu, 1988; Abubakar, 2007; Shitaye *et al*., 2007) and animal population (Alhaji, 1976; Ayanwele, 1984; Shehu, 1988; Dusai and Abdullahi, 1994; Shitaye *et al*., 2007; Okaiyeto *et al*., 2008; Ibrahim *et al*., 2010; Cadmus *et al*., 2004, 2010) in Nigeria.

Salmonellosis

This is a food-borne bacterial zoonosis caused by bacteria of the genus *Salmonella* and family enterobacteriaceae, which are facultative anaerobic, Gram negative, oxidase negative and rod shaped. The genus consists of two species, *Salmonella enterica* and *Salmonella bongori.* More than 2,400 serotypes are known. Serotypes that infect both humans and animals causing non-typhoidal salmonellosis are called zoonotic *Salmonella* species (Forshell and Wierup, 2006).

It is the most common food-borne bacterial disease worldwide (Forshell and Wierup, 2006). There have been increased outbreaks of human salmonellosis in most parts of the world resulting from animal infections (Forshell and Wierup, 2006). The prevention and control of animal salmonellosis has become a global issue, as this has been established as the main source of outbreaks in humans (EFSA, 2006).

In animals, *Salmonella* may or may not cause clinical disease. Specie-specific *Salmonella* in animals such as *S. abortus ovis* (sheep), *S. cholerae suis* (pigs), *S. abortus equi* (horse), *S. gallinarum* (poultry) and *S. dublin* (cattle) cause disease in the species they are adapted to, and are considered to be less pathogenic to man. However, these species may cause severe septicaemia in the immunocompromised humans (Acha and Szyfres, 1987). These host-specific serovars primarily cause abortion or severe gastroenteritis in their animal hosts. Serovars that readily affect humans and animals include; *S. typhimurium S.enteritidis S. hadar* and *S infantis* among others. These serovars cause per-acute septicaemia, acute and chronic enteritis in food animals, or may end as carriers without any clinical disease (Quinn *et al*., 2002).

Non-typhoidal salmonellosis in humans is usually manifested as localized enterocolitis. Incubation period ranges from five hours to seven days, but clinical signs may begin 12 to 36 hours after the ingestion of contaminated food. It is clinically manifested by diarrhoea, nausea, abdominal pain, mild fever and chills. Other clinical signs may include vomiting, prostration, anorexia, headache and malaise. Subclinical infections in humans may result in carrier state (Forshell and Wierup, 2006).

Transmission of infection from animals to humans may result from ingestion of raw or undercooked meat, eggs and products containing raw or undercooked eggs as well as unpasteurized milk and milk products (SCVPH, 2003). The organisms can also spread from one region to another through trades of live animals (Blood and Radostis, 1989), contaminated animal feed (Wierup, 1994; Sternberg *et al*., 2005) and non-heat treated animal products within or between countries.

Brucellosis

Brucellosis is an infectious disease caused by intracellular bacteria of the genus *Brucella*. It has a global distribution and is one of the widespread zoonotic disease (Pappas *et al.*, 2006). The disease has been documented in humans (Mathur, 1964; Panjarathinam and Jhala, 1986; Barbuddhe *et al*., 2000; Sen *et al*., 2002; Mantur *et al*., 2006; Mantur *et al*., 2008a,b; Tikare *et al*., 2008), domestic

animals (Mathur, 1964; Esuruoso, 1974; Adamu and Ajogi, 1999; Chahota *et al*., 2003; Osinubi *et al*., 2004) and a number of wildlife species across Africa (Herr and Marshal, 1981; Waghela and Karstad, 1986; Chaparro, 1990; Maden and Anderson, 1995). It is a very important zoonosis that is poorly understood in livestock and largely neglected in humans (McDermott and Arimi, 2002). It has very serious public health consequences in endemic areas including Nigeria, and over 500,000 cases are reported annually worldwide (Coulibaly and Yameogo, 2000).

In animals brucellosis can cause abortion, stillbirth, retained placenta and infertility in males (Yoo, 2010), and infections most commonly occur through contact with infected foetal tissues and post-parturient discharges **(**Godfroid *et al*., 2011). The etiological agents include; *Brucella abortus* in cattle, *Brucella melitensis* in sheep and goats, *Brucella suis* in pigs and *Brucella canis* in dogs. All these species have been reported in humans. However, *Brucella ovis* and *Brucella neotome* which are infective to sheep and rat respectively have not been reported in humans **(**Namanda *et al*., 2009). Infected animals usually serve as reservoirs of human infection (Namanda *et al*., 2009).

Human infections may result from contact with infected animal tissues or ingestion of infected animal products (Godfroid *et al*., 2011). Clinical signs may include recurrent fever, sweats, headaches, back pains, physical weakness, joint pain and fatigue. Severe infections of the central nervous systems or lining of the heart may occur. Of the *Brucella* species reported in humans *Brucella melitensis* is the one that causes severe infection. Goat, cattle, buffalos and sheep are the common sources of human infection. Human infections resulting from ingestion of *Brucella* contaminated foods has overshadowed the occupational transmission through contact with meat and blood of infected animals (Applebaum and Mathsen, 1997; Arimi *et al*., 2005).

Brucellosis has been reported by several workers in Nigeria both in humans (Collard, 1962; Falade, 1974; Alausa, 1977; Alausa and Osoba, 1977; Falade, 2002) and animals (Esuruoso, 1974; Adamu and Ajogi, 1999; Osinubi *et al*., 2004; Ocholi *et al*., 2005; Bertu *et al*., 2010; Ehizibolo *et al*., 2011).

Campylobacteriosis

Campylobacteriosis is the leading cause of zoonotic diarrhoea in the developed as well as developing countries. Domestic animals particularly poultry act as a source of human infection. The disease is caused by bacteria of the genus *Campylobacter*. The species recognized as major causes of acute bacterial foodborne gastroenteritis are *Campylobacter jejuni* and *Campylobacter coli* (WHO, 2002). Zoonotic transmission of these organisms have been established (Hopkins *et al*., 1984; Deming *et al*., 1987; Kapperud *et al*., 1992; Saeed *et al*., 1993), with the risk been greatest in children (Altekruse and Tollefson, 2003).

Campylobacter jejuni may be introduced into poultry flocks during the production cycle (Wedderkopp *et al*., 2000; Denis *et al*., 2001), thereafter these organisms may spread horizontally within the flock (Jacobs-Reitsma *et al*., 1995). In domestic ruminants and swine, *Campylobacter* species may inhabit the intestinal tract (Busato *et al*., 1999; Minihan *et al*., 2004). These organisms can exist as commensals in domestic poultry and livestocks. However in humans they can cause clinical signs like enteritis, headache, low fever and myalgia. Acute campylobacteriosis often begins with abdominal cramps followed by diarrhoea and high fever during the first days of illness (Blaser, 1997).

Human infection is associated with the consumption of undercooked infected poultry (Hopkins *et al*., 1984; Harris *et al*., 1986; Friedman *et al*., 2004), undercooked meat (Studahl and Anderson, 2000), unpasteurized milk (Perterson, 2003) and water contaminated with faeces of infected animals (Melby *et al*., 2000; Sacks *et al*., 1986).

In Nigeria, campylobacteriosis has been reported by several workers in humans (Coker *et al*., 1988; Coker and Adefeso, 1995; Coker *et al*., 2002; Adekunle *et al*., 2009), different species of animals (Elegbe, 1983; Bawa *et al*., 1991; Salihu *et al*., 2009a,b,c,d) and milk of animal origin (Uche *et al*., 1987; Salihu *et al*., 2010).

Cysticercosis

Cysticercosis is a food-borne parasitic zoonosis caused by larval stages of tapeworms of the genus *Taenia*. Larvae of *Taenia sagina* (beef tapeworm) and *Taenia solium* (pork tapeworm) are the two that cause serious human cysticercosis. These larvae are meat-borne and human infection results from the ingestion of raw or undercooked beef or pork. This condition is associated with tissue infection with the larval stages referred to as *Cysticerci* or metacestodes and occurs commonly in pigs and cattle. These metacestodes can invade the tissues of the eye as well as brain and spinal cord causing ocular and neurocercosis respectively (Pawlowski and Murrell, 2000; Phiri *et al*., 2003; Engels *et al*., 2003).

Infection with the *Cysticercus* stage is responsible for almost all serious human disease caused by these taeniid tapeworms (Nash, 2003). These cestodes are cosmopolitan in distribution, and are highly endemic in Latin America, Africa and Asia where poverty conditions such as poor sanitation, and intimate contact between humans and their livestock are common (Murrell, 2005; Pawlowski *et al*., 2005). It has been estimated that millions of people worldwide are infected with *T. solium*. For example, more attention to this zoonosis is occurring in sub-Saharan Africa because of the growing recognition of the importance of neurocysticercosis (larval infection of the central nervous system) in epilepsy (Diop *et al*., 2003).

Although the life cycle cannot be maintained in regions that have adequate sanitation and good animal husbandry practices, these regions are still vulnerable, owing to immigration of people from highly endemic regions carrying infections of the adult stage (taeniasis). Such introduced infections account for an increased global distribution to non-endemic regions such as in the United States and Europe. These human carriers can contaminate the environment of others, leading to secondary infections (Murrell, 2005; Pawlowski *et al.,* 2005).

Taeniasis in humans (Usip *et al*., 2011; Gweba *et al*., 2010; Faleke and Ogundipe, 2003) as well as bovine (Dada, 1980; Okolo, 1986; Okafor, 1988; Opara, 2006; Usip *et al*., 2011) and porcine cysticercosis (Dada, 1980; Faleke and Ogundipe, 2003; Weka and Ikeh, 2001; Gweba *et al*., 2010) have been reported in Nigeria by different workers.

Echinococcosis (Hydatidosis)

Hydatidosis is a widespread food-borne parasitic zoonosis caused by larval stages (hydatid cyst) of tapeworms of the genus *Echinococcus* (Bouree, 2001). The disease is one of the most important canine-associated zoonoses (Cook, 1989). The larval stages infect a wide variety of wildlife species, domesticated animals and humans (Magaji *et al*., 2011). Four species of parasites of the genus *Echinococcus* that are of public health concern are *Echinococcus granulosus* that causes cystic echinococcosis, *Echinococcus multicularis* that causes alveolar echinococcosis, *Echinococcus vogeli* and *E. Oligarthus* both been responsible for polycystic echinococcosis (Magaji *et al*., 2011).

The disease has a worldwide distribution (Eckert *et al*., 2001), and about 2-3 million people were said to be infected worldwide (Craig *et al*., 1996). The disease poses serious public health as well as veterinary and economic threads to endemic countries (Schntz, 1991).

Several works in sub-Saharan Africa have shown that the disease is highly endemic in the region (Daniel, 1995; Bouree, 2001; Dalimi *et al*., 2002). The endemicity of the disease in Nigeria is also established by several works (Dada, 1980; Ajogi *et al*., 1995; Garba and Maigandi, 1995; Agaie *et al*., 1997; Magaji *et al*., 2011; Saulawa *et al*., 2011).

Some common chemical contaminants of foods of animal origin in Nigeria

Pesticides

The term pesticide covers a wide range of compounds including insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators and others. Some of these pesticides include organochlorines, organophosphates, carbamates and pyrethroids. Ideally a pesticide must be lethal to the targeted pests, but not to non-targeted species, including man if correctly applied. However, this is not the case because of abuse as rampant and indiscriminate use of these chemicals has played

havoc with human and other life forms (Aktar *et al*., 2009).

There is now overwhelming evidence that some of these chemicals do pose a potential risk to humans and other life forms and unwanted side effects to the environment (Forget, 1993; Igbedioh, 1991; Jeyaratnam, 1981). The burden of these chemicals is shouldered mostly by people of the developing countries (WHO, 1990). It is estimated that over one million people die as a result of chronic diseases due to pesticide poisoning yearly (Aktar *et al*., 2009).

Animals may carry pesticide residues by grazing around pasture contaminated with such pesticides. These residues can get to humans through the consumption of such animal products. Other animals such as birds, fishes and wildlife are sometimes killed using such poisons and consumed by humans thus passing such pesticides to humans. These chemicals can be carcinogenic, mutagenic or teratogenic, or can be toxic and can cause severe illness and possibly death (WHO, 1997; WHO, 2000).

Antibiotic residues

The presence of antibiotic residues in animal products can be due to a number of different causes such as the misuse of antibiotics in food animals, disease prevention, failure to observe the withdrawal period, the illegal use of antibiotics, the use of antibiotics as growth promoters, among others (Gaudin *et al.*¸ 2001). Their presence poses a number of potential problems such as allergy, difficulty or impossibility to produce other milk-derived products and a risk of development of antibiotic bacterial resistance. Thus, maximum residue limits were introduced for food of animal origin (EEC 1990). These maximum residue limits offer protection for the consumer against the adverse effects of antibiotic residues in food (Gaudin *et al*., 2001). The control of antibiotics in animal products begins with their correct prescription and administration and the careful adherence to withdrawal periods.

The Veterinarian role in ensuring the safety of animal products

Essential veterinary education

The provision of essential information to the community at risk is necessary in ensuring food safety. The veterinarian should make available to the community information such as the endemic foodborne zoonoses available, feeding habits that increases risks of contracting such diseases, the dangers of contracting such diseases, the need for veterinary meat inspection and adequate cooking of animal products before consumption. In addition, livestock farmers should be provided with information, advice and training on how to avoid, eliminate or prevent food contamination with drugs and pesticide residues, mycotoxins including those originating from animal feeds and the possible consequences of ingesting foods contaminated with such chemicals.

On farm disease monitoring and surveillance

In recent years issues of food safety focus on the production of safe food unlike the traditional methods of checking for the safety of foods that are already marketed for human consumption (WHO, 1998; WHO/FAO, 1998; Mackenzie and Hathaway, 2002). Veterinarians should ensure that animals are handled in hygienic manners on the farm. Animals on farm should be routinely monitored for endemic food-borne zoonoses to ensure that products from diseased animals are not forwarded for human consumption. Veterinarians should also ensure that animal products collected at the farm such as milk, eggs etc. are hygienically processed and safely transported.

Veterinary meat inspection

Abattoir meat inspection remains the only affordable technique for monitoring the prevalence of bovine tuberculosis, cysticercosis and echinococcosis in Nigeria. The primary reason for both ante and post mortem examinations at slaughterhouse is for protection of public health (Biffa *et al*., 2010).

The veterinary inspection of live animals (*ante-mortem* inspection) and carcasses (*post-mortem* inspection) in the abattoir plays a key role in both the surveillance network for animal diseases and zoonoses and ensuring the safety and suitability of meat and by-products for their intended uses.

Control and/or reduction of biological hazards of animal and public health importance by *ante*- and *post-mortem* meat inspection is a core responsibility of the veterinarian and they should have primary responsibility for the development of relevant inspection programmes.

Prompt and efficient diagnosis and treatment of animal diseases

The effectiveness of prompt and correct diagnosis of animal diseases in the prevention and control of zoonoses has been reported (Karshima, 2012). Diseased animals on farms should be identified promptly by veterinarians and treated accordingly to reduce risk of passing such diseases to humans via their products. Veterinarians should ensure that products from such diseased animals are not forwarded for human consumption until the disease is cured and the withdrawal periods for the drugs used for treatment are fully observed.

Routine animal disease reporting

By law, practicing veterinarians in Nigeria are supposed to routinely report animal diseases encountered during practice to the state veterinary services who are in turn to forward such reports to the federal department of livestock for documentation. This responsibility if effectively carried out by practicing veterinarians will provide information on the endemic foodborne zoonoses in Nigeria. This will also help in the institution of prevention and control strategies against such diseases.

Issuance of certificate of animal health for international trade

Another important role of the Veterinarian is to provide health certification to international trading partners attesting that exported products meet both animal health and food safety standards. Certification in relation to animal diseases, including zoonoses, and meat hygiene should be the responsibility of the veterinarians and the department of veterinary services. In addition, veterinarians should also ensure that importers of live animals, animal products and veterinary biological present certificates of health before such animals and products are allowed into the country as it is required by law.

Routine immunization against vaccinable diseases

Veterinarians should ensure that animals are immunized against vaccinable foodborne zoonoses like brucellosis, anthrax etc. This will help reduce the risk of these diseases in humans. Prevention of foodborne zoonoses through animal intervention is more cost effective when compared to prevention in humans (Karshima, 2012).

Appropriate use of veterinary drugs and biologicals

Veterinarians should always ensure that veterinary drugs and biological are correctly prescribed and administered. They should monitor their usage and ensure that withdrawal periods are adhered to. They should ensure also that products from animals undergoing treatment are not forwarded into the food chains. Biologicals such as vaccines should be appropriately stored to ensure the maintenance of cooled chains.

Conclusion

The basic training of veterinarians covers nearly all aspects of food hygiene, food processing, pharmaceuticals and pathogenic agents that may be present in foods of animal origin. These, together with their specialty in animal health and welfare, place veterinarians in a unique position to provide expert advice and establish specific programmes on the farm, to prevent and control the presence of biological and chemical hazards that may be carried by animals, milk or other animal products to primary processing. The presence of a veterinarian on the farm is the key to an integrated approach and will ensure that animals and animal products sent to slaughterhouses, dairies and markets are free from disease.

Governments at the local, state and federal levels should ensure that farms that are providing animal products for human consumption, food industries that deals with products of animal origin and slaughter houses engage the services of veterinarians as this will help protect the public from food-borne zoonotic diseases and other hazards arising from contaminated animal products. Veterinarians on the other hand should recognize

their abilities and stand to their responsibilities in ensuring public health.

Through essential veterinary education, veterinarians should educate members of the community at risk of any endemic and emerging food-borne zoonoses and chemical contaminants of animal products. In addition, members of the public should be educated of the risk of not subjecting animal products to veterinary inspection and the consumption of undercooked animal products.

To guarantee a high level protection of consumers from food-borne diseases, there is an urgent need to integrate the animal feed production, on farm practices, transport of animals and slaughtering, primary and secondary processing, storage, distribution, sale, cooking and serving of foods in a hygienic manner, which will link the entire chain of food production from animal breeding and feeding until the time the food is placed on the table of the consumer (WHO, 2002). This concept of integrating all stages of food production can be easily adapted to all kinds of food including meat, milk, fish and their products. Wholesome and safe food can be produced only from healthy animals kept in hygienic conditions and under husbandry systems that cause them minimal stress. The safety of animal products can become a success only if animal health and welfare are fully integrated into it (WHO, 1984; Ahl and Buntain, 1997).

References

Abdou EA (2002). Application of food safety in developing countries. Epidemiology of meatborne and milkborne infections in the Mediterranean region. Inf. Circ. WHO/Mediter. Zoon. Control Centre, 54: 6-9.

Abubakar IA (2007). Molecular epidemiology of human and bovine tuberculosis in the Federal Capital Territory and Kaduna State, Nigeria. Ph.D Thesis, Plymouth University, UK.

Acha PN, Szyfres B (1987). *Salmonella*. In Zoonoses and communicable diseases common to man and animals. Pan American Health Organization (PAHO), Washington, DC, 147-155.

Adamu NB, Ajogi I (1999). Serological investigation of camels (*Camelus dromedaries*) slaughtered at Kano municipal abattoir for evidence of brucellosis. Trop. Vet., 18: 45-48

Adekunle1 OC, Coker AO, Kolawole DO (2009). Antibiotic susceptibility pattern of strains of Campylobacter coli isolated in Osogbo, Nigeria. Biology and Medicine, 1(1): 20-23.

Agaie BM, Magaji AA, Sonfada ML (1997). Slaughter of food Animals in Sokoto Metropolitan Abattoir and Meat availability in Sokoto. Nig. Jour. Basic & Appl Sci., 6:1-6.

Ahl AS, Buntain B (1997). Risk and the food safety chain: animal health, public health and the environment. Rev. Sci. Tech. Off. Int. Epiz., 16(1): 322-330.

Ajogi I, Uko UE, Tahir FA (1995). A Retrospective (1990-1992) Study of Tuberculosis, Cysticercosis and Hydatidosis in Food Animals Slaughtered in Sokoto Abattoir, Nigeria. Trop. Vet., 13 (3 & 4): 81-85.

Aktar W, Sengupta D, Chowdhury A (2009). Impact of pesticides use in agriculture: their benefits and hazards. Interdiscip. Toxicol., 2(1): 1-12.

Alausa OK (1977). Brucellosis: epidemiology and practical problems of control in Nigeria. Public Health 91: 141-146.

Alausa OK, Osoba AO (1977). Subclinical human *Brucella* infection in Ibadan, Nigeria. Ghana medical Journal, 16: 251-154.

Alhaji I (1976). Bovine tuberculosis in four northern states of Nigeria. Ph.D Thesis, Ahmadu Bello University, Zaria, Nigeria.

Altekruse SF, Tollefson LK (2003). Human campylobacteriosis: a challenge for the veterinary profession. JAVMA, 223(4): 446-452.

Amanfu W (2006). The situation of tuberculosis and tuberculosis control in animals of economic interest. Tuberculosis, 86: 330–335.

Applebaum GD, Mathsen G (1997). Spinal brucellosis in a Southern California resident. Western Journal of Medicine, 166: 61-65.

Arimi SM, Koroti E, Kang'ethe EK, Omore AO, McDermott JJ (2005). Risk of infection with *Brucella abortus* and *Escherichia coli* O157:H7 associated with marketing of unpasteurized milk in Kenya. Acta Tropica, 96: 1–8.

Ayanwele FO (1984). Studies on the epidemiology of bovine tuberculosis in some states of southern Nigeria. Ph.D Thesis, University of Ibadan, Nigeria, pp. 184.

Barbuddhe SB, Kumar P, Malika SV, Singh DK, Gupta LK (2000). Seropositivity for intracellular bacterial infections among abattoir associated personnel. J. Commun. Dis. 32: 295–299

Bawa EK, Adekeye JO, Oyedipe EO, Omoh JU (1991). Prevalence of bovine campylobacteriosis in indigenous cattle of three states in Nigeria. Trop Anim Health Prod., 23(3): 157-60.

Bertu WJ, Ajogi I, Bale JOO, Kwaga JKP, Ocholi RA (2010). Sero-epidemiology of brucellosis in small ruminants in Plateau State. Afr. J. Microbiol. Res., 4(19): 1935-1938.

Biffa D, Bogale A, Skjerve E (2010). Diagnostic efficiency of abattoir meat inspection service in Ethiopia to detect carcasses infected with *Mycobacterium bovis*: Implications for public health. BMC Public Health, 10:462. http://www.biomedcentral.com/1471-2458/10/462

Blaser MJ (1997). Epidemiologic and clinical features of *Campylobacter jejuni* infections. J Infect. Dis., 176(2): S103–S105.

Blood DC, Radostits OM (1989). Diseases caused by bacteria, III. In Veterinary medicine: a textbook of the diseases of cattle, sheep, pigs, goats and horses (D.C. Blood, O.M. Radostits, J.H. Arundel & C.C. Gay, eds), 7th Ed. Ballière Tindall, London, 643-655.

Bouree P (2001). Hydatidosis: Dynamics of transmission. World J. Surg., 25: 4-9.

Busato A, Hofer D, Lentz T, Gaillard C, Burnens A (1999). Prevalence and infection risks of zoonotic enteropathogenic bacteria in Swiss cow-calf farms. Vet. Microbiol., 69: 251-263.

Cadmus SIB, Agada CA, Onoja II, Ibrahim S (2010). Risk factors associated with bovine tuberculosis in some selected herds in Nigeria. Tropical Animal Health and Production, 42: 547-549.

Cadmus SIB, Atsanda NN, Oni SO, Akang EEU (2004). Bovine tuberculosis in one cattle herd in Ibadan, Nigeria. Vet. Med. Czech, 49: 406-412.

Calmette A (1923). In Tuberculosis *Bacillus* Infection and Tuberculosis in Man and Animals, translated by W.B. Soper and G.H. Smith. Williams and Wilkins Co. Baltimore.

Chahota R, Sharma M, Katoch RC, Verma S, Singh MM, Kapoor V, Asrani RK (2003). Brucellosis outbreak in an organized dairy farm involving cows and in contact human beings, in Himachal Pradesh, India; Vet. Arh. 73 95–102

Chaparro F, Lawrence J, Bengis R, Myburgh J (1990) A serological survey for brucellosis in buffalo (Syncerus caffer) in the Kruger National Park. Journal of the South African Veterinary Association 61: 110.

Coker AO, Adefeso AO (1995). The changing pattern of *Campylobacter jejuni*/*coli* in Lagos, Nigeria after 10 years. East African Medical Journal, 71: 437-440.

Coker AO, Olukoya DK, Odegbemi T (1988). Antibiotics susceptibility patterns and beta-lactamase production of strains of *Campylobacter* species isolated in Nigeria. Proceedings of the 4th International Workshop on *Campylobacter* Infections, Goteborg, held in Sweden. Edited by Kaijser B and Failsen E. Published by Gotherma Kungaly, Sweden 1988, 153-154.

Coker AO, Isokpehi RD, Thomas BN, Amisu KO, Obi CL (2002). Human campylobacteriosis in developing countries. Emerg Infect Dis., 8(3): 237-244.

Collard P (1962). Antibodies against brucellae in the sera of healthy persons in various parts of Nigeria. West African Medical Journal, 9: 172-174

Collins CH, Grange JM (1983). A review of bovine tuberculosis. J. Applied Bacteriol., 55: 13-29.

Cook BR (1989). The epidemiology of *Echinococcus granulosus* in Great Britain. Ann. Trop. Med. and Parasitol., 83(1):51-61.

Coulibaly ND, Yameogo, KR (2000). Prevalence and control of zoonotic diseases: collaboration between Public Health Workers and Veterinarians in Burkina Faso. Acta Tropica, 76: 53-57.

Cousins DV (2001). *Mycobacterium bovis* infection and control in domestic livestock. Rev. Sci. Tech. Off. Int. Epiz., 20, 71–85.

Craig PS, Rogar MT, Allan CC (1996). Detection, Screening and community epidemiology of taeniid cestode zoonoses: cystic echinococcosis, alveolar echinococcocsis and neurocysticercosis. Advan.Parasitol., 36: 169-250.

Dada BJO (1980). Taeniasis, cysticercosis and echinococcosis/hydatidosis in Nigeria: prevalence of bovine and porcine cysticercosis and hydatid cyst infection based on joint examination of slaughtered food animals. J. Helminthol., 54: 293-297.

Dalimi A, et al. (2002). Echinococcosis/hydatidosis in Western Iran. Vet Parasitol, 105: 161-171.

Daniel F (1995). Economic importance of organ condemination due to Fasciolosis and Hydatidosis in cattle and sheep slaughtered at Dire Dawa abattoir. DVM thesis, Addis Ababa University, Debre Zeit.

Davies PDO (2006). Tuberculosis in humans and animals: are we a threat to each other? J. R. Soc. Med., 99(10): 539-540.

Deming MS, Tauxe RV, Blake PA, Dixon SE, Fowler BS, Jones TS, Lockamy EA, Patton CM, Sikes RO (1987). *Campylobacter enteritis* at a university: transmission from eating chicken and from cats. Am J Epidemiol., 126: 526–534.

Denis M, Refregier-Petton J, Laisney MJ, Ermel G, Salvat G (2001). *Campylobacter* contamination in French chicken production from farm to consumers. Use of a PCR assay for detection and identification of *Campylobacter jejuni* and *Campylobacter coli*. J. Appl. Microbiol., 91: 255–267.

Diop AG, de Boer HM, Mandlhate C, Prilipko L, Meinardi H (2003). The global campaign against epilepsy in Africa. Acta Tropica, 87: 149-159.

Dusai DHM, Abdullahi DA (1994). Current status of bovine tuberculosis at Sokoto abattoir. Trop. Vet., 12: 134-137.

Eckert J, Deplazes P, Craig PS, Gemmell M, Gottstein A, Heath BD, Jenkins DJ, Kamiya M, Lightowlers M (2001). Echinococcosis in animals: clinical aspects, diagnosis and treatment, p. 72-99. In J. Eckert, M. A. Gemmell, F.-X. Meslin, and Z. S. Pawlowski (ed.), WHO/OIE Manual on echinococcosis in humans and animals: a public health problem of global concern. World Organisation for Animal Health, Paris, France.

Ehizibolo DO, Gusi AM, Ehizibolo PO, Mbuk EU, Ocholi RA (2011). Serologic prevalence of brucellosis in horse stables in two northern states of Nigeria. J. Equine Sci., 22(1): 17-19.

Elegbe IA (1983). *Campylobacter* infections: domestic cows as a possible source of infection in Nigeria. Med. Lab. Sci., 40: 145-147.

Engels D, Urbani C, Belotto A, Meslin F, Savioli L (2003). The control of human neurocysticercosis: which way forward? Acta Tropica, 87: 177-182.

Esuruoso GO (1974). Bovine brucellosis in Nigeria. Vet. Rec.,

95(3): 54-58

European Economic Communities (1990). Commission Regulation No. 2377/90 of 26 June 1990 laying down a community procedure for the establishment of maximum residue limits of veterinary medicinal products in foodstuffs of animal origin. Official Journal of the European Communities, 224, 1-8.

European Food Safety Authority (2006). Trends and sources of zoonoses, zoonotic agents and antimicrobial resistance in the European Union in 2004. EFSA J., 310(10): 23-95.

Falade S (1974). *Brucella* agglutinating antibodies in sera of persons dwelling in Ibadan and the surrounding districts. Nig. Vet. J., 3: 21-23.

Falade S (2002). A case of possible brucellosis relapse in a veterinarian. Trop. Vet., 20: 226-230.

Faleke OO, Ogundipe GAT (2003). *Taenia solium* cysticercosis and human taeniasis in Uyo State, Nigeria. Nig. Vet. J., 24(3): 60-64.

FAO/WHO (1998). The application of risk communication to food standards and safety matters. Report of a FAO/WHO Expert Consultation, Rome, Italy 1998. Food and Nutrition Paper no. 70.

Forget G (1993). Balancing the need for pesticides with the risk to human health. In: Forget G, Goodman T, de Villiers A, editors. Impact of Pesticide Use on Health in Developing Countries. IDRC, Ottawa: 2.

Forshell LP, Wierup M (2006). *Salmonella* contamination: a significant challenge to the global marketing of animal food products. Rev. Sci. Tech. Off. Int. Epiz., 25 (2): 541-554.

Friedman CR, Hoekstra RM, Samuel M, Marcus R, Bender J, Shiferaw B, Reddy S, Ahuja SD, Helfrick DL, Hardnett F, Carter M, Anderson B, Tauxe RV (2004). Risk factors for sporadic *Campylobacter* infection in the United States: A case-control study in FoodNet sites. Clin. Infect. Dis., 38(3): S285-S296.

Garba HS, Maigandi S (1995). Diseases of Camels (*Camelus dromedarius*) encountered at Slaughter at the Abattoir in Sokoto, Nigeria. Trop. Vet., 13 (3 & 4): 95-102.

Garner G, Saville P (2001). Bovine Tuberculosis." In Manual for the Recognition of Exotic Diseases of Livestock. FAO/SPC Animal Health Information System.

Gaudin V, Fontaine J, Maris P (2001). Screening of penicillin residues in milk by a surface plasmon resonancebased biosensor assay: comparison of chemical and enzymatic sample pre-treatment. Analytica Chimica Acta, 436, 191-198.

Gelders S (2001): Microbiological Contamination of Foods:Current Status and Need for Action. Conference Paper. AFC/WHO/FAO Intercountry Workshop on Emerging Food Safety Issues and Consumer Protection. Amman, Jordan, 28-30 October 2001.

Godfroid J, Scholz H, Barbier T, Nicolas C, Wattiau P, et al. (2011) Brucellosis at the animal/ecosystem/human interface at the beginning of the 21st century. Preventive Veterinary Medicine, 102: 118–131.

Gweba M, Faleke OO, Junaidu AU, Fabiyi JP, Fajinmi AO (2010). Some risk factors for *Tainia solium* cysticercosis in semi-intensively raised pigs in Zuru, Nigeria. Veterinaria Italiana, 46(1):57-67.

Harris NV, Weiss NS, Nolan CM (1986). The role of poultry and meats in the etiology of *Campylobacter jejuni*/*coli* enteritis. Am. J. Public Health, 76: 407–411.

Hathaway SC (1999). Management of food safety in international trade. Food Control, 10: 247-253.

Herr S, Marshall C (1981). Brucellosis in free-living African buffalo (*Syncerus caffer*): a serological survey. The Onderstepoort Journal of Veterinary Research, 48: 133.

Hopkins RS, Olmsted R, Istre GR (1984). Endemic *Campylobacter jejuni* infection in Colorado: identified risk factors. Am J Public Health, 74: 249–250.

Ibrahim S, Agada CA, Umoh JU, Ajogi I, Farouk UM, Cadmus SIB (2010). Prevalence of bovine tuberculosis in Jigawa State, North-western Nigeria. Trop Anim Health Prod., 42: 1333–1335.

Igbedioh SO (1991). Effects of agricultural pesticides on humans, animals and higher plants in developing countries. Arch Environ Health, 46:218.

Jacobs-Reitsma WF, van de Giessen AW, Bolder NM, Mulder RWAW (1995). Epidemiology of *Campylobacter* spp at two Dutch broiler farms. Epidemiol. Infect., 114:413–421.

Jeyaratnam J (1985). Health problems of pesticide usage in the third world. BMJ., 42: 505.

Kapperud G, Skjerve E, Bean NH, Ostroff SM, Lassen J (1992). Risk factors for sporadic Campylobacter infections: results of a case-control study in south-eastern Norway. J Clin. Microbiol., 30: 3117–3121.

Karshima NS (2012). A multidisciplinary approach in the control of zoonoses in Nigeria. J. Vet. Adv., 2(12): 557-567.

Kleeberg HH (1984). Human tuberculosis of bovine origin in relation to public health. Ruvue Scientique el Technique office international des epizootics, 3: 11-32.

Mackenzie A, Hathaway SC (2006). The role of veterinarians in the prevention and management of food-borne diseases, in particular at the level of livestock producers, Technical Item 1 of the OIE 70th General Session, Paris, France, 26-31 May 2002.

Maden M, Anderson EC (1995). Serologic survey of Zimbabwean wildlife for brucellosis. Journal of Zoo and Wildlife Medicine 240–245.

Magaji AA, Oboegbulem SI, Daneji AI, Garba HS, Salihu MD, Junaidu AU, Mohammed AA, Lawal M, Aminu S, Yakubu Y, Mamuda A (2011). Incidence of hydatid cyst disease in food animals slaughtered at Sokoto Central Abattoir, Sokoto State, Nigeria. Veterinary World, 4 (5): 197-200.

Mantur BG, Mulimani MS, Bidari LH, Akki AS, Tikare NV. (2008a). Bacteremia is as unpredictable as clinical manifestations in human brucellosis. Int. J. Infect. Dis., 12: 303–307.

Mantur BG, Mulimani MS, Bidari LH, Akki AS, Tikare NV (2008b). Splenic puncture: diagnostic accuracy and safety in infectious diseases. Int. J. Infect. Dis., 12: 446–447.

Mathur TN (1964). *Brucella* strains isolated from cows, buffaloes, goats, sheep and human beings at Karnal: Their significance with regard to the epidemiology of brucellosis. Indian J. Med. Res. 52: 1231–1240.

McDermott JJ, Arimi S (2002). Brucellosis in sub-Saharan Africa: epidemiology, control and impact. Veterinary microbiology, 90: 111–134.

Mckenzie AI, Hathaway SC (2006). The role and functionality of Veterinary Services in food safety throughout the food chain. Rev. Sci.Tech.Off. Int. Epiz., 25(2): 837-848.

Melby KK, Svendby JG, Eggebo T (2000). Outbreak of *Campylobacter* infection in a subartic community. Eur. J Clin. Microbiol. Infect. Dis., 19: 542–544.

Minihan D, Whyte P, O'Mahony M, Fanning S, McGill K, Collins JD (2004). *Campylobacter* spp. in Irish feedlot cattle: A longitudinal study involving pre-harvest and harvest phases of the food chain. J. Vet. Med. B., 51: 28-33.

Murrell KD (2005). Chapter 3, Epidemiology. In K.D. Murrell, ed. WHO/FAO/OIE Guidelines for the surveillance, prevention and control of taeniasis and cysticercosis. Paris, OIE (also available at http://www.oie.int/eng/publicat/ouvrages/A_taeniosis. htm).

Namanda AT, Kakai R, Otsyula M (2009). The role of unpasteurized "hawked" milk in the transmission of brucellosis in Eldoret municipality, Kenya. J Infect Developing Countries, 3(4): 260-266.

Nash TE (2003). Human case management and treatment of cysticercosis. Acta Tropica 87: 61-69.

Ocholi RA, Kwaga JKP, Ajogi I, Bale JOO (2005). Abortion due to *Brucella abortus* in sheep in Nigeria. Rev. sci. tech. Off. Int. Epiz., 24(3): 973-979

Okafor FC (1988). Epizoology of *Cysticercus bovis* in Imo State, Nigeria. Angewandte Parasitologie, 29(1): 25 – 30.

Okaiyeto SO, Allam L, Akam E, Sabo G (2008). Investigation of the prevalence of bovine tuberculosis in a dairy farm in Kaduna State Nigeria. Research Journal of Dairy Sciences, 2: 27-29.

Okolo M (1986). Studies on *Taenia saginata* cysticercosis in eastern Nigeria. Int. J. Zoonoses, 13(12): 98-103.

Opara MN (2006). Cysticercosis of slaughter cattle in South-eastern Nigeria. Ann. NY Acad. Sci., 1081: 339-346.

Osinubi MOV, Ajogi I, Ehizibolo DO (2004). *Brucella abortus* agglutinins in dogs in Zaria, Nigeria. Nig. Vet. J., 25(1): 35-38.

Panjarathinam R, Jhala CI (1986). Brucellosis in Gujarat state. Indian J. Pathol. Microbiol. 29: 53–60

Pappas G, Papadimitriou P, akritidis N, Christou L, Tsianos EV (2006). The new global map of human brucellosis. Lancet. Infect. Dis., 6: 91–99

Pawlowski Z, Murrell KD (2000). Taeniasis and cysticercosis. In Y. Hui, K.D. Murrell, W.K. Nip, P. Stanfield & S.A. Satter, eds. Food-borne Diseases Handbook, pp. 217-227. New York, Marcel Dekker Inc.

Pawlowski ZS, Allan JC, Meinardi H (2005). Chapter 6, Control. In K.D. Murrell, ed. WHO/FAO/OIE Guidelines for the surveillance, prevention and control of taeniasis and cysticercosis. Paris, OIE (also available at http://www.oie.int/eng/publicat/ouvrages/A_taeniosis.htm).

Peterson MC (2003). *Campylobacter jejuni* enteritis associated with consumption of raw milk. J. Environ. Hlth., 65: 20-21.

Pfeiffer DU (2003). Tuberculosis in animals. In: clinical tuberculosis, Davies, P.D. (Ed) 3rd edition, Arnold, London.

Phiri IK, Ngowi H, Afonso S, Matenga E, Boa M, Mukaratirwa S, Githigia S, Saimo M, Sikasunge C, Maingi N, Lubega GW, Kassuku A, Michael L, Siziya S, Krecek RC, Noormahomed E, Vilhena M, Dorny P, Willingham AL (2003). The emergence of *Taenia solium* cysticercosis in eastern and southern Africa as a serious agricultural problem and public health risk. Acta Tropica, 87: 13-23.

Potter EM, Tauxe RV (1997). Epidemiology of food-borne diseases: tools and applications. Wld. Hlth. Statist. Quart., 50(1/2), 24-29

Quinn PJ, Markey BK, Carter ME, Donnelly WJC, Leonard FC (2002). Veterinary microbiology and microbial disease. Blackwell Science, Oxford.

Radostits OM, Gay CC, Blood DC, Hinchelift KW (2000). Disease caused by bacteria – *Mycobacterium*. In: Veterinary Medicine: A Text Book of Disease of Cattle, Sheep, Pig, Goat and Horses. 9th ed. Harcourt Publisher Ltd., London, pp. 909-918.

Radostits OM, Blood DC, Hinchcliff KW, Gay CC (2007). Veterinary medicine: A textbook of the diseases of cattle, sheep, pigs, goats and horses. Bailliere-Tindall, London, pp. 1763.

Sacks JJ, Lieb S, Baldy LM (1986). Epidemic campylobacteriosis associated with a community water supply. Am J Public Health, 76: 424–428.

Saeed AM, Harris NV, Digiacomo RF (1993). The role of exposure to animals in the etiology of *Campylobacter jejuni*/*coli* enteritis. Am. J Epidemiol., 137: 108–114.

Salihu MD, Junaidu AU, Abubakar MB, Magaji AA, Mohammed LG (2009b). Isolation and characterization of *Campylobacter* species from camel (*Camelus dramedarius*) in Sokoto State, Northwestern Nigeria. Int. J. Anim. Vet. Adv., 1(1): 25-27.

Salihu MD, Junaidu AU, Magaji AA, Rabiu ZM (2010). Study of *Campylobacter* in raw cow milk in Sokoto State, Nigeria. British Journal of Dairy Sciences, 1(1): 1-5.

Salihu MD, Junaidu AU, Oboegbulem SI, Egwu GO (2009a). Prevalence and biotypes of *Campylobacter* species isolated from Sheep in Sokoto State, Nigeria. Int. J. Anim. Vet. Adv., 1(1): 6-9.

Salihu MD, Junaidu AU, Oboegbulem SI, Egwu GO, Magaji AA, Lawal M, Hassan Y (2009d). Isolation and prevalence of *Campylobacter* species in cattle from Sokoto State, Nigeria. Veter. Ital. Ser., 45(4): 501-505.

Salihu MD, Junaidu AU, Oboegbulem SI, Egwu GO, Tambuwal FM, Yakubu Y (2009c). Prevalence of *Campylobacter* species in apparently healthy goats in Sokoto state (Northwestern) Nigeria. Afr. J. Microbiol.

Res., 3(9): 572-574.
Saulawa MA, Magaji AA, Faleke OO, Mohammed AA, Junaidu AU, Salihu MD, Musawa AI, Sada A, Fakai LU, Mohammed M, Bala A, Sidi S, Lawal N (2011). Serodiagnosis of hydatidosis in sheep slaughtered at Sokoto abattoir, Sokoto state, Nigeria. Sok. J. Vet. Sci., 9(2): 20-23.
Schantz PM (1991). Parasitic zoonoses in perspective. Intl.J. Parasitol, 21: 161-170.
Scientific Committee on Veterinary Measures relating to Public Health (SCVPH) (2003). European Union (EU)/SANCO. Opinion of the SCVPH on Salmonellae in foodstuffs. Adopted on 14-15 April. SCVPH, Brussels, pp. 55.
Sen MR, Shukla BN, Goyal RK (2002). Sero-prevalence of brucellosis in and around Varanasi; J. Commun. Dis. 34: 226–227
Shehu LM (1988). Survey of tuberculosis and tubercle bacilli in Fulani herds, Nono and some herdsmen in Zaria, Nigeria. M.Sc Thesis, Ahmadu Bello University, Zaria, Nigeria.
Shitaye JE, Tsegaye W, Pavlik I (2007). Bovine tuberculosis infection in animals and human populations. Vet. Med., 52: 317-332.
Slorach SA, Maijala R, Belveze IT (2002). Examples of comprehensive and integrated approach to risk analysis in the food chain: experiences and lessons learned. Conference paper. FAO/WHO Pan-European Conference on Food Safety and Quality. Budapest, Hungary, 25-28 February 2002.
Sternberg S, Boqvist S, Engström B, Häggblom P (2005). The effective control of hazards in Swedish poultry: the case for Sweden. In Food safety control in the poultry industry (G.C. Mead, ed.). Woodhead Publishing, Cambridge, 195-215.
Studahl A, Andersson Y (2000). Risk factors for indigenous *Campylobacter* infection: a Swedish case-control study. Epidemiol. Infect., 125: 269–275.
Thoen CO, Steele JH, Gilsdorf JM (2006). *M. bovis* infection in animals and humans. 2nd edition, Blackwell Publishing, Ames, Lowa, USA, pp. 317.
Tikare NV, Mantur BG, Bidari LH (2008). *Brucella* meningitis in an infant – evidence for human breast milk transmission. J. Trop. Pediatr., 54: 272–274.
Uche EI, James OA, Abiodun AA, David SA (1987). Isolation and characterisation of *Campylobacter jejuni* from cattle faeces, milk and milk products. Zariya Vet., 2(1): 16-22.
Usip LPE, Isaac L, Amadi EC, Utah E, Akpaudo U (2011). The occurrence of cysticercosis in cattle and taeniasis in man in Uyo, capital city of Akwa Ibom State, Nigeria. Nig. J. Agric. Food and Environ., 7(2):47-51.
Waghela S, Karstad L (1986). Antibodies to *Brucella* spp. among blue wildebeest and African buffalo in Kenya. Journal of Wildlife Diseases, 22: 189.
Wedderkopp A, Rattenborg E, Madsen M (1998). National surveillance of *Campylobacter* in broilers at slaughter in Denmark in 1998. Avian Dis., 44: 993–999.
Weka RP, Ikeh EI (2009). Sero-prevalence of cysticercosis and intestinal parasites in pigs in Jos metropolis. J Anim. Vet. Adv., 8(5): 883-887.
Wierup M (1994). Control and prevention of salmonellosis in livestock farms. In Comprehensive report on technical items presented to the International Committee or to Regional Commissions. World Organisation for Animal Health (OIE), Paris, 249-269.
World Health Organisation (1998). Strategies for implementing HACCP in small and/or less developed business. Report of a WHO Consultation, The Hague, Netherlands, 16-19 June 1999 (Doc. WHO/SDE/PHE/FOR/99.7)
World Health Organisation (2002). Pre-harvest in food safety. Report on a WHO Consultation with the participation of FAO and OIE Berlin, Germany, 26-28 March 2001 (Doc. WHO/CDS/CSR/EPH/2002.9)
World Health Organisation (1984). The role of food safety in health and development. Report of a Joint FAO/WHO Expert Committee on Food. TRS, no 705, Geneva, Switzerland.
World Health Organization (1990). Public Health Impact of Pesticides Used in Agriculture; WHO, Geneva. pp. 88.
World Health Organization (1997). Introducing the Hazard Analysis Critical Control Point (HACCP) System. Food Safety Unit. Geneva, Switzerland (Doc. WHO/FSF/FOS/97.2).
World Health Organization (2006). Global tuberculosis control: surveillance, planning and financing, WHO/HTM, Geneva, pp. 362.
World Health Organization and Food and Agriculture Organization. (2000). Methodology for exposure assessment of contaminants and toxins in food. Report of Joint FAO/WHO Workshop. Geneva, Switzerland, 7-8 June 2000.
Yoo HS (2010). Infectious causes of reproductive disorders in cattle. Journal of Reproduction and Development, 56: 53–60.