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Review
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Public health importance of brucellosis: a review

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ABSTRACT

Members of the genus *Brucella* are the source of the infectious bacterial disease known as brucellosis which is characterised by abortion, retained fetal membranes, orchitis, infection of the male accessory sex glands, and decreased fertility. Cattle, pigs, goats, sheep, dogs, camels, and occasionally horses are the animals most commonly affected by the disease. It affects sexually mature animals and its preferred site is the reproductive tract of both male and female animals. Animals may acquire the infection by licking the genitalia of infected female animals shortly after parturition or abortion, or by consuming contaminated pastures, feedstuffs, and water. Because there are insufficient domestic animal health programs, adequate diagnostic facilities, and effective public health measures, brucellosis is common and seen as an important public health concern in developing countries. Due to its association with abortion storm in newly infected herds, a high rate of retained placenta, endometritis or metritis which lowers milk production, and infertility, the disease is important economically. Additionally, the contagious nature of the disease has an impact on public health. In humans, brucellosis is an acute or subacute condition that can last for weeks or months. It is typically characterized by an intermittent or remittent fever, malaise, anorexia, and prostration. Humans can become infected by consuming contaminated animal products such as milk. These and control strategies of brucellosis that include good farm management practices, surveillance, culling of infected animals, use of proper vaccination protocols and public awareness were the subject matter of this review.

Keywords: Brucellosis, endometritis, orchitis, public health

INTRODUCTION

Brucellosis is a highly contagious, zoonotic, and economically significant bacterial disease. *Brucella* spp. is a Gram-negative bacterium which belongs to the genus *Brucella* that can be transmitted to humans and animals and poses a significant risk to public health (Alkahtani *et al*., 2020). Cattle are mostly affected by *Brucella abortus* and in some situations by *Brucella suis* and *Brucella melitensis*, but *Brucella melitensis* is more common in sheep and goats (Selim *et al*., 2019; Negash & Dubie, 2021). *B. suis* and *B. canis*, respectively, affect both pigs and dogs. Cattle, sheep, and goats are associated with human infection because *B. melitensis* and *B. abortus* have been primarily linked to human infection (Nguna *et al*., 2019). Although they are not the main hosts of *Brucella*, camels are also vulnerable to infections from both *B. melitensis* and *B. abortus* (Gwida *et al*., 2012; Elsohaby *et al*., 2022).

It is the most common zoonotic bacterial disease; in endemic areas, 500,000 human cases are documented yearly (Khan & Zahoor, 2018). David Bruce made the initial discovery of brucellosis in 1887 while studying the spleen of English troops who had died in battle on Malta Island while suffering from Malta fever and *Bacillus abortus* from an aborted bovine fetus and fetal membrane (Bang, 1897; Asnake *et al*., 2017). In 1920, Meyer and Shaw named the organism *Brucella* in honor of Bruce (Meyer & Shaw, 1920).

The World Health Organization (WHO) has classified it as one of the world's leading "neglected zoonotic diseases" due to the disease's specific impact on low-income countries. It is an occupational disease that primarily affects veterinarians, farmers, stock inspectors, abattoir workers, laboratory personnel, and butchers (Olabode *et al*., 2012; Aworh *et al*., 2013; Franc *et al*., 2018). The WHO categorised *Brucella* as an agent in risk group III due to its ease of aerosol transmission (Yuguda *et al*., 2019). Other names for the disease include Gibraltar fever, Malta fever, Cyprus fever, Mediterranean fever, intermittent typhoid, Rock fever, and, more frequently, undulant fever in humans (Khan & Zahoor, 2018), Bang's disease, enzootic abortion, epizootic abortion and contagious abortion in animals (Gabretsadik, 2016;

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Yalew, 2022). Sexually mature animals are susceptible to brucellosis, which mostly affects the reproductive systems of both sexes, particularly the uterus during pregnancy. Most *Brucella* are stimulated to increase by allantoic stimuli of which Erythritol, perhaps steroid hormones, and other chemicals have been implicated as the causes (Petersen *et al*., 2013). Public health deteriorates and the animal production sector incurs large financial losses due to brucellosis (Khurana *et al*., 2021). Reproductive waste due to infertility, delayed heat, loss of calves, decreased meat and milk output, culling, and international trade restrictions result in economic losses (Yalew, 2022). The disease is extremely contagious and can be acquired congenitally, venerally, as well as through contact with milk, vaginal secretions, and aborted fetuses from infected animals (Khan & Zahoor, 2018).

Except for a few nations such as Australia, Cyprus, Canada, Norway, New Zealand, Finland, The Netherlands, Denmark, Sweden, and the United Kingdom where bovine brucellosis (*B. abortus)* has been completely eradicated as a result of protracted and costly control programs including vaccination and culling, brucellosis is still widespread in most countries of the world (Jajere *et al*., 2016; Khurana *et al*., 2021).

METHODOLOGY

Relevant online databases were searched for publications on brucellosis in Nigeria, West Africa, Central Africa, North Africa, Latin America, Asia and Middle East using PubMed and Google Scholar search engines between November 2023 –February 2024. Our search criteria included brucellosis, animals, humans, and zoonosis. Articles relevant to the topic with complete referencing were part of the inclusion criteria. Publications that were not relevant to the subject or that had information that could not be verified, insufficient referencing, or duplicate material were not included.

EPIDEMIOLOGY OF BRUCELLOSIS IN SUBSAHARAN AFRICA

Brucellosis is a disease that is distributed worldwide and occurs in both domestic and wild animals. Reports of it have been made wherever animals are raised globally (Qureshi *et al*., 2023). The disease is still a major issue in underdeveloped nations, even though certain developed nations in Europe and America have successfully eradicated brucellosis in domestic animals through rigorous control and eradication programs (Warner, 2001; Ragan, 2002). The well-being of both human and animal populations is essential for stability, prosperity, and economic growth (WHO, 2006). The prevalence of infectious diseases affects livestock's health and ability to reproduce, which significantly lowers the livestock's value and trading potential (Smits & Cutler, 2004). Zoonotic diseases, such as brucellosis, are significant for both human health and animal health because they increase morbidity and reduce working capacity, which results in loss of income (OIE, 2009). Brucellosis causes appreciable economic losses to the livestock industry in infected areas, resulting from abortion, sterility, decreased milk production, veterinary care costs, and the cost of culling and replacing animals (FAO, 2003). There have been reports of brucellosis in practically every African nation (Refai, 2002; Ducrotoy *et al*., 2017). It is important to note that brucellosis is a zoonotic disease and that programs targeted at public health are mostly responsible for its eradication. Animals are the source of nearly all human cases of brucellosis (Godfroid *et al*., 2005). Pappas *et al*. (2006) considered brucellosis the World's most widespread of all zoonoses, and besides its effect on humans, it has an enormous impact on the animal industry, as the international trade in animals and animal products and human movement increases, the risk of introduction and re-introduction of brucellosis is growing (McDermott & Arimi, 2002; Godfroid *et al*., 2005). One of the major factors contributing to the spread of the disease is the free movement of nomadic pastoralists accustomed to the traditional extensive management system (Al-Majali *et al*., 2007). According to recent studies, there are 1.6 - 2.1 million new human cases worldwide each year, which is a higher incidence than was previously believed (Laine e*t al*., 2023).

EPIDEMIOLOGY OF BRUCELLOSIS SUB-SAHARAN AFRICA

Sub-Saharan Africa is linked to the majority of cases of brucellosis in humans and animals worldwide. Large pastoral populations and the anticipated increase in the demand for meat and cattle products by 2050 make this region very vulnerable to brucellosis, necessitating the development of effective control measures (McDermott & Arimi, 2002). At the herd, within-herd, and individual animal levels, the infection's prevalence has been recorded (Makita *et al*., 2011). Additionally, certain measurements of human brucellosis have been made (Kumari *et al*., 2023). Brucellosis in humans has been reported in Ethiopia, Chad, Tanzania, Nigeria, Uganda, Kenya, Zimbabwe, and Somalia, and it was linked to domestic cattle, camels, goats, and sheep. Persistent disease was observed in the majority of Sahelian countries (Racloz *et al*., 2013).

BRUCELLOSIS IN NIGERIA

Brucellosis is endemic in Nigeria, and outbreaks have been documented practically everywhere in the country (Cadmus *et al*., 2006). Brucellosis was first reported in Nigeria in 1927, since then, several epidemiological surveys have revealed the presence of the disease in the livestock population in Nigeria (Ocholi *et al*., 1993). Nigeria conducted its initial brucellosis investigation from 1966 to 1981 (Aiyedun *et al*., 2022). Due to the initial phase's

creation of awareness, many researchers became interested in several aspects of brucellosis in Nigeria starting in 1981 (Bale & Kumi-Diaka, 1981; Chukwu, 1985a&b; Chukwu, 1987; Ocholi, 1990; Asanda & Agbede, 2001; Bale & Nuru, 2001; Ishola & Ogundipe, 2001; Ocholi *et al*., 2004; Cadmus *et al.*, 2006; Cadmus *et al*., 2009; Gusi *et al.*, 2010; Farouk *et al*., 2011; Hamza, 2011; Junaidu *et al*., 2011; Mbuk *et al*., 2011; Mai, 2012; Olabode *et al*., 2012).

MODE OF TRANSMISSION

Animals become infected through direct contact with aborted fetuses, placenta, uterine discharges and ingestion of contaminated feed and water, artificial insemination from infected bull (Khurana *et al*., 2021). Brucellosis can spread to humans by direct contact with infected animals or their bodily fluids, such as semen, vaginal discharges, and aborted tissue (Qureshi *et al*., 2023). Due to frequent encounters with animals, those who work directly with livestock, such as farmers, veterinarians, and livestock handlers, are more likely to have the disease (Laine *et al*, 2023). Consumption of raw or unpasteurised dairy products from diseased animals, such as milk and cheese, can also spread brucellosis (Islam *et al*., 2023). Human infection resulting from consuming these contaminated animal products underscores the significance of food safety procedures in controlling the spread of the disease (Islam *et al*., 2023).

Inhalation is another possible means of transmission. Airborne transmission of brucellosis can become a problem in some work environments, such as slaughterhouses and meat processing plants (Qureshi *et al*., 2023). Employees in these establishments run the risk of becoming infected by breathing in airborne contaminants (Qureshi *et al*., 2023). This emphasises how important it is to put in place efficient workplace safety procedures and make use of personal protective equipment (Laine *et al*., 2023).

BRUCELLOSIS IN CATTLE

Since its initial discovery in 1927, Nigeria's livestock population has been found to be carriers of the disease, according to multiple epidemiological surveys (Ocholi *et al*., 1993). In Nigeria, the most common *Brucella* infection is brucellosis in cattle caused by *Brucella abortus*, and about nine biotypes (1-9) are known (Radostits *et al.*, 2007; Akinyemi *et al*., 2022). *Brucella* had been isolated from horses, pigs, dogs, goats, sheep, and cattle; they were primarily linked to *B. abortus* biotype 1. No documented reports of *B. melitensis*, *B. canis*, *B. ovis*, or *B. neotomae* isolation from livestock in Nigeria are known to exist (Bale & Kwanashie, 1984, Ocholi *et al*., 1993). Bovine brucellosis is an endemic disease in Nigeria (Agunloye *et al*., 1999). All breeds of cattle in Nigeria have been confirmed to be susceptible to brucellosis, this has been detected wherever there are cattle (Akinyemi *et al*., 2022). Research conducted across Nigeria shows that the disease is prevalent, especially in dairy farms, ranches, and cattle breeding facilities where prevalence rates have been shown to range from 3.7% to 48.8% (Esuruoso, 1974; Agunloye, *et al*, 1999) and between 0.4 and 26% in slaughterhouse surveys conducted on slaughtered cattle as well as in the traditional Fulani nomadic herds (Nuru & Dennis, 1975; Eze, 1978a; Falade & Shonekan, 1981; Chukwu, 1987). Very few studies have been devoted to the investigation of the various biovars of brucellae among Nigerian cattle breeds. All of these investigations were based on serological surveys using the Rose-Bengal test (RBT), buffered antigen plate agglutination test, standard tube agglutination test, Wright sero-agglutination test, complement fixation test (CFT), and indirect enzyme-linked immunosorbent assay (ELISA) (Aiyedun *et al*., 2022). Nevertheless, some research has documented the isolation of *B. abortus* biovars 1, 2, 3, and 4 (Ocholi *et al*., 1993). In Northern Nigeria, twenty strains of *B. abortus* were isolated from cattle. Of these, 19 (95%) were biotype 1, and 1 (5%) was biotype 2 (Eze, 1978b).

Comparably, in a livestock study conducted at breeding centers in Nigeria, 8 strains of *B. abortus* from semen and aborted fetuses of cattle were found; 5 (62.5%) belonged to biotype 1, 2 (25%) to biotype 3, and 1 (12.5%) to biotype 4 (Bale & Kumi-Diaka, 1981; Ocholi *et al*., 2004; Ocholi, 2005).

BRUCELLOSIS IN SHEEP AND GOATS

In Nigeria, brucellosis in sheep, goats, and small ruminants is a disease of great social and economic significance (Bale *et al*., 1982). *Brucella melitensis* and *Brucella ovis* are the primary causes of brucellosis in these animals, although other *Brucella* species can infect sheep and goats, biovars 1 and 3 are most commonly isolated in small ruminants in the Middle East, Latin America, and the Mediterranean (Saxena *et al*., 2018). Adams & McKay (1966) and Kramer *et al.* (1967) provided serological findings that served as the basis for the first report of brucellosis in goats. The disease has been confirmed in sheep and goats by later reports based on serological surveys from different sections of the country (Falade *et al*., 1975; Falade *et al*., 1981; Falade & Shonekan, 1981)**.** According to these investigations, brucellosis prevalence in sheep and goats ranges from 2.15% to 14.5%. There are reports of *Brucella* isolation from goats and sheep (Kramer *et al*., 1967; Okoh, 1980; Falade, 1981; Falade & Shonekan, 1981; Bale *et al*., 1982; Brisbie *et al*., 1993). Although field observations suggest that abortion occurs often in sheep and goats, a thorough laboratory analysis of the causes was not conducted (Okoh, 1980). *B. abortus* biotype 1 isolation was reported by Falade (1981) and *B. abortus* was isolated from a case of sporadic natural infection of sheep (Okoh, 1980).

BRUCELLOSIS IN DOGS

The most common cause of canine brucellosis is *B. canis* (Carmichael, 1990; Wanke, 2004). Dogs that come in contact with the tissues or secretions of infected livestock especially aborted fetuses, raw milk, and placenta become infected with *B. melitensis*, *B. abortus*, or *B. suis* (Baek *et al*., 2003; Woldemeskel, 2013). *B. canis* has also been isolated from a lymph node of a cow, but the clinical and epidemiological implications of this discovery are unknown (Baek *et al*., 2012). There is very little evidence of breed predisposition in dogs, and the large number of well-documented outbreaks in beagles could be attributed to the breed's widespread use in research (Morisset & Pink, 1969; Hollett, 2006; Brennan *et al*., 2008; Gyuranecz *et al*., 2011). Kennel outbreaks of *B. canis* infection in dogs have been reported (Morisset & Spink, 1969; Brower *et al*., 2007; Brennan *et al*., 2008; Gyuranecz *et al*., 2011; Hofer *et al*., 2012) or serological examination of stray and companion animals (Dreer *et al*., 2013; Yoak *et al*., 2014; Hubbard *et al*., 2018).

Serologic surveys showed that stray dogs had a greater prevalence of *B. canis* infections than dogs kept as companions (Brown *et al*., 1976; Lovejoy *et al*., 1976), and lack of control of mating in stray dogs, which encourages the spread of the disease (Santos *et al*., 2021) according to research carried out in Mississippi 2.3% of Shelter dogs had *B. canis* infection. However, the prevalence in shelter dogs ranges from 0 to 8.6%, this suggests that a small percentage of shelter dogs can have a high seroprevalence of brucellosis (Hubbard *et al*., 2018). During an outbreak of abortions and other reproductive failures in the United States in 1966, *B. canis* was first isolated from aborted fetuses in a Beagle kennel (Carmichael & Kenney, 1968). Since then, many countries have reported canine brucellosis caused by *B. canis* (Wanke, 2004; Hollet, 2006; Brower *et al*., 2007; Lucero *et al*., 2008; Holst *et al*., 2012). While the literature suggests a global distribution of *B. canis* infection (Hensel *et al*., 2018), no reliable epidemiological studies determine the prevalence of canine brucellosis (Santos *et al*., 2021).

In many countries, the significance of canine brucellosis may be overlooked due to a lack of reliable and accurate commercial laboratory tests (Wanke, 2004; Mol *et al*., 2020). Anti-*B. canis* antibodies have been discovered in wild canids in addition to dogs (Carmichael & Green, 1990; Oliveira-Filho *et al*., 2012) and both domestic and wild cats, even though cats are thought to be resistant to brucellosis (Santos *et al*., 2021).

Momoh *et al*. (2014) conducted a serological survey of canine brucellosis in Jos, Nigeria. They reported a seroprevalence of 29.2% out of the 113 Rose Bengal Plate Test (RBPT) positive samples using competitive ELISA. Agunloye *et al*. (1999) found serological evidence of *Brucella abortus* infection in dogs in Ibadan, with a prevalence of 4.35%. Osinubi *et al*. (2005) revealed that 21.5% of 200 canines investigated in Zaria tested positive for *B. abortus* agglutinins using RBPT.

BRUCELLOSIS IN PIGS

Since the 1940s, swine brucellosis has been investigated. Adams & McKay (1966) documented the first cases of swine brucellosis in Eastern Nigeria. The disease might exist, but not enough data is available to determine how common brucellosis is in Nigerian pigs. *Brucella* antibodies were found in 12 (2.7%) of the 443 pigs sampled from 6 pig farms in the Northern states of Nigeria. (Akinyemi *et al*., 2022). Two of the pigs had untyped *B. suis* recovered from them (Bale & Nuru, 1985).

Although epidemiologic data on swine populations in Africa are scarce, *B. suis* biovar 1 has been isolated from cattle in Egypt and Zimbabwe despite the continent's small swine populations (Ledwaba *et al*., 2014; Menshawy *et al*., 2014). In sub-Saharan Africa, porcine brucellosis is thought to be common, although epidemiologic data are scarce (McDermott & Arimi, 2002).

BRUCELLOSIS IN HORSES

It is unclear how horses contribute to the spread of brucellosis in Nigeria. Reports on its occurrence in horses are quite scarce. However, 14 (8%) of the 166 horses in Northern Nigeria that Bale & Kwanashie (1984) studied had antibodies against *Brucella*. According to reports by Ehizibolo *et al*. (2011), Ardo & Abubakar (2016), and Baba *et al*. (2022), seroprevalences of *Brucella* in horses in Nigeria range from 6.7% to 22.7%. Similar findings were reported by Tijjani *et al*. (2017) about the seroprevalence of *Brucella* in donkeys in Northeastern Nigeria. Baba *et al*. (2023) reported a prevalence of 24.09% and 11.89% using Modified Rose Bengal Plate Test (mRBPT) and Serum Agglutination Test with EDTA (SAT-EDTA) respectively in horses in Kano metropolis.

BRUCELLOSIS IN CAMELS

The serological surveys of camels were conducted in Kano State, Nigeria by Okoh (1979) and in three Northern states, Kaduna, Katsina, and Kano by Adamu *et al*. (1997), where the prevalence of *Brucella* antibodies was 1.0% and 27.8%, respectively, provide the basis for the evidence currently available regarding the presence of brucellosis in camels in Nigeria. Salisu *et al*. (2018) also observed that camels in Katsina State, Nigeria, produced 110 (11.22%) RBPT-positive and 103 (10.50%) Serum Agglutination Test (SAT)-positive samples. According to Salisu *et al.* (2018), 63 (13.3%) and 47 (9.3%) of the 472 and 508 serum samples examined from the field and abattoir, respectively, tested positive by RBPT, while 62 (13.1%) and 41 (8.1%) tested positive by SAT.

PUBLIC HEALTH IMPORTANCE OF BRUCELLOSIS

Production of food animals (cattle, lambs, goats, pigs, and poultry) and the horse industry, including polo and racing, as well as ceremonial activities, can be considered significant sectors where people and even the government generate revenue (Alton, 1990). Cattle, sheep, goats, and pigs provide the majority of the meat that people in Nigeria and most other African countries consume (Salisu & Babashani, 2015).

There are nine recognised species of *Brucella*, and five of them can infect humans. *B. melitensis B. abortus*, and *B. canis* are the most invasive and pathogenic species for humans. It has been established that marine *Brucella* (*B. ceti*) is zoonotic. The most severe form of brucellosis in humans is produced by *B. melitensis*, followed in decreasing order by *B. suis*, *B. abortus*, and *B. canis*. The contents of the United States of America disease control and prevention programs list them as possible bioweapons. This is because the three species may be aerosolised, making them extremely contagious. Furthermore, it would be challenging to identify an outbreak because the early symptoms of brucellosis are often confused with those of influenza (Chain *et al*., 2005). About half a million cases of brucellosis occur in humans globally. The prevalence in reservoir animals leads to its occurrence in humans (Scholz *et al*., 2008).

ECONOMIC IMPORTANCE OF BRUCELLOSIS

The global incidence of brucellosis in domestic and game animals, together with humans, poses a significant economic challenge for systems of intensive and extensive livestock production. (Bshop *et al*., 1994). The disease can result in significant losses in animal productivity, mainly from a 20% reduction in milk output in cows that have had abortions (Lokamar *et al*., 2020). The typical after-effect of infertility is an extended interval between lactations. An infected herd's inter-calving period is typically extended by several months (Dubie *et al*., 2014).

It also causes loss in calves and interferes with the breeding program. In cattle ranches, where the calves are the only source of income, this is extremely important. A high rate of permanent infertility leads to extensive culling of valuable cows, and severe metritis following placental retention causes several fatalities (Radostits *et al*., 2006).

Bovine brucellosis causes several economic losses, including abortion-related losses of calves, decreased milk yield, culling and condemnation of valuable cows due to breeding failure, endangered animal export trade of a country, loss of manpower, medical expenses, and government costs for eradication and research programs (Chukwu, 1987). According to the data that is currently available, brucellosis is one of the most serious diseases that cattle in Latin America and other developing nations face. According to official estimates, bovine brucellosis causes over US$ 600 million in losses per year in Latin America (PAHO-WHO, 2001). There have been reports of sheep brucellosis in Australia, New Zealand, the United States, South Africa, and Europe due to *B. ovis*. In certain places, the incidence has been extremely high, and there has previously been significant financial damage (Dubie *et al.*, 2014).

In certain places, the incidence has been extremely high, and there have previously been significant financial losses. It was estimated that the disease impacted 30–40% of rams in California, resulting in an annual loss of US $2 million. *B. suis* is a chronic swine disease that causes orchitis in boars, infertility and abortion in sows, and high piglet mortality. The disease's economic significance stems from the reduced fertility and number of weaned piglets per litter of infected herds (Radostits *et al*., 2006).

PREVENTION AND CONTROL IN ANIMALS AND HUMANS

Realistic adoption of brucellosis prevention and control requires knowledge of regional and local differences in infrastructure, social customs, animal husbandry methods, and epidemiological patterns of the disease (Dadar *et al*., 2021). Brucellosis is often controlled by quarantining imported livestock, properly disposing of aborted fetuses, and removing fetal membranes and secretions before disinfecting infected areas (Tulu, 2022). Until after parturition, animals in advanced pregnancy should be kept in isolation (Bshop *et al*., 1994; Dubie *et al* 2014). Additionally, replacement stock ought to be acquired from a herd free of brucellosis, and the decision on immunising negative animals should be made (Dadar *et al*., 2021). It is also feasible to eliminate positive reactors through screening and slaughter (Walker, 1999). vaccinations such as *B. abortus* strain 19 (S19), a live vaccine typically administered as a single subcutaneous dose of 5-8 × 10^{10} viable organisms to female calves between the ages of three and six months (Chaudhuri *et al.*, 2021). For adult cattle, a lower dose of 3 × 10^{8} to 3 × 10^{9} organisms might be given subcutaneously. Alternatively, it can be administered through the conjunctiva applied in two doses of 5 x 10^{9} live organisms to animals of any age. This lowers the possibility of miscarriage and milk excretion (OIE, 2004). The control and prevention of the infection in animal reservoirs is the most practical method for preventing brucellosis in humans. Furthermore, farmers must be educated on the need to handle the disposal of aborted fetuses, fetal membranes, and discharges properly. Abattoir workers also need to be educated on the risks of transmitting the disease, particularly through skin abrasions, and the need to stop drinking unpasteurized milk (Acha & Szyfers, 2001).

CONCLUSION

Brucellosis is one of the most prevalent animal and zoonotic disease of both economic and public health importance. In developing nations, the disease is endemic with a high rate of occurrence which maybe as a result of cultural, socioeconomic, political and sanitary factors. Early and rapid diagnosis of the disease using cultural methods, serology and molecular method including PCR is essential for effective control strategies against brucellosis. The control of brucellosis requires a One Health approach with collaboration between all associated workers in animal production that include farmers, butchers, hunters, veterinarians, laboratory personnel and the government.

National policies should be developed for the control and eradication of animal brucellosis to lessen the disease's negative effects on the economy and public health. Thorough research and documentation of the disease's prevalence, distribution, economic effect, and public health implications which encompasses surveillance is necessary to inform decision-makers. Nationally recognised reference laboratories should be established to enhance rapid and accurate diagnosis of brucellosis. It is essential to educate the public about the source of infection and mode of transmission including symptoms of disease in man to increase knowledge level and prevent the risk of infection. To lower the risks of infection, the appropriate safety measures should be implemented especially for occupationally exposed individuals. Pasteurisation of milk should be highly encouraged to prevent disease in humans. Creating public health awareness on brucellosis is paramount and formed the primary reason motivating this review.

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