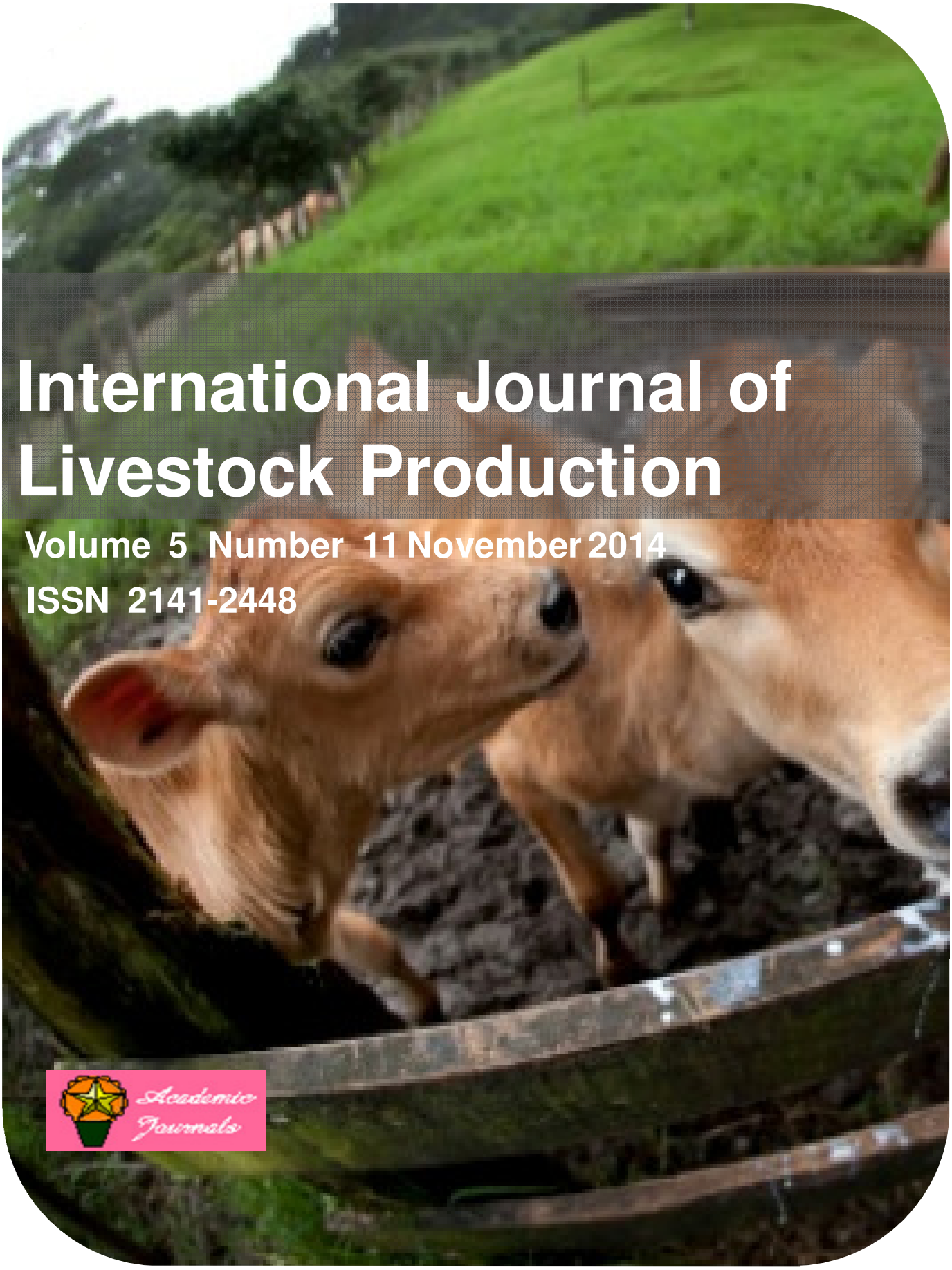

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Full Length Research Paper

Biosecurity practices in Central Ethiopian cattle feedlots: Its implication for live cattle export

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Biosecurity is the implementation of measures that reduce the risk of the introduction and spread of disease agents. Biosecurity is a cornerstone of herd health maintenance in export-oriented feedlots. The aim of this study was to document current biosecurity practice in export-oriented cattle feedlots in Central Ethiopia and to discuss its implication for live cattle export. In this study 31 export-oriented cattle feedlots found in central Ethiopia were interviewed with structured questionnaire in order to better understand how owners deal with the challenges of introduction or spread of diseases. Majority of the feedlot operators took little percussions in purchasing and introduction of bulls for their feedlots. This study furthermore indicated that hygienic practice of the feedlots workers and visitors are none existent. Vaccinations of all bulls for six diseases were given in all assessed feedlots. Only 9 (29%) of assessed feedlots used their own veterinarian for the treatment of sick animals. A single needle was used on multiple cattle by all feedlots without disinfection. This study has identified that biosecurity measures in export oriented feedlots to be very low, with majority of them undertaking little or no preventive measures to combat disease transmission either within or between farms.

Key words: Biosecurity, feed lots, Central Ethiopia.

INTRODUCTION

Biosecurity is the implementation of measures that reduce the risk of the introduction and spread of disease agents; it requires the adoption of a set of attitudes and behaviors by people to reduce risk in all activities involving domestic, captive exotic and wild birds and their products (FAO/OIE/World Bank, 2008). Introduction and spread of diseases in livestock industries reduce the efficiency of production. Therefore, prevention through biosecurity is the most cost-effective protection for animal diseases (Van Schaik et al., 2001, 1998). Public concern is growing worldwide regarding the rapid trans-boundary spread of animal diseases through animals and animal products. Thus countries are forced to apply stricter measures so that animals and their products exported should meet international sanitary phytosanitary (SPS) agreement requirement of the World Trade Organization (WTO). This requires putting in place adequate biosecurity practices.

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Therefore, in order to secure international market, Ethiopian livestock producers and exporters needs to meet WTO requirement by demonstrating their responses to biosecurity risk. Currently, live cattle and cattle meat exports from Ethiopia are largely feedlot-based. However, due to lack of biocontainment, awareness of the actors and poor biosecurity measures in feedlots, those feedlots are venerable for the introduction and spread of transboundary animal diseases (Alemayehu, 2012; Alemayehu et al., 2012). Due to this fact export-oriented feedlots are repeatedly challenged by transboundary animal diseases such as foot and mouth disease (FMD), lumpy skin disease (LSD) and contagious bovine pleuropneumonia (CBPP) (Alemayehu, 2012; Alemayehu et al., 2012; Kassaye and Molla, 2012). Therefore, the current biosecurity practices in the feedlots and the existence of transboundary animal diseases in country certainly affect the live cattle and meat export from the country. Thus, it has significant impact on the feedlots industry and livelihoods of smallholders and poor pastoral producers. Therefore, improving the standards of biosecurity in feedlots is necessary to increase competitiveness of live cattle and meat export to international markets.

For longer time Middle East markets are the traditional destination of Ethiopian live cattle and cattle meat. However, the current biosecurity measure undertaken to prevent diseases spread along the value chain unquestionably becoming a challenge for the country future live cattle exports opportunities to those countries. From Middle Eastern countries, Egypt and Yemen were the only importer of live cattle from Ethiopia during the study period. This fact signifies the declining share of Ethiopian live cattle and meat export in recent years while the competitors have been taking an advantage of the rapidly expanding market for live animals in terms of reliability of supply, quality and safety. Although some information exists for the developed country on biosecurity practices on farm animals (Brennan and Christley, 2012; Noremark et al., 2010; Hoe and Ruegg, 2006; Brandt et al., 2008) there is generally no published data on farm animal health and biosecurity practices in cattle feedlots in Africa in general in Ethiopia particular. With this regard these survey was undertaken in order to better understand how export-oriented cattle feedlots owners deal with the challenges of introduction or spread of diseases.

MATERIALS AND METHODS

Study area

The study was conducted in East Shewa Zone, Central Ethiopia. Absolute location of the Zone extends from 7° 33'50"N to 9°08'56"N and 38°24'10"E to 40° 05' 34"E which indicate that this zone is located in tropical climatic zone though the climate is influenced by altitudinal variation. The total area of East Shewa Zone is approximately 9,633.52 km^2. Adama (the biggest city of the zone) and surrounding areas hosts feedlots of various sizes for both local and export markets. The feedlots are located in urban and peri-urban areas. The larger feedlots produce about 2,000 to 3,000 heads of cattle a year while the smaller ones hold about 10 to 20 heads at any one time.

Data collection and analysis

A survey was performed in 31 feedlots found in central Ethiopia. The feedlots keeping cattle ranged from 140 to 1800 in Adama, Awash Melkasa and Wanji were considered for the survey. The list of feedlots owner who owned cattle in their feedyard were obtained from Adama Plant and Animals Quarantine Center and Ethiopian livestock trader's association Adama branch office. Feedlots owners were contacted through phone call to confirm their willingness to participate. Of 42 feedlots owners contacted, 5 of them were already sold the bulls and the remaining 6 feedlots owner refused to participate. Therefore, of the 37 currently finishing the bulls for export, 88% agreed to participate in the study. Therefore, 31 feedlots owners/managers were interviewed with semi-structured questionnaire. The data was collected and descriptive analysis such as frequency and percentage was done.

RESULTS

New cattle purchasing and introduction practices

The study revealed that 25 (80.6%) of feedlots operators (n=31) use Borena markets as the main source bulls and 6 (19.4%) feedlots operators used Dera and Adama markets for purchasing bulls for their feedlots. However, none of those operators have any idea about previous health status of purchased bulls. All feedlots operators do not use veterinarian to perform pre-purchase inspection and selection of bulls in the market; however, per-purchase inspections and selection have been conducted by feedlots operators or purchaser groups which involves a visual and physical evaluation of animal while moving freely in the market. In all studied feedlot the purchased animals were not subjected to any tests before they were moved into feedlots. Only small proportion of feedlots operators, 4 (12.9 %) have trend of buying animals as single where as majority 27 (87%) of them have trend of buying animals as batch. Of feedlots operators 26 (83.9%) indicated that the disease of most concern was foot and mouth disease (FMD), on the other hand, 5(16.1%) of them indicated that the disease of most concern was lumpy skin disease (LSD). All feedlots operators transport the purchased bulls with small trucks which were not dedicated for livestock transport.

Twenty five (80.6%) respondent indicated that they fatten the purchased bulls in privately owned barn, whereas 6 (19.4%) fatten in rented barn. All assessed feedlots keep the bulls in concrete fenced premises with secure gate. The survey results revealed that 27 (87.1%) feedlots practiced All-in / All-out management system whereas 4 (12.9) of them keep unsold bulls and/or resident animals within the facility. Only 1 of 27 (3.7%) of feedlots clean and disinfect the units between subsequent herds/flocks regularly (Table 1).

Table 1. Biosecurity practices used during new cattle purchasing and introduction to the feedlots in central Ethiopia, 2011.

Biosecurity practices	Frequency	Percent
Source market		
Borena	25	80.6
Dera and Adama	6	19.4
Previous health status		
Known	0	0
Not known	31	100
Per-purchase inspection		
Veterinarian	0	0
Feedlots operators	31	100
Buying system		
Single	4	12.9
Batch as single	11	35.5
Both single and batch	16	51.6
Barn ownership		
Own	25	80.6
Rented	6	19.4
Introduction of subsequent herds/flocks		
All-in / All-out	27	87.1
Resident animals	4	12.9
Clean and disinfect the units between subsequent herds/flocks regularly		
Yes	1	3.7
No	30	96.3

Cleaning and disinfection practices

The assessment result revealed that 83.3% of the staff working in feedlots has direct contact with bulls. In all feedlots, staffs did not use any protective cloths while handling dead bulls and also did not use sanitary and disinfection facilities to avoid contamination. The staff were coming in contact directly with bulls for several reasons at all stages of the production cycle including tagging, prophylaxis treatments, vaccinations, medication of sick animals, blood sample collections and disposal of dead bulls. Indirect contacts also occur during feeding and watering. Formal training for feedlots workers on biosecurity was offered in none of the feedlots.

Only 2 (6.5%) of the feedlots disposed carcass by bury or burn where as 29 (93.5%) of surveyed feedlots carcasses were disposed in open space nearby feedlots where scavengers and insects have easy accesses. In almost all feedlots scavengers such as vultures, dogs, cats and rodents have free access to the feedlots and dump sites. The assessment further indicated that 6 (19.3%) of feedlots were keeping dogs and in all feedlots cats and vultures can have easy access. In 10 (32.3%) of assessed feedlots manures were collected in one side of the facility only during wet season. Of surveyed feedlots feed and water troughs were cleaned regularly before use in 5 (16%) feedlots where as in 15 (48.4%) feedlots troughs were cleaned daily in the morning and 11(35.5%) were cleaned when need arise (Table 2).

Health management practices

Vaccinations for FMD, LSD, CBPP, anthrax, black leg and pasteurellosis were given for all bulls in all assessed feedlots as part of SPS requirements and rules and

Table 2. Cleaning and disinfection practice used in cattle feedlots in Central Ethiopia.

Biosecurity practice	Frequency	Percent
Hygienic practice of staff		
Protective cloths for staff	0	0
Sanitary and disinfection facilities	0	0
Training of staff on hygiene	0	0
Carcass disposal methods		
Bury or burn	2	6.5
Open air	29	93.5
Cleaning of feed and water troughs		
Cleaned regularly before use	5	16
Cleaned daily in the morning	15	48.4
Needed basis	11	35.5

Table 3. Animal health delivery and reporting practice in export oriented cattle feedlots.

Biosecurity practices	Frequency	Percent
Veterinary service		
Own	9	29
Private	22	71
Use of needle		
One needle per cattle	0	0
One needle for multiple cattle	31	100
Needle hygiene		
Disinfect needle between use	0	0
Not disinfected between use	31	100
Death of cattle		
Sudden death	30	96.8
No sudden death	1	3.2
Reported sudden death to veterinary authority (N=30)		
Reported	5	16.7
Not reported	25	83.3

regulations of animal quarantine. According to survey result, only 9 (29%) of assessed feedlots used their own veterinarian for the treatment of sick animals where as 22 (71%) of them used private veterinarians (Table 3). A single needle was used on multiple cattle by all feedlots. Survey further indicated that almost all feedlots are unlikely to disinfect or thoroughly clean and dry their equipments between use. Of surveyed feedlots, 30 (96.8%) of them indicated that they experienced sudden unexplained death of their bulls, however, only 5 (16.7%) of them reported this to veterinary authority. An animal with infectious signs were not subject to laboratory investigation in all assessed feedlots. All respondents believed that there was clinical incident lumpy skin disease in their feedlots. In 26 (83.9%) of surveyed feedlots there were isolation pen for clinically sick bulls.

DISCUSSION

This study was the first to our knowledge on biosecurity measures undertaken by Ethiopian cattle feedlots owners. We found almost nonexistent of common biosecurity practices in export-oriented cattle feedlots.

Export of live cattle and cattle meat from Ethiopia are largely feedlot based. So maintaining high standards of biosecurity is crucial to make sure that Ethiopian produce remains sought-after in an increasingly competitive market place. However, an accidental animal diseases outbreak in feedlots could cause large economic damages with significant international markets and trade disruptions. This highlights the need for better understanding of factors reinforcement feedlots operators' decisions regarding the implementation of biosecurity practices. The overall understanding of the use of biosecurity plan in the majority of the feedlots operators is almost negligible. None of the feedlots applied two phase SPS certification system proposed by Ministry of Agriculture and Rural Development (MoRAD) which enforces live cattle exporters to undertake pre-selection of bulls in local markets, followed by initial testing, vaccination, and quarantine of bulls for 21-day during the first phase and then quarantining and finished in a feedlot (Phase 2). Furthermore, none of the operators followed guideline and standards released by MoARD (2008) for prevention and control of diseases in Phase I and II SPS facilities. As a result, live cattle and meat exported from Ethiopia fail to compete in international market especially in those importing countries having more strict measures. The repeated bans imposed by importing countries on livestock and meat export trade of Ethiopia signify a lack of confidence in the country's export systems. The imposition of this type of trade ban and the endemic nature of TADs in Ethiopia raises questions about the most appropriate ways to control the disease along the chain and also, ensure the safety of live cattle and meat exported to other countries.

New cattle purchasing and introduction practices

Using Borena markets as main source of cattle for fattening was the same as reported by Farmer (2010). This might be due to the larger size, efficient feed conversion and superior meat quality of Borena breed cattle (Legese et al., 2008). However, Borena pastoral area is one of area in which transboundary animals diseases such as FMD, LSD and CBPP epidemics have been reported (Rufael et al., 2008; Bayissa et al., 2011; Mekonen et al*.,* 2011; Gari et al., 2010; Roger and Yigezu, 1995). Moreover, these animals move from production areas to the feedlots without certifications and any test. Pre-purchase inspections along the market chain have been conducted by traders or purchaser groups without necessary veterinary skills and knowledge and there are no appropriate holding facilities in the market chain that can assure containment of the agents upon release. Moreover, majority (87%) of feedlots owners have trend of buying animals as batch with visual and physical evaluation of animal while moving freely in the market could increase the probability of an infected bull with unapparent infection to pass undetected along the market chain since sensitivity for clinical inspections of diseases such as FMD during the early stages is low (sens: <0.1) (Achterbosch and Döpfer, 2005). This trend expands vulnerability of feedlots for disease incursion, since detection is based on visual observation of clinical signs, the disease could have been present and possibly spreading before discovery.

Although, majority of feedlots owners (87.1%) practiced All-in / All-out management system, almost none of them clean and disinfect the units between subsequent herds/flocks regularly. Sobsey et al. (2003) indicated that manure and other wastes (such as respiratory secretions, urine and sloughed feathers, fur or skin) of various livestock animals often contain high concentrations pathogens which are capable of persisting for days to weeks to months, depending on the pathogen, the medium and the environmental conditions. FMD virus may persist for over 1 year in contaminated premises (Radostits et al., 2006). LSD virus is also remarkably stable and surviving for long periods at ambient temperature, especially in dried scabs (Rovid, 2008). Therefore, manure and other waste can act as source of infection for new herds.

Cleaning and disinfection practices

Most stringent biosecurity requirements are concentrated on the people in the high-risk category, such as those who have direct contact with animals or manure on the farm, as well as other farms (Gekara and Leite-Browning, 2012; Anderson, 2010). However, this study indicated hygienic practice of the feedlots workers and visitors are none existent. Brennan and Christley (2012) indicated that only 7% farms did farmers or their workers carry out any personal biosecurity (that is, cleaning boots, changing overalls) between handling different management groups. This low level protocol, such as washing hands or cleaning general equipment was reported by Rogers and Cogger (2013) thoroughbred stud farms in New Zealand. Staff hands, clothes or shoes soiled with excretions from infected bulls and carcasses can also be the source of infection for FMD Virus (Aftosa, 2007; Radostits et al., 2006). Majority of the feedlots owners (93.5%) dispose carcass by throwing carcasses into shallow pits or leave it on open air where scavengers can easily have accesses to carcasses and transmit diseases such as FMD to feedlots mechanically or biologically (Radostits et al., 2006; Mckercher and Callis, 1983).

Health management practices

As part of SPS requirements and rules and regulations of animal quarantine, all bulls destined for export must be vaccinated for six diseases. However, vaccination of bull

started after one to three weeks of registration by Adama veterinary controlling authority. The length of time from introduction of first batch of bulls to vaccination is sufficient to transmit the diseases to healthy bulls. Only 29% of assessed feedlots used routine veterinary visits by their own veterinarian this is similar to study of North-West England on cattle farms where only 36% of farms had regular visits with their veterinary surgeon (Brennan and Christley, 2012). This indicated that majority of feedlots plan biosecurity protocol by their own and with higher probability of getting infection from other feedlots by contaminated equipments used by mobile veterinarian. Using single needle on multiple cattle was similarly reported in US by Andersons (2010) in which a single needle was used for up to 20 head of cattle. If proper needle hygiene was not practiced, common use of needles has been shown to be a means of transmission of diseases such as *Anaplasma marginale* (Whittier et al. 2009) and LSD Virus (Magori-Cohen et al., 2012; Tuppurainen and Oura, 2012) in cattle.

Even though, almost all (96.8%) feedlots experienced sudden death of their bulls, only small proportion of them (16.7%) reported this to veterinary authority. This might be due to the fact that most business owners need to keep diseases occurrence as a secret because it might result in decrease customers' interest on their finished bulls and lack incentives to report infection (Kuchler and Hamm, 2000; Jin et al., 2009). In majority of feedlots have isolation pen for sick animals; however, the infectiveness of the isolation is questionable. Since many of isolation pens were found adjacent to pen where healthy bulls were kept with possibility of diseases transmission from infected bulls to healthy bulls by means of aerosols (Kitching, 1992) and the pens were non-insect proof with very high probability of diseases transmission through mechanical vectors (Chihota et al., 2001; Ali et al., 1990).

Conclusion

This study has identified that biosecurity measures in export oriented feedlots were found very low, with majority of them undertaking little or no preventive measures to combat disease transmission either within or between farms. This study could be used as springboard for further studies and awareness creation and education for feedlots operators.

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Conflict of Interest

The authors have not declared any conflict of interest.

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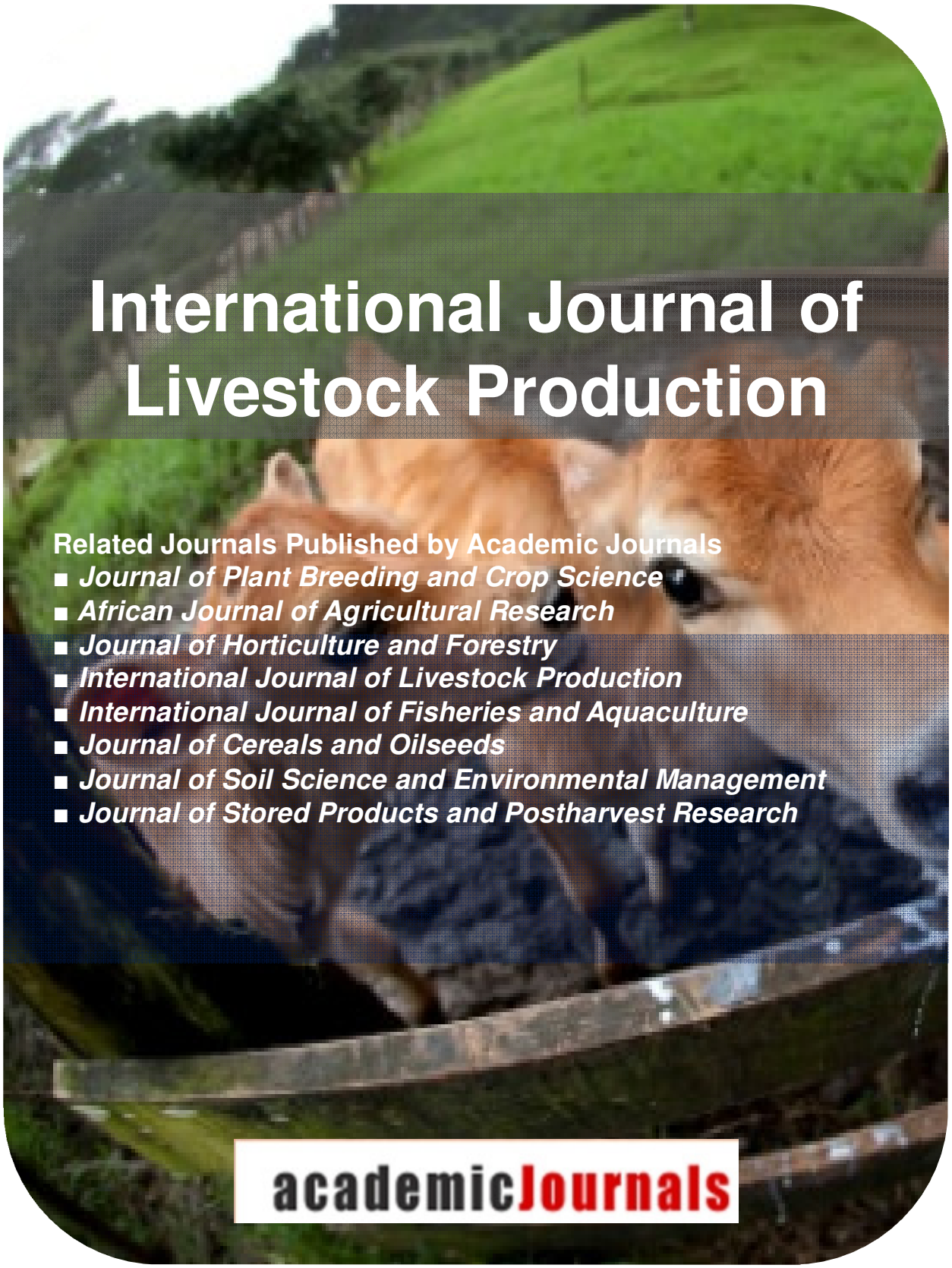

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