

Livestock-Cattle Welfare and Public Health Implications of Injectable Drug-Administration Malpractices under Livestock-Cattle Farming and Commercial Conditions

Abstract

Background: Injection drug administration can harm animals and cause increased public-health problems, if improperly administered, and without professional ethics.

Objective: To investigate the unreported and under-reported injection malpractices by the nomadic livestock-cattle farmers and livestock-cattle traders in Nigeria, and associated animal welfare issues, as well as related public health implications.

Methodology: Sources of information were observations and informal oral interviews of the livestock-cattle farmers and traders, who were located at six major livestock-cattle farms and settlements, and six livestock-cattle markets in Southwest Nigeria. Interviewed veterinary doctors and animal husbandmen were also proximal to the same locations, while others quite far were interviewed through telephone conversations. Verbal informed consents were obtained from the respondents, and transcribed information were presented in textual and graphical forms.

Findings: Pastoral livestock-cattle farmers and traders in Nigeria commonly inject their cattle unprofessionally. To restrain a cow for injection, its head is tilted sideways after tying a rope with slip knot round its neck, then injection would be administered on or around the hump, followed by hitting the injection site with fist. Injected cow is made recumbent on the floor with the head tilted backwards and the tail held between the two tied hind legs, while more pressure is applied on the neck by the rope whenever the cow struggles. About five minutes after injection, the rope around the neck of the injected cow is released. Major reasons for non-professional injections administrations on livestock-cattle include, shortage of veterinary doctors and animal husbands, inaccessibility to animal health professionals, due to nomadic cattle farming, lack of subsidy and non-compensation by governments, in cases of livestock-cattle morbidity and mortality, as well as, the livestock-farmers' occasional refusal to pay for rendered veterinary services.

Conclusions: This study to our knowledge is the first to highlight the unreported but notable non-professional harmful injection of livestock-cattle, by nomadic livestock-cattle farmers and livestock-cattle traders. Resulting drastic effects of the injection malpractice on livestock-cattle welfare, and zoonotic implications on public health, must be addressed through the suggested adequate interventions and appropriate implementable policies.

Keywords: Livestock-cattle welfare; Humane livestock care; Injection administration; Livestock management; Public health; Veterinary health malpractices

Adenike AO Ogunshe^{1*} and Abiodun A Adeola²

- 1 Applied Microbiology & Infectious Diseases, Department of Microbiology, Faculty of Science, University of Ibadan, Nigeria
- 2 Food and Nutrition Research Programme, Institute of Food Security, Environmental Resources and Agricultural Research, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria

***Corresponding author:**

Adenike AO Ogunshe

✉ adenikemicro@gmail.com

Applied Microbiology & Infectious Diseases, Department of Microbiology, Faculty of Science, University of Ibadan, Nigeria.

Tel: +23408056502579

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Introduction

The livestock sector globally has been reported to be highly dynamic, and one of the fastest growing agricultural subsectors in developing countries [1-3], and with an increasing demand for production of animal products, a trend known as the livestock revolution [4-6]. Livestock are important assets in Africa, due to significant opportunities for their contributions to economic growth and poverty reduction, especially among the rural farmers in developing countries [2]. Livestock in Africa also fulfills other multiple roles, ranging from draught power, to providing manure, and nutrition, such as, milk, and meat [3,7,8], as well as improvement of the nutritional status of their owners [2,9]. Meanwhile, animal trade plays an important role in the spread of infectious diseases in livestock populations [2,10-12]. More specifically, animal trade issues include international trade rules, food safety, and harmonisation of environmental and animal welfare rules [13].

Veterinary care of health importance in livestock is mainly for treatments in pre-infectious, infectious and post-infectious conditions of livestock animals, and in most cases, through injection with appropriate medications; since injection has been reported as the best method of administering many medicines and vaccines on animals [14]. It is therefore, very important to know how to appropriately inject animals subcutaneously, intramuscularly or intra-nasally, with the needed medications, including large animals like cattle [15,16]. This is because, livestock bovine mishandling, and improper injection methods, like needle or animal movements during administration of an intramuscular injection, can cause animal welfare conditions, such as, muscle damage, bruising, petechial haemorrhages, and loss of a significant portion of the injection intended to be deposited subcutaneously, etc. [17].

Authors had also documented that there is need to care for, and use animals in facilities that allow safe and efficient restraint of livestock, as well as, ways judged to be scientifically, technically and humanely appropriate [18-23]. Since the cattle farmers and traders in Nigeria, who personally inject their animals in inhumane manner, are mostly non-literate, the afore-mentioned livestock health and welfare issues, and public health risks are not adequately comprehended by them. The purpose of this study therefore, is to investigate unethical practices against animal welfare, through unprofessional drug administration injection malpractices on cattle, and the associated general public health implications.

Methodology

Study area

The study was limited to selected Southwest Nigerian cities and towns (Akungba, Ibadan, Ijebu-Ode, Lagos and Oyo), where the indigenous (nomadic) cattle farmers could be interviewed under non-hostile and safer conditions. Interviewed veterinary doctors and animal husbandmen were also proximal or distal to the same locations.

Sources of information

Selected cattle farmers and traders were consulted informally for briefing on how cattle were treated in clinical and infectious cases, while guided, informed verbal consents were obtained from the cattle farmers and traders. Veterinary doctors and animal husbandmen who were far from the locations of the nomadic livestock-cattle farmers and traders were interviewed through telephone conversations. Information transcribed from informal oral interviews were analyzed presented as textural and graphical / pictorial results.

Results

Injecting a cow took an average of about 18 minutes, depending on the size of the cow, number of the livestock-cattle farmers, sellers or attendees, nature or stage of illness of the cow and time of the day. Figures presented the pictorial modes of the non-professional drug administration on livestock-cattle by injection. To restrain livestock-cattle for injection, a rope with slip knot was tied round the neck of the cattle, and the other end of the rope tied to a very strong tree (**Figure 1**).

The livestock-cattle were mostly injected at the hump or around the hump (**Figure 2**), followed by hitting the injection site with fist (**Figure 3**). Almost all the livestock farmers and traders injected their cattle on the hump or around the hump, without having any cogent reason for selection of the hump as injection site.

Injected cow was restrained shortly before and after injection, with the head tilted upwards and backwards, while straining the rope tighter around its neck (**Figure 4**). Further restrain of the injected cow was by making it recumbent, and still tightening the rope around its neck to the tree, while more pressure was applied on the neck by the rope when the animal kept struggling. The two hind legs were tied together, with the tail held between the thighs, as the head was still tilted sideways. The two hind legs were later outstretched for further restrain (**Figures 5-7**), and after about five minutes or more, the rope around the neck of the injected cow was released at the other end, which was tied to a tree (**Figures 8-10**), and the injected cow then allowed to rest for a while (**Figure 11**).



Figure 1 Tying a rope around the neck of a cow to a tree.



Figure 2 Injecting the cow at the hump.



Figure 5 Tightening the rope around the neck of the injected cow and titling the head upwards while placing it on the floor.



Figure 3 Hitting the injection site with folded fist.



Figure 6 Restraining the injected cow by tying the two hind legs and the tail between the thighs.



Figure 4 Restraining the injected cow by holding the head upwards and backwards and straining the rope around its neck.

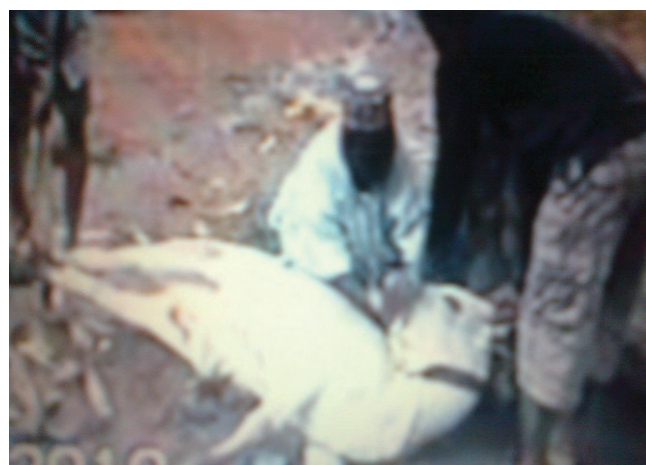


Figure 7 The two hind legs were tied and outstretched.



Figure 8 Releasing the rope around the neck injected cow.



Figure 9 Releasing the rope around the neck of the injected cow tied to the tree.



Figure 10 Releasing the rope around the neck injected cow tied to the tree cow.



Figure 11 Resting injected cow.

The major reasons for non-professional administration of drugs by injections on cattle, as claimed by the livestock-cattle farmers and traders were, shortage of veterinary doctors and animal husbands, lack of government subsidy, and most especially, non-compensation by governments in cases of livestock-cattle morbidity and mortality. According to veterinary doctors and animal husbands, the major likely conditions for non-professional administration of drugs on livestock-cattle by the livestock-cattle farmers and traders could be inaccessibility to animal health professionals, communication gaps between the livestock-cattle farmers and veterinary doctors, including language barrier, and also inability of the livestock-cattle farmers to pay or deliberate refusal to pay for rendered veterinary services, in addition to lack of agricultural subsidies from the government.

Discussion

Most regulations on status of animal welfare legislations, concerning animal transport, slaughter of animals for human consumption, killing of animals for disease control, and their implementation, even as distributed by the World Organization for Animal Health, are yet to be implemented in a number of developing countries, inclusive of Nigeria. Physical restraint, which is commonly known as the use of manual or mechanical means, like crush or chute is to limit some or all of an animal's normal movement for the purpose of examination, collection of samples, drug administration and therapy or experimental manipulations [15,16,23]. Whereas, as presented in this study, the highlighted physical restraint method commonly employed by the livestock-cattle farmers and sellers, when injecting their cattle, not only causes stress, discomfort, pain and distress but can also cause potential injury to the injected animals. Such series of animal stress can suppress the animals' immune systems; thus, facilitating animal-human and animal-animal disease transmissions [24]. Stress has also been known to damage rumen function; reduce the ability to prevent diseases and weight gain; thereby, causing increased weight loss, decreased milk production, as well as other adverse effects on the reproduction of farm animals [14,25-27].

Ordinarily, prior to injection, prevention of the cattle to be injected from struggling is normally by head restraint. But in cases where the animal was seriously agitated, and there was so much pressure around the neck of the livestock-cattle, due to excessive tightening of the noose, as observed in this study, this could cause choking, shoulder and neck injuries, dislocation of the affected joints or fracture, and other severe injuries like ruptured diaphragm or broken bones [14,25]. In addition, it has been reported that the reproductive efficiency of dairy cows is affected by different factors, including animal mismanagement [28]. There is also the possibility of scarred tissues and/or abscesses that could cause the animal much pain and suffering, while likely occlusion on the carotid arteries can kill the animal [14,25]. Due to the observed restraining methods applied by the cattle farmers and traders in this study, foot and leg injuries, injury to the nerves and other tissues, as well as other clinical and pathological trauma and injuries are similarly possible, when personally injecting cattle.

Subcutaneous injection of drugs is the preferred route in calves, although, injection technique is critical for prevention of livestock health problems [29]. Prior to administration of injections on livestock animals, restraint devices should be suitable in size, design and operation, to avoid bending and possible breakage of injection needles, in order to minimise overall stress, discomfort, pain, distress and potential injury to the animal, and also to improve handler safety [15-19,21,22,30]. Abscesses in the neck region can result from infections associated with injection of drugs into the neck muscles, as well as cervical spinal cord damage and motor disturbances [31,32], cervical diskospondylitis [33], osteomyelitis of the cervical vertebra, and spinal cord compression secondary to an abscess in the neck [31]. Also, shock or death of the animal being treated is very likely if injected medications unintentionally enter the bloodstream [14,34], especially the carotid artery, which supplies blood to the brain. Thus, when subcutaneously injecting a medication or vaccine to cattle animals, the *tenting method* of injection is commonly used, to ensure that such medication is delivered under the skin, and kept out of the underlying muscle tissue [16,34]. However, all these basic and clinical procedures in veterinary practices could not also be comprehended by the nomadic livestock-cattle farmers and traders.

The livestock-cattle farmers and traders interviewed in this study did not also know, as an example that, for the purpose of intramuscular or subcutaneous injections in cattle, muscle tissues of lesser value to consumers are expected to be chosen or that when intramuscular injection is required, especially in dairy calves, the posterior thigh muscles should be used, and that intramuscular injection of drugs that are also labelled for subcutaneous administration should be avoided [16,34]. But, as observed in this study, the livestock-cattle farmers and traders mostly injected their livestock-cattle on or around the hump, without having any cogent reason for selection of the hump, as injection site. Whereas, professionally, injections (even when administering more than one injection) are often subcutaneously administered in the neck area, half way up the neck, in front of the

shoulder or over the ribs, and well behind the shoulder. In cases of multiple injections, it has also been advised that the injection sites be placed at least four inches apart (one handbreadth from a previous injection site, e.g., opposite sides of the neck), for better absorption and less interaction between injection products, since moving only one to two inches between injection sites essentially creates one big site [14,16,34]. Injection-site swelling [16,35,36] is usually prevented by firmly rubbing the injected area for few seconds, after removing the injection needle, in order to also numb the pain, and prevent the injected medication from oozing out. Whereas, injection of livestock-cattle by the mostly nomadic livestock-cattle farmers and traders is usually followed by hitting the injection site with fist, even, without being certain of proper reason for hitting the injection site at or around the hump with fist. Meanwhile, apart from pains, this non-professional injection practice of hitting the injection site can cause local inflammatory responses (pyogranulomatous myositis, fibrosis and myonecrosis) of varying degrees [37], and can also lead to drug mal-absorption and drug residues in the animals.

Studies and documented information on farm animal injection mishandling are presently non-existing in Nigeria and several other developing countries, although similar mishandling of livestock bovine had been earlier reported in few other developed countries [14,38]. Considering that it has been continually confirmed that indicator multiple antibiotic-resistant bacterial species, especially those that are aetiological, are being introduced into other countries through animal movements and illegal imports of livestock, at rates that are higher than in the past [12,39,40], so, the issues relating to such non-professional administration of antimicrobial and clinical drugs in livestock-cattle addressed in this study, are also of significant global public and environmental health importance. This is especially with regards to bovine disease transmission to industrialised countries, in spite of the major reasons proffered for the non-professional administration of injectable drugs on livestock-cattle, by the cattle farmers and traders.

The livestock cattle farmers / traders, whose activities were observed in this study, are known as lacking expected clinical veterinary practices, which is responsible for their unprofessional cattle injection practices, and associated adverse animal welfare concerns. Furthermore, most of the regulations on the status of animal welfare legislation, including administration of medications on animals, etc., and their implementations, are yet to be fully enforced in a number of developing countries, including Nigeria, as animal trade is presently commonly unregulated. Considering that epidemiological studies, such as the present study, can be used to identify risk factors for livestock welfare concerns [41], then, notable inappropriate epidemiological cattle health, welfare and general public health data, due to the effect of unethical practices of medication malpractices on livestock-cattle must be shared with policy-makers. During the course of this study, the implications for animal maltreatments, during injection with medications were informally explained to most of the livestock cattle farmers and traders. But much importantly, under no circumstance should the livestock-cattle farmers and

traders be taught any injection practice by the animal health professionals.

Presently, the nomadic livestock farming/trading in the country has more or less reached a likely *terrorism* status. However, for the purpose of the public, human and veterinary health implications affirmed in this study, it is compulsory that effective and implementable policies must be put in place, as utmost priority, to control the unethical veterinary practice of injection malpractice and associated welfare issues, which severely compromise the standards of delivery of proper animal health services. Such appropriate policies can especially curb the unprofessional injection of livestock-cattle and associated livestock-cattle welfare, as well as the general public health, and as a proposed direction for moving nomadic livestock agriculture towards One Health concepts and objectives.

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Competing Interests

Authors declared no competing interests.

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