

# Welfare of Livestock During Transportation and Market Transactions: Implications for Meat Quality in Ethiopia

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## Abstract

In Ethiopia, the welfare of farm animals during handling, transportation, and market transactions is a pressing concern with significant implications for both animal well-being and meat quality. Key factors affecting animal welfare and meat quality during transport include animal behavior, temperature regulation, and transport duration. Poor transport conditions contribute to stress and meat quality defects, with long durations exacerbating these issues. Moreover, inadequate handling practices during loading and unloading further compromise animal welfare, impacting meat quality parameters such as tenderness and flavor. To address these challenges, comprehensive legislation and regulations specifically targeting animal welfare standards for farm animals are urgently needed. Additionally, training programs for stakeholders and improved supply chain management practices can enhance understanding and implementation of proper welfare practices. Collaborative efforts among government agencies, veterinary services, industry stakeholders, and animal welfare organizations are essential for sustainable improvements in animal welfare and meat quality standards. In conclusion, addressing the identified challenges through targeted interventions and collective action can significantly enhance animal welfare and meat quality standards in Ethiopian livestock markets, ensuring the well-being of animals and the production of high-quality meat products.

## Keywords

Animal transportation, Animal welfare, Ethiopia, Market, Meat quality

## 1. Introduction

Animal handling is an important subject since it affects not only animals' emotional states but also economics because abusive handling can, or most likely will, result in lowered production [1]. In Ethiopia, the handling of animals is usually aversive [2] and therefore in conflict with animal welfare. If animals fail to cope with environmental stressors, they will likely express chronic stress. Ethiopia has no policies on animal health, production, processing, or welfare. The country has four laws on animal health, production, and processing: Proclamation No. 267/2002 on Animal Diseases Prevention and Control; Proclamation No. 728/2011 on Veterinary Drugs and Feed Administration and Control; and Proclamation No. 819/2014 on Live Animal Marketing. There is also a draft Animal Health, Animal Welfare, and Veterinary Public Health Proclamation. There are no other guidelines, standard operating procedures, or dissemination materials on animal welfare [3]. This will result in lower animal welfare, which leads to the proclamation that the welfare of an animal is said

to be good when it can manage to cope with stress factors satisfactorily [4].

Several market systems exist for trading animals in Ethiopia. Usually, they involve various stakeholders, e.g., farmers, traders, merchants, butchers, and animals of different breeds. Transport to markets is mostly on foot due to a lack of suitable vehicles, and there has been research performed on how many animals die and get injured during transport. Furthermore, transport conditions and the level of vibration have a direct impact on the behaviors an animal expresses and the changes in stress hormones [2]. The range of behaviors that an animal expresses is a good indicator of how the animal copes with certain situations. If a behavioral change is observed, i.e., the animal refuses to move or vocalize to a high extent, it may indicate what the problem is and where improvement is needed [5].

Meat quality can be defined by organoleptic evaluation parameters such as tenderness, juiciness, flavor, palatability, color, neatness [6], pH, water-holding capacity, and its proximate composition [7]. Good animal welfare is a prerequisite for high-quality and sound farm animal production [8] and is an increasing concern around the world, which has resulted in the introduction and enforcement of government regulations and the formation of animal welfare organizations [9]. In developing countries, the welfare of farm animals is limited and is often hindered by high levels of poverty, cultural perceptions and beliefs, a lack of training and knowledge of animal handling, and inadequate transport and slaughter facilities [10]. There is no significant awareness among stakeholder groups, particularly handlers, in Ethiopia [9] regarding animal welfare and hygiene in slaughterhouses, and there are no explicit rules and regulations on how animal handling in slaughter should be done [11]. The situation of animal welfare still has multi-directional problems and lacks species-specific regulation for the rearing, transport, and slaughter of farm animals, which in turn alters their welfare. As a result, poor animal handling during transport, marketing, loading, and unloading before and during slaughtering, which could result in poor animal welfare and meat quality, is commonly practiced in Ethiopia [9]. Increased stocking densities during trekking could also expose animals to injury and stress [11]. Therefore, the present review delineates the welfare of livestock during transportation and market transactions: Implications for meat quality in Ethiopia.

## **2. Literature Review**

### **2.1 Animal welfare**

Animal welfare is a worldwide issue that is under more focus now than ever before. In Ethiopia, there are no animal welfare regulations or any constitution that protects animals from suffering. However, there are six or seven organizations that work for animals' welfare, and the first was established as early as 1954. Still, they have not yet accomplished the main objectives of their work to implement animal welfare, but it is in progress and hopefully ready within the near future [12].

### **2.2 Animal handling in Ethiopia**

The handling of animals in developing countries has been a subject of critical discussion for a long time and requires further research. In Ethiopia, the handling of animals is usually in conflict with animal welfare because most commonly, stakeholders handle animals in an aversive way. A recent study indicated that stakeholders in Ethiopia handle animals in an aversive way, which has been shown to increase the prevalence of death and injuries [2]. When adult male cattle are mixed in lairage or during transport, they express higher levels of fighting behavior, which can be recorded and measured as a welfare indicator. Another established method for this is to use the fact that farm animals that are handled or transported remember previous situations where they have been exposed to aversive handling by stakeholders [13].

### **2.3 Animal markets in Ethiopia**

Animal trading is carried out only on special markets in Ethiopia. These markets could be fenced or without fencing, and trading occurs mostly with farm animals. They are usually of local breeds, and trading with male animals dominates over females. A farmer generally sells their ox at the age of five, with the main purpose of selling meat, and sales typically increase during holidays such as Easter. The price is often negotiated between seller and buyer, but it is affected by several factors: age, weight, color, body condition of animals, value of hides and skins, distance of travel to sell animals, and ease of bringing animals back with them [14]. Consumers buy live animals from terminal markets, i.e., bigger markets located in cities, slaughter them by themselves, or buy meat from markets or butchers, where in both cases meat has been processed at abattoirs. However, these methods of acquiring meat are likely to spread zoonotic diseases, and options need to be evaluated [15].

At the local or primary market, traders purchase a few large animals or a sufficient number of small animals for selling on the secondary market. On the secondary market, large and small traders work together. Also, traders and butchers from terminal markets come to buy animals. Lastly, in terminal markets, big traders and butchers work with a large number of animals, mainly for slaughter. The livestock markets are usually controlled by local authorities [15].

## 2.4 Animal transport in Ethiopia

The most common way of transporting animals in Africa is by foot since there is a great lack of vehicles with sufficient capacity [16]. Walking animals by foot often leads to injured, dead, or stolen animals, which were investigated by [2] who found that 7.6% of animals died, 6–9% got injured, and 2.8% were stolen. Furthermore, lameness and injuries such as swelling of the legs commonly occur. This has also been proven to be a problem when animals are transported by vehicle [16] and also alludes to the problems that accompany a lack of rest, water, and feed.

## 2.5 Factors in farm animal transport that affect animal welfare and meat quality

### 2.5.1 Animal behavior

Different livestock species, genetic variations within species, and life experiences combine to influence how an animal behaves during the transport and preslaughter processes. Although farm livestock have been domesticated over time, they remain a prey species. The instinct to avoid being attacked by predators is inherent, and therefore most farm animals are sensitive to novelty. An important objective in handling animals is to minimize their level of fear because, at high fear levels, animals behave in a self-protective way by fleeing or fighting [17].

### 2.5.2 Temperature regulation

Optimal environmental conditions for livestock are 15–20 °C at 50–80% relative humidity [18]. The ventilation rate during transport should be adjusted to the inside temperature of the truck compartment, which will reflect the combined influence of heat flowing from the outside to the inside and the heat produced by the animals. The inside temperature of the truck can quickly escalate in very hot conditions in a stationary truck [19].

### 2.5.3 Transport duration

Scientific results discussed earlier in the report from measuring the behavioral and physiological responses of livestock to the transport process prove that transport is an inherently stressful procedure for them, and under poor conditions, meat quality defects are increased. However, where conditions in transport are good, long (between 15 and 24 hours) transport durations for livestock, to a certain extent, can be no more stressful for livestock than short journeys. If transport conditions are poor for livestock, even the shortest journeys can be highly stressful and result in high meat quality losses. Dehydration and fatigue occur in cattle after 24 hours of transport, to the point where any extension of this time is detrimental to the welfare and meat quality of animals [20].

## 2.6 Effect of Handling, Slaughtering Process, and Transport on Meat Quality and Welfare of Farm Animals

It is mentioned that high levels of poverty, cultural perceptions and beliefs, a lack of animal handling skills and knowledge, inadequate transport and slaughter facilities, and cultural views and beliefs all pose significant challenges to the welfare of farm animals in poor nations, even in Ethiopia [9, 21]. Better animal welfare and a lower chance of low carcass quality are achieved when handling animals without the use of sticks. For an animal, one of the most important aspects affecting its welfare during transportation is the space density permitted [22].

When animals showed signs of chronic stress due to an inability to manage environmental stressors, their welfare was similarly diminished [23]. Mixed-species animals exhibit more fighting behaviors during transit, which can be assessed and documented as a welfare indicator [24]. Animal welfare was neglected during the butchering process. The impact of handling on the welfare of animals during marketing and transportation revealed that, during loading, workers would tie a rope around an animal's neck or horn to draw it toward the vehicle. If the animal refused to be loaded, handlers would then whip the animal repeatedly or violently bend its tail [2].

Transport from farm to abattoir, loading of animals at the farm, unloading of animals at the abattoir, and slaughter are critical points that farm animals encounter during pre-slaughter handling. Loading and unloading are the core activities that cause an increase in the heart rate of cattle [25]. Stress before slaughter can have an impact not only on welfare but also on the quality of the meat [26]. The concentration of glycogen differs significantly during slaughter depending on the part of the muscle, breed type, and nutritional status of the animal, but most of all on the level of pre-slaughter stress [27]. Pre-slaughter stress imposed on farm animals also increased muscle temperature, lactic acid concentration, and rate of muscle, which in turn resulted in pale, soft, and exudative (PSE) meat and darker meat [28]. Meat quality was affected when farm animals were exposed to poor animal welfare conditions before slaughter [26]. These include long-term transportation [29], food withdrawal and exhaustion because animals bear the pain during long trekking [30], improper handling, duration of restraint, and isolation stress [26]. The importance of thorough ante-mortem examination of food animals by experienced veterinarians at authorized slaughterhouses with regard to meat hygiene is delineated by Pal [31].

### 3. Conclusion and recommendations

Ethiopian markets sometimes have poor standards for animal care, and poor transportation circumstances cause animals to act aggressively toward their handlers. Regretfully, there is a dearth of thorough laws, policies, or guidelines that notably address the welfare of farm animals, especially while they are being handled, transported, or put to death. Meat quality is directly impacted by these shortcomings in welfare requirements. Depending on the origin and market distance, transport times can differ significantly. Furthermore, because of their varied origins and differing distances from one another, animal supply chains are inefficient. It is necessary to create and put into effect inclusive laws and regulations that especially address the well-being of farm animals during handling, transportation, and slaughter in Ethiopia in order to improve animal welfare and meat quality. Animal welfare and meat quality standards can be raised by improving supply chain management and taking origin and transit distance into account, among other things.

Based on the above conclusion, the below recommendations are made:

- Implement comprehensive legislation and regulations specifically addressing animal welfare standards for farm animals, with a focus on handling, transport, and slaughter practices.
- Provide training and education programs for stakeholders involved in animal handling, transport, and slaughter to improve their understanding of proper welfare practices.
- Improve supply chain management to streamline transportation routes and reduce transport times, thereby minimizing stress and injuries to animals.
- Foster collaboration between government agencies, veterinary services, industry stakeholders, and animal welfare organizations to address these challenges collectively and promote sustainable improvements in animal welfare and meat quality standards.

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