Welfare of cattle at livestock markets in Addis Ababa and Ambo, Ethiopia

Välfärd hos nötkreatur på boskapsmarknader i Addis Ababa och Ambo, Etiopien

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Summary

In Ethiopia, cattle have an important role in the farming system and are the main source for meat and milk. The cattle production also provides employment opportunities and cash income, which is important, especially for the poor and landless households in Ethiopia. However, there are several constraints limiting the production and ultimately affecting the animal welfare negatively. The goal of this study was to investigate the welfare of cattle at different markets in Ethiopia and the study was based on animal-, resource- and management measures. The assessment was carried out through health recordings of the animals, observations of the management practices at the markets, and interviews with the stakeholders. The study was carried out at three cattle markets, Kera market and Kara market which are located in Addis Ababa and Gudar market which is located in Ambo. The health recordings involved the following parameters; lameness, body condition scoring, lesions/swelling, cleanliness, hoof health, diarrhea, ocular and nasal discharge. In order to comply with the cattle markets in Ethiopia, the assessments were based on a modified animal welfare protocol. All parameters were scored using a 4-level scale and a total of 94 animals were scored during the recordings. Also, at every observation the surroundings at the markets were observed and several factors were taken in-to account; weather, number of people and animals present at the market, feed and water sources and if animals were tied or walked loose. Five interviews were conducted and an interview form was outlined in advanced. The questions focused on how far the animals had been transported (by walking or by vehicle), food and water availability (during transport and after arriving at the market) and if there were any sick or injured animals. Questions were also asked regarding the management practices at the markets.

The results indicated that body conditions, lesions/ swelling, and cleanliness were the most common welfare problems for the animals. For all animals, 60 % were scored thin or very thin, and 55 % of the animals had minor or moderate signs of lesions/swelling. Approximately 60 % of the animals were minor or moderately dirty to their body, indicating that the cleanliness of the animal was low. Furthermore, lack of feed and water, ineffective management practices, lack of proper handling of animals and lack of education were common problems at the markets in Ethiopia. The results also showed that the animals were often beaten or hit with sticks. Also, the transport of cattle to the markets, either by truck or by walking with the animals, is ineffective and subjects the animals to stressful environments that also increases the risk or injuries. In order to improve the welfare of cattle at the markets there is a need to give the animals proper feed and water which meets their requirements, educate stakeholders, apply more effective management routines. Furthermore, enforce laws and regulations regarding animal welfare, which the authorities control and that non-compliance are followed by sanctions.

Sammanfattning

Nötkreatur spelar en viktig roll för jordbrukssektorn i Etiopien och djuren är den främsta källan för mjölk och kött. Dessutom ger nötkreatursproduktionen en ökad sysselsättning och är en viktig inkomstkälla, speciellt för de fattiga och ägandelösa i Etiopen. Dock är produktionen väldigt begränsad av en rad faktorer som har en negativ effekt på nötkreaturens välfärd. Målet med denna studie var att undersöka välfärden för nötkreatur på djurmarknader i Etiopien och grundade sig på djur-, resurs- och skötselbaserade mätningar. Detta utfördes genom att studera djurens fysiska hälsa, beskriva rutinerna på marknaderna och genom intervjuer med de som hade ansvar för djuren. Studien genomfördes på tre olika boskapsmarknader, Kera marknad och Kara marknad som ligger i Addis Ababa och Gudar Marknad som ligger i Ambo. Hälsobedömningen inkluderade följande parametrar; hälta, hull, sår/svullnader, renlighet, klövhälsa, diarré samt okulär och nasal utsöndring. Protokollet för hälsobedömningen var modifierad och anpassad för att kunna studera nötkreatur på boskapsmarknader i Etiopien. Bedömningen genomfördes med hjälp av en 4-gradig skala och totalt 94 djur graderades under hälsobedömningarna. Under varje observation antecknades miljön på marknaderna och flera faktorer noterades såsom väder, antal människor och djur, mat- och vattentillgången och om djuren var bundna eller gick lösa. Fem intervjuer genomfördes och ett frågeformulär användes under varje intervju. Frågorna fokuserade på hur djuren hade transporterats till marknaden (på lastbil eller genom vandring), mat- och vattentillgången (under transport och på marknaden) samt om det fanns sjuka eller skadade djur. Frågor ställdes också angående rutiner och skötsel på marknaden.

Resultaten från insamlade data indikerade att hull, sår/svullnader samt smutsiga djur var de vanligaste hälsoproblemen. Av alla djur bedömdes 60 % vara magra eller mycket magra och 55 % av djuren hade mindre eller måttliga sår/svullnader på kroppen. Cirka 60 % av djuren var mindre eller måttligt smutsiga. Dessutom var avsaknad av foder och vatten, ineffektiva rutiner på marknaden och brist på kunskap vanliga välfärdsproblem på marknaderna i Etiopen. Resultaten visade också att djuren behandlades och hanterades ovarsamt och slogs ofta med pinnar. Transporten av djuren till marknaderna var ineffektiv och utsatte djuren för en ny miljö som kan vara stressande och dessutom öka risken för skador. För att förbättra välfärden krävs det att djuren får tillräckligt med foder och vatten som möter deras näringsbehov, utbilda de personer som har hand om djuren och tillämpa mer effektiva skötselrutiner på marknaderna. Även införa lagar och regler om djurskydd, som kontrolleras av myndigheter och är försedda med sanktioner om de inte efterlevs.

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1. Introduction

The livestock population in Ethiopia ranks first in Africa and tenth in the world (Masiga & Munyua, 2005). Livestock play an important role in the Ethiopian farming system and have several functions. For the smallholder, livestock are a main source of meat and milk, cash income, transport, traction and also manure. For the cultural and social values livestock have a significant role, particularly for pastoralists (Gebremedhin et al., 2007). Without doubt, the livestock sector provides wide and all year around employment opportunities (MEDaC, 1999) and cash income from livestock production is especially important for the poor and landless households of Ethiopia (Delgado et al., 1999; Thornton et al., 2002).

There are approximately 57 million cattle in Ethiopia (FAOSTAT, 2014) and the environment in the country is very suitable for livestock production. The vast grazing land area could contribute significantly if developed and managed properly. With improved management practices, the indigenous cattle breeds could give better quality meat and a marketable surplus. Increased urbanization, economic growth and a rising population all offer the potential for the Ethiopian livestock sector. The huge demand of meat and live animals from the Middle East also offers a great opportunity to expand (Gebremedhin et al., 2007).

Despite the high potentials for the livestock sector in Ethiopia, there are several constraints limiting the production. A number of fundamental reasons are the following: lack of technologies, limited supply of inputs (feed, water, breeding stock and artificial insemination (AI)), high disease rate, lack of marketing service and information, poor marketing infrastructure and the absence of effective producer organizations (Gebremedhin et al., 2007). Furthermore, the knowledge gap of what an animal requires, regarding proper feed, housing and handling, are lacking and also the overall view of animals as sentient creatures. The strategies to improve animal welfare in Ethiopia relies on understanding the status of farm animal handling, proper management and design appropriate regulations (Bimrew, 2014).

2. Literature review

Ethiopia is the 27th largest country in the world and lies in east Africa, on the Horn of Africa (Figure 1). The vast highland consisting of mountains and plateaus is divided by the Great Rift Valley which is surrounded by lowlands, steppes and semi-deserts. Ethiopia has a great diversity of terrain which makes the variations in climate, soil, vegetation and settlement patterns very great. The capital Addis Ababa is centered almost in the middle of the country and is situated approximately 2400 meters above sea level (Briggs, 2012).

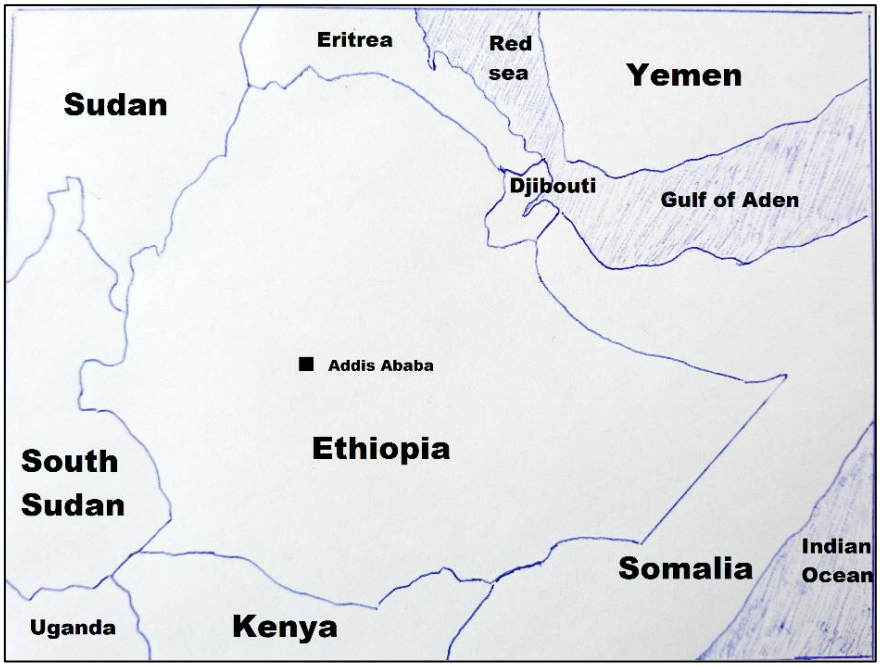

Figure 1. Map over Ethiopia and neighbour countries.

The livestock sector in Ethiopia offers a living for 65 % of the population and the sector stands for 16 % of the total export earnings in the country. In the pastoral areas, the household cash income mainly comes from livestock (Solomon & Workalemahu, 2003) and it contributes to around 25 % of the total agricultural Gross Domestic Product (GDP) in Ethiopia (ICPALD, 2013).

The breeds of cattle vary greatly in Ethiopia, but are usually mixed with Zebu (*Bos Indicus)* and Sanga (*Bos Taurus Africanus*) (DAGRIS, 2015), with the most common indigenous breeds including Borana, Horro, Fogera, Arussi, Karaya and Nuer (IBC, 2004). These breeds are very well adapted to the hot climate and are often used for dual purposes i.e. for both meat and milk production (Stock & Gifford-Gonzales, 2013). However, genetic improvements are lacking in Ethiopia as there is no selective breeding. Natural insemination is most common as AI practices are limited. Cows are put in to breeding at around three years of age and some calves are slaughtered at 1-2 months and only sold for foreign consumption (mostly to hotels) as locals in Ethiopia do not have a tradition in eating calf meat (pers. comm., L. Lefketa, Ambo University, Ethiopia, 5 October 2015).

2.1 Animal welfare

The welfare of animals can be affected by several different factors and that is why there has not yet been adopted a unified definition of what a desirable welfare state is. However, according to Fraser (2008) the term animal welfare can be viewed from three different perspectives:

- *The biological state; the welfare is good if the animal is healthy, grows and reproduces well.*
- *The affective state; the animal suffers if stressed but has good welfare if it has positive experiences.*
- *The natural state; describes the differences between the captive animal and the wild state where they origin from and to what extent they are able to express natural behaviours.*

In 2005 the World Organization for Animal Health (OIE) implemented the first international guidelines for animal welfare and a total of 167 countries accepted these (OIE, 2005). The fundamental basis of animal welfare was outlined in UK by Rogers Brambell in 1965 and are called the five freedoms:

(1) freedom from hunger and thirst: By providing constant access to fresh water and a diet to maintain full health and vigour

(2) freedom from discomfort: By providing an appropriate environment including shelter and a comfortable resting area

(3) freedom from pain, injury, or disease: By prevention or rapid diagnosis and treatment

(4) freedom to express normal behaviour: By providing sufficient space, proper facilities, and company of the animal's own kind

(5) freedom from fear and distress: By ensuring conditions and treatment which avoid mental suffering

Many different groups and organizations have been addressing animal welfare in recent decades and it seems that they have been effective in raising animal welfare awareness. It has also stimulated a response from the food industry (Stricklin, 2003) as consumers expect that their food from the production animals are being produced with respect for animal welfare (Blokhuis et al., 2003; Broom, 2010). The pressure from the public and different animal welfare groups have resulted in great legislations within the European Union (Stricklin, 2003). However, since ethical values differ between countries, so will the legislation dealing with animal welfare, even though there is scientific knowledge how certain procedures and situation will affect animal welfare (Lundmark et al., 2014). Furthermore, one important factor to improve animal welfare in the long term, is to educate those who are involved in the handling of animals and those who have the overall responsibility for the animals. These people should receive adequate education and training regarding biological functioning of the animals, as well as, in which way the animal's welfare may be improved or made worse (Broom, 2009; Szücs et al., 2009).

However, in developing countries such as Ethiopia, the subject of animal welfare has not been of interest to the public or the authorities (Bekele, 2009). In 2008, the first step of including animal welfare in the Ethiopian legislation began (pers. comm., B. Duguma, The Donkey Sanctuary, Ethiopia, 18 December 2015). As of today, there is no legislations in Ethiopia regarding cruel handling of animals caused by humans (Bimrew, 2014). Though, the first animal welfare legislation guideline has been under review during 2015, and the plan is that it will be released in 2016. The legislation includes all animals except wildlife as these animals are under the Wildlife Conservation Authority treaty. The legislation has been passed by The Ministry of Livestock and Fisheries (previously called The Ministry of Agriculture) in Ethiopia (pers. comm., B. Duguma, The Donkey Sanctuary, Ethiopia, 18 December 2015).

2.1.1 Perceptions of animal welfare

People have different perceptions about animal welfare and emphasize different concerns. For some people, the basic health and functioning of the animals are most important, especially freedom from disease and injury. Other people may emphasize the "affective states" of the animal – states like pain, distress and pleasure that are experienced as positive or negative. Others emphasize the ability of the animals to live as natural as possible and be able to carry out natural behaviour. These different criteria of what animal welfare is, reflect different sets of values that have been in conflict since the arise of animal welfare awareness. One side value a simple, natural life for the animals while the other side values progress, productivity and a life improved by science and technology. Our perceptions and attitudes of animal welfare are based on values and science. Our values are based on world-views that have deep roots in our culture, where ethical and morally concerns are taken in to account (Fraser, 2008).

The interaction amog different disciplines is important in order to carry on studies on animal welfare. These disciplines include social science, as animals have a great role in human society and the fact that attitudes towards animals and their product affect consumers' choice (Carenzi & Verga, 2007).

2.2 Principles of good cattle welfare

Good health is an important factor of animal welfare and it can be defined as the absence of injuries, disease and pain and certain management procedures can affect these states negative. Injuries may be caused by abuse, rough handling and accidents. Fighting between individual animals, especially cattle, can also cause injuries as well as, for example, when animals' need to compete for access to feed, water and resting space. Injuries can cause acute and/or chronic pain, wounds and lesions can become infected and lead to disease (Smulders & Algers, 2009). Cattle spend one third of its life lying down in order to recover and usually this is the time when the animal ruminates to digest their food (Fraser & Broom, 1997). Inadequate resting increases the risk of lameness (Manteca et al., 2009) and could compromise animal welfare.

The absence from prolonged hunger and thirst is a welfare criteria according to Welfare Quality® and lies under the principle of "Good feeding". To ensure good feeding four major criteria need to be achieved; all the essential nutrients need to be provided, a satisfactory chemical composition and physical form of feed which gives stable digestion, feed that provides opportunity for foraging that achieves oral fulfilment and minimizes the risk of disturbed

behaviour, and feed being free from harmful substances (Webster, 2009). When nutrition is not balanced malnutrition may occur while undernutrition reflects insufficient supply of feed. Both states cause stress and can lead to loss of body condition, immunosuppression and disease, and consequently, result in inadequate biological functioning, and is most likely an unpleasant emotional state for the animal (Webster, 1995; Kariazakis & Tolkamp, 2011). Undernutrition may be caused by neglect and/or poor management practices. In extensive production systems, grazing cattle may suffer from undernutrition due to poor forage conditions. Furthermore, competition and limited feed may also lead to undernutrition (Smulders & Algers, 2009).

Prolonged thirst is a sensation that is accompanied by dehydration and can cause debilitation, loss of body condition and disease. When water of poor quality is provided the drinking facilities are usually inadequate and this may lead to prolonged thirst and is the consequence of neglect and poor management. Animals that are transported over long distances in hot weather are at a higher risk of becoming dehydrated (Smulders & Algers, 2009).

2.3 Animal welfare assessment

The increased understanding of which indicators reliably reflect and individual animal's welfare status and what factors that represents a risk to good welfare, is of great importance (Blokhuis et al., 2008). However, the importance of these factors may vary between different people (Welfare Quality®, 2009). The Welfare Quality® assessment protocol for cattle use different measurements to assess welfare and they are turned into different welfare criteria, which reflect what is most important for the animals' as understood by animal welfare science. The criteria involve animal-based measures (e.g. health and physical condition) and management-based measures (e.g. handling, environmental enrichment) (Figure 2) (Blokhuis et al., 2008). Direct observations of the animals and inspections of the environment may indicate certain welfare conditions (Costa et al., 2013). Animals may experience the same environment in different ways due to their genetics, previous experience and temperament. Also, apparently similar environments may be managed differently by stakeholders which further affect animals' experience of a specific situation. Welfare Quality® is therefore mainly based on animal-based measures and secondly on management-based measures (Welfare Quality®, 2009). However, management and resource evaluations, together with physiological and health measuring's, could give a good indicator of animal welfare (Costa et al., 2013).

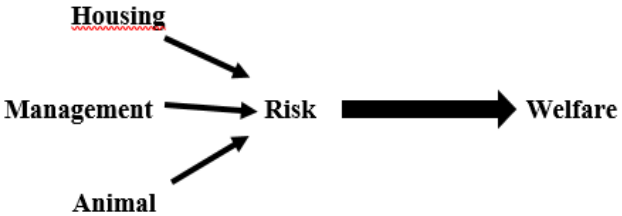

Figure 2. Illustration of the relationship between risk assessment and welfare assessment. The welfare of an animal is the outcome of housing, management and animal (Blokhuis et al., 2008).

The Welfare Quality® assessment protocol is adapted and suited for European production where animals are kept indoors in intensive productions systems. Therefore, there is a need of modification when the Welfare Quality® protocol is used in another production system. As of today, there is no well-adapted protocol for Ethiopian production systems.

2.4 Animal handling

Proper animal handling is of great relevance as it not only affects the animal's emotional state and health, but also the stakeholder's economics. Abusive handling will most likely result in lowered production (e.g growth rate, meat production etc.) and this is of course unwanted in every business (Price, 2008). Those animals that are considered to be hard to handle are more likely to become stressed and therefore affect the welfare negatively. The animal also possesses a great safety risk for handlers and themselves, which will increase the cost and make them harder to sell (Grandin, 1993). Furthermore, genetics and previous life experiences are the two main reasons that will affect how the animal will behave during handling (Grandin, 1998).

Associations between positive handling (e.g. tactile contact and verbal effort), were negatively correlated with negative tactile interactions (e.g. pushes), which was positively associated with an animal's fear of humans. Stakeholders that have inadequate attitudes towards animals when interacting with them, are believed to affect the behavioural response of the animal and productivity negatively, and therefore reduce animal welfare (Hemsworth, 2003). Animal handling is generally aversive in Ethiopia (Bulitta et al., 2012) and therefore in conflict with good animal welfare. The human-animal interactions at e.g. livestock markets, are crucial and will have a substantial impact on the animal welfare. Exposing animals to human contact early on in their lives is important and having properly trained persons to be responsible during the most aversive procedures (Gonyou, 2000). Furthermore, animal handling can be explained to a higher extent by measuring behavioural or physiological conditions of the animal (The Scientific Committee on Animal Health and Animal Welfare, 2002).

2.5 Animal markets in Ethiopia

In Ethiopia, the trading of farm animals is carried out on special markets. and these markets can be with or without fencing. Feed and watering infrastructures are lacking at the markets. The farmer generally sells the cattle at an age of five years and the dominating gender at the markets are male animals. The main purpose of selling is for meat and it increases during Ethiopian holidays, such as Easter. The price of the animal is negotiated between the seller and the buyer and it is affected by several factors; age, weight, colour, body condition, value of hides and skins, distance of travel to sell animals and ease of bringing animals back with them (Gebremedhin et al., 2007).

Despite Ethiopia's large cattle numbers and great opportunities for the agricultural sector, the productions systems are not market-oriented to the extent that is needed. In order to keep up with the costs at the farm the farmer must sell their animals, however, this would not always be the first option. In the highlands cattle are kept as draft power for crop production and in the lowlands the cattle form a social security need and is seen as prestige (Solomon & Workalemahu, 2003).

The trading of farm animals in Ethiopia involves many different stakeholders, which most commonly include farmers (animal owners), traders (sellers and buyers), merchants and butchers (buyers). The stakeholders' involvement can be described in the four market systems (Figure 3). At farm gate level, the main participants are local farmers and rural traders that operate on farm level, with one or two animals of different species. These small traders bring their livestock to the markets from various rural locations. At local or primary markets, traders purchase a few larger animals for selling at the secondary markets. Here, large and small traders work together and bigger traders and butchers from terminal markets come to buy animals. Finally, in terminal markets, big traders and butchers work with a large number of animals for slaughter (Solomon & Workalemahu, 2003).

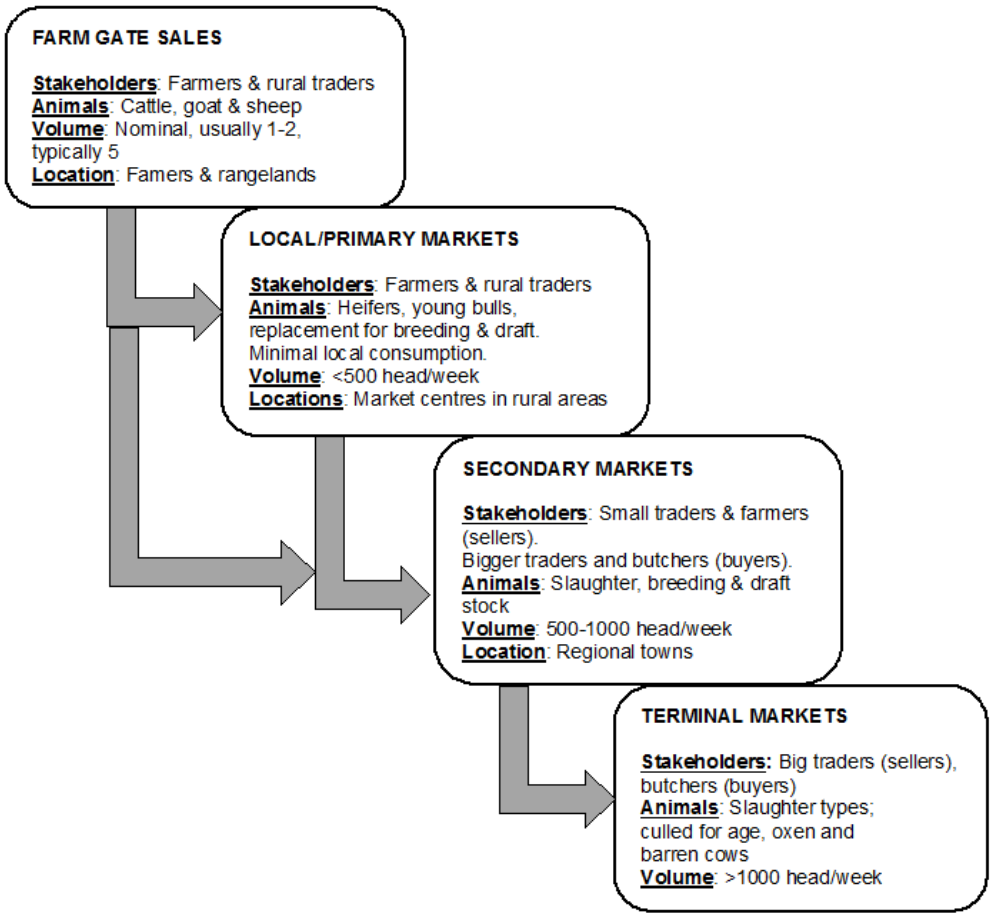

Figure 3. Structure of Ethiopian livestock markets (Solomon & Workalemahu, 2003).

The livestock markets in Ethiopia are usually controlled by local authorities (Solomon & Workalemahu, 2003). New regulations regarding the livestock markets were set in 2013, and were implemented from September 12th, 2015. Before, the taxes were set between buyers and sellers, but now the taxes are fixed to 15 % per cattle sold and the amount is paid to the government. Since the new regulations came into force there are significantly more check-ups regarding economic management at the livestock markets (pers. comm., Legesse, Manager at Kera market, 22 October 2015).

2.5.1 Transport of animals to livestock markets

In Ethiopia, the most common way to transport animals to livestock markets is by cattle driving, as there is a lack of suitable and appropriate designed vehicles (Bulitta, 2012). Cattle driving is preferred as it is much cheaper than transporting animals by vehicle. However, traders prefer vehicle transportation, to avoid weight loss and declined body conditions. Studies by Bulitta et al (2012) show that cattle driving to markets in Ethiopia, has a negative impact on animal welfare. The animals observed arriving at the market, had problems such as: lameness and injuries to bone and muscle, swelling of legs and inflammation on their bodies. These problems are linked to the many traffic accidents that the animals are involved in during their journey to the markets.

3. Aim

The main aim of this study was to evaluate the welfare of cattle for slaughter at livestock markets in Addis Ababa and Ambo, Ethiopia. Furthermore, it was intended to investigate the attitude of the stakeholders involved in livestock marketing regarding animal welfare.

The specific aims were to:

- Evaluate the welfare of cattle at Kera, Kara and Gudar livestock markets by performing a health study on individual animals using a modified protocol.
- Investigate how the management and resources at the cattle markets could affect the welfare of the cattle - by describing the conditions at the markets and conducting interviews with stakeholders.
- Investigate, with help of interviews and observation of management practices, the stakeholder's attitude towards the animal and animal welfare.

4. Material & method

Preparation for the study was conducted in Sweden six weeks before travelling. This involved gathering background information, preparing a literature review and outlining the health assessment protocol. The study outline was conducted through animal, resource and management-based measures.

4.1 Study site

The study was conducted in Addis Ababa, capital of Ethiopia, and in Ambo, which is approximately 100 km west of Addis Ababa. The study period lasted for 8 weeks from the beginning of September to middle of November 2015. Data were collected at three livestock markets (Figure 4), where animals from different regions around Ethiopia were brought by vehicle transport or by cattle driving, to be sold for slaughter. In Addis Ababa the data were collected in Kara market and Kera market. A third market, Gudar, located 10 km west of Ambo was also inspected. One to two times a week cattle at different markets were studied and a translator was always present. The study was carried out in the beginning of the dry season and the weather was mostly sunny with some clouds and around 25° C.

Figure 4. Location of Kera, Kara and Gudar markets. Distance between Addis Ababa and Ambo is approximately 100 km.

Kera market lied in the district of Kera, south of the city center. Kera market was the largest cattle market in Addis Ababa and approximately 80 m^2. Next to the market, Kera abattoir was located where the majority of the cattle sold from Kera market (and animals from other markets) were taken to be slaughtered. Kara market is located north-east of the city center in a suburban part of Addis Ababa, and the market was approximately 60 m^2.

Gudar market was located 10 km from Ambo and was the largest market in that area. The market was approximately the same size as Kara market (60 m^2). The number of cattle passing through Gudar market on a market day, was estimated to be between 1000-2000 animals (Bulitta et al., 2012).

At every observation the surroundings at the market were observed and noted (Figure 5). The following factors were taken into account; weather, noise, how many animals and people that were present at the market, housing, feed and water sources, if animals were tied or walked loose and how the animals were handled. Additionally, at Gudar market, one observation of loading of the cattle was conducted.

Figure 5. From left; Kera market, Kara market and Gudar market.

4.2 Animals

All of the cattle at the markets were bullocks and therefore the data consisted of only male animals. Different breed types were observed, usually cross-breed with the African Cattle Zebu and Zebu. Calves and older animals could sometimes be present at the markets but were not included in the study. In many cases the age of the animals could not be determined as the trader did not know.

4.3 Data collection

The data were collected through health observations and interviews. Animal health was scored at five occasions and a total of 94 individual animals were scored during the health observation. Each assessment was performed at Kera market (36 animals) and Kara market (45 animals). Finally, one assessment was performed at Gudar market (13 animals).

At each assessment session, 15 - 25 randomly selected animals were observed. For each animal, lameness, body condition, lesions/swelling, cleanliness, hoof, diarrhea, ocular discharge and nasal discharge were scored. All parameters were scored using a 4-level scale (see Appendix 1 for definitions of scores):

Lesions/swelling, cleanliness, diarrhea, ocular discharge and nasal discharge were adopted and modified from Welfare Quality® (2009) assessment protocol for cattle. Lameness was adopted and modified from Zinpro Step-Up™ *Locomotion Scoring System (*1997). Body condition scoring was adopted and modified from Welfare Quality® (2009) assessment protocol for cattle and *Condition scoring of cattle* by Lowman (1976). Finally, hoof health, was added in the protocol (only recording the prevalence of overgrown hoofs) and based on experience.

A pilot study was conducted the first week and some changes and adjustments were made in the protocol. The animals were observed from a distance of approximately 2 m. In order to score lameness, the animal was touched (with a stick or the hand) by the trader to start walking. Photos were taken on every animal and gender, date, market were noted. All photos were taken by the author of this thesis if not stated otherwise in the text.

4.4 Interview

A total of five interviews were conducted: two each at Kera market and Kara market and one at Gudar market. The interview form was outlined in advanced (see Appendix 3). Four of the interviews were done with traders and one interview with the manager at Kera market. A translator was needed during the interviews as the traders and manager only spoke Amharic. The interviews focused on how far the animals had been transported (by walking or by vehicle), food and water availability (during transport and after arriving at the market) and if there were any sick or injured animals. Questions were also asked regarding the management practices at the markets. The interviews covered only general conditions, and did not reflect conditions for individual animals included in the health recordings. An additional interview was conducted with the translator regarding breeding of cattle in general in Ethiopia to gain additional information about management practices in Ethiopia.

4.5 Data analysis

The data collected during the study was entered into a spreadsheet in Excel. Later on, the data was transferred to the statistical program Minitab where the distributions were calculated as percentages for every parameter – both the total percentage for all the markets and for the three markets separately. These distributions were then presented in bar charts.

5. Results

5.1 Health recordings

Overall, the distribution of the percentage of the parameters fell into scoring 0 or 1 with some differences between the markets (Figure 6). The majority of all animals observed did not show signs of lameness (Figure 6). Approximately 60 % of the animals were thin or very thin (Figure 6). Of all animals, 55 % had minor or moderately sign of lesions/swelling to the body, 60 % of the animals were minor or moderately dirty and 51 % of all animals observed had minor overgrown hoofs (Figure 6). Diarrhea was observed in 39 % of the cases (Figure 6). Around 35 % of the animals had minor ocular discharge and 48 % of the animals had minor nasal discharge (Figure 6).

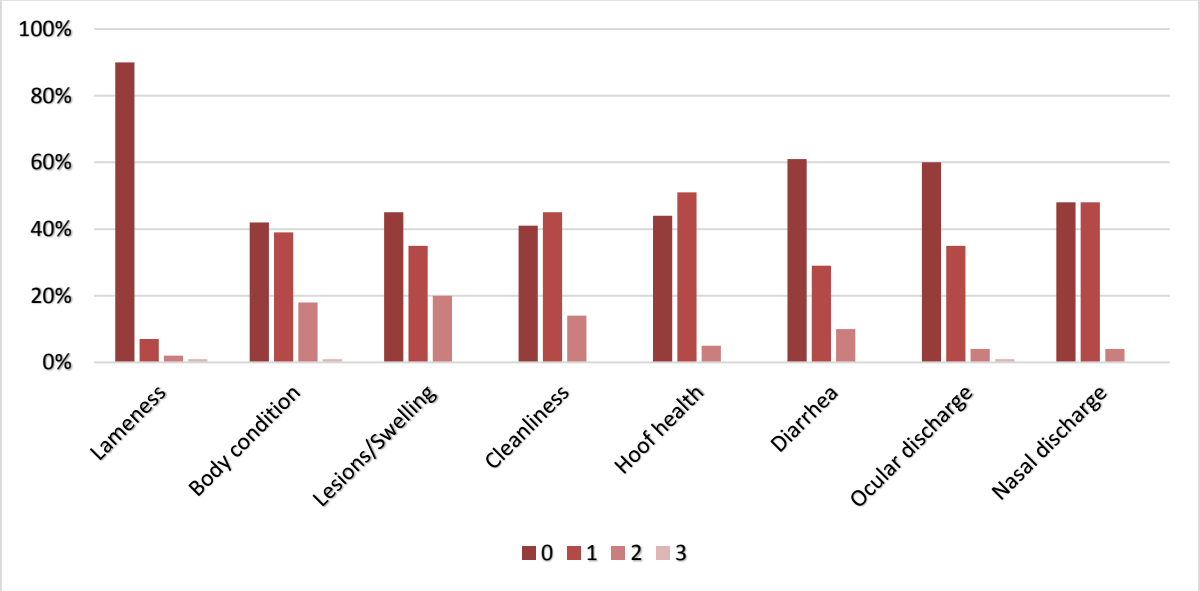

Figure 6. The total scoring distribution in percentage for eight health parameters in bullocks at three markets in Ethiopia. Scoring 0=none/satisfactory, 1=minor, 2=moderate, 3=severe. For body condition scoring 0=satisfactory, 1=thin, 2=very thin, 3=severely emaciated.

Comparison between the percentage results of all parameters showed that body condition, lesions/swelling and cleanliness had the highest percentage difference between the markets (Figures 7, 8 and 10). Gudar market stood out the most, as it had the highest scorings for these parameters.

At Kera market the majority of the animals were scored thin, and the distribution of satisfactory body condition and very thin were somewhat even (Figure 7). At Kara market the majority of the animals had satisfactory body condition but a significant number of animals were also scored thin (Figure 7). At Gudar market, the distributions of body condition scorings fell into thin or very thin (Figure 7).

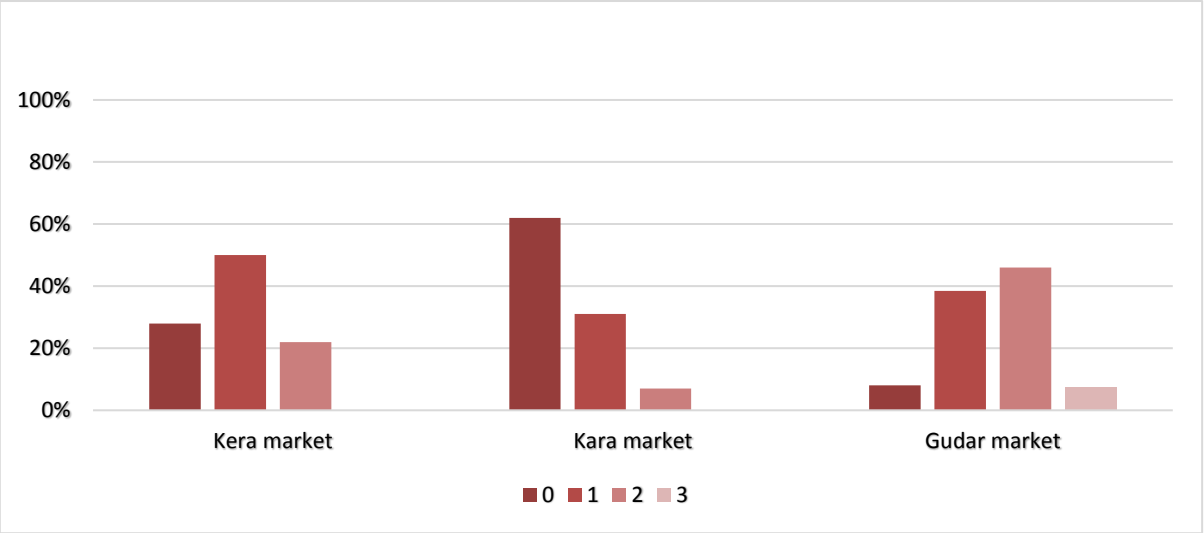

Figure 7. Percentage distribution of body condition scoring at different markets. Body condition scoring 0=satisfactory, 1=thin, 2=very thin, 3=severely emaciated.

At Kera market, lesions and swelling were evenly distributed between none, minor and moderate (Figure 8). For Kara market, 34 % of the animals had lesions/swelling to the body but the majority of the animals were scored none (Figure 8). At Gudar market, all animals were scored minor or moderate, indicating that all animals had signs of lesions/swelling to the body (Figure 8). No animals were scored 3.

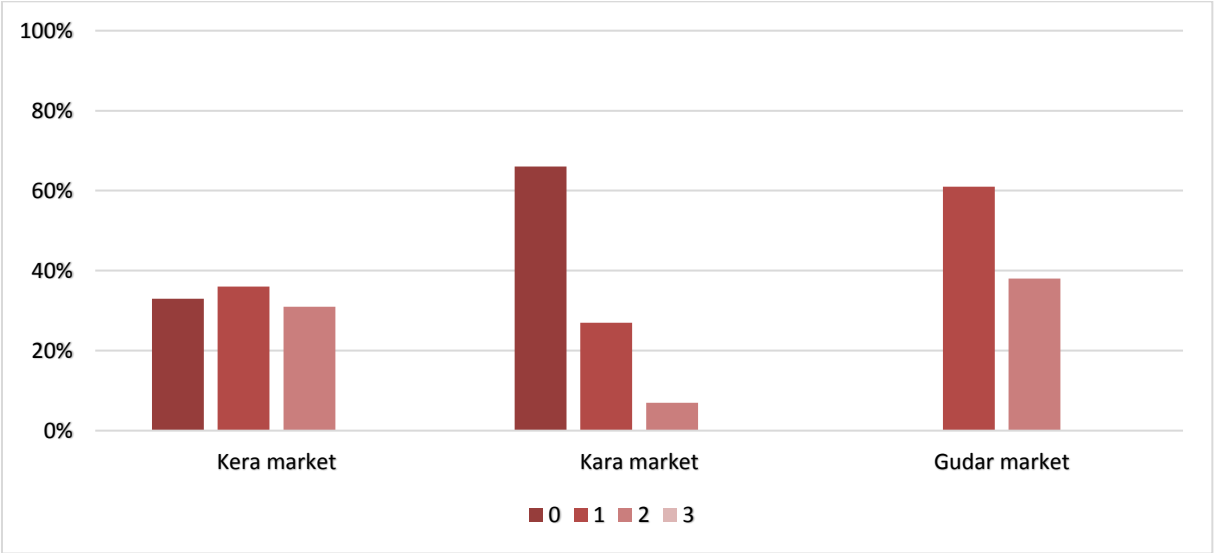

Figure 8. Percentage distribution of lesions and swelling at different markets. Scoring 0=none/satisfactory, 1=minor, 2=moderate, 3=severe.

Swelling in the face and on the animals' body was commonly observed and often seen in the same place - just below the eyes, on the tail hand and on the side of the animal, at the rib area (Figure 9).

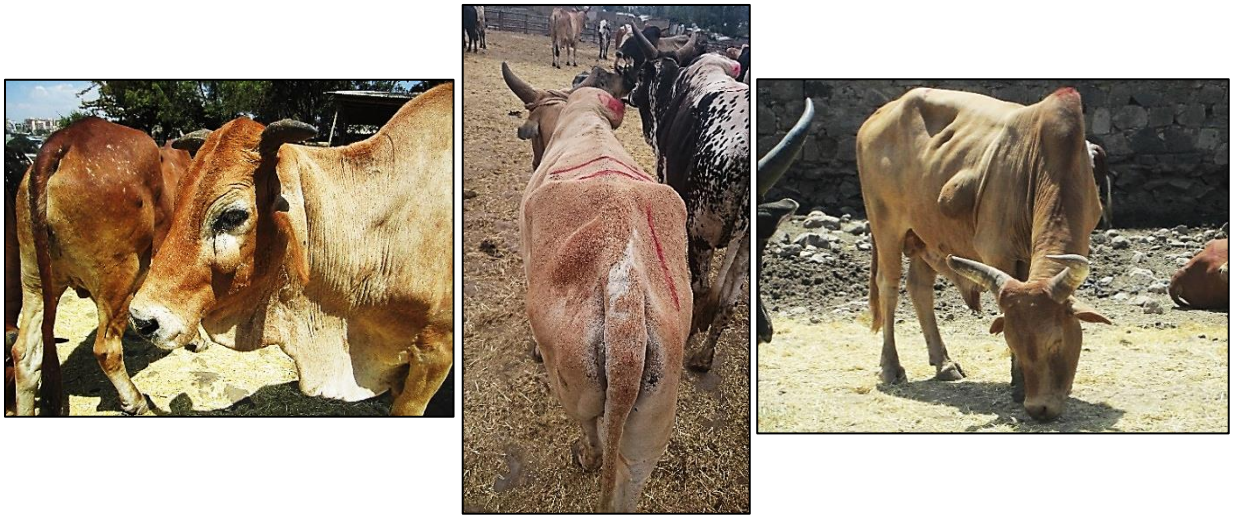

Figure 9. Three different individuals (scored 2) with swelling on head, tail head respective body at Kera market.

At Kera and Kara market approximately 40 % of the animals were scored minor dirty (Figure 10). The prevalence of dirty animals was more common at Gudar market where 84 % of the animals were scored minor or moderately dirty (Figure 10).

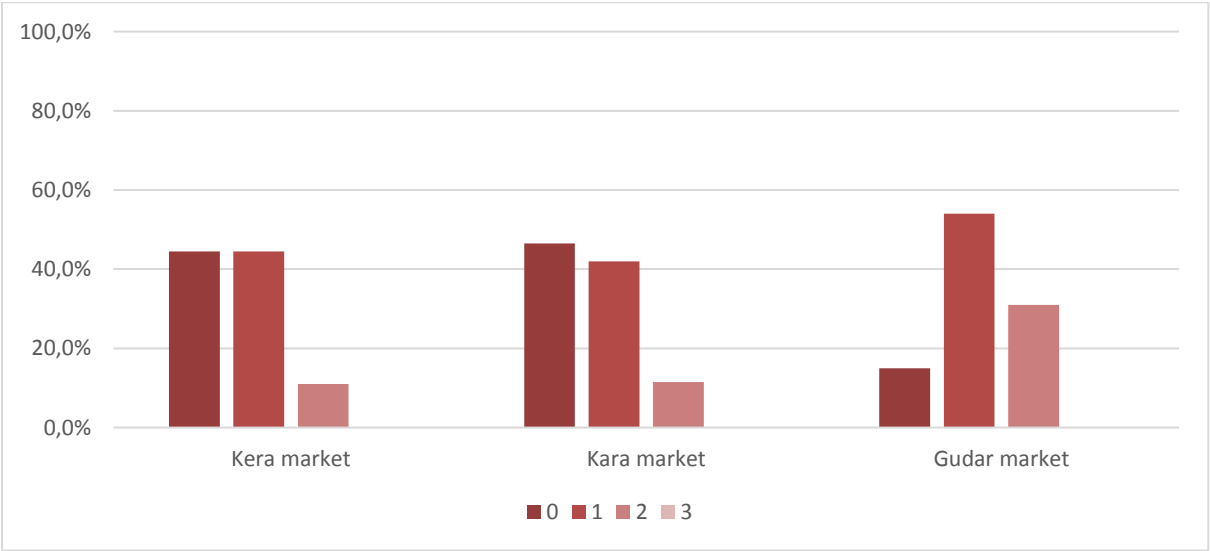

Figure 10. Percentage distribution of cleanliness at different markets. Scoring 0=none/satisfactory, 1=minor, 2=moderate, 3=severe.

5.2 Observations of markets

5.2.1 Market conditions

No housing protection from sun, rain and wind was observed at the markets. However, at Kera market there were smaller concrete pens with roof tops, where animals could be held during the night.

At Kera market the majority of the cattle were hosted in a large fenced area but there were also other smaller pens where animals that were sold or injured were kept. The cattle roamed freely within the market area, however, some animals were observed having a rope tied from the horn

to their leg (Figure 11) which limited their movement (also observed at Kara and Gudar markets). This was done to animals that was considered aggressive and hard to handle. Approximately 150 animals were present at both observations at Kera market. Most of the ground was covered by flagstones (with some straw spread on top of it) but in other smaller areas at the market the ground consisted of gravel, sand and rocks. During the two observations at Kera market the area was calm and there was not much noise. Overall, the animals stood mostly still and slow or very little movement was noticed during the observations. During the first observation a dead animal was seen at the far end of the market where the ground consisted of muddy soil. The dead animal was lying in the mud and was bloated. When asked the cause of death the staff said that it probably got stuck during the night. No actions to move the animal were seen and the intention to leave the animal behind was obvious. Also, skulls from cattle were seen at the market, some were still relatively intact with eyes and skin present.

At Kara market the cattle were mainly hosted within a fenced area but on market days, in need of more space, the animals could also be hosted just outside the market entrance. Approximately, 150 animals were present at the first observation and 250 animals at the second observation. Sick or injured animals were held in small pens made of tin walls. The cattle walked around freely but approximately 1/3 of the animals were tied with a rope by their neck to a fence. The ground within the market area consisted of flagstones with low amounts of straw scattered around, and outside the market area the ground consisted of soil and gravel. During the first observation at Kara market, the surroundings were calm and there was a lot of space to move around on, but the ground was hard and a lot of cattle slipping was noticed when the animals walked around. During the second observation at Kara market (market day) it was very noisy and many people present. The animals were tied by the horns to a pole in the ground (Figure 11) and a lot of grunting could be heard from the animals as they tried to move around. The animal's movement was very limited and they could not hold their head up in a normal position.

Figure 11. From left; bull tied by its horns at Kara market and a bull tied with a rope by its horn to the front leg at Kera market.

Gudar market was fenced and divided into two larger parts, one where animals were being sold and one where animal had been sold. The majority of the cattle were observed in the selling part. No smaller pens were observed for injured or sick animals. The animals were not tied but held in separate groups by the traders and approximately 300-400 cattle were within the market

area (market day). The ground consisted of soil and gravel. The market area was very noisy during the observation, and the majority of the animals stood still standing up with head lowered but a lot of mounting and fighting was observed between specific individual animals. One individual animal was noticed with a deep cut on its back hook and it was clearly visible that it could not support its leg. The owner of the animal informed that he would take the animal to a veterinarian. During the two hours at the market it was not observed that he took his animal to a veterinarian and no effort that this was prioritized was seen.

5.2.2 Feed and water managements

At Kara market and Kera market, the animals were given a cereal mixture called frusca, consisting of wheat bran (Figure 12). The cereal was mixed with water and given in buckets of various sizes. Two to three animals at a time drank the mixture, and after approximately three minutes the next group of animals were provided. Furthermore, straw was seen provided for the animals, distributed in piles around the market area or lined up by the fence. At Gudar market, no feed was seen.

Figure 12. Bull drinking the cereal mixture frusca at Kera market.

Water barrels were present at both Kera market and Kara market, and the water was gathered in buckets from a bigger tank just outside the market area. However, no water barrels were seen in the smaller pens and it is unclear how often those animals were given water. At Kera market, the animals had free access to water but at Kara market the animals were seen provided water at certain times during the day. The water was collected in buckets containing approximately 15 liters. At Gudar market, provision of water was not seen.

5.2.3 Handling and transport managements

At all markets, it was noticed several times that the cattle were hit on the head or body for no reason by the people at the market. This often occurred when the person was just walking by the animal and that could be with either a stick or the person's hand or leg. Shouting was also commonly observed in combination with hitting the animal. Especially at Kara market and Gudar market, the hitting and shouting at the animals occurred more frequently than at Kera market. At Gudar market, animals tried several times to lie down but were hit with a stick to stand up. When asked why this was, it was said that the animals needed to stand up in order for the buyer to see the animal well enough.

At Gudar market, loading of the animals occurred about 400 meters from the market area up on a small hill that would act as a ramp for the truck. The vehicle truck had barred fences around and no roofing (Figure 13) and fitted approximately 15 animals, if loaded tightly. The floor of the transport vehicles at Gudar market consisted of sawdust or dry grass and straw, During the observation of the loading of cattle the animals were driven upon the vehicle with one person standing in front and two to three persons in the back pushing the animal up on the truck. It was approximately a 0,5-meter step for the animal to take in order to get upon the truck. At every observation of loading, the animal showed resistance by trying to turn around, away from the vehicle, and was clearly not willing to get on to the truck. One transport was heading to Giorgis market – 43 km from Gudar market. The transport would take about 45 minutes and was heading east in the direction of Addis Ababa. The second transport was heading to Kemoye – 62 km from Gudar market in the direction of Addis Ababa. Final destinations of the two transports were Addis Ababa.

Figure 13. Loading of cattle at Gudar market.

5.3 Interviews

All five interviewees stated that they thought that animals can feel pain. However, they did not think that hitting and kicking the animals was of any concern. The majority of the animals were taken to the markets by foot but some animals were also transported on trucks. The animals stayed at the markets for a maximum of five days and were then taken to another market or the abattoir.

At all three markets, a veterinarian could be called for in case of injured or sick animals. The interviewers could not give examples of what type of injuries the animal could have in order for a veterinarian to be contacted.

At Kera and Kara markets the animals are provided frusca and straw two times a day. However, one interview from Kara market stated that they are only provided feed once a day. At Gudar market the animals are given frusca and straw once a day. Water was continuously refilled ad Kera market, and at Kara market and Gudar market it was given twice respective once a day. For all three markets, on market days (two times a week), no feed or water was provided. The

animals are divided into different groups while eating frusca in order to save time for the people looking after the animals, and to keep track on which individuals that were fed or not.

At Kera market the majority of the cattle were transported there by truck. The trader at Kera market stated that the animals had been transported by vehicle (16 bulls) from Godjam to Addis Ababa - approximately 420 km. No feed was provided during transport. The cattle observed had been there half a day (about 12 hours) and were planned to be sold or slaughtered the following day. The other bulls at the market (approximately 150 animals) came by vehicle from Gudar, Harar and Gondar. Every animal was vaccinated before entering the market but it was unclear what kind of vaccination was given as the trader did not know. During the nights the majority of the cattle stayed within the Kera market area but some animals were housed under a roof which costs a specific amount per night. The manager at Kera market informed that the cattle were always checked by a veterinarian before being slaughtered. If an animal was sick (and this was discovered later on at the abattoir veterinarian check) the seller refunds 50 % of the payment. The manager emphasized that this means that the buyer must have a good perception of healthy animals versus sick animals.

The trader interviewed at Kara market owned 20 animals and they were transported by vehicle from Wallo to Addis Ababa - approximately 400 km. The transport took about 10 hours and the animals were not provided feed during transport or at the market (as it was market day).

The trader interviewed at Gudar market owned 10 animals and the animals had walked from Ejeji market to Gudar market - approximately 70 km. The journey took two days and they stopped for 8 hours (during the night), and at that time the animals could graze in a temporary enclosure where also water was provided. The animals had not been fed on the day of observation.

When the cattle were taken to a market by walking, the journey could take from a few days up to a few weeks depending on at which market they were sold. An animal could be taken through several markets and have several owners before being slaughtered. Usually the animals were taken from smaller markets in rural areas to bigger markets closer to the capital, Addis Ababa, where they were finally slaughtered.

6. Discussion

Despite Ethiopia's high potential in the livestock sector the animal welfare issue is a serious problem due to inefficient production and marketing systems (Bulitta et al., 2012). The main findings from the health observations show that animal welfare for cattle at markets in Ethiopia is low. Additionally, from observing the surroundings at the markets and interviewing the traders it was shown that the animal welfare issue was not prioritized.

6.1 Health recordings

The percentages of body condition scoring (60 % being thin or very thin) and the presence of lesions/swelling (55 % had more or severe lesions/swelling), could support the statement of

poor animal welfare at cattle markets in Ethiopia. Also, that the lack of cleanliness was commonly occurring (60 % scored minor or moderate dirty) is an indicator of this. Body condition scoring is a good indicator of animal welfare as it can reveal if the animal is given proper feed and water, the occurrence of injured or sick animals and their overall health. Specific locations on the animal are assessed to determine how thin or fat the animal is and assessing the animals body score gives valuable information about the level of previous feeding, the overall health of the cow and future production (Dairy Australia, 2007). Seen from the results, body condition of the cattle was often considered thin or very thin (Figure 14) and this would probably be due to lack of feed and lack of feed of correct nutritional value. Furthermore, as the majority of the cattle are taken to the markets by cattle driving (Bulitta, 2012) it could therefore compromise the animals' body condition by walking long distances and especially without water, feed and sufficient rest.

Lesions and swelling could indicate how the animals are treated and if they are beaten and/or injured during the different management practices. As beating of animals with sticks was commonly seen during the health observations this is an explanation to the distribution of lesions and swelling. Also, not only the beating of animals by humans would affect the distribution of lesions and swelling to the animals but also the injuries caused by other animals. Fighting and mounting between bulls can lead to welfare problems when the animals are kept in mixed social groups and where the stocking density are high (Fraser & Broom, 1997) which was seen at Kara and Gudar markets, during the market days. The consequences may result in injuries, bruising and extreme physiological responses. The problems can be greatly reduced by keeping the animal in stable social groups and use fencing and bars to prevent mixing of animals (Fraser & Broom, 1997). From the results, cleanliness was often scored minor (41 %), indicating that the animals were dirty (Figure 14). As the animals are mainly housed outdoors at the markets due to lack of proper housing systems and shelter from rain this would probably increase the number of dirty animals. Furthermore, when walking the cattle to the markets, the animals usually rest outdoor in the nearest field which also would increase the risk of animals getting dirty. The number of dirty animals would be correlated to weather conditions and the study was conducted just after the rainy season, which means that the ground could still be moist and muddy at times, explaining the results of cleanliness. The outcome of the cleanliness results would probably have been different if the study was conducted during the rainy season with even more dirty animals, and a decrease in dirty animals during the end of the dry season.

Figure 14. Bull scored very thin (2) during the health recordings at Kera market and bull scored moderate dirty (2) at Gudar market.

Lameness was the only parameter where the distribution was low and almost all observations had scoring 0. The reasons could be that when an animal gets too lame the economic value of it decreases significantly and it is therefore left by its own or culled before entering the market. It could also be that the animal was not highly exposed to situations where the risk of getting lame were high, due to the dry season. Weather conditions which result in wet surfaces and uneven grounds can result in limb injuries and foot lameness (Fraser & Broom, 1997). Therefore, the expected distributions of lameness would be higher during the rainy season in Ethiopia. The scoring distribution of hoof health could be explained by that the majority of the cattle in Ethiopia are living on pastures and driven to the market by foot, which would be a natural way of trimming the hooves (Hepworth et al., 2004). However, as 51 % of the animals had somewhat overgrown hooves, this indicates that there is a need to trim the hooves in order to achieve optimal hoof health and decrease the risk of lameness.

As shown in the results, the majority of the cattle at the markets stood still and showed low interest in their surroundings. This could be due to that the animal was exposed to high temperatures, dehydrated, lack of feed, stressed, injured or sick, scared of the traders and not allowed to lie down and that, overall, their health was very low. However, more studies and observations is needed to make these statements.

6.2 Feed and water management

The main issue and the biggest challenges for the livestock markets is proper and correct management. The feed provided for the cattle was similar at all markets and as the animals were only given the frusca once or twice per day it could be assumed that this amount is too low and does not give the animal the correct amount of energy. Also, as the animals often walk between the markets the energy intake from the feed must increase and this requirement is in many cases not taken into consideration when feeding the animals. Furthermore, at market days, Kara and Gudar markets did not provide feed for the animals. The animals are without feed for at least two days every week and this could affect the animals' health, such as disturbing the rumination process, animals' becoming too thin and increasing the risk of diseases. The nutritional value of frusca was not tested but it can be questioned if the nutritional content is too low and does not give the animal the correct amount of calories, vitamins and minerals to maintain or gain body weight. Furthermore, roughage such as straw-residues are the most common feeds in Ethiopia (Birhan & Adugna, 2014) and was the only roughages observed at the markets. Fibrous feeds can cause malnutrition and starvation in the rumen as they contain high levels of indigestible lignin and could therefore cause animal welfare problems such as metabolic hunger and lack of feed energy and nutrients (Webster, 2005: Webster, 2009). The feed supply is limited in Ethiopia due to low amounts of own produced feeds and the restricted naturally available feed such as from grazing lands. Also, for those that can afford to buy feed it is limited due to the unavailability of feed supply (Gebremedhin et al., 2007). Furthermore, parasites present in the cattle could be a limitation factor of the feed absorption in the rumen resulting in sick animals, thin animals or be the cause of diarrhea. This should be taken in to consideration even though studies and observations on this subject would have to be conducted in order to make these conclusions. Also, despite the differences in age, size and health status of the

animals, they are given the same amount of feed and water at the three markets, and this could affect the welfare of the animal negatively.

The water requirements for the cattle were of high concern. Kera market was the only market that had free access to water. When drinking facilities are insufficient the amount of water provided decreases and the water quality becomes poor, which can cause prolonged thirst for the animal (Manteca et al., 2009). The staff at Kara market and Gudar market provided the animals with water only once or twice a day and during the time of observations it was the dry season with high temperatures and the animals did not have protection from the sun, which would also have an effect on the animals' water requirements. At Kara and Gudar markets no water was provided during the market days which means that the animals were without any water for at least 24 hours. Cattle drink one to four times a day in temperate climates and this activity occurs more often in hot climates (Fraser & Broom, 1997) and therefore, it could be assumed that the majority of the animals were affected by this and that the water requirements were far from being fulfilled, especially at Kara and Gudar market. Furthermore, water requirements are directly correlated to dry matter content in feed and a high dry matter content requires a high water intake (Phillips, 2002). This indicates that the dry roughages that are given to the cattle at the markets would increase water intake but the frusca (mixed with water) may decrease the water intake for the animal. However, the combination of dry feed, hot climate, lack of water resources and walking long distances for the cattle indicates that the water requirements are poor at the markets in Ethiopia. The impression from the interviews regarding water requirements indicate that water was available but it was hard work to provide the animals with water. There was no effective way of bringing the water from outside the market in to the market area and was only done by human work as the staff had to carry the water buckets.

Even though feed and water supply are limited in Ethiopia one should also consider that it not necessarily always affects the health of the animals in a negative way. It is of importance, to consider species and breed when assessing body condition. The Zebu breeds in tropical areas may have a lean body appearance (when given proper feed) without being too thin, as they don't have a great muscle development (pers. comm., L. Berg, The Swedish University of Agricultural Sciences, January 14 2016) and therefore the production outcome may be decreased, but not always the health status of the animal. The negative effect could therefore, in some occasions, be more on the farmer or trader's economy rather than the animal welfare.

6.3 Handling, attitude and transport concerns

The handling and attitudes towards the cattle in Ethiopia seem to affect the animal welfare negatively. In general, poor animal handling results in loss of weight, physical injuries, sickness and even death of animals, leading to poor welfare conditions and economic loss of the stakeholders and the country as whole (Frimpong et al., 2014). The majority of the cattle are hit and beaten for no reason, animals that are clearly sick or injured are often not cared for, and that basic needs like feed and water are not fully provided. People may hit animals and cause pain and injury because of selfish consideration, or because they do not consider that the animals are subject to pain or due to the lack of knowledge about animal and animal welfare (Broom, 2003). The percentages of lesions and swelling of the animals shown in the results

could be caused by the unnecessary hitting and beating of the animal for no apparent reason. By stopping this action, it would most definitely contribute to less lesions and body swelling and increase the welfare of the animal. The handling and attitudes towards the cattle at the markets in Ethiopia have a significant effect on animal welfare. Frightened animals and animals that avoid human contact have probably been exposed to negative human contact. This would also lead to an unsafe environment for the handlers to be in and also an increased risk of the animals getting hurt. A proper handling with positive human contact would increase animal welfare, but unfortunately, this was not the case at the cattle markets in Ethiopia. Furthermore, by contacting a veterinarian and treating lesions and other injuries at an early stage would prevent the animal from becoming increasingly sicker and therefore increase their animal welfare and economic value for the trader. This would of course affect the economy for the trader but would probably in the long run be of an economic benefit. As the seller and buyer share the economic loss if the animal is stated sick by a veterinarian, this would also be a reason and motivation to prioritize veterinarian assistance (pers. comm., Legesse, Manager at Kera market, 22 October 2015). Why is this not done? The reasons could be many. And again, education, knowledge and understanding about the animals' needs is crucial. Seeing the whole production chain from different aspects is crucial; from both an economic standpoint to animals' requirements such as proper feeding and housing management. Education is of great importance in Ethiopia as the stakeholders would not only get more knowledge of how an animal functions and their needs, but also an understanding that increased animal welfare will often contribute to higher productivity. Furthermore, to educate stakeholders can substantially alter attitudes to, and treatment of, animals (Broom, 2003).

As the majority of the cattle are transported to two or three different markets before reaching the abattoir the impact of the transport is of high relevance. Transport by driving cattle and transport by vehicle both have a negative impact on animal welfare. Cattle that walk between the markets, for example, the group of animals that walked from Ejeje market to Gudar market (70 km) which took two days, would assumingly be affected by the walking. Feed and water are only provided if available and walking all day in high temperatures and direct sunlight are all indicators of poor animal welfare. Even when the cattle reach the destination it is not sure that the animals are provided feed, water and rest that would be required after such a long journey. Transporting cattle by vehicle takes less time but is often a more stressing and more unfamiliar to the animal. All cattle showed resistance to enter the truck as they seemed eager to spin around and go the other way. By dragging the animals by the horns and hitting them with sticks the handlers forced them to get up on the truck. These could all be indicators that the stress levels increase and therefore affects the animal welfare negatively. When the cattle are on the truck they stand very close together in new groups tied to the vehicle so they cannot move their heads or fight with each other. This is a very new and unfamiliar environment that the animals are exposed to. The whole procedure of loading cattle on to trucks can be very noisy, chaotic and subject the animals to very unnatural situations that could cause severe coping problems and that can make the animals vulnerable to injuries (Broom & Fraser, 2007). There is a need to evaluate and improve the loading and transporting of cattle to and from the markets in Ethiopia.

6.4 Supply chain challenges

From a national point of view, the whole supply chain of the cattle markets is questionable. The animals pass at least two to three markets before being slaughtered, which affects their condition as they often lose weight during travelling, and has a negative impact on their welfare. Furthermore, the risks of infectious diseases spreading through the market system increases, which might cause tremendous loss for the owners and other citizens, and unnecessary suffering for the animals. Making the cattle market chain more effective, with fewer and more organized cattle markets, would be beneficial for everyone involved.

The livestock, as mentioned before, a great economic value to farmers, traders and other stakeholders involved in the cattle livestock sector. None of them want sick or injured animals as this will decrease their income and affect their business. However, the reality is different as management practices, knowledge, education and economic resources are lacking and are therefore affecting animal welfare negatively. By improving these areas, animal welfare would increase significantly as welfare would be a topic of value. However, by tackling these issues there comes great challenges and this would require prioritization, dedication and willingness, from not only the stakeholders, but especially from a higher political level. Laws and regulations can have a significant effect on animal welfare, but only if they are implemented and enforced (Broom, 2003). Therefore, it is important that the authorities perform adequate control and that non-compliance is followed by sanctions. When this is achieved, the regulations can be effective. Hence, with enforced laws, regulations and proper control regarding animal welfare combined with education, there could be a great improvement for the animals' health and situation in Ethiopia.

6.5 Methodological reflections

6.5.1 Collecting data at cattle markets

Performing assessments and interviews at cattle markets in Ethiopia could be difficult. It was common that we attracted a large group of people that stood around us, making it difficult to perform the recording sessions of the animals. The environment at the markets could sometimes be stressful and dangerous because of all the cattle present, especially at Gudar market, as the animals often moved around and fought with each other. All this could of course affect the outcome of the study. The data collected through animal welfare assessments could be affected by the market circumstances and the knowledge of the student preforming the assessments.

If the study had involved a larger number of animals and more interviews, the study might have provided more data and more advanced statistical analyses could have been conducted. Also, if more markets had been visited in Addis Ababa and Ambo, additional data could have been used. Further animal welfare assessments need to be conducted, in order to draw definite conclusions about the welfare situation for cattle at livestock markets in Ethiopia.

6.5.2 Animal welfare assessment

The Welfare Quality® assessment protocol had to be modified in order to comply to the livestock cattle markets in Ethiopia and different scoring methods were used. As the Welfare Quality® assessment protocol is developed for intensive production systems in Europe, this

must be taken into consideration when discussing the results and the outcome of this thesis. For example, body condition scoring is adapted to highly produced breeds which may look very different from the breeds used in Ethiopia and therefore the animals would be scored very differently using the same protocol. The Welfare Quality® assessment protocol can be used in different production systems like cattle markets in Ethiopia, however, there is a need for a modification of the protocol. Furthermore, the best outcome and most reliable results would come from an animal welfare assessment protocol that is valid for these specific circumstances. Therefore, further studies need to be conducted in order to develop an animal welfare protocol which can be used for cattle markets in Ethiopia.

6.5.3 Interviews

During the interviews there was always a risk that the answers were based on assumptions rather than correct knowledge. The truth-value of the interviews could be questioned, as it sometimes felt that the interviewer gave an answer that he would think was the "correct" answer. Furthermore, as different translators conducted the interviews (which may have different backgrounds and knowledge about animal welfare), different perceptions of the answered questions must be taken in to account, and could have resulted in misleading information and misunderstandings. Furthermore, when translating to another language a loss of information could occur.

The interview questions were general and could be outlined more specific and detailed in order to get more reliable answers. If additional questions were conducted about animal welfare, a greater knowledge about the stakeholders' attitudes towards animal welfare could have been achieved. Furthermore, if more interviews had been conducted it would have been of more statistical value. But this was due to that I twisted my ankle and some weeks later I was treated for malaria in the hospital. Also, during several periods of the study we had problems getting a translator. Approximately four weeks were lost due to these circumstances.

7. Conclusions

The welfare of cattle at livestock markets in Ethiopia is low according to this study and the animals suffer from different health problems. Improving animal welfare would benefit both the cattle and the stakeholders involved in the livestock production. Results from health recordings indicates poor body condition, lesions/swelling were commonly observed and also the cleanliness of the animals was of concern. Furthermore, lack of proper management practices such as not providing sufficient feed and water, poor handling of animals (people hitting and kicking the animals) and ineffective transport practices were detected at the markets, indicating inadequate animal welfare. Furthermore, observation of the cattle markets indicates that hot weather, high stocking density and mixing different groups of animals have a negative impact on the welfare of the animals, increasing the risk of dehydration and injuries. There is a need to improve animal welfare at the markets in Ethiopia by providing sufficient information for stakeholders, increasing effectiveness of management practices and enforce proper animal handling strategies. By increasing the knowledge of the stakeholders, the attitudes towards the animals may improve and have a positive effect on the animal welfare. The results from this study can provide guidelines and be used for further research, however, further studies need to

be conducted on animal welfare at additional cattle markets in Ethiopia, in order to draw deeper conclusion about the situation.

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Appendix 1

The ethogram, with definitions, used during the health observations.

Health parameters	Scoring	Definitions
Lameness	0	Normal. Animal walks normally with no apparent lameness or change in gait. Hind feet land in a similar location to front feet.
	1	Minor lameness. Animal shows short strides when walking, dropping its head slightly. Animal does not show a limp when walking.
	2	Moderate lame. Animal shows obvious limping, favouring affected limb(s) which still bears weight. A slight head bob is present when the animal is walking.
	3	Severe lameness. Animals applies little or no weight to the affected limb and is reluctant or unable to move with obvious head bob and limp detected
Body condition	0	Satisfactory body condition: Good smooth appearance throughout. Not more than the last two or three ribs can be seen. Shoulders and hindquarters show fair muscling. Some or good fat deposition in brisket and over tail head
	1	Thin. Ribs visible but shoulders and hindquarters still showing fair muscling. Backbone visible
	2	Very thin. Ribs easily visible. No fat on ribs or brisket) but some muscle still visible on shoulders and hindquarters. Backbone easily visible
	3	Severely emaciated. All ribs and bone structure easily visible
Lesions/Swelling	0	No evidence of damaged skin or swelling
	1	Minor lesions/swelling. Between 1-10 lesions larger than 2 cm in diameter on the body. Some minor swelling can be seen
	2	Moderate. Between 10-20 parts lesions on the body. Clearly visible swelling on parts of the body. Or at least one large swelling/lesion. Some lesions may be fresh and blood may occur
	3	Severe. More than 20 lesions on the body. Larger than 2 cm diameter. The lesions are fresh showing redness and blood is seen. There could be at least one greatly wound, bleeding and in need of stitching
Cleanliness	0	Not dirty
	1	Minor. Somewhat dirty on feet and legs. Upper body is clean
	2	Moderate. Legs and feet are clearly dirty. Hindquarter up to tail head are dirty. Belly is dirty. Some areas on upper body is dirty but the majority of the upper body is clean
	3	Severe. The majority of the animal's body is clearly covered in dirt including feet and legs, upper body, neck and face

Hoof health	0	No evidence of overgrown hoofs
	1	Minor. Hoof is somewhat overgrown but not affecting the locomotion or standing. No spiral upwards
	2	Moderate. Hoof is clearly overgrown and showing tendency to spiral upwards
	3	Severe. Hoof is severely overgrown, spiral upwards and is affecting the standing
Diarrhea	0	No signs of diarrhea
	1	Minor. Less than one hand around tail are covered with manure
	2	Moderate. Big area, at least the size of a hand on both sides
	3	Severe. Large areas on both side are covered in manure, larger than one hand. Hindquarters is clearly covered in manure
Ocular discharge	0	No signs of ocular discharge
	1	Minor discharge. Wet or dry visible discharge
	2	Moderate. Area around eye is clearly affected by wet/dry discharge. Eye is partly closed and showing some swelling and redness
	3	Major discharge in the eye and around the eye. Eye is completely closed. Clearly visible swelling and redness in and around the eye
Nasal discharge	0	No signs of nasal discharge
	1	Minor discharge. Visible discharge/flow. Transparent color. Not thick
	2	Moderate. Somewhat thick and runny. Visible green/yellow color
	3	Major. Nostrils are completely covered in discharge in a clearly visible green/yellow color. The discharge is very thick

Appendix 2

The survey of the health observation preformed at the markets.

Health Survey

Date:

Market:

Individual nr:

Health parameters	**Rating**	**Other remarks**
Lameness	0 1 2 3	
Body condition	0 1 2 3	
Lesions/Swelling	0 1 2 3	
Cleanliness	0 1 2 3	
Hoof health	0 1 2 3	
Diarrhea	0 1 2 3	
Ocular discharge	0 1 2 3	
Nasal discharge	0 1 2 3	

Appendix 3

Interview outline

1. What is your profession?
2. How far have the animals travelled? By vehicle or walking? (km and hours)
3. For how many days/hours have the animals been at the market?
4. How often do the animals get feed/water at the market? What type of feed? And when was the last time they got feed/water?
5. How have they been housed during the travel? Any rest? If so, how many hours?
6. Do you have any injured or sick animals?
7. How often do you seek veterinarian assistance?
8. Do you think the animal feel pain and have emotions?
9. Do you think it is of any concern to hit and kick the animal (from an animal welfare or economically perspective)?

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