LIVESTOCK FEED RESOURCE AND FEEDING PRACTICES IN URBAN AND PER-URBAN AREAS OF ETHIOPIA

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Abstract: This review was done to describe livestock feed resources and feeding practices in urban and peri-urban areas of Ethiopia. Ethiopia is one of Sub-Sahara African country with largest livestock population density. Agro-ecological conditions of the country vary which determine the type of livestock production system. In source of livestock feed resources are natural pasture, crop residue, improved pasture and forage, agro industrial by-products and other by-products. Among this natural pasture and crop residue accounts the largest share. In urban and peri-urban areas livestock owner feed their animal agro-industrial byproduct, road side pasture, crop residue, fruit and vegetable wastes. Grazing land shrinkage, high cost of feeds, drought, and lack of technical know-how were the major factors limiting livestock productivity in urban and peri-urban areas. Additionally inadequacy of feed in terms of quality and quantity, even available feed resource are unused, undeveloped and poorly utilized. Moreover commonly used feed resource (crop residue), is low in quality, high fiber content with low digestibility, as a result of this the livestock productivity will be affected due to malnutrition. Therefore to solve the problem it should be better to consider non-conventional feed resource identification and nutritive value improvement for effective livestock feed resource utilization. Capacity building training for the farmers, giving attention for the sector on proper utilization of available feed resources in in urban and peri-urban areas should be considered.

Index Term: Livestock, Feed resource, Non-conventional, Urban and Peri-urban, Ethiopia

1. INTRODUCTION

Ethiopia is known for its large and diverse livestock resource endowments and livestock production is a part of the agriculture and the contribution of livestock and their products to the agriculture economy accounts about 47% (Inter-Governmental Authority on Development (IGAD), 2011). Ethiopia holds the largest cattle population from Africa with an estimated approximately, cattle 57.8 million, sheep 28.89 million, goat 29.7 million, horse 2.08 million, donkey 7.88 million and mule 0.41 million. From the total cattle population 98% are local breeds (Central Statistics Agency (CSA), 2016). Production systems are classified based on integration of livestock with crop production, level of input and intensity of production, agro-ecology and market orientation (Yitaye et al., 2007). Urban and peri-urban production systems is developed in areas where the population density is high and agricultural land is shrinking due to urbanization (Sintayehu et al., 2008); and the system contribute for income and employment generation, poverty alleviation, and improving human nutrition and health. In order to get all these benefits from animals, they should fed sufficient and quality diets that meet their needs. If their needs are not properly met, the animals won’t grow, reproduce, or produce milk, and they could possibly die. Hence, livestock production is strongly related to availability and quality of feed resources (Haldeman, 2004).

Feed resources in Ethiopia are classified as conventional and Non-Conventional Feed (NCF). They are mainly derived from natural pasture, crop residue, improved pasture and forage, agro industrial by-products, other by-products like food and vegetable refusal. Non-conventional refer to all those feeds that have not been traditionally used for feeding livestock and are not commercially used in the production of livestock feeds (Alemayehu, 2003; Girma et al., 2014). Also the processes of making the right diet choices and limitations in the supply of nutrients are the challenges to the urban and peri-urban livestock owners. However, the practice of feeding animals on crop/food wastes was found to be a very important strategy for coping with feed scarcity in urban and peri-urban areas. In addition, harvesting natural forages from open access lands (roadsides, undeveloped plots, wet- lands/swamps etc.) is an important source of feed for livestock owners in urban and
peri-urban areas (Azage and Alemu, 1998). Currently, Ethiopian populations are growing at a rate of 2.5% per annum (CSA, 2014), consequently, the demand of the livestock product in urban and peri-urban areas was higher and there is market opportunity for producers (Mesay et al., 2013). Rapid urbanization has not been accompanied by equitable economic growth and has resulted in increased urban poverty (Azage et al., 2001). Therefore the objectives of this review were:

- To review livestock feed resource and feeding practices in urban and peri-urban areas of Ethiopia.
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2. LIVESTOCK PRODUCTION SYSTEM IN ETHIOPIA

Many suggestions have been made for the classification of livestock production systems. But none of these classifications provide completely suitable framework for the evaluation of tropical livestock production systems on worldwide basis (Malede and Takele, 2014). Based on integration of crop cultivation and livestock production and agro ecology production system can be classified as, mixed crop-livestock farming, agro pastoral farming and pastoral production system (Institute of Biodiversity and Conservation (IBC), 2012). According to Azage et al. (2003) urban and peri-urban production system is practiced in urban and peri urban areas.

2.1. Livestock Feed Resource

Livestock feed resources are natural pasture/ grazing land, crop residue, improved pasture and forage, agro -industrial by product and other by-products like food and vegetable refusal, of which the first two contribute the largest feed types (Alemayehu, 2003). In most highland areas of the country, the grazing land availability and its productivity become declining due to crop land expansion, inadequate technical support, and lack of appropriate management and sufficient input supply particularly forage seed production (Alemayehu, 2004; Menberu, 2014). According to Angassa and Oba (2008), land use changes linked to bush invasion in dry land ecosystems threaten both indigenous plants and animals and exacerbates soil erosion, with far-reaching implications for local communities.

2.1.1. Natural pasture

Many researchers agreed that natural pasture comprises the largest share from livestock feed, but estimates of the contribution of this feed resource vary greatly. Yami et al. (2012) in highland natural pasture account as 49% of all feed resources. The distribution of such natural vegetation varies from place to place depending on climatic variation. The study done so far by Hussen (2017) in central highlands of Ethiopia the contribution of natural pasture was 56.5%. Natural pasture lands/ rangelands become degraded because of expansion of cultivation, conflict, water pond development and settlement. Generally, dry land ecosystems are subject to increasing land use changes as human need for food and natural resources rise, which eventually contributes to climate change (Grover et al., 2011). A significant proportion of grazing lands in pastoral areas have been encroached due to crop cultivation, ranching, year round grazing, settlement and shortage of rainfall (Angassa and Oba, 2008).

2.1.2. Crop residues

Crop residues are abundantly produced in almost all parts of the world where there is crop production is produced. Cereal straws such as Teff, barley, heat and pulse crop residues are stalked after threshing and fed to animals during the dry season when the quality and quantity of available feed from natural pasture declines drastically in different parts of the Ethiopian (Ketema, 2014). The sizes of farm holdings for crop production were highly variable, ranging from 0.5 hectare to 5 hectare. Some of the cereal grain by-products, particularly fermentation residues from alcoholic drinks and beverages are abundant in most parts of the country.

Improved pasture and forages play varying role in different livestock production systems. In general, they are important as adjuncts to crop residues and natural pastures and may be used to fill the feed gaps during periods of inadequate crop residues and natural pasture supply. Even in the presence of abundant crop residues, which are often free fed to ruminants, improved forage crops especially legumes are needed to improve the nutritional values of crop residues. Improved forages also provide benefits such as soil fertility through their nitrogen fixing ability and reducing soil erosion (Yami et al., 2012). Due to its positive biological impact on degraded lands the government of Ethiopia has given due attention in stock exclusion and watershed areas. However, not much progress achieved till recently. Similarly, (Rich et al., 2008) reported about the unsatisfactory and limited success rates of improved forage development because of shortage of land in the mixed crop-livestock system, technical problems such as planting and managing the seedlings, insect damage and low interest of farmers were some of the reported reasons for poor adoption of improved forage production (Hussen, 2017).
2.1.3. Agro-industrial by-products

Agro-industrial by-products have special value in feeding livestock mainly in urban and peri-urban livestock production system, as well as in situations where the productive potential of the animals is relatively high and require high nutrient supply. The major agro-industrial by products commonly used are obtained from flour milling industries (wheat bran, wheat short, wheat middling and rice bran), edible oil extracting plants (noug cake, cottonseed cake, peanut cake, linseed cake, sesame cake, sunflower cake etc), breweries and sugar factories (Molasses). The current trends of increasing urban population has a significant effect on the establishment of agro-industries due to the corresponding increasing demand for the edible main products (Dereje, 2012).

2.1.4. Non-conventional feed

Different types of organic wastes play a key role in urban agriculture. Organic wastes from hotels, cafés and markets are fed to animals, which roam freely, consuming waste around municipal bins and in the market places. Smallholder farmers in developing countries are faced with limited resource availability for feeding livestock. They use whatever is locally available to them, at either no or low cost (Jayasuriya, 2002). It is beneficial and have high economic values are obtained from the inclusion of fruit and vegetable wastes in the diet of livestock (Amata, 2014). Non-conventional feed resources have considerable potential as feed materials and for some; their value can be increased if there were economically viable technological means for converting them into some useable products (Salem et al., 2002). When such waste can be utilized and can be converted by livestock to valuable products which are beneficial to man, they become new feed materials of importance. In addition, they can be used to supplement the existing limited feed resources. Agro-industrial by-products and concentrate feeds are expensive and therefore not an option for poor households (Constantine et al., 2012). The practice of feeding animals on whatever feed resource that is locally available fruit and vegetable waste rather than relying solely on any particular feed resource/ingredient was found to be a very important strategy for coping with feed scarcity among farmers in urban and peri-urban areas (Malede and Takele, 2014).

2.2. The Role of Nutrition on Animal Productivity

Three factors, viz. genetic makeup, nutrition and management decide the productivity of an animal (Sethumadhavan, 2004). Improvements of genetic makeup only contribute up to 30% to production, while the 70% is dependent on nutrition and management. Poor forage quality, that is with low protein and energy content is also a serious problem. Poor quality feed causes low intake rates resulting in low levels of overall production (Bureau of Finance and Economic Development (BoFED), 2006).

A major gap exists between the demand and supply of conventional feed resources for feeding livestock in the world. In order to manage this problem of demand and supply, it is essential to increase the availability of conventional feed resources for the different livestock production and management systems. One method is to exploit the use of non-conventional feed resources (NCF) in livestock production systems (Mesay et al., 2013).

2.3. Livestock Feeding Practices

Free grazing is a predominant feeding practice in pastoral, agro-pastoral production system Ethiopia. The practice of feeding animals on whatever feed resource that is locally available rather than relying solely on any particular feed resource/ingredient was found to be a very important strategy for coping with feed scarcity among farmers in urban and peri-urban areas (Constantine et al., 2012). In the urban and peri-urban areas of Ethiopia, livestock grazing on seasonal fallow land and permanent pasturelands during cropping season and on croplands after harvest is common. Production problem common to most Ethiopian livestock feeding systems are seasonality in animal feed supplies and of poor quality when fed alone it is often unable to provide even for the maintenance needs of livestock (Alemayehu, 2006). Conserved hay is the main source of nutrients for cattle in non-grazing season, or all the time if they don’t have access to browse.

In lowland indigenous management grassland land practices are not widely used due to increase in population pressure and livestock density. Some of the practices like grazing land fire application were practiced to control pest and to facilitate vegetation growth (Angassa and Oba, 2008). The role of indigenous knowledge on grassland management is invisible compared with crop and forest land management (Angassa et al., 2012). The grasslands are used for livestock grazing for millennia. In the highlands plant growth is slow due to low temperature. Stacking density and intensity of cultivation determine the carrying capacity of land. In the lowlands, the short growing season suits only fast maturing plants; limited rainfall and recurrent drought, shrub invasion and overgrazing are major features of lowland grasslands (Angassa and Oba, 2008). Overgrazing and seasonal feed shortage are evident in the country. In highlands of Ethiopia the grazing lands (except protected areas) are in poor to very poor condition and deteriorate further unless there is immediate action (Alemayehu, 2006; Hussen, 2017).
2.3. Problems Associated with Livestock Feed Resource in Ethiopia

2.3.1. Crop land expansion

There are three aspects of feed problems, namely, the issue of increasing the efficiency with which the available feed is utilized (e.g. forages, crop residues, agro-industrial byproducts and non-conventional feeds), and the inability to make maximum use of the limited total feed resources and the seasonal fluctuations in quantity, nutritive value, and water availability. Inadequate feed supply in urban areas is due to many interacting factors, which include among others land shortage, high cost of feeds, climate risks and poor quality of feeds. The most devastating factor diminishing of feed for animals is due to rapid increment in the expansion of arable land that reduce the grazing land which is the major source of conventional animal feeds (Aschalew et al., 2014: Malede and Takele, 2014). This system is developed in areas where the population density is high and agricultural land is shrinking due to urbanization around big cities and other regional towns (Sintayehu et al., 2008).

2.3.2. Feed shortage both in quality and quantity

In urban and peri urban areas animal feed sources were poor in nutritive values due to that there is lower the production capacity and fertility potential of animals (Sethumadhavan, 2004). The feed supply is seasonal and shortage of green grass in the dry season is one of the major causes of the drastic decline in livestock performance. As a result, nutritional stress causes low growth rates, poor fertility and high mortality, which is compounded by diseases (CSA, 2007). A possible and perhaps the most viable proposition could be the inclusion of non-conventional feed resources in livestock rations with suitable and complete feed technology that can utilize the feed sources with maximum efficiency (Amata, 2014). The inability to feed animals adequately throughout the year is the most widespread technical constraint. Much of the available feed resources are utilized to support maintenance requirements of the animals with little surplus left for production (BoFED, 2006). Poor forage quality, that is with low protein and energy content is also a serious problem. Poor quality feed causes low intake rates resulting in low levels of overall production. Mature grass, especially those that are weather leached or bleached are low in digestible energy and protein as well as in soluble carbohydrate, carotene and some of the minerals (Tolera et al., 2012).

2.3.3. High cost of feed

Many scholars reported as in Ethiopia the main reason why livestock owners not to use agro-industrial by products properly was associated with its cost and availability. Moreover in urban and peri-urban production systems commercial to smallholder livestock production were practiced and they are profit oriented. But livestock producers not feed their animal balanced feed mainly due to its cost and its availability, to to this they use poor quality feed and urban-based resources which is not able to fulfill their daily nutrient requirement (CSA, 2012).

3. SUMMARY AND RECOMMENDATION

3.1. Summary

Non-conventional feed sources perceived to be cause environmental contamination, extra cost of disposal and lead to further deterioration of the urban environment. But efficient utilization of this feed resource minimize environmental negative effects, these include the removal of much wet organic waste from the streets and bins, the revenue from selling waste, which, in turn, creates more space at the dumpsites. In urban and peri-urban production system industrial by-products, fruits and vegetables waste are possible source of feed. Rapid urbanization has not been accompanied by equitable economic growth and has resulted in increased urban poverty. The human population in urban areas is growing at alarming rate per annum. So that there is higher demand of the livestock product in urban and peri-urban areas of Ethiopia it will create market opportunity for producers. Inadequacy of available basal roughage in terms of quality and quantity, even available feed resource are unused, undeveloped and poorly utilized, land shortage, high cost of feeds and transportation, seasonal variations, lack of technical know-how is the major factors limiting livestock productivity in urban and peri-urban areas.

3.2. Recommendation

In order to promote the survival and the sustainability of pastures sustainable grazing land management should be considered with proper strategic management plans. Participation of local users in natural resource management is very important. In the rapidly urbanizing African continent, urban feed resource identification, evaluation and utilization practice associated with urban growth is an indispensable task to understand the livestock production system and trend on the ongoing changes. Identifying the available alternative feed resources is important to devise/improve their utilization method to the extent that can bring changes in the production.
There was little attempt to investigate non-conventional feed resource availability and utilization practices in urban and peri-urban areas. Strategic supplementation of protein and energy rich feeds should be required in urban areas. In relation with the increasing market price of concentrate and roughage feeds, other optional feeds like fruit waste and other non-conventional feed resources should be considered.

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