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Management practice of the Sheko cattle breed in Ethiopia: A review

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Abstract: The great diversity of agroecological conditions and production systems present in Ethiopia contributes to the country's large livestock population and makes it suitable for various forms of livestock production. The Ethiopian livestock sector provides significant economic and social benefits at household levels and to the national economy. Ethiopia has 32 recognized indigenous cattle breeds, of which the Sheko is a known trypano-tolerant breed found in the southwest of the country. However, in recent times, the Sheko population has been declining mainly due to interbreeding with local Zebu cattle and to a shift in the production system. This paper aims to review and illustrate the current status and management practices of the Sheko cattle breed towards conserving and improving the breed, and the production system. The feed resources in the Sheko home area are natural pasture and crop residues, with limited utilization of cultivated improved forage. Husbandry practices such as feeding, watering, housing and veterinary services are priority areas where improvements are needed. Enhancing the conservation and improvement of the breed would greatly benefit from the active improvement of various stakeholders, including governmental policymakers and non-governmental organizations. Therefore giving special attention to enhancing the management systems in the breed's home area is crucial. This involves the direct engagement of research centres, extension workers; and higher learning institutions in proximity to the area all aimed at the conservation and improvement of the Sheko cattle breed.

Keywords: Conservation, Ethiopia, husbandry practice, livestock, trypanosomiasis

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Introduction

Ethiopia is a forefront country in Africa with an important livestock sector. The great diversity of agroecological conditions and production systems found in Ethiopia contributes to the country's large livestock population and makes it suitable for various forms of livestock production. The country is home to 32 recognized cattle breeds with an estimated population of 65 million heads (DAGRIS, 2007; Dessie, 2012; CSA, 2020). Although livestock farming in Ethiopia is subsistence-oriented, the sector provides significant economic and social contributions at household levels and to the national economy (Tolera *et al*, 2012; Desta *et al*, 2011). For instance, the livestock sector in the country serves as a source of food, income, employment opportunities, draught power and savings. The sector contributed 20% of the total gross domestic product (GDP), 40% of agricultural GDP, and 20% of national foreign exchange earnings (World Bank, 2007).

The occurrence of serious diseases also limits cattle production through increased mortality rates and their effects on fertility, growth and production. The major disease affecting cattle in the area is trypanosomiasis, locally called 'Gendi', which is caused by flagellate protozoa belonging to the genus *Trypanosoma* and transmitted by tsetse fly (*Glossina* spp). The disease appears at all times of the year but it reaches its peak point after the rainy season (May–October). Both direct and indirect loss is brought on by the disease. Lack of equipment and transport for the field services, a weak tsetse and trypanosomiasis control unit, and a shortage of adequately trained workforce are some

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of the problems associated with cattle health in the area (DAGRIS, 2007).

The direct loss is primarily caused by disease-related costs, death, morbidity and infertility in infected cattle. According to Seyoum *et al* (2013), trypanosomiasis-related mortality, morbidity and control expenses result in a yearly direct loss of US$200 million. More substantial than the direct loss is the indirect loss, which includes the lack of use of cattle and animal power for agricultural production in productive land in tsetse-infested areas. Food security and the reduction of poverty are both significantly hampered by trypanosomiasis (Kitila *et al*, 2017). Blackleg and other diseases including babesiosis and pasteurellosis are also present in the area. There is heavy tick infestation, especially in the lowland areas of south-west Ethiopia (Dawit, 1992). The Sheko cattle breed is known for its trypano-tolerance, which makes it very suitable for areas affected by the disease but populations are facing conservation challenges. This paper aims to review and illustrate the current status and management practices of Sheko cattle towards conserving and improving the breed and its production system.

Location and characteristics of Sheko cattle breed

Indigenous cattle breeds have a multipurpose function and are distributed across the country's diverse topographic and climatic conditions. Sheko is one of the taurine-known cattle breeds (humpless) found in the southwestern part of Ethiopia, particularly in the Bench-Sheko, Sheka and Keffa zones of the Southern Nations Nationalities and Peoples' (SNNP) region and adjacent to the Sudanese border (Hanotte *et al*, 2000) (Figure 1). Sheko cattle are also called 'Mizan' or 'Goda' by the local community. Phenotypically, the breed is characterized by short-horned and/or hornless heads, a small body size, humplessness, particularly in females, and a diverse range of coat colours such as red, red-brown, patchy red, white, and black (Taye *et al*, 2009; Bayou *et al*, 2014).

The breed is known for its hardiness, trypano-tolerance (ability to survive in trypanosomiasis endemic areas), good mothering ability, better feed conversion efficiency, fast growth rate and comparable milk production to other indigenous cattle breeds in Ethiopia (Taye *et al*, 2009; Stein *et al*, 2011; Desta *et al*, 2012). Farmers in the mid-altitude agroecological zone keep the Sheko cattle breed primarily for draught power followed by milk and income whereas farmers in the lowland agro-ecological zones often keep the breed for milk and as a source of income (Bayou *et al*, 2014). However, the breed is endangered, estimated at around 4,000 heads due to gradual interbreeding with local zebu, castration of the male at an early age, shift of production systems and shrinkage of grazing land (Takele, 2005). Studies done by Hanotte *et al* (2000) indicated that approximately 90% of the inspected Sheko bulls had their particular taurine allele almost 10% replaced by the Zebu-originated indicine allele, showing an alarming amount of crossbreeding Zebu.

Conservation and maintenance of pure-breed individuals are essential to the long-term survival of any species to withstand the changing environmental conditions and ensure their sustainable use in the future. Conservation of animal genetic resources is undertaken to maintain their diversity, fostering contributions to food and agricultural production, enhancing productivity and safeguarding ecological resources and cultural values for current and future generations. According to Mekuriaw and Kebede (2015), genetic conservation can be carried out using different methods. *In situ* conservation refers to the conservation of livestock through continued use by livestock keepers in the production system in which the livestock evolved or are normally found and bred. It involves the production of animals in their original production environment either on-farm or community-based (Figure 2).

Feeds and feeding

Feed is the main input of livestock production and largely determines its profitability since it accounts for 65–75% of the total cost of livestock operation (Walli *et al*, 2012; Makkar, 2018; Matope *et al*, 2020). In addition, feeding is the foundation of livestock systems as it directly or indirectly affects the entire livestock sector, including animal productivity, health and welfare, and the environment (Garg *et al*, 2014). Feed sourcing and feeding are at the very interface where the 'positive' and 'negative' effects of livestock production are negotiated (Blummel *et al*, 2018). Feed resources in the home area of the Sheko cattle breed are natural pasture, crop residues, and to a small extent the cultivation and utilization of cultivated improved forage. For instance, during cropping season (early June to late August), tinned maize (*Zea mays* L.) and the green stovers remaining after the green cob is harvested are used for animal feeding (Bayou *et al*, 2014). Crop residues, such as teff or barley straw are also major feeds. Improved forage like elephant grass (*Pennisetum purpureum*) to some extent, sesbania (*Sesbania sesban*), cassava (*Manihot esculenta*), taro (*Colocasia esculenta*), sweet potato (*Ipomoea batatas*), leaf and stem parts of enset (*Ensete ventricosum*), Steudner's dragon tree (*Dracaena steudneri*), banana (*Musa sapientum*), sugarcane (*Saccharum officinarum*) and homemade conventional feeds are common and well known. No reports are available regarding the production of roughage, such as hay for feeding livestock during the dry season. Straw treatments to produce feed include cutting and chopping long stalks and utilizing molasses and urea to enhance digestibility (Takele and Workneh, 2011; Hailu, 2020).

There is a general lack of feed availability for livestock production in the area due to the use of grazing lands for crop production. Feed shortage is rampant when most of the farmlands are covered with food crops during the wet season, and grasses are depleted

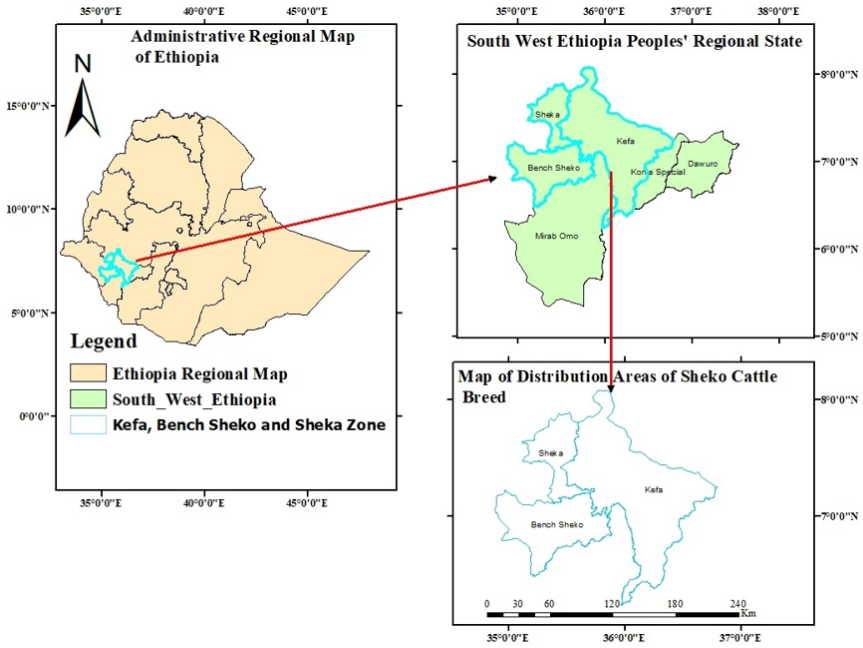

Figure 1. Map of the distribution areas of Sheko cattle breed

Figure 2. Sheko cattle breed maintained at the Teppi Agricultural Research Center

during the dry season (Bayou *et al*, 2014). The lack of improved feed conservation knowledge, shortage of land to plant forage, lack of adequate extension service to inform farmers on improved forage technology and unavailability of forage seed or planting materials are the most common limiting factors in the production and productivity of Sheko cattle breed (Desta *et al*, 2011). Feed resources are declining due to the expansion of crop fields in the face of fast human population growth. Consequently, Sheko cattle keepers increasingly resort to tethered feeding. Therefore, the average cattle herd size is declining, which also discourages the maintenance of the Sheko cattle breed (Desta *et al*, 2011; Mengistu *et al*, 2017). There is a notable lack of awareness and poor feed resource management, utilization, preservation, treatment and development (Hailu, 2020).

Feeding troughs are made of wood clay dishes, and synthetic materials such as plastic bath and plastic pot are used (Desta *et al*, 2011). The challenge lies in creating linkages between innovation sources, such as research centres and agricultural extension services, and the expansion of technology as well as coordination with budgetary administrations. Accordingly, addressing the issues related to the quantity and quality of feeds is essential (MOA, 2013).

Water resources and watering systems

Within the region where the Sheko cattle are grown, agriculture has actively harnessed water resources, predominantly drawing from natural resources such as springs and ponds. However, watering frequency is an additional limiting factor for Sheko cattle rearing (Bunke, 2019). The irrigation system adds further challenges, particularly if access, water quality, timing and frequency of watering are limiting factors (Hailu, 2020).

According to Mengistu *et al* (2017), water sources for cattle in the area are rivers, springs and ponds. The majority of the people give water to their cattle twice a day during the dry season, others offer water to their cattle once a day and some of them water their animals three times a day by tracking the animals to the watering point.

The majority of producers report there is no water shortage in the area, but for the remaining 27%, water is scarce during the dry season. The distance to a water hole is another factor that limits the rearing of cattle. About 86.4% of producers travelled 1–4 km to reach drinking water for their animals (Mengistu *et al*, 2017). Some communities need more accessible watering points and natural mineral licks to fully utilize the genetic potential of the Sheko cattle breed (Desta *et al*, 2011).

Housing system

The majority of cattle keepers in Mejenger (81.2%) and 47% in Bench-Sheko zones keep their animals in separately constructed houses made of wood with a grass-covered roof (Mengistu *et al*, 2017). At night, cattle are housed not far from the family house to protect them from cold, rain, predators and theft (Alemu, 1990). Feeder cattle are well protected from adverse weather conditions, predator attacks and theft. To keep the stall warm, the walls are covered with leaves and grasses. Enough space is provided in the stall to reduce competition for feed among stall-fed cattle (Takele and Habtamu, 2009).

Calves are kept separate from their dams, either within an annex connected to most houses or independently situated in and around the family house, typically within a horse shelter. Often the roof of a cattle house is made of grasses (Mengistu *et al*, 2017; Hailu, 2020).

Husbandry practices

Husbandry practices are carried out with family individuals and sometimes with neighbours. To utilize manure for trim generation, farmers frequently clean cattle faeces and urine and bolster refusals from the barn and the compound (Takele and Habtamu, 2009). Tools such as nose rings are used to tame aggressive Sheko bulls and oxen in the area. Traditionally, farmers use ear rings for the same purpose and this practice needs to be closely examined for its effectiveness (Lund, 2002).

Breaking and training animals at a younger age and alternating herding with tethering can soften the aggressive behaviour of the breed. Larger herd sizes increase the likelihood of selection and maintenance of breeding studs in the villages. Male cattle are usually castrated at an early age. Such males are kept in the herd for a long time adorned with decorations and are a source of pride to their owners. Another reason for the observed high number of castrates in household herds is that the number of castrated males is an indicator of social status ranking (Terefe *et al*, 2012).

Marketing practices

The breed has the potential for high marketability in large parts of south-western Ethiopia, which are challenged with medium to high tsetse and trypanosomiasis presence. Recent government initiatives, aimed at relocating smallholder farmers from densely populated highlands into underutilized fertile and sparsely populated valleys in south-western Ethiopia, have created a demand for adapted breeding cattle with the Sheko breed emerging as the optimal choice. The dairy and draught qualities of the breed may be worth investigating even for other agroecologies. The agriculture extension services and the national research systems need to support this effort until market interests gain momentum. In light of the threat of extinction, implementing an incentive system is essential for the Sheko breed. Owners who successfully rear a Sheko calf could be rewarded, promoting efficiency as proposed in some studies and encouraging breed preservation efforts by discouraging crossbreeding (Zander *et al*, 2009).

Additionally, the creation of a breeders' society for Sheko cattle will ensure farmers' involvement in identifying elite animals, creating market opportunities, recruiting herd registration and taking the lead in conservation activities (Hegde, 2005). Targeted promotion outside the existing market niche should focus on the special merits of the breed, such as its trypano-tolerance and dairy quality potential. The breed management plan should also be widely communicated to relevant stakeholders using appropriate media as part of marketing strategies (Terefe *et al*, 2012).

Production system

The livestock production system dominating in Sheko district and its surrounding areas is a mixed crop–livestock farming system. Permanent crops like coffee and bananas are widely produced. Coffee is the main cash crop. Smaller areas of land are also used for cereal production like maize and sorghum. Fruits such as avocado and mango are also highly produced. Cattle are important as a source of diverse foods such as milk, butter and meat, and also a source of income through sales of live animals and animal products like leather (Fasil, 2004).

The margin for increasing forage production from pasture is limited. Free grazing is the main animal management system in the area, but a few farmers provide supplementary feed at home. Most of the farmers keep their animals outdoors during the night near their homestead. Some farmers have enclosures made for their animals, whereas others keep animals together within the family house in a partially enclosed area (MOA, 1984). Sheko cattle are said to be better milk producers, reproduce faster than other breeds of cattle in tsetse-infested zones, and have good grazing and browsing ability during critical periods of forage scarcity (Workeneh, 2001). The average production and reproduction performances of the Sheko breed are presented in Table 1.

The most important characteristics of Sheko cattle include tolerance to disease especially to trypanosomes, long lactation length, good milking potential, good adaptation to heat stress, good traction power and adaptation to internal parasitic and tick infestations. Other positive traits attributed to Sheko cattle include good mothering ability, less selective feeding behaviour, attractive coat colour appropriate for the local environment, tolerance for biting flies, shorter calving interval and better adaptation to the terrain of the area. On the other hand, Sheko are known for their aggressive behaviour and their relatively high feed requirement of the farm households (Elias, 2008).

Table 1. Production and reproduction performances of the Sheko cattle breed (Takele, 2005)

Parameter and measure	Values
Age at first mating (years)	3
Age at first calving (years)	4
Calving interval (years)	1.5
Gestation length (days)	276.8
Body weight at calving (kg)	20
Body weight at weaning (kg)	102
Daily milk yield (litre)	2.3
Lactation milk yield per calving (litre)	698.3
Lactation length (months)	9.9
Females life span calving (in number)	8

Constraints of production

The overall trend indicates a decline in the population of Sheko cattle in its production region. The reason for this decline could be identified with Sheko cattle's energetic and aggressive behaviour, which decreases their acceptance by the local community (Alemu, 2002). The lower male-to-female ratio in the Sheko population might expose the animals to inbreeding and crossbreeding with bulls of other breeds. This situation is exacerbated by little consideration given to maintaining the endangered breed (Alemu, 2002). Due to their aggressive behaviour, Sheko cattle are difficult to harness and control by old persons, women, children and disabled persons. In addition, the early castration of bulls exercised by some farmers to control their aggressive behaviour seriously limits pure breeding of Sheko cattle (Takele, 2005). The most important constraints affecting Sheko cattle production are their sparse distribution, absence of conservation efforts, declining interest of the community in Sheko cattle due to their aggressive behaviour, inbreeding and hornlessness, which makes them difficult to restrain using rope (Elias, 2008; Bayou *et al*, 2014).

Given that the home area of Sheko cattle is renowned for coffee plantations, nearly all available land except for the swampy areas and hill-tops, is utilized for cultivation. The potential for increased forage production from pasture is severely limited and cattle rely entirely on natural pasture. Consequently, natural pastures are overgrazed causing the proliferation of undesirable plant species. Seasonal feed shortage is common during the dry season. Proper management, along with the allocation of grazing area and conservation of feed, is rarely practised. All stocks are grazed together with no attempt to provide special treatment for different classes of the stock (MOA, 1984).

Conclusion and way forward

In Ethiopia's rural areas, livestock is the most long-lasting feature of the way of life. Sheko cattle are among the three categories of Ethiopian breeds, which include small East Africa zebu and large East Africa zebu. Characterized by short horns and lack of hump, Sheko cattle are predominantly located in the Bench-Maji area, which was formerly part of the Bench-Sheko zone. Additionally, they can be found to some extent in the Sheka and Kefa zones of south-western Ethiopia.

Sheko cattle are raised within mixed farming systems and are sustained through natural pasture and crop residues. The breed's most important traits include resistance to trypanosomiasis, better milk yield compared with other local breeds, drought power and better feed conversion efficiency. Safeguarding the breed is vital to preserving its distinctive characteristics. To counteract the loss of the breed's genetic diversity, a diverse array of conservation and management practices needs to be in place. These include establishing *in situ* breeding stations and breed studs in its breeding tract, promoting niche markets and improving husbandry practices. Crucial measures involve addressing production challenges like feed shortages during the dry season, ensuring proper housing and feeding management, and allowing the breed to thrive in its natural habitat. The creation of incentives can encourage owners to keep breeding stock under good management, contributing to the breed's preservation. Consequently, the establishment of a Sheko breed conservation fund may be necessary.

Conflict of interest

The authors declare no conflict of interest.

Author contributions

Melkam Aleme provided contributions to the current versions of the article through collection, review, writing and interpretation, while Gezahegn Mengistu provided a review of the work before its final submission and overall assistance.

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