Original Research Paper

Conventional Beef Cattle Farming Practices in Wolaita and Sidama, Southern Ethiopia

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Abstract: Beef cattle farming is an integral part of livelihood for rural and urban smallholder farmers in developing countries. We aimed to describe the cattle farming practices in selected communities of Diguna Fango district, Wolaita Zone, and Sidama Region, Southern Ethiopia. Data were collected with pretested, semi-structured questionnaires applying a cross-sectional study. A stratified sampling was used to select a total of 180 fatteners from the three communities. Collected data were analyzed using descriptive statistics. The most cited forages for fattening cattle in the dry season were hay and wheat seeds, 180 (100% each), and fresh kidney bean and maize shoot system in the wet season, 180 (100% each). Rivers (75%) and ponds (84%) were the dominant sources of water. The body frame selection criteria had a significant ($p = 0.021$) effect on the weight gain and determined the fattening period. The breed that was most preferred (100%) was *Wolaita sangga*. Trypanosomiasis (57.77%) was the highest disease burden in the study area. Lack of clean potable water (50%), feeding resources (20%), and animal health ailments (10%) were the main constraints on beef cattle farming practices in the study area. Market actors were producers, consumers, middlemen, restaurant owners, traders, and butchers. The majority (79%) of fatteners had access to market information before the sale and the price was self-determined by fatteners (78%). Availability of better meat types, cattle, and high market demand were identified as good opportunities which could be used to enhance the performance of cattle fattening activity in the study area. It should be essential to provide farmers with adequate training and extension services on improved cattle fattening technology, management techniques, and market information to increase the revenue of the farming communities that use seasonally available feed supplies.

Keywords: Beef Cattle, Diguna Fango, Ethiopia, Fattening, Marketing, Wolaita

Introduction

Globally, mixed farming systems produce the greatest proportion of total milk production (90%), and meat (54%) and in many developing countries, it is the primary mode of production for smallholder farmers (Gebremichael *et al*., 2017; Ayalew *et al*., 2019; Keringingo *et al*., 2022; Mohamud *et al*., 2022; Waiswa *et al*., 2021). In the tropics, the principal objective of farmers engaged in mixed farming is the complementary benefit from an optimum mixture of crop and livestock farming and spreading income and risks over both crops and livestock production (Bahiru *et al*., 2023). The system gives farmers the chance to employ labor more effectively, have a cash flow source for investing in

farm inputs, increase the value of crops or crop by-products (Keringingo *et al*., 2022) and according to Ayalew *et al*. (2019), ensuring food security and other socio-cultural and environmental assets. In Ethiopia, smallholder cattle fattening is emerging in rural and urban areas with the same objective (Abebe *et al*., 2022). In other African countries such as Burundi (Keringingo *et al*., 2022), Somalia (Mohamud *et al*., 2022), and Uganda (Waiswa *et al*., 2021) the trend was observed.

With approximately 63 million cattle, more than 31 million sheep, 33 million goats, and 61 million chickens, Ethiopia has the highest livestock population in Africa by 2020 (CSA, 2021). In terms of contribution to the national economy, livestock contributes about 16.5% of the Gross

Domestic Product (GDP) and 35.6% of the agriculture GDP and currently, the subsector supports and sustains livelihoods for 80% of the rural population (Ayalew *et al.*, 2019; Abebe *et al.*, 2022). However, the system of production and marketing animals is not very advanced in the country (Ayalew *et al.*, 2019) as in other regions of the continent (Waiswa *et al.*, 2021; Keringingo *et al.*, 2022; Mohamud *et al.*, 2022). It is characterized by markets that lack essential amenities, including pens for cattle, weighing scales, water troughs, feed, and market information (Gebremichael *et al.*, 2017; Ayalew *et al.*, 2019; Keringingo *et al.*, 2022; Mohamud *et al.*, 2022; Waiswa *et al.*, 2021). Prices are usually fixed by individual bargaining and depend mainly on supply and demand, which is heavily influenced by the season of the year and the occurrence of religious and cultural festivals (Ayalew *et al.*, 2019). They are commonly traded by visual judgment and phenotypical observation of weight gain and in some of the southern (Borena) markets weighing was also practiced (Ayalew *et al.*, 2019; Getachew, 2019).

In Ethiopia, the livestock production systems are predominantly categorized as agro-pastoral systems in the lowlands and mixed crop systems in the highlands. One type of livestock production system, beef cattle farming, is practiced in rural and urban settings, either in cooperative or private forms (Ayalew *et al.*, 2019). The country has three main methods for fattening cattle: Conventional, by product based, and the Hararghe fattening system, according to Gobena (2017). Under the conventional system, farmers typically sell oxen after the plowing season when they are in poor condition and too old for drought purposes. When grazing pasture is unavailable, a byproduct based fattening system is practiced mostly based on agro industrial by products such as molasses, cereal milling by products, and oilseed meals. The Hararghe fattening practices could be described as intensive feeding of the available feed supply with young oxen purchased from nearby lowland pastoral areas for fattening. Which may depend on thinning of annual crops during the growing season and feeding on the individually tethered animals on the cut and carry system and on the stored crop stover during the dry season (Gobena, 2017). They let their oxen graze for about 3 h every morning before sunrise during the brief rainy season along the edges of farm plots or roadsides. When a farmer has more than one ox, he gives the extra one to a family member or neighbor in the same village so they can feed it after he uses it for traction. Sorghum and maize stover, straw, maize and sorghum leaves, thinned maize and sorghum seedlings, sterile plants, and crop field weeds are the main feed resources used in this system (Ayalew *et al.*, 2019).

Although the study area is known for its indigenous *Wolaita sangga* beef, cattle fattening practices, the presence of large live animal markets, and abattoir owners, significant benefit reports have not been made and have received no attention. There could be some challenges that prevent local methods for rearing beef cattle from being profitable.

Therefore, we aimed to describe the cattle farming practices in selected communities of Diguna Fango district, Wolaita zone, Ethiopia to conduct research and raise appropriate improvement strategies for cattle fattening practices.

Materials and Methods

Description of the Study Area

Based on the availability of cattle fattening techniques and a live animal market in the Wolaita zone of the Southern regional state and the Sidama Regional state of Ethiopia, respectively, two districts, Diguna Fango and Bilate Zuria, were purposefully selected (Fig. 1).

Three traditional live animal markets were investigated; one from the Bilate Zuria district called Bolela traditional market and two from the Diguna Fango district called Dimtu and Karchache local traditional live animal markets. Diguna Fango district is located at 6°57'571"N, 38°02'15.7"E with altitudinal ranges from 1395 masl to 2070 masl. It is surrounded by the Damot Weyde District in the southwest, the Damot Gale District in the west, the Hadiya Zone in the north, the Oromia Region in the northeast, and the Sidama area in the east. It is 93 km from Sodo town, the zonal capital city, and 350 km south of Addis Ababa, Ethiopia. Bilate Zuria District is bordered on the south by Boricha, on the west by the Wolaita Zone, on the northwest by the Oromia Region, on the northeast by Darara, and on the southeast by Dale District. The district is located: At 6°56'44"E, 38°15'26"E with altitudinal ranges from 1835 masl to 1911 masl. It is far 49.7 km from Hawassa the regional capital city and 326.1 km south of Addis Ababa, Ethiopia.

Sampling Method

A stratified sampling technique was utilized. The study sites were grouped into three strata. From each selected community, 60 informants or fatteners (a total of 180) were selected as representative samples using a systematic random sampling method. For the determination of the sample size, a formula from Yamane (1973) was utilized with a 90% confidence level (Table 1):

$$n = \frac{N}{1 + N(e)^2}$$

where,
n = Represents the sample size
N = Denotes the population size
e = The level of precision

With the assumption of a 7% level of precision, a total of 1500 population sizes were taken from this total population sample size as follows:

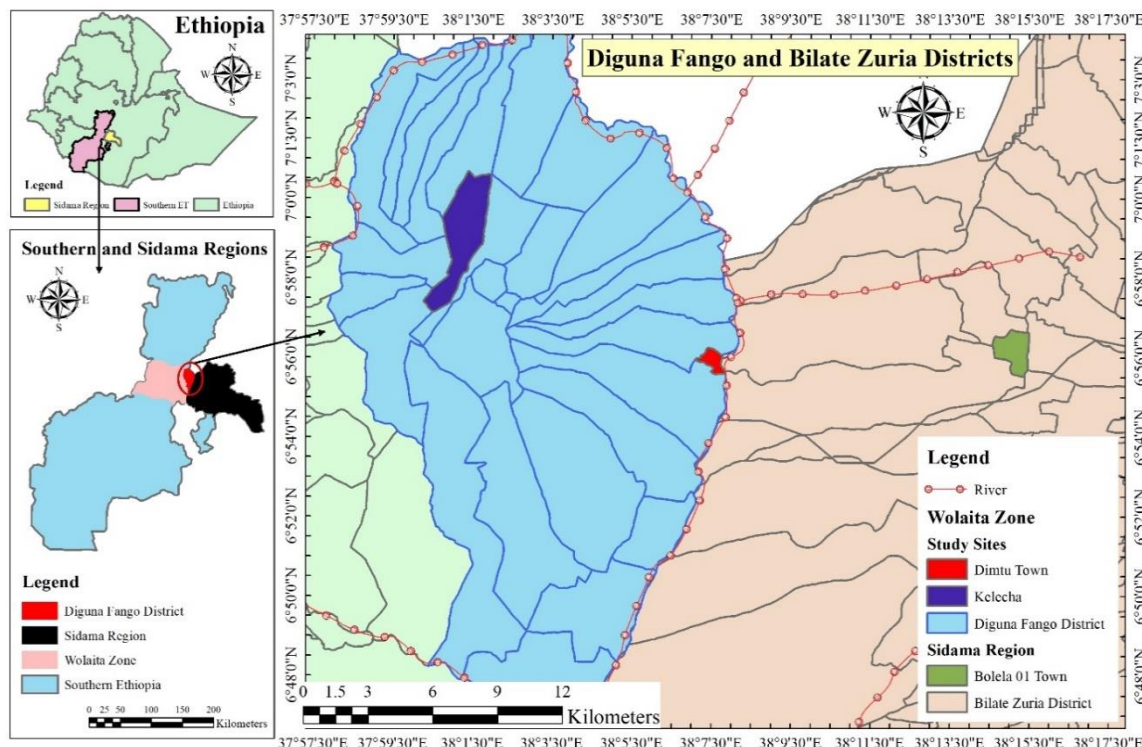$$n = \frac{1500}{1 + 1500(0.07)^2}$$

$$n = 180$$

Fig. 1: In Southern Ethiopia, Wolaita zone, Diguna Fango district, and Bilate Zuria district in Sidama regional stateside

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency (n = 180)	Percent (%)
Age (years)		
21-30	60	33.33
31-40	70	38.90
41-50	30	16.70
51-60	18	10.00
61 and above	2	1.10
Gender		
Male	170	94.40
Female	10	5.60
Literacy		
Illiterate	32	17.80
Literate	148	82.20
Marital status		
Single	26	14.40
Married	153	85.00
Widowed	1	0.60
Main occupation		
Animal fattening only	6	3.30
Animal fattening and crop production	119	66.10
Animal fattening and civil service	25	13.90
Animal fattening and other	30	16.70
Family size		
1-4	79	43.80
5-9	91	50.60
≥10	10	5.60
No. of animals per fattening season		
1	132	73.30
2	38	21.10
≥3	10	5.60

Data Type and Methods of Collection

Both primary and secondary data were collected. The primary data were gathered by using questionnaires, interviews with informants and stakeholders, and direct field observation on feed management, house management, and fattening cattle selection were essential parts of the research process. Secondary data were collected from different published and unpublished written materials. Questionnaires were prepared to assess demographic features, methods of fattening, cattle selection, feeding systems, and feed sources, frequency of fattening per year, housing and other key husbandry procedures, challenges of cattle fattening practices and marketing and systems for marketing life, fattened cattle.

Data Analyses

Collected data were analyzed using IBM Statistical Software for Social Science (SPSS) V.26.0 and descriptive statistics was used to quantify and summarize the data. Least Significant Difference was utilized to identify the mean differences existing in the data sets and their statistical significance was checked for variance using one-way ANOVA. We utilized the statistical model as follows:

$$Y_{ij} = \mu + \alpha_j + \varepsilon_{ij}$$

where,

Y_{ij} = The measurement of dependent variables
μ = The overall mean
α_j = The fixed effect of the measured variable
ε_{ij} = The random error

Results

Socio-Demographic Character of Respondents

The majority (38.9%) of the respondents were within the age range of 31-40, whereas ages above sixty accounted for only the least amount (1.1%). Males (94.4%) were the most dominant gender category of the respondents and more than half of them were married group (85%) followed by singles (14.4%). It was further investigated that literate participants (82.2%) were custodians and illiterates (17.8%). The primary occupations of the participants were crop production along with animal fattening (66.1%) and other livelihood-sustaining activities (16.7%). For the majority of respondents, (50.6%), the size of families was found in between 5-9 in number. A large number of participants, which was (73.3%), fed only animals per each fattening season and was then followed by two, (21.1%) and more than three (5.6%) animals (Table 1).

Beef Cattle Fattening

Beef Cattle Fattening System

All respondents practice three types of beef cattle fattening systems. However, the extent to which they were used varies depending on livestock feeding preferences and sessional dynamics. In communities around Dimtu traditional market, it was reported that fatteners commonly practice Hararghe type fattening practice (63.30%) with an alternation of traditional (27%) and byproduct-based systems (10%). In the Karchache community, however, comparative trends were observed with commonly practiced traditional fattening practices (45%) and with succeeding Hararghe (38.3%) and by-product-based systems (16.7%). The Hararghe type fattening practice (55%) was the most dominant type over traditional (26.7%) and by-product-based (18.3%) fattening systems in and around Bolela traditional markets (Fig. 2). There were no significant differences observed between the three fattening systems and fatteners using three of the methods almost equally likely.

Feed Resources for Cattle Fattening

Table 2 the study participants reported that feed resources for fattening cattle vary with the dry and wet seasons. The two most cited forages for the dry season were hay (100%) and wheat seed (100%), followed by roasted kidney bean (97.7%), bean coat (94.4%), sisal (*Agave sisalana*) succulent fresh apical meristem (93.3%) and roasted sorghum seed (92.2%). For wet seasons, easily available fresh-cut green forages were utilized. Fresh and red kidney bean (100%) and maize straw and shoot system (100%) were the two most cited available feed resources succeeded by grass and pasture (99.4%), fresh sorghum (98.3%), and ripe maize (93.8%). The only by-product-based feed resource savored in the study area was *areqe-atella* (39.4%) with other year-long forages and supplements such as processed fodder (27.2%) and salt bar soil (49.4%) given only for licking purposes after feeding or watering.
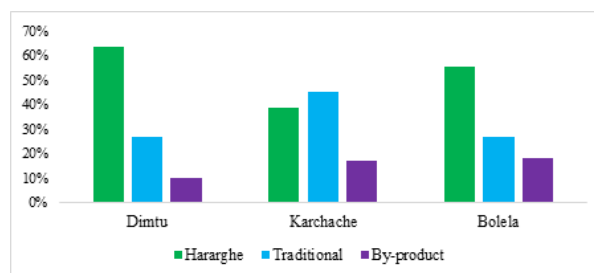

Fig. 2: Beef cattle fattening system

Table 2: Feed resources for cattle fattening in the study area

Type of feed	Frequency (n = 180)	Percentage (%)
For the dry season (dry forages)		
Bean coat	170	94.4
Hay	180	100.0
Sisal	168	93.3
Maize bran	152	84.4
Malted maize seed	123	69.4
Roasted kidney bean	176	97.7
Roasted maize seed	122	67.7
Roasted bean with maize mixture	145	80.5
Roasted sorghum seed	166	92.2
Sugar cane	119	66.1
Sweet potato tuber	100	55.5
Teff straw	160	88.8
Wheat seed	180	100.0
For the wet season (fresh-cut green forages)		
Fresh and red kidney bean	180	100.0
Fresh sorghum	177	98.3
Grass and pasture	179	99.4
Maize straw and shoot system	180	100.0
Ripe maize	169	93.8
Byproduct-product		
Areqe atella*	71	39.4
Yearlong forages and supplements		
Processed fodder	49	27.2
Salt bar soil (only for licking)	89	49.4

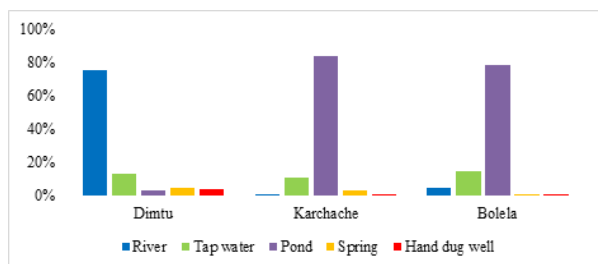*Areqe atella - local brewery products residue resulting from home distilling of an alcoholic liquor

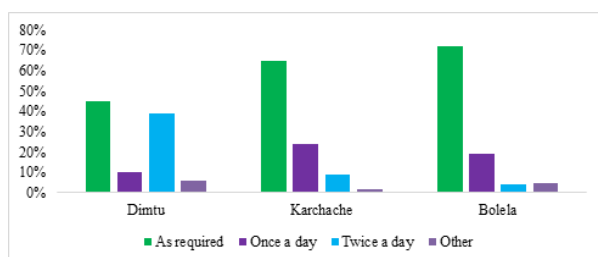**Fig. 3:** Water source for beef cattle fattening

Fig. 4: Watering frequencies for beef cattle fattening

Water Sources

Five different types of water sources were identified in the study area. Around Dimtu's local traditional market, fatteners mentioned the river as a dominant source of water for their cattle (75%) followed by tap water (13%). Around Karchache and Bolela, however, fatteners were forced to use pond water (84 and 78%), to a greater extent, respectively (Fig. 3).

Watering Frequencies

A common practice in all study's communities, including Dimtu (45%), Karchache (65%), and Bolela (72%), was the frequency of water provision, which was made whenever the cattle required it. Local market communities in the area of Karchache (24%) provided water once daily, whereas fatteners in the area of Dimtu (39%), were free to provide water twice daily (Fig. 4).

Feeding System for Beef Cattle

The study participants claimed that any cattle in the study area fattened in one of two broadly classified feeding systems. The first one is allowing the fattening cattle to range freely in an area with substantial amounts of forage before the last month of the fattening season, which is also known as open feedlot confinement. The confinement types which were used in the area were fences (91%) and tethering of animals to the tree (9%). In the second method, the cattle were fed in cozy cowsheds with access to forage until the end of the fattening season and free-ranging was completely prohibited. Which was a common practice in the study community (74%) in contrast to open feedlot confinements (26%).

Table 3: Preference ranking of selection criteria

Selection criteria	Fatteners (informants)						Total	Rank
	I1	I2	I3	I4	I5	I6		
Good body condition	5	5	5	5	5	5	30	1st
Tall height	5	5	5	4	5	5	29	2nd
Big and stand hump	5	5	5	4	4	5	28	3rd
Smooth coat	4	5	4	4	5	5	27	4th
Thick neck	5	5	4	3	5	5	27	4th
Body frame	4	5	4	5	5	3	26	6th
Glossy coat color	5	5	2	3	4	5	24	7th

Based on selection criteria (5 = best; 4 = very good; 3 = good; 2 = less used; 1 = least used and 0 = no value)
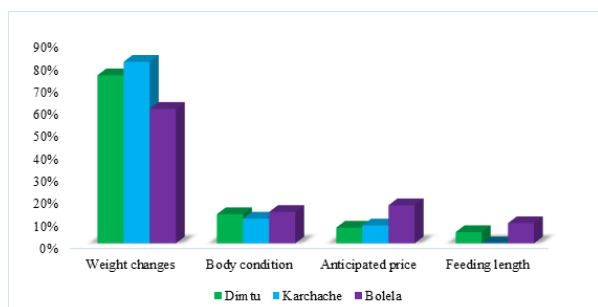

Fig. 5: Determination of cattle fattening periods in the area

Selection Criteria of Beef Cattle for Fattening

Table 3 preference ranking of selection criteria for purchasing beef cattle for fattening in the present study showed good body condition, tall height, big and standing hump, smooth coat, thick neck, body frame, and glossy coat color in decreasing order of importance. No significant differences were found between the cattle selection criteria for buying in the study communities, regardless of how the degree of preference varied.

Preferred Cattle Type for Fattening

According to the respondents, the local breed of cattle called *Wolaita sangga* was the most preferred for fattening purposes (100%) and is currently more well-known in the study community than other crossbreed types.

Determination of Cattle Fattening Period

The fattening periods for cattle that fatteners identified ranged in length from three to four months. Various factors were used to determine when the fattening period ended. Phenotypic observation of live weight gain was a common practice in all communities such as; Karchache (81%), Dimtu (75%), and Bolela (60%) for the cessation of fattening periods. Not only that but also considering normal body condition was

the other technique to anticipate current and future prices by calculating the length of feeding seasons (Fig. 5). There was no significant difference observed in cattle fattening period and factors affecting fattening periods in the study communities.

Cattle Health Care and Management

In all communities, respondents were confronted with many animal health ailments. Trypanosomiasis was the most cited disease in Dimtu (76.66%) and Bolela (61.66%), while bacterial infection (36.66%) particularly "*xillikiya*" was commonly occurring in Karchache localities. The burden of other infections was not as common as trypanosomiasis (57.77%) in the study area as a whole (Table 4). Since there was no statistically significant difference in disease prevalence observed across the communities, it was likely that the epidemiology of diseases in the study area was balanced.

Constraints on Cattle Fattening Practices

The main constraints to beef cattle fattening practices in the study area were lack of clean potable water (50%), increased cost of feeding resources and unavailability of scientific feed formulation (20%), shortage of foraging land (15%), diseases (10%), reduced credit facilities (4%) and lack of improved cattle fattening technologies (1%). Each and individual constraint on cattle fattening practices had a significant (p = 0.01) effect on the gross profit of fattening cattle.

Beef Cattle Marketing System

The primary and village level are the two levels on which markets in the study area operate. Animals are sold at primary level markets only in district towns, but not at the village level. Producers, medium-sized traders, middlemen/brokers, butchers, bar owners, and other farmers purchasing cattle for replacement were the market actors. In the markets, there were no facilities for feeding, watering, housing, or weighing animals.

Table 4: Common diseases of fattening cattle

| | Communities of the study | | | | | | | |
| | Dimtu | | Karchache | | Bolela | | Total | |
Type of diseases	N	%	N	%	N	%	N	%
Trypanosomiasis	46	76.66	21	35.00	37	61.66	104	57.77
Ecto-parasitic/tick	39	65.00	9	15.00	19	31.66	67	37.22
Anthrax	21	35.00	19	31.66	13	21.66	55	30.55
Bloat	18	30.00	7	11.66	22	36.66	47	26.11
Lameness	22	36.66	13	21.66	11	18.33	46	25.55
Bacterial infection	10	16.66	22	36.66	8	13.33	40	22.22
Pasteurellosis	12	20.00	4	6.66	1	1.66	17	9.44
Evil eye	2	3.33	0	0.00	4	6.66	6	3.33
General and unspecified	3	5.00	2	3.33	1	1.66	6	3.33

Market Information

To close information gaps and eliminate uncertainties in the agricultural sector, market information is essential. Producers use it in their planning for production and strategy for marketing the product. The majority (79%) of the respondents indicated that they obtain market information before cattle sales. Regarding the sources of market information, some of the households use cooperatives (2%), brokers (10%), relatives (29%), and neighbors (19%), but own market visit (40%) was cited by most fatteners.

Price Determination

The price was self-determined by the majority of fatteners (78%) and little (22%) mentioned the involvement of brokers in the seller and buyers. The price was sometimes judged by comparing it to the selling price of fattened cattle in markets. However, the price set factors depend on the weight gain (97.5%) and age (2.5%) of animals and the demand for beef cattle increases with the time of holiday. Regarding the sources of animals, 71.8% of the respondents reported purchasing cattle from other smallholders in other localities, and the rest (28.2%) purchased from farmers within the same locality. About 67% of the respondents sold some of their cattle in the last 12 months to replace older stock (33%), while the rest sold to meet family financial needs (77%) such as taxes, health bills, school fees, and household expenses.

Transportation of Cattle

According to the survey results, all respondents trek their cattle to nearby markets and do not use a vehicle for transportation.

Discussion

One of the parts of the global agriculture and food industry with the fastest growth rates is the livestock production sector. The sector subsidizes 47% of the agricultural GDP and 15% of the overall GDP in Ethiopia and has produced an estimated 31% of all agricultural employment for the country, making it a vital part of the economy (Behnke, 2010). The third most important export, accounting for 11% of the total export revenue, is live animals and livestock products like meat, hides, and skins (Ayalew et al., 2019; Abebe et al., 2022).

Ethiopian beef production has become more market-oriented recently and the demand for cattle products has grown in the domestic and export markets. To increase domestic per capita meat consumption and export, however, a bottleneck still exists due to the lack of sufficient supplies of export-quality livestock that meet the required body weight and age for slaughter, the lack of knowledge about the most effective way to use feed resources for quick feedlot finishing and the biological reaction of indigenous cattle to feedlot fattening (Teklebrhan and Urge, 2013). Therefore, for agricultural production systems that are market-oriented, a stronger management system has to be established (Abebe et al., 2022). The government is making an effort to expand the sector by enticing producers to meet the rising demand. As a result, there are more meat processing facilities and export abattoirs than ever before, which has increased the sector's export earnings (Ayalew et al., 2019; Abebe et al., 2022).

The majority of the fatteners were from younger and economically active age groups. A similar thing was seen in Pabna and Sirajgonj districts (Sarma et al., 2014). Men were more actively involved in fattening practices as labor is needed to collect forage and water pitching from remote areas, as well as to trek cattle to remote markets and, stay away all night. Women may find it tough to perform all mentioned tasks, but some powerful women are effective despite their household duties. According to Sarma et al. (2014), the majority of fatteners were male. However, a report from Bangladesh has shown that the female custodian feedlot finishing industry (Ahmed et al., 2021). The importance of marital status in agricultural production can be explained in terms of the supply of family labor for agricultural production. Married groups

were higher and this responsibility may enable farmers to independently make more rational decisions with high accuracy, which in turn may increase their efficiency (Abdulaziz *et al*., 2021). In line with the present findings in Sokoto State of Nigeria that the marital status of cattle fattening farmers was dominated by the married groups (Atiku *et al*., 2018). Therefore, married individuals were discovered to be more involved in cattle fattening activities in the study area because, as household heads, they were expected to earn more income for the maintenance of their families' daily operations. The culture of early marriage among people may be responsible for this and which also ensures a good supply of labor on the farm. Bahiru *et al*. (2023), asserted that marriage is an important factor in the livelihood of individuals in their society as it is perceived to confer responsibility to individuals.

Feed resources for fattening cattle varies with seasonal variations. The two most cited forages for the dry season were hay and wheat seeds. For wet seasons, easily available fresh-cut green forages were utilized. The only by-product-based feed resource used in the study was *areqe-atella* with other year-long forages and supplements such as processed fodder. In line with the present finding, Gebremichael *et al*. (2017) reported the same types of feed used for cattle fattening in and around Mekelle such as grain and wheat bran. Mulu *et al*. (2009) also reported fresh-cut green forage in the Bure district that took the higher proportion of the respondents and followed by maize stover, hay, and pasture grazing. Some of the fatteners using *areqe-atela* (local brewery products) as supplementary feed in the present study are in line with reports from Arsi Negelle and Gondar areas (Ayalew *et al*., 2019).

A mineral lick is a place where animals can go to lick essential mineral nutrients from a deposit of salts and other minerals. This salt lick is an ideal supplement for standard feed and grass or if the livestock is not receiving sufficient nutrients (Plummer *et al*., 2018; Insoongnern *et al*., 2021; Tawa *et al*., 2023). It is thought that certain fauna can detect calcium in salt licks (Plummer *et al*., 2018). The minerals of the salt bars usually contain Calcium (Ca), Magnesium (Mg), Sulfur (S), Phosphorus (P), Potassium (K), and Sodium (Na) (Blake *et al*., 2011). In some regions, under specific conditions, Mg, K, Iron (Fe), and Manganese (Mn) may be deficient and excesses of Fluoride (F), Molybdenum (Mo), and Selenium (Se) can be extremely detrimental (Plummer *et al*., 2018).

The frequency of water provision was any time as required by the cattle, which was a common practice in all study communities. Fatteners around Dimtu were free to provide water twice a day due to enough amount of lotic and lentic water resources, whereas once a day around Karchache local communities. In contrast to the present findings, (Mulu, 2009) respondents offered water for their fattening cattle twice and three times per day. The finding of Ayalew *et al*. (2019), however, indicated that the majority of respondents gave water to their cattle only when they sought it. The present finding proved that the areas around Karchache and Bolela had a high scarcity of clean potable water not only for fattening cattle but for human consumption.

There were two broadly classified feeding systems for fattening cattle in the study area. The first one is allowing the fattening cattle to range freely in an area with substantial amounts of forage before the last month of the fattening season, which is also known as open feedlot confinement. This could be because open feedlot confinement is the least expensive type of feedlot construction. The second method was prohibiting the cattle from free-ranging and feeding in the home with available forages in comfy cowsheds from begging on the last date of the fattening season. In this closed system, every activity of cattle is under close control by any of the family members rather than the open system. In Gondar Town, all fatteners feed their fattening cattle by using a feedlot finishing system, that is, an open feedlot confinement (Ayalew *et al*., 2019).

Trypanosomiasis was the most cited disease in Dimtu and Bolela, while bacterial infection caused by *Bacillus anthracis*, particularly called anthrax or "xillikiya = Wolaitic language" was commonly occurring in Karchache localities. The epidemiology of diseases in the study area was likely balanced because there was no statistically significant difference in disease prevalence observed across the communities. This finding is consistent with reports from northern Ethiopia of pasteurellosis, ectoparasitic tick infestation, anthrax, and GIT parasitism (Haftu *et al*., 2014).

Cattle marketing in the study area functioned at two levels: Village and primary market levels. Animals are sold at primary markets located in district towns, but they are rarely sold at markets at the village level. Producers, medium-sized traders, middlemen/brokers, butchers, restaurant owners, and other farmers purchasing cattle for replacement were the market actors. There were no markets with facilities for feeding, watering, housing, or weighing animals. A three-tier system of primary, secondary, and terminal markets is used in Ethiopia for the marketing of livestock. Through these markets, animals are sold to small and large traders who then sell them to butchers, factories that process meat, fattening farms, or exporters of live animals as final consumers. The livestock marketing systems in Ethiopia are underdeveloped (Ayalew *et al*., 2019). Markets lack basic infrastructure such as cattle pens, weighing scales, water troughs, feed, and market information (Gebremichael *et al*., 2017; Ayalew *et al*., 2019; Abebe *et al*., 2022).

The price was self-determined by the majority of fatteners and there was an involvement of brokers between the seller and buyers. In line with the present finding, middlemen were reported to be involved in Ilu Aba Bora markets due to the presence of more buyers such as butchers and restaurant owners, particularly in the Kemise market (Ayalew *et al.*, 2019). The price was determined by comparing it to the selling price of fattened cattle in markets. However, the price-setting factors depended on animal weight gain and age. The demand for beef cattle increases during the holiday season as finished cattle are sold at attractive prices due to the high demand for beef during major holidays (Abebe *et al.*, 2022).

The main constraints to beef cattle fattening practices in the study area were lack of clean potable water, increased cost of feeding resources and unavailability of scientific feed formulation, shortage of foraging land diseases, decreased credit facilities, and lack of improved cattle fattening technologies. In line with the present finding, the main constraints of beef cattle fattening practices in Gondar town were feed cost increase, lack of credit, and absence of market information (Ayalew *et al.*, 2019). Similar to this report, the problem of cattle fattening in different countries was a lack of feed, a lack of credit facilities, price variations in different markets, a disorganized marketing system, and the problem of transporting cattle for marketing (Abebe *et al.*, 2022). The gross profit of fattening cattle was significantly impacted by each constraint on cattle fattening practices.

Conclusion

Beef cattle fattening is a common practice and it is one of the few agricultural commodities for which the country earns foreign currency through both live and processed commodity exports. Traditionally, by product based and the Hararghe fattening system were the fattening systems identified in the area. The main feed types used to fatten cattle in the dry season were hay and wheat seeds with fresh and red kidney beans and maize shoot system in the wet season. Rivers and ponds were the dominant sources of water for cattle. Fatteners had access to market information before the sale and the price was self-determined by fatteners. Even though weight measurements had not been practiced, the price set factors were depending on the weight gain of the animal. The type of cattle breed that was most preferred was the local breed called *Wolaita sangga*. Trypanosomiasis was the highest disease burden in the study area. Market actors were producers, consumers, middlemen, restaurant owners, traders, and butchers. The main constraints to beef cattle fattening practices in the study area were lack of clean potable

water, increased cost of feeding resources and unavailability of scientific feed formulation, shortage of foraging land diseases, decreased credit facilities, and lack of improved cattle fattening technologies.

Recommendations

Based on the above conclusions, the following recommendations were forwarded:

- Solving the water scarcity problem is critical for increasing the quality and quantity of fattened animals
- To improve the effectiveness of cattle fattening practices in the study area, training and extension advice is urgently needed in the selection of fattening cattle feed resources, feeding systems, and healthcare management
- More research and development should be conducted using byproducts that are readily available locally to find ways to lower the increase in feed costs

Author's Contributions

Abenezer Wendimu: Data collection, manuscript write-up, data analysis, software calculations, second draft write-up, language edition, study area mapped, approval.

Wondimagegnehu Tekalign: Supervision, data validation, fund accusations, manuscript revision, approval, language edition, assist data collectors.

Ethics

This article is original and has never been published before. The author has also confirmed to all authors involved in this study to read and agree to the contents of this article and that there are no ethical issues involved.

Consent to Publication

All authors agreed to the public this original research work.

Competing Interests

The authors declare that they have no competing interests.

Availability of Data and Materials

Data generated and analyzed during the current study are included in the body of this study.

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