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RESEARCH ARTICLE

Cattle Marketing System in Bena-Tsemay District of South Omo, South-Western Ethiopia

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Abstract: The absence of information on cattle marketing systems is a major challenge for cattle producers and policymakers in Ethiopia. Therefore, this study was conducted in the Bena-Tsemay district with the aim of assessing the cattle marketing system. The household survey involved the interviewing of 150 households of eight Kebeles, which were purposefully selected from the three cattle production systems. The qualitative parameters, such as cattle market infrastructures, cattle transportation facilities, cattle market information, cattle marketing channels, cattle market actors, and the extent of extension service in the cattle marketing system, were analyzed using non-parametric methods, while the means of the quantitative parameters, such as cattle price and a number of cattle supplies, were analyzed using a one-way ANOVA of SPSS, version 20. The results revealed that the majority (73.2%) of the cattle keepers in three production systems sold their cattle; while very few (24.8%) did not. Approximately 58.33% of respondents said they bought and sold cattle at the local market using eyeball estimation, while only 12.2% used a bartering system. The majority of cattle keepers (69.30%) have access to cattle market information, while a few of them (30.7%) do not have access to cattle market information. The prices of selling and purchasing cattle were determined via peaceful negotiations between cattle sellers and traders (66.7%), while a small percentage (33.3%) was determined only by the cattle seller's decision. The lack of cattle market and transportation facilities, the lack of cattle market price promotion centers, the lack of credit services, and the lack of capacity buildings were the major cattle marketing constraints. Thus, based on the results, the authors concluded that capacity-building and development efforts should be designed for cattle market transport facilities, legal cattle market promotion centers, credit services, and cattle feeding and health improvement strategies.

Keywords: Cattle; Cattle marketing; Production systems; Market channel; Marketing prices

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1. Introduction

Ethiopia has approximately 70 million cattle, which have been reared in pastoral, agro-pastoral, and mixed crop-livestock production systems. The pastoral production system is one in which pastoralists extensively rely only on cattle; there is no crop production practice in this system. The agro-pastoral production system is characterized by the dominance of livestock husbandry and limited crop production practice, while the mixed crop-livestock system is the dominant livestock production system in which crops and livestock play interdependent roles, with livestock providing draught power and manure for crop agriculture while crop residues provide feed for the livestock. Of the 70 million cattle population, about 68,180,000 (97.4%) are indigenous cattle, 1,610,000 (2.3%) are hybrid cattle, and 210,000 (0.3%) are exotic breeds [1]. Cattle are the leading livestock species in the country and have a tremendous role in being a source of cash income, food (meat and milk), fulfilling cultural obligations, and delivering about 68 million tons of organic fertilizer and almost 617 million days of animal traction to 3.85 million rural households in the highlands and 7.15 million rural households in the lowlands [2]. The cattle consist of cows, oxen, heifers, and steers and have the capability to adapt to the varying agroecological zones of Ethiopia to produce milk, meat, and traction [3,4]. It is evident that the average lactation period and milk yield per cow per day at the country level is estimated to be about seven months and 1.482 liters, respectively [1]. The beef cattle here refer to all cattle reared exclusively for meat that is used either for home consumption or for sale [1]. Of the annually produced meat from the beef, about 56.9% was used for household consumption, 29.41% was sold at the local market, 1.9% was paid for wages in kind, and 11.8% was used for other products [5]. Despite the huge share of the cattle population in the country, the economic and social merits that have been generated from the cattle production systems in Ethiopia are generally very low due to different technical and non-technical constraints [1,2]. The lack of much-updated information on the cattle marketing system related to cattle market infrastructures, cattle market transportation facilities, the cattle market information delivery system, cattle handling facilities at the abattoir and export level, the absence of a market-oriented cattle production system, excessive cross-border illegal trade, and stiff competition are among the major non-technical constraints that have been challenging the cattle marketing system in Ethiopia [6,7]. The market is defined as the set of actual and potential buyers of a product, while marketing is defined as the performance of all business activities involved in the flow of goods and services from the point of initial production until they are in the hands of ultimate consumers [8]. The "market price" is the quantity of payment or compensation given by one party to another in return for goods or services [9]. The marketing channel is an organized network of various agencies and institutions that, when combined, perform all of the activities required to connect producers and consumers in order to complete marketing tasks [10]. Similarly, in the Bena-Tseamy district where this study was conducted, there is a lack of updated information on cattle market infrastructures, cattle transportation facilities, cattle market information sources, cattle marketing channels, cattle market actors, cattle marketing prices, the source of cattle supply, the extent of extension service in promoting on-time cattle market prices, the credit service delivery system, and cattle market constraints due to the absence of capacity-building and development interventions. Understanding the cattle marketing system and cattle market constraints is therefore critical for developing cattle marketing system development strategies for interventions that would improve the efficiency of the cattle marketing system in a way that would benefit livestock producers, traders, government organizations, and non-governmental organizations (NGOs). Thus, the objective of the study was to assess the effect of the production systems and seasons on the cattle marketing system.

2. Materials and Methods

The assessment study on the cattle marking system was conducted in the Bena-Tseamy district which is indicated in Figure 1. The Bena-Tseamy district is located between 5°0'1" and 5°73'0" feet north latitude and 36°38'0" and 37°07'0" feet east longitude in the South Omo region of southwestern Ethiopia. The district is characterized by semi-arid and arid climatic conditions, with mean annual rainfall averaging from 350 mm to 838 mm. The long rainy season began in March and lasted until June, while the short rainy season lasted from September to October [11]. The average ambient temperature of the study area ranged from 26 °C to 35 °C, and the district is predominantly covered with different masses of Acacia, Grewia, and Solanum woody species [12,13]. Agro-pastoralism is the most common land-use system [13,14], with cattle and goats grazing and browsing on more than 48% of the district's total land area [12]. Rain-fed agriculture is practiced, and sorghum, maize, millet, beans, wheat, barley, and vegetables are the major crops grown in the study area [12]. The Bena are an ethnic group that lives in the higher altitudes of the Bena-Tsemay district and is more involved in crop production, whereas the Tsemay are an ethnic group that has practiced pastoralism and lives in the lower altitudes

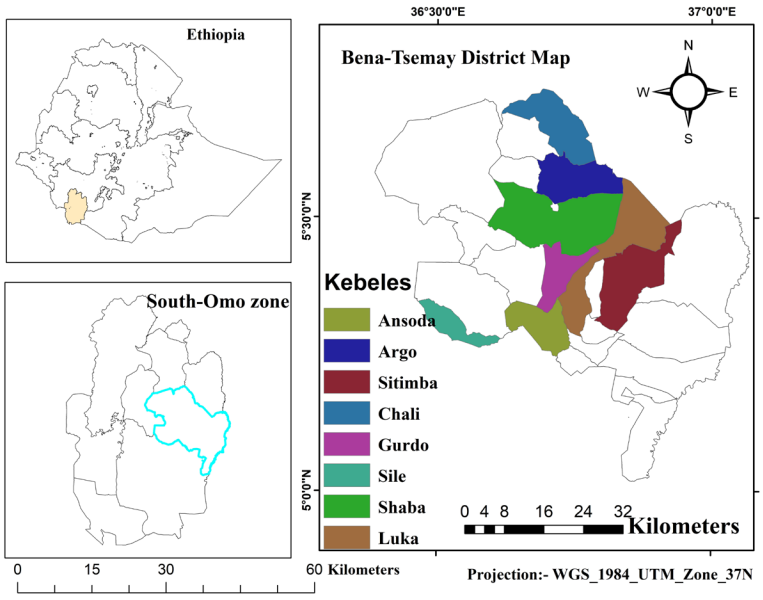

Figure 1. Map of study area.

of the Bena-Tsemay district and relies on livestock production [12]. The estimated human population of the Bena-Tsemay district is about 86,691, of which 44,591 are male and 42,100 are female [15], and the population of livestock is estimated to be 525,941 cattle, 211,818 sheep, 910,252 goats, 235,363 poultry, and 36,387 donkeys [16].

3. Study Design

3.1 Sample Selection Procedure and Sample Size

A multistage sampling procedure was employed to select the study Kebeles. For the first stage, 34 Kebeles (the smallest administrative subunit) of the Bena-Tsemay district were stratified into three categories based on the cattle production systems that prevailed in the district (pastoralists, agro-pastoralists, and a mixed crop-livestock system). In the second stage, a purposive sampling technique was used to select the sample study Kebeles from each cattle production system based on the number of cattle they supplied to the cattle market, their cattle marketing experience and potential for the cattle emanated from a different place to market. Thus, from the pastoral production system, three Kebeles (Sitemba, Luka, and Anesonda); from the agro-pastoral production system, four Kebeles (Argo, Shaba, Gurdo, and Sile); and one from the mixed crop-livestock production system (Chali) were acknowledged for the face-to-face household survey. Finally, a simple random sampling technique was used to select households from each selected kebele that have experience in the cattle marketing system. The sample size from each kebele was determined based on proportion to the total human population in each selected Kebele, and thus, a total of 150 households (57 HHs from pastoral, 55 HHs from agro-pastoral, and 38 HHs from mixed crop-livestock production systems) were selected according to the sampling technique [17].

$$no = \frac{Z^2 * (P)(q)}{d^2} \rightarrow n_1 = \frac{no}{(1 + no/N)}$$

where, n_o = desired sample size according to Cochran's (1977) when population greater than 10,000; n_1 = finite population correction factors population less than 10,000; Z = standard normal deviation (1.96 for 95% confidence level); P = 0.11 (proportion of the population to be included in the sample i.e. 11%); q = 1-0.11 i.e. (0.89); d = is degree of accuracy desired (0.05), 5% error term.

3.2 Data Collection Methods

3.2.1 Household Survey

Primary data were collected by interviewing the households using a semi-structured questionnaire. During the face-to-face interviews, respondents raised important points such as cattle marketing practices, cattle marketing locations, access to cattle market information, source of cattle market information, main actors in the cattle market, cattle marking prices, cattle price determiners, cattle market efficiency, and cattle marketing channel. The rapid cattle market assessment study was conducted at the five cattle marketing centers (Key-Afer, Alduba, Kako, Woito, and Luka). Figure 2 indicated cattle in Alduba during the cattle market monitoring study.

Figure 2. Alduba market monitoring during cross sectional study.

3.2.2 Focus Group Discussions (FGDs)

A Focus Group Discussion (FGD) is a qualitative research method and data collection technique in which a selected group of people discusses a given topic or issue in-depth. In each selected Kebele, one FGD was conducted by using a checklist prepared for this purpose. The participants in the focus group discussions were comprised of 12-25 interviewees, of which about 6-10 were women's households. The participants for FGD were drawn from pastoralists, agro-pastoralists, farmers from crop-livestock production systems, and local collectors, medium traders, large traders, and butcher men with the aid of development agents based on their cattle marketing experiences. Respondents raised key points during the FGD about cattle market infrastructures, cattle market information sources, cattle marketing channels, cattle market actors, cattle marketing prices, and cattle supply sources which are indicated in Figure 3.

Figure 3. FGD with respondents during cross sectional study in Shaba Aregmenda Kebele.

3.2.3 Key Informants Interviews

Key informant interviews are qualitative, in-depth interviews with people who know what is going on in the community to collect information from a wide range of people, including community leaders and professionals. The three key informant interviews were conducted with developmental agents, livestock production experts, and marketing experts based on their knowledge of cattle marketing and their willingness to cooperate in providing information to the cattle marketing system.

3.3 Methods of Data Analysis

Data collected from the face-to-face survey were coded using the MS Excel program. The collected data from the qualitative parameters were analyzed using non-parametric methods, while the means of the quantitative parameters were analyzed by using One-Way ANOVA using SPSS, version 20. The following models were used to analyze the effects of cattle production systems and cattle marketing seasons on cattle marketing systems and prices in the Bena-Tsemay district.

Model 1: The statistical model for the analysis of the effect of livestock production systems on cattle marketing systems:

$$\mathbf{Y_{ijk} = \mu + PS_i + eijk;}$$

where Y_{ij} = cattle marketing system; μ = Overall population means; PS_i = the effect of i^{th} cattle production system (i = pastoral, agro-pastoral and mixed crop-livestock); e_{ijk} = Random residual error.

Model 2: The statistical model for the analysis of the effect of cattle marketing seasons on prices of cattle:

$$\mathbf{Y_{ij} = \mu + S_i + e_{ij}}$$

where Y_{ij} = the observation on prices of cattle at different seasons; μ = Overall; population mean; S_i = effect of i^{th} seasons (i = Dry and Wet); e_{ij} = Random residual error.

4. Results and Discussion

4.1 Purchasing and Selling of Cattle

The purchasing and selling practices of cattle in the Bena-Tsemay district are presented in Table 1. The majority (73.2%) of the households with pastoral, agro-pastoral, and mixed livestock production systems reported that they sold cattle, while a few (26.8%) did not. Those who sold cattle were due to settle government expenses, cover social obligations, cover health bills, buy replacement stock, restock, and cover school fees. More respondents from agro-pastoralists and crop-livestock production systems participated in cattle-selling practices than pastoral

production systems. The respondents of the former of the two production systems that sold the cattle reasoned out that they had more access to market information and were partly engaged in pasture-crop-residue-based cattle fattening operations. Respondents from the pastoral production system (35.10%) who did not sell cattle argued that cattle are a source of food (milk and meat) for their family members as well as an indicator of who is the wealthiest in the community. As a result, they preferred to increase the cattle population rather than decrease it by selling the cattle. In line with the present study, the studies [18] and Teshager et al. [19] indicated that the major reasons for the selling of cattle were to settle government expenses, fulfill social obligations, cover health bills, buy replacement stock, restock, and cover school fees. Regarding the purchase of cattle, about 51.3% reported they purchased cattle from the local market, while about 48.7% replied that they did not participate in cattle purchasing from the local market. More respondents were involved in purchasing cattle in the pastoral production system than in the agro-pastoral and crop-livestock production systems. They reasoned that they were involved in purchasing more cattle in order to increase the number of cattle as an indicator of the wealthiest members of the community. The fewer respondents that did not participate in cattle purchasing from agro-pastoral and crop-livestock production systems as compared to pastoral production systems were due to more grazing land being converted into cropland, so they faced a shortage of grazing land. Similarly, the study [13] showed that in the Bena-Tsemay district, most of the communities have transitioned from purely pastoralist livelihoods into agro-pastoralist livelihoods. As a result, a large portion of the former browsing and grazing rangelands is being converted to farmland.

4.2 Cattle Buying System

The cattle buying system in the study area is presented in Table 2. The majority of pastoral, agro-pastoral, and mixed crop-livestock production households (58.33%) reported that they bought and sold cattle from the local market using eyeball estimation, while only a small percentage (12.2%) used the bartering system, and the majority of respondents used both methods. According to the group discussants, eyeball estimation was the preferred method used by all buyers in the study area due to a lack of weighing facilities, and producers (sellers) had no skill in reading weighing scales. The bartering methods of price determination refer to an act of trading goods or services between two or more parties without the use of money. According to the findings of this study, cattle selling or buying methods using bartering systems are more prevalent in pastoral production systems than in agro-pastoral production systems, but not in crop-livestock production systems. As a result, the respondents from pastoral areas have reported that they have less access to education and cattle marketing information. As a result, they exchange cattle with goats or with grains. Similarly, different scholars reported that eyeball pricing was practiced in the informal marketing system in many parts of Ethiopia [20-22].

4.3 Cattle Marketing Place

The places where the cattle are marketed in Bena-Tsemay Woreda are illustrated in Figure 4. In the Bena-Tsemay district, there are about five cattle marketing places, such as Key-Afer, Kako, Alduba, Woyito, and Luka, which are legalized. During market monitoring time, with the exception of the Key-Afer, Alduba, and Kako markets, the village markets such as Woyito and Luka are undeveloped and characterized by poor market infrastructure or are not fenced. However, Key-Afer and Kako markets were fenced with locally available woody materials, while the Alduba market is well developed and has cattle loading facilities that were constructed by the Lowland Land Resilience Project (LLRP). The majority of

Table 1. Purchasing and selling practice of cattle in Bena-Tsemay district.

	Production systems					
Variable	Pastoral (N = 57)	Agro- pastoral (N = 55)	Crop-livestock (N = 38)	Over all (N =150)	X^2	P-value
Do you sell cattle?					1.3	0.52
• Yes	64.90	76.40	78.30	73.20		
• No	35.10	23.60	21.70	26.80		
Do you buy cattle?						
• Yes	56.40	54.40	39.50	51.30		
• No	43.60	45.60	60.50	48.70		

The value observed between the three cattle production system are significantly different at ($X^2 < 0.001$); X^2 = Pearson Chi-square; N = number of respondents.

Table 2. Purchasing and selling practice of cattle in Bena-Tsemay district.

	Production systems					
Variable	Pastoral (N = 57)	Agro- pastoral (N = 55)	Crop-livestock (N = 38)	Over all (N =150)	X^2	P-value
Buying cattle based on					3.8	<0.001
• Eyeball estimation	33.30[a]	41.70[b]	100[c]	58.33		
• Bartering system	21.10[a]	14.50[b]	0.00	12.20		
• Both	45.60[a]	43.60[a]	0.00	29.73		

The value observed between the three cattle production system are significantly different at (X^2 < 0.001); X^2 = Pearson Chi-square; N = number of respondents.

respondents (68%) of pastoral, agro-pastoral, and mixed crop-livestock production systems reported that they purchased and sold their cattle in the legalized markets (Key-Afer Kako, Alduba) and however, very few respondents (6%) purchased and sold cattle within the village market such as Woyito, and Luka, which is not well organized. In all identified marketplaces, there is only one market day per week. Consequently, the Kay-Afer market will be held on Thursday, the Kako and Luka markets on Monday, the Alduba market on Tuesday, and the Woyito market on Saturday. Legalized cattle marketing was more prevalent in the crop-livestock production system than in the pastoral and agro-pastoral systems. On the other hand, in the pastoral production system, more cattle were sold at the village market than crop-livestock, while in the agro-pastoral production system, there were no cattle sold or bought at the village market. As a result of the present study, the studies [18,23] demonstrated that the cattle marketing systems in Harshin and Borana districts were undeveloped and characterized by inadequate market infrastructure, and cattle were marketed in open spaces. Similarly, the study reported by Kassa et al. [24] indicated that the cattle marketing place in the Moretna Jiru district of North Shoa did not have any shade or fence, but it had a boundary with other livestock, which did not have any fence or mark.

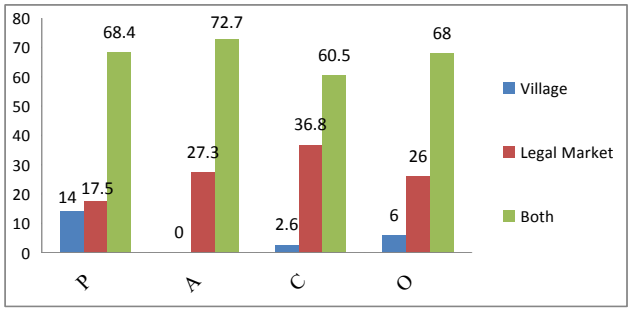

Figure 4. Cattle marketing places in Bena-Tsemay district.

4.4 Access to Cattle Market Information

As indicated in Figure 5, the majority of respondents (69.30%) from pastoral, agro-pastoral, and mixed crop-livestock production systems replied that they have access to cattle market information**,** while a few of them (30.7%) reported that they do not have access to cattle market information. Access to market information refers to whether the actors obtain information on current cattle prices from available public media, co-farmers, friends, and farmers' organizations [19]. Market information is dynamic in order to reduce information uncertainties at the production site, and it is required by producers in their production planning and marketing strategy [19]. Similarly, in the Borena and Ilu Aba Bora areas, most of the cattle producers get market information before taking their livestock to marketplaces, and they decide to sell at a good price [18,19].

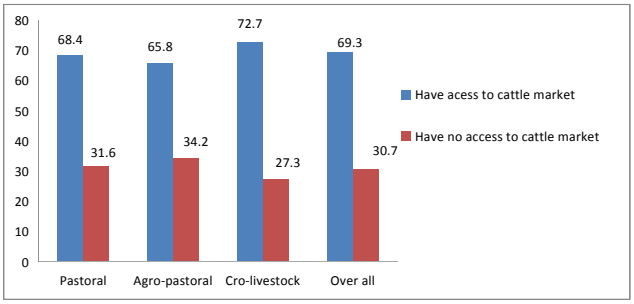

Figure 5. Access to market information and source of market for cattle market in Bena-Tsemay district.

4.5 Source of Cattle Market Information

The source of cattle market information is presented in Figure 6. Regarding the source of cattle market information, the majority of respondents (30.7%) in the pastoral, agro-pastoral, and mixed crop-livestock systems got it from friends and relatives, while only a few (12.70%) got it from the previous week's market in the study area. Similarly, Borana pastoralists used previous market information, relatives and neighbors, extension agents, cooperatives, and traders as sources of market information before selling cattle to the local market [18].

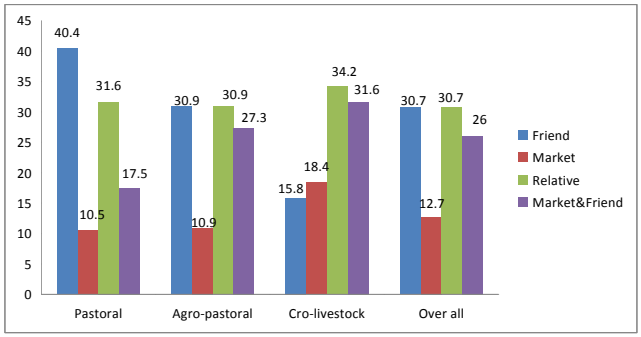

Figure 6. Source of cattle market information in Bena-Tsemay district.

4.6 Buyer and Seller Linkage

As indicated in Figure 7, the majority of cattle sellers (59.30%) were linked to cattle buyers in the study area through direct contact and brokers at the marketing place, while about 40.70% of respondents replied that they were directly contacted by cattle buyers in the market place during market day. In terms of production systems, cattle sellers from the agro-pastoral production system were contacted directly by cattle buyers or traders in the cattle market more than cattle sellers from the pastoral (36.6%) or crop-livestock (31.6%) production systems, while there was no sole broker role in the cattle marketing system in the three production systems.

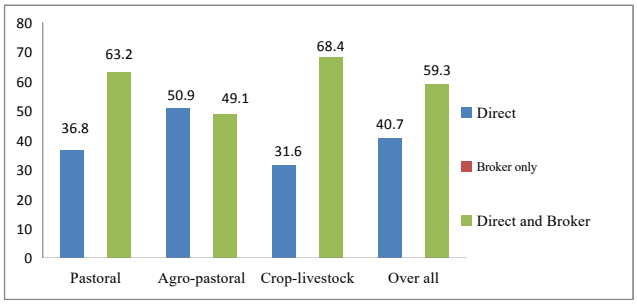

Figure 7. Cattle buyer and seller linkage in Bena-Tsemay district.

4.7 Cattle Price Determination

The cattle price determination in the Bena-Tsemay district is presented in Table 3. According to the present study, the prices of selling and purchasing cattle at the market centers were determined through peaceful negotiations between sellers and buyers (66.7%) based on visual estimations of the body weight of cattle, while few (33.33%) of the respondents from pastoral, agro-pastoral, and mixed crop-livestock production systems reported that the selling and buying price of the cattle in the study area was determined only by seller decision. The seller that has decided on the selling price of cattle did so based on previous marketing price information. Thus, if the price of the present market is below the price of the previous market, the seller has decided to take their cattle back home, and if the price of the present market is higher than the previous market price, the seller has decided to sell cattle at that price. Similarly, cattle prices are mainly determined through negotiations between seller and buyer in the pastoral area of Borana Zone, Southern Ethiopia [18,19].

4.8 Impact of Seasons on Cattle Marketing Price

The seasonal cattle marketing price in the Bena-Tsemay district is presented in Table 4. According to the findings of this study, the pooled cattle marketing price was significantly higher ($P < 0.001$) during wet seasons, which lasted from mid-March to December, than during dry seasons. In this study, the higher cattle price observed in wet seasons is due to higher rainfall availability across wet seasons, resulting in a sufficient supply of feed from rangeland with good nutritive values to meet cattle requirements, causing the animal to attain a higher body weight and, thus, fetch a higher price. However, in dry seasons, which lasted from January to mid-March, where there is a critical feed and water shortage and thus cattle producers were forced to take their cattle to the market, the selling prices of cattle are significantly lowered. Similarly, Getachew

Table 3. Cattle price determination in Bena-Tsemay district.

Particulars	Production system					
	Pastoral (N = 57)	Agro- pastoral (N = 55)	Crop-livestock (N = 38)	Over all (N =150)	X^2	P-value
Price determination					0.24	0.88
• Seller	35.10	30.90	34.20	33.30		
• Buyer	0	0	0	0		
• Broker	0	0	0	0		
• Negotiation b/n seller and buyer	64.90	69.10	65.80	66.70		

The value observed between the three production system are not significantly different at ($X^2 > 0.01$); X^2 = Pearson Chi-square; N = Number of respondents.

et al. [25] reported that the body conditions of animals highly influences the price at cattle markets, which indicated that buyers paid a significantly higher price for cattle with excellent body weight than those with poor body condition. In the dry season, the shortage of feed and water may also increase the supply of cattle in the local market and, hence, lower the selling price of cattle as reported [26]. Different researchers reported different selling prices of cattle in Ethiopia, which are lower than the reported price values from the present study. Accordingly, the average selling price for an ox ranges between 4,500 and 6,000 ETB in Turmi and Dimeka districts, while the price of ox in the town of Arbaminch ranges from 8,00 to 9,00 ETB [27]. The other study [28] indicated that the average selling price of breeding cattle in the Sebeta terminal market was 4,880 ETB for heifers and bulls, while the selling price of oxen is 6,427 ETB, and Fikru [23] reported an average selling price of 9,500 ETB for cattle in the Harshin district of Somalia's regional state.

The price of cattle compositions that have been affected by marketing seasons at the Key-Afer terminal cattle market is presented in Figure 8. The result declared that the cattle marketing price decreased from January to mid-March and reached its peak price in April for all categories of cattle. However, it fell again between May and July before beginning a steady rise that culminated in September. It was unusual with the sharp drop in marketing prices of all cattle compositions that got higher prices in December than in October, except for the price of heifers used for breeding purposes, during October and November. The sharply decreased marketing prices of different cattle categories from January to February are due to the critical feed and water shortages from January to mid-March, which forced cattle producers to take their cattle to the market, resulting in the cattle selling prices being significantly lowered. The higher cattle buying capacity of traders in the months of April, September, and December in the study area is due to holy ceremonies and the New Year's festival, which require the supply of large numbers of cattle at local and national markets.

Table 4. The seasonal cattle marketing price in Birr in Bena-Tsemay Woreda.

Cattle species	Seasons			P-value	SL
	Wet season (Mean ± SEM)	Dry season (Mean ± SEM)	Overall (Mean ± SEM)		
• Heifer	$7{,}503^{a} \pm 63.2$	$6{,}350^{b} \pm 53$	$6{,}923 \pm 53$	< 0.001	***
• Bull	$11{,}492^{a} \pm 96.6$	$9{,}992^{b} \pm 67$	$10{,}737 \pm 73$	< 0.001	***
• Cow	$9{,}689^{a} \pm 91.3$	$8{,}214^{b} \pm 82$	$8{,}947 \pm 75$	< 0.001	***
• Ox	$18{,}593^{a} \pm 202$	$16{,}403^{b} \pm 15$	$17{,}491 \pm 146$	< 0.001	***

Means with different superscripts (a, b) within across a row in seasons for cattle price are significantly different ($P < 0.001$); SEM = Standard error of mean; SL = Significance level; ETB = Ethiopian Birr; *** = significantly differed at $P = 0.001$.

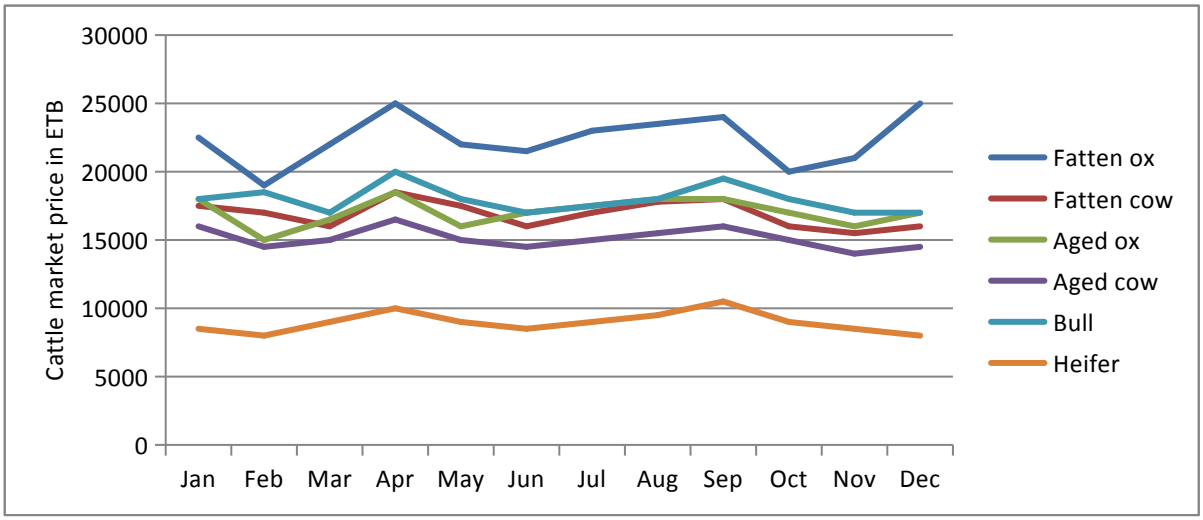

Figure 8. Extent of the prices of various categories of cattle supplied to Key-Afer cattle market in 2020.

4.9 Marketing Routes for Cattle

The cattle marketing route is a pathway through which producers flow into different market destinations. The Key-Afer market is the legalized terminal cattle market in the Bena-Tsemay district for the inflow of cattle population to different destinations. The main source of cattle in the Key-Afer terminal market is the bush market such as Kako, Woyito, Alduba, Luka and Dimeka market. According to FGDs, there were three cattle market routes identified in the Bena-Tsemay district:

1) Bushmarket > Kako/Woyito/Luka/Dimeka/Beneta/Alduba > Key-Afer > Modjoexport abattoir;

2) Kako/Woyito/Luka/Dimeka/Alduba > Keyafer > Addis Ababa;

3) Bush market > Kako/Key-Afer > Jinka.

4.10 Cattle Marketing Channel

A marketing channel is a pre-planned network of various agencies and institutions that, when combined, perform all of the activities required to connect producers with consumers in order to complete marketing tasks [29]. According to respondents, in the Bena-Tsemay district, there were about 10 cattle marketing channels were identified. These cattle marketing channels began at the cattle production gate and flowed out through various paths to final consumers. These channels represent the full range of available outlets through which cattle move from the different collection points into the terminal markets to meet end-users requirements. Key-Afer Market is the terminal cattle market in the Bena-Tsemay district for the inflow of cattle. The main sources of cattle in the Key-Afer market are village markets such as Kako, Beneta, Woito, Alduba, Luka, and Hamer Woreda (Dimeka market). The following cattle marketing channels were identified based on the cattle marketing channels depicted in Figure 9:

Channel 1: Producers > Consumers

Channel 2: Producers > Producers (for breeding purpose)

Channel 3: Producers > NGOs > Producers

Channel 4: Producers > Local hotels & restaurants > Consumers

Channel 5: Producers > Local collectors' > Local hotels & restaurants > Consumers

Channel 6: Producers > Local collectors > Consumers

Channel 7: Producers > Local collectors > Small scale traders > Addis Ababa

Channel 8: Producers > Small scale traders > Arbaminch/Wolaita >Addis Ababa baba

Channel 9: producers > Local collectors > Medium scale trader > Modjo export abattoirs

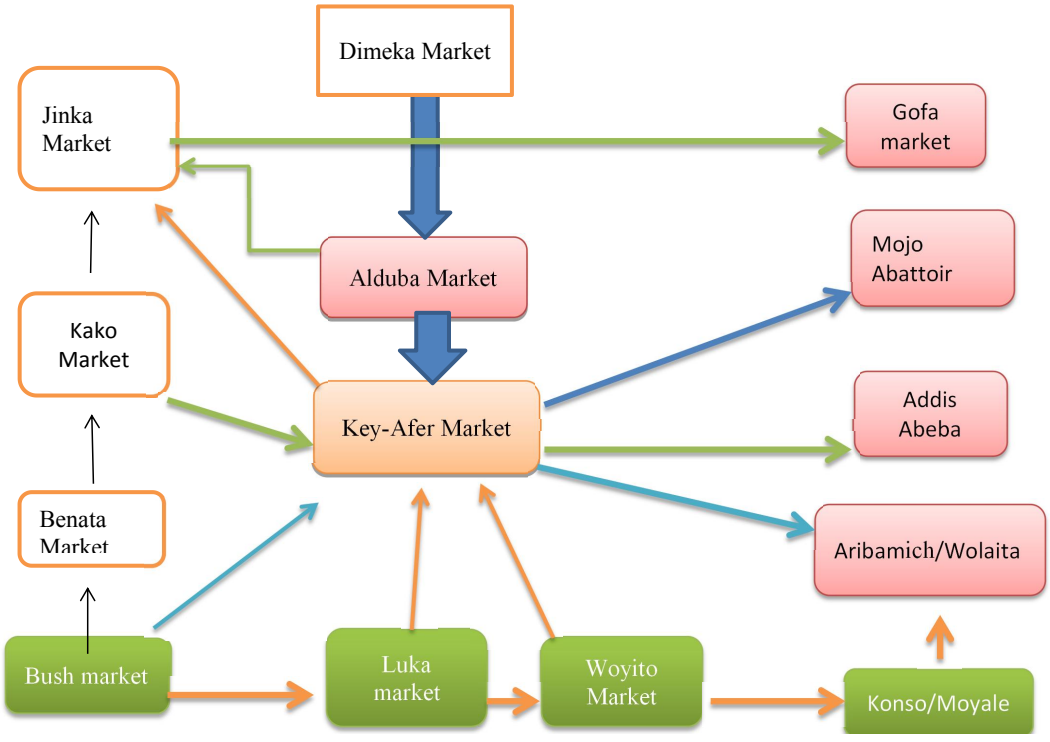

Figure 9. The cattle marketing routes in Bena-Tsemay district.

Channel 10: Producers > Medium scale trader > Modjo export abattoirs

Channel 1: Producers > Consumers

According to respondents, in this channel, individual consumers at Key-Afer, Kako, Jinka, and Woyito markets bought the cattle from producers for home consumption during the holiday festivity. In this case, there was no intermediary share and, thus, the producers were getting all the margin of transactions there was a middleman who shared intermediary costs. Moreover, the Jinka market is a bigger market where a number of buyers and sellers meet on the weekend. The cattle from the Kako market chain end partly when purchased by butchery men and farmers for farm-land traction. Some of the traders purchased heifers and oxen from the Jinka market and transported them to the Gofa area for breeding and farmland traction, respectively.

Channel 2: Producers > Producers

Under this cattle marketing channel, producers participated directly in the selling of cattle in their local area, either for breeding or for farm-land traction purposes. The producers sell the cattle to other producers because they prefer to they know to get the basic historical evidence about the adaptability of the cattle to their extent. They also stated that during critical feed shortages caused by climate change, they lost a large number of cattle compositions, and the producer desired to obtain replacement stock from the local market to restock their farm. They also mentioned that they bought cattle for breeding purposes because agro-pastoralists feel contented to buy from other agro-pastoralists since they can get reliable historical information about the cattle breeding performance and this is more of an advantage of traceability in case something goes wrong with ownership of cattle.

Channel 3: Producers > NGOs > Producers

The respondents reported that sometimes they faced drought incidences, and thus the producers quickly lost a number of cattle and were vulnerable to the menacing condition. Therefore, under these circumstances, different NGOs purchased cattle from their local market or other areas and donated them to the affected cattle producers so that they could be used for restocking purposes.

Channel 4: Producers > Local hotels & restaurants > Consumers

The respondents reported that the hotels and restaurants in Key-Afer town, Kako, Woyito, and Alduba Kebeles were buying live cattle from the cattle producers. In this channel, producers and hotels benefited from transactions due to the fact that there were no intermediaries that shared benefits from cattle selling. This direct transaction between producers and hotels/restaurants would boost the proportion of the final price of the cattle that would reach producers and also induce buyers to purchase more cattle at lower prices.

Channel 5: Producers > Local collectors > Local hotels & restaurants > Consumers

Under this channel, the local collectors bought cattle from producers and resold them to local hotels and restaurants in the market or directly to the hotel customer. According to respondents, the local collectors were involved in the selling of cattle to local restaurants/hotels and made a profit of 1,500-2,000 ETB per head while the local restaurant/hotel made up to 3,000 ETB profit from the transaction that made producers less benefit.

Channel 6: Producers > Local collectors > Consumers

Individual consumers who live in Jinka and Key-Afer towns have little or no chance to buy cattle from the producers, who usually buy cattle from the local collectors, especially during religious holidays.

Channel 7: Producers > Local collectors > Small scale traders > Aribaminch/Sodo > Addis Ababa

The respondents reported that there were many small-scale traders who collect cattle from local collectors and supply live cattle to Arbaminch/Sodo and Addis Ababa from the Key-Afer market. They purchased cattle with a higher body weight and in good condition in order to supply Arba Minch, Sodo, and Addis Abeba.

Channel 8: Producers > Small-scale traders > Arbaminch/Wolaita > Addis Ababa baba

Under this channel, the small-scale traders directly bought the cattle from producers and transported the live cattle to Arbaminch/Wolaita/Addis Ababa and made benefit transactions. On market days, they were mostly collected from local cattle markets in the study area. They sometimes could not get a sufficient number of cattle from one market day, so they waited for the next market day and were transported to Addis Ababa.

Channel 9: Producers > Local collectors > Medium scale trader > Modjo export abattoirs

Under this channel, the local collectors would collect cattle from producers and resell them to medium-scale

traders. Then medium-scale traders collect cattle from different collectors at different locations until they get full of the truck load and supply them to Modjo's modern export abattoirs.

Channel 10: Producers > Medium scale trader > Modjo export abattoirs

This channel refers to the channel in which medium-scale traders in the Key-Afer market get cattle from different destinations into the study area through brokers. The brokers sell or collect the cattle to medium-scale traders who truck them to Modjo modern export abattoirs.

5. Cattle Marketing Constraints

5.1 Lack of Transportation Facilities

The respondents from the three cattle production systems reported that they transported cattle a long distance by foot from the production gate to the market. As an example, they mentioned that cattle are transported from Dimeka to Alduba market for about 40 km, from Alduba market to Key-Afer market for about 17 km, from Woyito market to Key-Afer for 42 km, from Luka to Key-Afer market for 21 km, and from Key-Afer to Jinka market for about 42 km. They mentioned that cattle were transported the whole day from the production gate to the marketplace, which exposed them to different stresses due to a lack of feed and water. As a result, considerable weight losses were incurred, which, in turn, accounted for the significant fall in market prices. During the FGDs with the local collectors and medium traders at the Key-Afer market, they mentioned that they incurred additional costs for cattle keepers and transporters for the whole day for hoof transportation.

5.2 Lack of Feed Shortage

The respondents replied that the lack of cattle feed as a result of climate change is the major constraint that has been greatly affecting cattle market prices for the last ten years by inducing considerable weight losses, especially during dry seasons, of the weight that was made in wet seasons. The traders wanted to pay more for cattle with good or excellent body conditions than for cattle with poor body conditions. Similar to the results from the present study, the study reported by Zelalem et al. [30] demonstrated that the seasonal fluctuation in the availability and quality of feed is a major constraint that has affected cattle production in the Bena-Tsemay district.

5.3 Lack of Extension Service in Market Promotion

The promotion of cattle market prices is a key aspect in price determination due to the fact that cattle producers know what prices were estimated in the market, and the cattle producers can easily negotiate with traders or take their cattle to markets where prices are higher rather than sell them to the local traders at lower prices. In the study areas, cattle producers replied that they had obtained the weekly cattle market price information from neighbors and friends, but they had not obtained the weekly or monthly cattle market price information from the market experts or heard from radio or other media, which has greatly reduced the benefit to cattle producers.

5.4 Lack of Credit Service

The respondents from the three cattle production systems replied that they do not have access to credit services that allow them to borrow money to produce more cattle for the market or fatten them and supply them to the local market due to a lack of credit-providing organizations or services in the study area. Similarly, Shewangizaw et al. [22] reported that the lack of initial capital is the first-ranked constraint due to the lack of credit provision organizations for the cattle market in the Central Southern Region of Ethiopia. Also, the study reported by Belete et al. [31] showed that farmers found in Fogera Plain are willing to get involved in beef cattle fattening activity and supply, but they are not able to purchase cattle to be fattened due to a lack of initial capital.

5.5 Lack of Training on Cattle Marketing

Providing capacity-building training to cattle producers is important to promote cattle producers concerning when, how, for whom and how many cattle to produce and supply to the market. The respondents from the three productions mentioned that they had not received any capacity-building training related to cattle marketing and supply which adversely affected them.

6. Conclusions

The majority of the households with pastoral, agro-pastoral, and mixed livestock production systems sold cattle, while very few did not. The majority of respondents from pastoral, agro-pastoral, and mixed crop-livestock production systems purchased and sold their cattle in the village and legalized markets, while very few purchased and sold cattle within the village market, which is not legalized. The majority of respondents in pastoral, agro-pastoral,

and mixed crop-livestock production have access to cattle market information**,** while a few of them have no such access. The more cattle sellers were connected to cattle traders and deals through direct contact and brokers, the more cattle traders were contacted directly in the marketplace. The prices of selling and purchasing cattle were determined via peaceful negotiations between cattle sellers and traders, while a small percentage were determined only by the cattle seller's decision. The impact of seasons on cattle marketing prices revealed that higher cattle marketing prices were observed in wet seasons while lower ones were observed in dry seasons. The lack of cattle transportation facilities, a feed shortage, a lack of cattle market price promotion, a lack of credit service, and a lack of capacity building were cattle marketing constraints. Based on the results of this study, it was concluded that the government should design strategies for cattle market infrastructure development (Federer, waterer, loading and animal health facilities), transportation facilities, the introduction and promotion of improved feeds and feeding strategies, the establishment of legal cattle market promotion centers, and the provision of capacity-building services to improve the cattle marketing system as policy implications of this study.

Author Contributions

Mr. Zelalem Adane prepared the proposal, conducted research, collected data. Mr. Denbela Hidosa analyzed data, wrote and edited the whole paper and formatting the paper according to journal protocol.

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Data Availability

All data are available in the main text or in the supporting materials, and raw data can be obtained from the corresponding author upon request.

Conflict of Interest

The authors declare that they have no conflict of interest.

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