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Dairy Cattle Husbandry Practices and Coping Strategies Against Feed Scarcity in Buno Bedele Zone, South Western Ethiopia

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Abstract: The study was aimed with to study dairy cattle husbandry practices and coping strategies against feed scarcity in selected districts of Buno Bedele zone, south western Ethiopia. Both purposive and simple random sampling techniques were used to select kebeles and household respondents. For this study, a total of 384 households were used for an interview. Of the total land size occupied by the respondents, higher proportions (5.07±2.739) were used for communal grazing land followed by land for cereal production (2.86±1.495); land for coffee (1.02±0.965) and land for forest land (0.85±0.585). As the current result indicated majority (42.9%) of the households were used communal natural pasture as the main feed source, especially during the wet seasons; and road and river side and aftermath grazing (15.6%) were also used as feed resource in the study areas. As compared with tethering during wet grazing (27.8%), free grazing (72.12%) remains the major and dominant feeding system practiced in the study areas. In the study area grain leftover (27.6%) were the major supplementary feeds followed by and mill by products (20.3%) and house wastes, *atela* and common salt (19.01%). River (72.13%), pip water (22.1%) and deep water (5.73%) were the major drinking water in the study areas. Of the total respondents, majority (72.65%) of them housed their dairy cows in open kraal followed by adjoin house (22.92%). As the current study indicated *Trypanosomiasis*, Mastitis, Foot and mouth disease (FMD) were the commonly occurred diseases of dairy cattle reported by 23.44%, 19.8% and 17.7%, respectively. Changing feed recourse based on availability and cost (26.3%), rent land and grows fodder (23.7%) and reducing herd size (21.4%) were the available copying strategy against feed scarcity, respectively in the study areas.

Keywords: Buno Bedele, Copying Strategy, Dairy Cattle, Feed Scarcity, Husbandry

1. Introduction

Ethiopia is one of the countries of Sub-Saharan Africa with the largest livestock population, and is ranked 5th on the world. The total cattle population of the country is estimated to be 61.59 million CSA [1], of which 6,690,662 were dairy cows. The country holds large potential for dairy development due to its large livestock population; the favorable climate for improved crossbred cows, the relatively disease-free environment, better market opportunity and proximity to international markets.

Dairy sector is a major contributor to economic development, especially among the developing countries, both driving economic growth and benefiting from it. As an engine of growth, it provides increased income, employment, food and foreign exchange earnings as well as better nutrition. As income increases with economic development, the share of animal products in total food budget increases faster than that of cereals. This occurs because of the relatively high-income elasticity of demand for animal products Dayanandan [2].

Despite the existing high potential for dairy development, the performance of the Ethiopian dairy sub-sector has been lagging far behind that of the neighboring countries with comparable agro-ecological conditions Lemma et al. [3]; at 19 liters per annum annual milk consumption is extremely low and well below the world average of 105 liters and the African average of about 41 liters CSA [4]. This is due to the fact that there are lots of genetic and non-genetic factors that hamper the dairy sector development in the country. The

others milk quality and quantity depends on dairy feeds [5].

With cattle population of 24,479,280 Oromia National Regional state stands first in Ethiopia, Buno Bedele Zone has 437,688 dairy cattle used for milking purpose CSA [1]. Hence, Buno Bedele zone is very well suited for dairy cattle production because the area is endowed with such enormous cattle resources and climatic situations conducive to dairy cattle production. There is also high demand for dairy and dairy products and there is no a cultural taboo or prejudice towards milk consumption in this area like other parts of the country.

Even though dairy production is a source of nutritious food, income and job opportunities to the dairy producers; there is low production and productivity due to poor management practices such as feed and feeding system [6]. From the researchers point of view, the existing dairy cattle husbandry practices and coping strategies against feed scarcity during seasons of the year is need to be considered Amsalu [7] and and Belay Duguma and Geert [8]. During the long period of dry season dairy producers should be practiced coping strategies against feed scarcity through reducing herd size and conserve forage [9]. In fact Buno Bedele zone is not outside this circumstance. Moreover, these is no systematic research and development activities undertaken in the areas either by national government, regional or non-government organization to know the current status of dairy husbandry practices, nutritive value of major dairy feeds and coping strategies against feed scarcity during dry period. Therefore, in order to implement dairy sector development strategies in the area, it is essential to know details the overall dairy husbandry practices and investigation of coping strategies against feeds scarcity. Thus the current study was aimed with studying dairy husbandry practices and coping strategies against feed scarcity in the study area.

2. Material and Methods

2.1. Description of Study Area

The study was conducted in selected districts (Bedele, Didessa Dabo and Gechi districts) of Buno Bedele Zone. The zone was located at a distance of 481km to south western of Addis Ababa, the capital city of Ethiopia. Currently, zone covers 1,633,156.56 hectares of land and contains 10 districts. Astronomically it is located at latitude and longitude lies between 8° 27` - 8°45`N and 36° 21' - 36°35` E, respectively. The agro-ecological setting of the zone comprised of 10% high land, 67% mid land and 23% low land. The altitude of the zone ranges from 500-2,575 meter above sea level. Annual precipitation ranges from 1500-2200mm with 6 to 9 months of rain fall Buno Bedele Agricultural Office [10]. The livestock potential of the zone is 437,688 of cattle, 117,052 of sheep, 94,377 of goats, 11,836 of horses, 568 of mules, 25,465 of donkeys, 250,379 of poultry and 100,662 of Beehives CSA [1].

2.2. Sampling Procedure and Sample Size

With the consultation of the Zone Livestock Resources and Fishery Development Office, four districts (Bedele, Didessa, Dabo and Gechi) were purposively selected based on their potential in livestock population, particularly dairy cows. Then 3 kebeles from each district, a total of 12 kebeles having potential for dairy production were purposively selected. By using simple random sampling technique, a total of 384 household respondents were selected from the targeted kebeles. The total number of households included in the study was determined according to the formula given by Cochran (1977).

$$n = \frac{z^2(p)(q)}{d^2} = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384$$

Where: n = the sample size,

z^2 = value for selected alpha level of 0.025 in each tail 1.96,

(p) (q) = the probability estimate value at 0.5 or (maximum possible proportion (0.5)

*1-maximum possible proportion (0.5) produces maximum possible sample size),

d = acceptable margin of error for proportion being estimated =0.05

2.3. Sources and Methods of Data Collection

The required data according to the objectives of the study were collected by using primary and secondary data sources. Pre-tested semi-structured questionnaire and field observation were used to collect the primary data. To strengthen the survey data, focus group discussions were held with individuals who have knowledge and experience on dairy production. In addition, key informant interviews were made with Districts' Livestock and Fishery Resource Development Office experts and Development Agents (DAs). Then, secondary data were collected from zonal and districts agricultural offices, published journal articles, reports and other relevant documents.

2.4. Methods of Data Analysis

All the collected data were coded and entered into the computer Excel software. The Statistical Package for Social Sciences (SPSS) software (version 23.0) computer programs was used for data analysis using descriptive statistics (means, frequencies and percentages). Wherever ANOVA test was employed, the following two factorial ANOVA model was used.

$$Y_{ijk} = \mu + \alpha_i + \beta_{ij} + e_{ijk}$$

Where: Y_{ijk} = production parameter

μ = Overall mean

α_i = the effect of i^{th} districts (i=1-3)

β_{ij} = the effect of j^{th} nutritive feed of dairy cattle at dry and wet seasons (j=1-2)

e_{ijk}= random error

3. Results and Discussion

3.1. Characterization of Dairy Production

In the study area, based on integrated with other

agricultural practices, proximity to the urban center and market-oriented, dairy cattle production systems were characterized into mixed-crop dairy production (78.5%), urban and peri-urban dairy production system (13%) and other (8.5%). Majority of the respondents were practicing mixed-crop dairy production due to the fact that livestock and crops are maintained as complementary enterprises. Because the livestock producers were depend on both crop and animal production for their livelihood improvement. This result was supported by the study of Amanuel et al. [11].

3.2. Dairy Cattle Management

3.2.1. Major Source of Dairy Cattle Feed and Feeding

The major feed resources in the study area were depicted in Table 1. In the present study, different feed resources were identified and categorized into: private natural pasture, communal pastures grazing, hay, green feeds (fresh or succulent grasses and legumes), crop residue, road and river side, aftermath grazing and also non-conventional feed were identified. The finding of the present study with regard to identified feed resources was in agreement with previous work of Sintayehu et al. [12] who reported natural pasture, hay, crop residue and non-conventional feeds were the most important feed resources used by urban dairy producers in different parts of Ethiopia.

Of the total respondents, majority (42.9%) of them used communal natural pasture as the main feed source, especially during the wet seasons. Road and river side and aftermath grazing (15.6%) used as feed resource of dairy cattle in the study area. As shown in table 1, the feeding practices of dairy cows in the study area were (90.1%) mixed with other livestock followed by (9.6%) separately and (0.3) tethering. As the result of field observation, during feeding the dairy cows were competing with other livestock, this might be due to lack of awareness or shortage of feed stuffs. This finding was in line with the result of Amanuel et al. [11].

Table 1. *Major source of feed, feeding practice in the study areas.*

Variables	Study District				Total N(%)
	Bedele N(%)	Dabo Hana N(%)	Didessa N(%)	Gechi N(%)	
Major sources of feed for dairy cattle					
Private pasture (hay)	27 (28.1)	23 (23.96)	13 (13.54)	58 (60.4)	121 (31.5)
Communal pasture	38 (39.6)	51 (53.1)	39 (40.6)	35 (36.4)	163 (42.9)
Crop residue/hay	14 (14.6)	7 (7.3)	19 (19.8)	0	40 (10.4)
Road and river side and aftermath grazing	17 (17.7)	15 (15.6)	25 (20.4)	3 (3.1)	60 (15.6)
Total	96 (100)	96 (100)	96 (100)	96 (100)	384 (100)
How do you practice feeding of dairy cattle?					
Separately	9 (9.4)	12 (12.5)	9 (9.4)	7 (7.3)	37 (9.6)
mixed with other livestock	87 (90.6)	83 (86.4)	87 (90.6)	89 (92.7)	346 (90.1)
tethering	0	1 (1.04)	0	0	1 (0.3)

3.2.2. Feeding System

Table 2 represented the different feeding systems practiced by dairy farmers in the study area. The result of study emphasized that respondents practiced different feeding practices based on land availability and season of the year. Free grazing remains the major system of feeding (72.12) practiced as compared to tethering during wet grazing (27.8%) systems. All the respondents indicated that feed shortage is the main challenging of dairy cattle production in the study area. This might be due to increased human population (52.6%); expanding crop production (22.1%) and decline of grazing land (15.1%). This result was agreed with the report Sintayehu et al. [12].

Table 2. *Feeding system, feed availability, in the study area.*

Variables	Study District				Overall Total N(%)
	Bedele N(%)	Dabo Hana N(%)	Dedesa N(%)	Gechi N(%)	
Which type of feeding system you practice?					
Free grazing during dry period	74 (77.08)	83 (86.46)	90 (93.75)	30 (31.25)	277 (72.12)
Tethering during wet season	22 (22.92)	13 (13.5)	6 (6.25)	66 (68.75)	107 (27.8)
Is there feed shortage in your area?					
Yes	96 (100)	96 (100)	96 (100)	96 (100)	384 (100)
No	0	0	0	0	0
If yes, due to what?					
Expanding crop production	21 (21.9)	20 (20.83)	23 (23.96)	21 (21.9)	85 (22.1)
Decline in productivity of grazining land	15 (15.62)	3 (3.1)	0	40 (41.7)	58 (15.1)
increased animal population	0	3 (3.1)	0	0	3 (0.8)
increased human population	55 (57.29)	55 (57.3)	73 (76.04)	19 (19.8)	202 (52.6)
Increasing crop production and human population	5 (5.21)	15 (15.62)	0	16 (16.7)	36 (9.4)

3.2.3. Supplementary Feeding

Practices of supplementary feeding were presented in table 3. About 94.5% of the interviewed farmers were supplementing their dairy cows. About 27.9% of the respondent used house west, *Atela* and common salt as a major supplementary feed, followed by grain leftover mix (27.6%), mill by products (20.3%), grain leftover and *atela* and common salt (19.01%). Since shortage of feeds is highly

occurred during dry season of the year, majority (83.9%) of the households experienced feeding of supplementary feeds for their animals (Table 3). This result was also in agreement with the study of Sintayehu et al. [12].

Table 3. *Supplementary feeds, practice in the study areas.*

Variables	Study District				Overall Total N(%)
	Bedele N(%)	Dabo Hana N(%)	Dedesa N(%)	Gechi N(%)	
Do you practice supplementary feeding?					
yes	92 (95.8)	96 (100)	96 (100)	79 (82.3)	363 (94.5)
No	4 (4.2)	0	0	17 (17.71)	21 (5.5)
If yes, w/c type of supplementary feeds?					
grain leftover	29 (30.2)	12 (12.5)	12 (12.5)	53 (55.21)	106 (27.6)
House west, Atela and common salt	26 (27.1)	38 (39.6)	36 (37.5)	7 (7.3)	107 (27.9)
Mill by products	19 (19.8)	22 (22.92)	25 (26.04)	12 (12.5)	78 (20.3)
Grain leftover and atela and common salt	18 (18.75)	24 (25)	23 (23.9)	8 (8.3)	73 (19.01)
other	4 (4.2)	0	0	16 (16.7)	20 (5.2)
In w/c season you supplement your dairy cow?					
Dry season	84 (87.5)	85 (88.5)	96 (100)	57 (59.4)	322 (83.8)
Wet season	0	0	0	1 (1.04)	1 (0.3)
Both dry and wet season	9 (9.4)	11 (11.45)	0	23 (23.9)	43 (11.2)
others	3 (3.1)	0	0	15 (15.6)	18 (4.7)

3.2.4. Drinking Water for Dairy Cattle

River, pip water and deep water were the major drinking water in the study area accounted for 72.13%, 22.1% and 5.73%, respectively (Table 4). Of the total respondent, 73.9% were provided water for their animals twice per day during dry seasons of the year. As reported by Adebabay [13] in Alefa district of North Gondar zone, 66.7% of the respondents was watered their dairy cattle twice per day.

3.2.5. Housing of Dairy Cattle

The current result indicated that 72.65% of the respondents housed their dairy cows in open kraal followed by adjoin house (22.92%). About 72.65% of the dairy producers were not used roof for house construction and only 15.1% were made house from grass (Table 4). This result was supported by the study of both Adebabay [13] and Tegegne et al. [14].

Table 4. *Source of drinking water, frequency of watering, housing of dairy cattle in the study areas.*

Variables	Study District				Overall Total N(%)
	Bedele N(%)	Dabo Hana N(%)	Dedesa N(%)	Gechi N(%)	
Source of drinking water for dairy cattle					
River	63 (65.6)	72 (75)	50 (52.1)	92 (95.8)	277 (72.13)
Piper water	27 (28.1)	18 (18.75)	40 (41.7)	0	85 (22.1)
Deep water	6 (6.25)	6 (6.2)	6 (6.2)	4 (4.2)	22 (5.73)
Total	96 (100)	96 (100)	96 (100)	96 (100)	384 (100)
Frequency of watering during dry season?					
once a day	25 (26.04)	13 (13.5)	16 (16.7)	38 (39.6)	92 (23.9)
Twice a day	70 (72.92)	82 (85.42)	80 (83.3)	52 (54.2)	284 (73.9)
Every other day	1 (1.04)	1 (1.04)	0	6 (6.25)	8 (2.08)
Frequency of watering during wet season?					
once a day	72 (75)	77 (80.2)	77 (80.2)	58 (60.42)	284 (73.9)
twice a day	24 (25)	19 (19.8)	19 (19.8)	38 (39.6)	100 (26.04)
Where you confine dairy cattle?					
in the main house	4 (4.2)	4 (4.2)	0	5 (5.2)	13 (3.4)
Adjoin house	15 (15.6)	38 (39.6)	20 (20.8)	15 (15.6)	88 (22.92)
separately constructed house	1 (1.04)	0	0	3 (3.1)	4 (1.04)
Open Kraals	76 (79.2)	54 (56.25)	76 (79.2)	73 (76.04)	279 (72.65)
Materials used for house roof construction					
iron sheet	1 (1.04)	23 (23.9)	0	10 (10.4)	34 (8.8)
grass	15 (15.6)	14 (14.6)	16 (16.7)	13 (13.54)	58 (15.1)
stone/brick	2 (2.08)	0	0	3 (3.1)	5 (1.3)
None	78 (81.25)	59 (61.45)	80 (83.3)	70 (72.92)	287 (74.74)
Materials used for house wall construction					
grass	2 (2.08)	0	0	3 (3.1)	5 (1.3)
wood and mud	15 (15.6)	38 (9.9)	20 (20.8)	11 (11.46)	84 (21.9)
concrete	0	4 (4.2)	0	8 (8.3)	12 (3.1)
wood only	79 (82.3)	54 (56.25)	76 (79.2)	74 (77.08)	283 (73.7)
Materials used for house floor construction					
concrete	1 (1.04)	3 (3.1)	0	9 (9.4)	13 (3.4)
earth/mud	95 (98.9)	93 (96.9)	96 (100)	86 (89.6)	370 (96.35)
Others	0	0	0	1 (1.04)	1 (0.3)

3.2.6. Common Disease of Dairy Cattle in the Study Areas

In the study area, *Trypanosomiasis* (23.44%), Mastitis (19.8%) and Foot and mouth disease (FMD (17.7%) were among the frequently occurring dairy cow diseases in the study area (Table 5). of the total about 61.72% of the dairy producers treat their sick animals and by taking to veterinary clinic and about 38.28% use traditional medicine.

Table 5. *Common disease of dairy cattle in the study areas.*

Variables	Study Districts				Total Overall N(%)	Rank
	Bedele N(%)	Dabo Hana N(%)	Dedesa N(%)	Gechi N(%)		
Common disease of the dairy cattle						
Black leg	18 (18.9%)	18 (18.9%)	25 (26.04%)	3 (3.12%)	64 (16.7%)	4th
FMD	13 (13.5%)	16 (16.7%)	10 (10.42%)	32 (33.3%)	68 (17.7%)	3rd
Mastitis	19 (19.8%)	27 (28.12%)	21 (21.9%)	11 (11.46%)	76 (19.8%)	2nd
Pasteurolosis	11 (11.46%)	13 (13.54%)	18 (18.75%)	0	37 (9.60%)	5th
Skin Disease	11 (11.46%)	8 (8.3%)	12 (12.5%)	4 (4.2%)	35 (9.11%)	6th
Trypanosimosis	24 (25%)	14 (14.6%)	10 (10.42%)	42 (43.75%)	90 (23.44%)	1st

3.3. Coping Strategies Against Feed Scarcity

In the study area as the result of the study indicated change of feed resources based on availability and cost, rent land and grow fodder and reducing herd size which was accounted by 26.3%, 23.7% and 21.4%, respectively (Table 6) were among the coping strategies that the dairy farmers applied in order to overcome the problem of feed scarcity. The present result was in line with the report of Leng [15] who reported changing feed resources based on availability is the first strategy used for cattle and pig farmers overwhelm the feed shortage.

Table 6. *Copying strategies against feed scarcity.*

Parameter	Districts				Total N (%)
	Bedele N (%)	Dabo hana N (%)	Didessa N (%)	Gechi N (%)	
Using conserved forage (hay, silage)	6 (1.6)	3 (0.8)	6 (1.6)	2 (0.5)	17 (4.4)
Change feed recourse based on availability and cost	33 (8.6)	20 (5.2)	46 (12.0)	2 (0.5)	101 (26.3)
Reducing herd size	15 (3.9)	15 (3.9)	6 (1.6)	46 (12.0)	82 (21.4)
Using non-conventional feed	11 (2.9)	18 (4.7)	15 (3.9)	5 (1.3)	49 (12.8)
Rent land and grow fodder	20 (5.2)	35 (9.1)	19 (4.9)	17 (4.4)	91 (23.7)
Resort free roaming	11 (2.9)	5 (1.3)	4 (1.0)	24 (6.2)	44 (11.5)
Total	96 (100)	96 (100)	96 (100)	96 (100)	384 (100)

4. Conclusions

The result of the present study would seem to suggest that the production and productive performance of dairy cattle is governed by multiple factors. The major factor affecting the production and productivity of dairy cattle in the study area were poor husbandry practices (housing, feeding, breeding, health care) and shortage of feed scarcity in dry season and absence of preparatory for overcoming the feed shortage. Therefore, the dairy farmers in the study area should supplement adequate supplementary feeds and coping strategy against feed scarcity need to be permanent to increase dairy productivity.

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