SciencePG
Science Publishing Group

Research Article

Assessment of Husbandry Practices, Production and Reproductive Performance of Indigenous Cattle in Urban and Peri -urban Areas of Gambella City, Ethiopia

Yien Deng[1, *] ![ORCID], **Ulfina Galmessa[2]** ![ORCID]

[1]Ethiopian Institute of Agricultural Research, Abobo Research Center, Abobo, Ethiopia

[2]Ethiopian Institute of Agricultural Research, Holetta Research Center, Holetta, Ethiopia

Abstract

The objective of the present study was to characterize cattle husbandry practices, production and reproductive performance of cattle in the urban and peri-urban areas of Gambella city. Sample of respondents from each selected kebele were selected randomly using simple random sampling technique. A total of 133 household (70 from urban and 63 from peri-urban) were selected for questionnaire interview. Data was analyzed using SPPS version 23 software. The overall mean of the respondents revealed that, the management system practiced was semi-intensive (87.2%), extensive system (12.8%) and there was no intensive management system practiced. the overall mean daily milk yield was 1.58 ± 0.017 Littre/cow/day. The overall mean daily milk yield analysis of variance was significantly (P<0.05) difference among urban and peri-urban areas. The current result also indicated that, the overall average lactation length was and 10.59 ± 0.15 months, and was not significantly (P>0.05) affected by the study areas. The overall average age at first services, age at first calving and calving interval was 46.31 ± 0.33, 51.51 ± 0.54, and 19.01 ± 0.11 months respectively. In Addition, disease prevalence, poor animal health service delivery, grazing land and feed shortage were among the major constraints affecting production and productivity in the study areas. In conclusion, Age at first services, age at first calving and calving interval of indigenous cow was low compared to some of the indigenous breed in other regions, animal health and health services delivery are the problems affecting cattle productivity. Hence, all concerned stakeholders need to take urgent interventions in order to improve production and productivity of cattle.

Keywords

Husbandry Practices, Production, Reproduction, Indigenous Cattle, Gambella

1. Introduction

The world population is predicted to reach 9.7 billion by 2050, with approximately 68 percent of the people residing in urban and peri-urban areas in 2050, compared to 55 percent in 2018 and 30 percent in 1950 [42]. Agriculture is the leading sector in Ethiopian functions by providing food, economy by contributing 42.3% for the total national gross domestic product (GDP) [45]. Out of the total agricultural GDP, livestock sector contributes about 40% to agricultural gross domestic product and the livestock subsector exclusively contributes about 26.4% to the national Gross Domestic Product [4]. Livestock husbandry plays an

important role in agricultural development in Ethiopia, which is the backbone of the economy [13]. The primary objective of urban and peri urban dairy production Ethiopia is generating additional cash income; main milk supplier to the urban market, sold to dairy cooperatives, in local market or directly to consumers [24]. The increasing demand for livestock products in developing countries is mainly driven by urbanization, a notable growth in population and increasing incomes. Urbanization has been associated with changes in lifestyle, particularly with people consuming more animal-derived foods. Given the often poor rural infrastructure, a very dynamic urban and peri-urban livestock production sector has evolved in many African countries [37]. The main emphasis was given to rural livestock production systems directed towards urban demand. Consequently, information on urban and peri-urban livestock production is limited [35]. In addition, Maximizing reproductive efficiency requires the matching of genotypes to the production environment, together with appropriate husbandry practices, in order to ensure that the intervals from calving to conception are short and the rates of conception to natural or artificial breeding are high. This will result in short calving intervals, yielding more lactations and calves per lifetime of each breeding cow. The outcome will be greater economic benefits to the farmers [31].

Assessment of the cattle husbandry practices is a pre-requisite to bring improvement in cattle productivity in the country in general and in the study area in particular [27]. The urban poor engage in urban livestock keeping as a response to limited alternative livelihood options and food insecurity. This category of livestock keepers, lacking the control over and access to basic inputs, is seldom able to access support services and is either harassed or ignored by the city planners [35]. Currently most of the individuals and farmers in Gambella city and its surrounding areas are engaging in livestock keeping, as a result of increase in livestock number brought to market by Agro pastoralist from rural districts. So far, most of the studies in Gambella regional state in general and study area in particular were limited to rural livestock production systems and; dairy cattle husbandry practices and production system in urban and peri urban areas were not studied in the study area. Therefore, the objective of the present study was to characterize cattle husbandry practices, production and reproductive performance of cattle in the urban and peri-urban areas of Gambella city.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted in Gambella city which is located in the southwest part of Ethiopia, situated at the distance of 766 km from Addis Ababa in the lowlands of the Baro River. It lies between latitudes $6^0 22'$ and $8^0 30'$ N, and longitudes $33^0 10'$ and $35^0 50'$ E, and covers a total area of about 34,063 square kilometers [26]. The annual rainfall and mean annual temperature in the Regional State are 1,247 mm and 34.37 ℃, respectively [32]. The rainfall regime is unimodal, referred to

as the "Sudan Type", occurs in the lowlands along the border with Sudan [17]. The major breed is the Nuer (zebu) breed of cattle which is a very good performer in dairying and beef production provided proper management levels and considered to have high tolerance to Tse-tse fly challenges [7].

2.2. Research Design and Method of Data Collection

Cross-sectional type of study was conducted to collect data using questionnaire survey, observation, group discussion and key informant interview. The sampling units were defined as households keeping cattle. Both primary and secondary data sources were used for this study. Primary data was collected from respondents by pre-tested semi-structured questionnaire, key informants' interviews, and personal observation. Whereas, the secondary data were collected from various sources such as livestock and fishery resources development office, published and unpublished materials.

2.3. Sampling Techniques and Sample Size

Prior to conducting field survey research, discussion was conducted with the experts from Gambella city administration livestock and fishery resource development office to select sites and respondents. Within five kebeles of the city, households and farms keeping cattle from both urban and peri-urban areas were selected purposively. Sample of respondents from each selected kebele were selected randomly using simple random sampling technique. A total of 133 household (70 from urban and 63 from peri-urban) were selected for questionnaire interview. The sample size to collect data for this research were determined by using [46] formula as shown below

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

Where;

n = designates the sample size;

N = designates total number of households in selected kebeles.

e = designates maximum variability or margin of error 8 % (0.08);

1= designates the probability of the event occurring.

N= 906

n = N/1+N $(0.08)^2$ =906/1+906$(0.08)^2$

n =133

2.4. Statistical Analysis

The collected data from different sources was coded and recorded using Microsoft Excel spreadsheet. Descriptive statistics such as frequency and percentage were used to analyze the quantitative data using SPSS version 23 software. Then the analyzed data were presented in the form of table

and graph.

3. Results and Discussion

3.1. Socio-economic Characteristics of the Respondents

Table 1. Demographic characteristics of the respondents in the study area.

Variables	Study areas		
	Urban (N=70)	Peri urban (N=63)	Overall (133)
Gender			
Male	18.8	21.1	39.9
Female	33.8	26.3	60.1
Age category			
<25 yrs.	0.0	4.5	4.5
26-50 yrs.	27.1	33.1	60.2
51-65 yrs.	24.1	9.0	33.1
>65 yrs.	1.5	0.7	2.2
Sources of income			
Livestock production only	48.8	44.4	93.2
Crop production only	0.0	0.0	0.0
Both	93.2	2.9	6.7

The socio-economic characteristics of the household are shown in (table 1). The result of the overall interviewed households shows that most are female (60.1%) than male (39.9%), which indicates that most the cattle husbandry activities in the study are were carried out by females. The present finding also indicated that the overall age category of the interviewed households are in the range of 26-50(60.2%), 51-65(33.1%), <25 (4.5%) and > 65(2.3%) years respectively. This finding shows that most of the households who were participated in the cattle husbandry practices are in the productive age, and similar survey result was reported by [43]. In addition, the overall status of income sources of the interviewed households indicated that about (93.2%) come mostly from livestock production and sale of their products, and (6.7%) come from both livestock production and crop production. The reason for keeping only cattle than crop cultivation by most of respondent was due to limitation of land for crop cultivation in urban and peri-urban area. According to [21], commercial peri-urban production of livestock is an extremely fast-growing sector and in and around cities, urban farmers grow horticulture crops on small plots as a part time activity or become professional growers dedicated to an intensive market gardening.

3.2. Cattle Holding

The mean cattle holding per household was shown in (table 2). The result indicated the overall mean number of cows per households was highest (5.51±0.204) head than other types of cattle. Similar finding reported the numbers of cows were more than other categories of bovines in Hadiya Zone [44]. This survey result also shows that, the average means of total cattle in urban and peri-urban areas of Gambella city was (12.25±0.532) head. Current average mean numbers of cattle was lower than the survey result reported by [9], which reported (14.08 head) average cattle size per households in Gindeberet and Abuna Gindeberet districts of west Shoa Zone. Furthermore, average mean number of cattle herd size per household lower than our finding were recorded in peri-urban areas of greater Addis milk shed (11.8), Debre Markos (7.35), Bahir Dar and Gonar peri-urban milk shed areas (6.5) and Hawassa (3.15) respectively [8]. According to interviewed household, more numbers of cows were kept for milk production and uses milk and milk products as food source and for commercialization.

Table 2. Mean (±SE) number of cattle holding per household in urban and peri-urban areas Gambella city.

Species	Study areas		
	Urban (N=70)	Peri Urban (N=63)	Overall (N=133)
Heifers	2.51±0.12	2.97±0.13	2.73±0.08
Bulls	0.09±0.034	0.49±0.098	0.28±0.048
Steers	1.17±0.104	1.14±0.094	1.16±0.067
Calves	2.56±0.12	2.59±0.16	2.57±0.097
Cows	5.37±0.25	5.71±0.33	5.51±0.204
Total	11.7±0.628	12.9±0.812	12.25±0.532

3.3. Cattle Management System, House Type and Frequency of Cleaning in the Study Area

The production system, housing type and frequency of cleaning are presented in (Table 3). The overall mean of the respondents revealed that, the management system practiced was semi-intensive (87.2%), extensive system (12.8%) and there was no intensive management system practiced. Most of the respondents particularly in urban areas practices semi-intensive management system, whereas most of the respondents in peri-urban areas kept their cattle under extensive system of management. This indicates that most of the cattle keepers in urban combine grazing and confinement of cattle as well as use of supplementary feeding. This finding is not in line with report by [47] who reported 70% and 37% of respondents who practice extensive and semi-intensive management respectively, in Sinana district of Bale Zone.

Similarly, the overall mean result indicated that, most of the roof type (49.7) was corrugated, while (27.0%) of respondents use plastic and the rest (23.3%) use thatched type of roof respectively. [33], reported that majority of the respondent (89.4%) and (68.5) constructed dairy cattle barn with corrugated iron roofing materials, while rest constructed with thatched grass and few with plastic materials in Urban and Peri-urban milk shed areas of North Shoa Zone. Present study also indicated all of the respondents (100%) keep their cattle in the house with earthen floor. This result was not in line with previous study in the country [15, 2, 41]. The present study indicated that most (82.0%) of the respondent used bedding while (12%) did not use bedding. In addition, the cleaning frequency of the barn was done on a daily basis by the entire respondent (100%). Even though most of the respondent apply bedding materials and clean the barn daily, there was bad odor due to and poor drying and ventilation condition in some of the barn in study area. Similar finding were reported by [12], who stated that the use of poor quality bedding materials and earthen floor without any bedding materials in Cheha districr of Gurage Zone might resulted in udder and/or teat contamination and attribute to poor quality milk production.

Table 3. Production system, cattle house type and frequency of cleaning.

Parameters	Study areas		
	Urban (N=70)	Peri urban (N=63)	Overall (133)
Management system			
Extensive	2.3	10.5	12.8
Semi-intensive	50.4	36.8	87.2
Intensive	0.0	0.0	0.0
Roof type			
Corrugated	28.6	21.1	49.7

Parameters	Study areas		
	Urban (N=70)	Peri urban (N=63)	Overall (133)
Thatched	1.5	21.8	23.3
Plastic	22.5	4.5	27.0
Floor type			
Earthen	52.6	47.4	100
Cement	0.0	0.0	0.0
Stone	0.0	0.0	0.0
Bedding used			
Yes	49.6	32.3	82.00
No	3.0	15.0	18.00
Cleaning frequency			
Daily	52.6	47.4	100
Weekly	0.0	0.0	0.0

3.4. Feed Sources, Feed Supplements, Water Availability and Mating System

The feed type, feed supplements, water availability and mating system in Urban and Per-urban areas of Gambella city was shown in (table 4). The survey results indicated that, natural pasture was mainly the common feed sources in the study area. According respondents, crop residues are not available in a required amount since there are limited farming activities in around urban and per-urban areas. Current survey result is similar with the report of [48] in Sidama Zone, Southern Ethiopia. Similarly, the result of the present study is not in agreement with previous study of [28] who reported that, natural pasture, crop residues, crop aftermath, non-conventional feed and agro industrial products as the major feed resources in Misha district of Ethiopia. Overall percentage of the respondents who supplemented their cows with concentrate feed, Atela (local brewery products), salt solution and others were 30.8%, 16.5%, 4.5%, and 48.2% respectively. For a cow to produce milk to its maximum ability, nutritional requirements must be satisfied every day, and this can be achieved by feeding balanced formulations of different feeds as rations of improved quality [18]. The present result related to watering frequency indicated that, most of the respondents (93.2%) give their cows drinking water and water point twice a day and some of the respondents (6.8%) make cows drink thrice a day. Similar result reported by [22], were 67.3 and 8.3% for river and pipe water, and frequency of watering were twice a day (70.5%) and three times a day (26.6 %) in Telo District, Ethiopia. The main sources of water in the study area was river water mainly Baro and Jejebe rivers. Majority of the respondents (97%) uses river water while (3.0%) uses Tap water for their cows. This finding is in agreement with the finding of [16] who reported 15%, 35%, 20% and 30% for river, pipe, and spring and bore water respectively in south Gondar zone. Similarly, current finding indicates that mating system was entirely (100%) natural mating, while AI was not commonly practiced. Present result was not in agreement with the report of [2].

Table 4. Feeds, Feed supplement, water availability and mating system.

Parameters	Study areas		
	Urban (N=70)	Peri Urban (N=63)	Overall (N=133)
Watering frequency			
Once	0.0	0.0	0.0
Twice	45.9	47.4	93.2

Parameters	Study areas Urban (N=70)	Peri Urban (N=63)	Overall (N=133)
Thrice	6.8	0.0	6.8
Sources of water			
Tap	3.0	0.0	3.0
River	49.6	47.4	97.0
Feed type			
Natural pasture	52.6	47.4	1000
Crop residues	0.0	0.0	0.0
Sown pasture	0.0	0.0	0.0
Feed supplementation			
Concentrate with salt mix	30.8	0.0	30.8
Atela	12.8	3.8	16.5
Salt	3.8	0.8	4.5
Others	5.3	42.9	48.2
Mating system			
Natural mating	52.6	47.4	100
AI	0.0	0.0	0.0

3.5. Productive and Reproductive Performance of Cattle in the Study Area

Daily Milk Yield (L/cow/day)

The overall average daily milk yield of cattle in the study areas are shown in (table 5). Current result indicated that, the overall mean daily milk yield was 1.58 ± 0.017 Littre/cow/day and ranges from 1-3.0 litter/cow/day depending on season. The overall mean daily milk yield analysis of variance was significantly (P<0.05) difference among urban and peri-urban areas of Gambella City. Present result was similar with finding of [20] who reported the mean daily milk yield of local cow under small holder farmer management system were 1.53 ± 0.09 liters in Hawella-Tulla District, Ethiopia. The overall average milk yield this study was lower than report by [43] who reported 2.06 ± 0.5 in Bench-Maji Zone, by [14] who reported 2.02 ± 0.8 in around Walmera districts of Oromia. The current result was higher than the report by [9] who reported 1.42 ± 0.15 litter/cow/day for local cows in Gindeberet and Abuna Gindeberet districts of west Shoa Zone. [36] Reported the overall mean of milk yield to be 1.18 ± 0.17 litter/cow/day during dry season in Bench-maji, Sheka and Mejenger, southwest Ethiopia which is also lower than current finding. Milk production of cows is affected by genetic makeup of cows, management system and environmental

factors. Generally, the performance record of local cows is essential for designing breeding as well as management strategies in dairy sector [20].

Lactation Length (LL)

Lactation length is the period from the time a cow start secretion of milk after parturition to the time of dry period. The current result indicated that, the overall average lactation length was and 10.59 ± 0.15 months, and analysis of variance of overall lactation length was not significantly (P>0.05) affected by the study locations (table 5). This finding was similar with the result of [30] who reported that, the overall average lactation length of local cows in Debre-Markos Town were 10.35 ± 0.15 months, [29] were 10.59 ± 0.86 months in Shambu, Fincha and Kombolcha Towns of Horro Guduru Wollega Zone, Ethiopia and, [3] were 10.27 months in Gondar. Similarly, lower lactation length values were reported by [19] at 7.10 ± 0.31 and 8.06 ± 0.16 months in Ilu and Woliso districts respectively. Generally, There were negative relationships between lactation length and annual production of milk and milk solids (milk fat + protein) [10].

Age at First Services (AFS)

The age at first services was significantly (P<0.05) varies among study location (table 5). The overall average age at first services of present finding was 46.31 ± 0.33 months. The overall mean value of age at first services lower than current study were reported by [40] at 44 ± 0.18 months in Bona zuria

of Sidama Zone, and at 38.5 ± 2.71 months by [20] in Hawella-Tulla district, Ethiopia. Similar result of overall average age at first services reported for Horro cows were 46.79±1.03 [23]. Similarly, the overall age at first services longer than current result were 55 months [6]. The variation in age at first services value in different studies on indigenous Ethiopian heifers was due to breed or management differences [39].

Age at First Calving (AFC)

The overall Mean Age at first calving was not significantly difference (P>0.05) across urban and peri-urban areas of Gambella city (table 5). In addition, our finding indicated that, the overall average age at first calving was 51.51±0.54 months. Present result was nearly similar with report of [43] who reported mean value of 50.87±7.0 months in Bench-Maji Zone. The current result of overall age at first calving was longer compared to [19] who reported (53.94±0.56 month Woliso districts, and [9], who reported (57.08 ±0.61) in Gindeberet of Oromia region. Similarly, overall mean age at first calving lower than current finding reported by [44] were 4.49±0.03 Years in Hadiya Zone. Delayed age at first calving

is one of the factors affecting the productivity of cow. Heifers calved between 27 and 30 months of age had the highest milk yields, milk fat content and lactation peak as opposed to those calved before and after that age [38].

Calving Interval (CL)

A calving interval of a cow is the amount of time between the birth of one calf and the subsequent birth of the next calf from the same cow. In current study, the overall Mean calving interval was not significantly difference (P>0.05) across urban and peri-urban areas of Gambella City (table 5). In present study, the overall mean calving interval of indigenous cow was 19.01±0.11 months. Longer mean calving interval than current finding reported for indigenous cows were 2.7 years in selected districts of Sidama Zone, Southern Ethiopia [34]. Similarly, mean calving interval shorter than current result were reported in previous studies [40, 1]. Generally, the calving interval (CI) is a period between two consecutive parturitions and should ideally be in the regions of 12 to 13 months. However, calving interval in Ethiopian Zebu range from 12 to 24 months [6].

Table 5. Productive performance and reproductive of cattle in the study area.

Parameters	Study areas			
	Urban	Peri urban	Overall	
Lactation performance	Mean±SE	Mean±SE	Mean±SE	P-value
Lactation length (month)	10.31±0.22	10.98±0.20	10.59±0.15	NS
Daily milk yield (Littre)	1.63±0.03	1.52±0.014	1.58±0.017	**
Reproductive performance				
Age at first services (Month)	45.59±0.42	47.11±0.50	46.31±0.33	*
Age at first calving (month)	51.14±0.72	51.98±0.86	51.51±0.54	NS
Calving interval (month)	18.94±0.12	19.08±0.02	19.01±0.11	NS

*significance at p<0.05, ** significance at p<0.01, NS none significance

3.6. Major Constraints of Cattle Production in the Study Area

Major constraints affecting cattle production in the study area are shown in (figure 1). Animal health services delivery in Ethiopia include vaccination, modern and traditional treatments, GIT parasite and external parasite controls, disease outbreak investigations and information on diseases outbreaks, herd health and trainings. The present study indicate that major constraints of cattle production were poor animal services delivery (18.05%), limited grazing land (16.55%), cattle diseases (43.6%) and feed shortage (21.8%)

respectively. This finding was in agreement with [25], who reported that animal health service delivery in the remote marginal lowlands in Ethiopia has been facing severe challenges in accessing, affordability and reliability. According to key informant interview, an animal health problem includes zoonotic diseases, internal and external parasites, and diseases like pasteurellosis, brucellosis, FMD and others. Similarly, lack of animal health post, medicine and regular cattle treatment and vaccination are critical problems. The veterinary service in Ethiopia confronts significant provocations, including a shortage of skilled and disciplined manpower, an insufficient budget, resource issues, and a lack of basic equipment and foundations [5]. In addition, limited grazing

land and feed scarcity during dry season are also major problems limiting cattle production in Gambella city. Similar survey result related to feed shortage and limited grazing land were reported by [11] in Kembata Tambaro zone of southern Ethiopia.
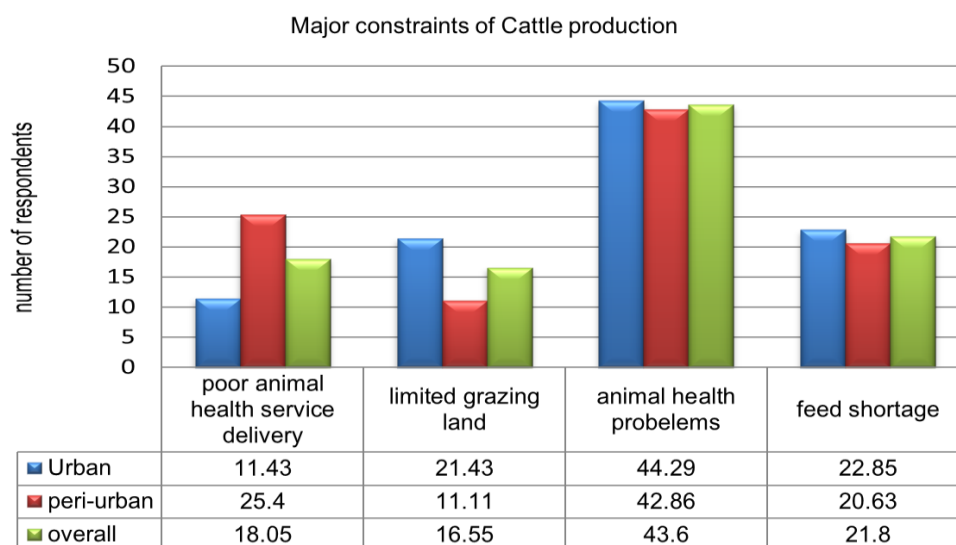

Figure 1. *Major Constraints of cattle production.*

4. Conclusion and Recommendations

In this study, management system observed was semi-intensive and extensive in which most of the cattle keepers combine grazing and confinement of cattle, but the overall husbandry practices still poor and cannot improve cattle productive and reproductive performances. The study also revealed that the overall mean daily milk yield and lactation length was low compared to other regions. Age at first services, age at first calving and calving interval of indigenous cow was poor compared to some of the indigenous breed in other regions. In Addition, disease prevalence, poor animal health service delivery, grazing land and feed shortage were among the major constraints affecting production and productivity in the study areas. Based on this conclusion, the city administration needs to take necessary interventions which include provision and accesses to basics inputs, improvement of indigenous cattle breed and satisfactory animal health service delivery are required. Provision of training and awareness creation among smallholder cattle producers about improved cattle husbandry practices to enhance livelihood of cattle keepers in the study area is necessary.

Abbreviations

FMD   Foot and Mouth Disease
GIT   Gastrointestinal Tract
SPSS   Statistical Package for the Social Science

Acknowledgments

Author Contributions

Yien Deng: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Ulfina Galmessa: Funding acquisition, Project administration, Resources, Supervision, Validation

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Abrha B. H., Niraj K., Berihu G., Kiros A. and Gebregiorgis A. G. 2020. Productive and reproductive performance of local cows under farmer's management in central Tigray, Ethiopia Nigerian J. Anim. Sci. 2020 Vol 22(3): 70-74 (ISSN: 1119-4308).

[2] Abunna F, Worku H, Gizaw F, Ragassa F, Ayana D. 2018. Assessment of Post-Harvest Handling Practices, Quality and Safety of Milk and Antimicrobial Susceptibility Profiles of Escherichia coli O157: H7 Isolated From Milk in and around Asella Town, Oromia, Ethiopia. Ann Public Health Res 5(1): 1072. https://doi.org/10.47739/2378-9328/1072

[3] Adane A. and Ayalew M. 2020. Assessment of lactation performance of dairy cows in Gondar town, Gondar, Ethiopia Int. J. Adv. Res. Biol. Sci. (2020). 7(9): 37-41. http://dx.doi.org/10.22192/ijarbs.2020.07.09.004

[4] Admasu L, Gebeyehu G, Ashenafi M, Gezahegne M, and Tilaye D. 2019. Dairy Cattle Husbandry Practices in Selected Urban andPeri-Urban Milk Shed Areas of North Shoa Zone, Ethiopia World Journal of Agricultural Sciences 15(2): 86-92, 2019, https://doi.org/0.5829/idosi.wjas.2019.86.92

[5] Ahmed MA, Hussen AH, Bashir BM and Ibrahim AS.2024. Animal Health Service Delivery in Ethiopia: A Review Asian Journal of Advanced Research and Reports Volume 18, Issue 3, Page 59-72, 2024; Article no. AJARR. 113058 ISSN: 2582-3248. https://doi.org/10.9734/ajarr/2024/v18i3615

[6] Aleli AT. 2023. Productive and Reproductive Performances of Indigenous Dairy Cattle in Ethiopia. A Review, J Anim Res Vet Sci 7: 0.47. https://doi.org/10.24966/ARVS-3751/100047

[7] Alemayehu M. 2004. Rangeland Biodiversity: Concepts, Approaches and the way forward. Addis Ababa University, Faculty of Science, Addis Ababa, Ethiopia. 80p.

[8] Alemu M. M. 2019. Urban and peri-urban dairy cattle production in Ethiopia: a review. *Online J. Anim. Feed Res*., 9(4): 173-177. www.ojafr.ir

[9] Amenu B., Galmessa U., Fita L., Regasa B. 2017. Assessment of Productive and Reproductive Performance of Dairy Cows in Gindeberet and Abuna Gindeberet Districts of West Shoa Zone, Oromia Regional State, Ethiopia Journal of Biology, Agriculture and Healthcare ISSN 2224-3208(Paper) ISSN 2225-093X (Online) Vol. 7, No. 10, 2017.

[10] Auldist M. J., O'Brien G., Cole D., Macmillan K. L. and Grainger C. 2007. Effects of Varying Lactation Length on Milk Production Capacity of Cows in Pasture-Based Dairying Systems, Journal of Dairy Science Vol. 90 No. 7, 2007.

[11] Ayele B, Tigre W& Deresa B. 2015. Investigation of major cattle production constraints in Kembata Tambaro zone of Southern Ethiopia using participatory epidemiology methods Trop Anim Health Prod # Springer Science+Business Media Dordrecht 2015 https://doi.org/10.1007/s11250-015-0928-y

[12] Babege K, Eshetu M, and Kassa F. 2020. Hygienic Production Practices and Microbial Quality of Cow Milk in Cheha District of Gurage Zone, Southern Ethiopia Open Journal of Animal Sciences, 2020, 10, 592-607 https://www.scirp.org/journal/ojas

[13] Bainesagn W. 2016. Smallholder Cattle Production Systems and Husbandry Management in West Shewa Zone of Oromia Regional State, Central Ethiopia, WSN 53(3) (2016) 178-188. Available online at www.worldscient i ficnews.com

[14] Bekuma A. and Ketema H. 2018. Productive and Reproductive Performance of Indigenous Cows under Farmer's Management System in and around Walmera Distract, Oromia Regional State, Ethiopia Int. J. Adv. Res. Biol. Sci. (2018). 5(10): 65-69. http://dx.doi.org/10.22192/ijarbs.2018.05.10.006

[15] Beyene B, Hundie D and Gobena G. 2015. Assessment on Dairy Production System and its Constraints in Horoguduru Wollega Zone, Western Ethiopia, Sci. Technol. Arts Res. J., April-June 2015, 4(2): 215-221 http://www.starjournal.org/

[16] Biks M, Tassew A, and Moges F. 2023. Management practices and cow comfort of crossbred dairy cows in youth managed dairy farm enterprises, South Gondar Zone, Amhara Region, Ethiopia J. Agri. Environ. Sci. 8(2), 2023.

[17] Coppock DL. 1994. The Borana Plateau of Southern Ethiopia: Synthesis of pastoral research, development and change, 1980-1991. International Livestock Center for Africa (ILCA), Addis Ababa, Ethiopia. 393p.

[18] Denis M. and David M. 2022. Improved feeding for dairy cattle and poultry for smallholder crop-livestock system © CAB International 2022. Sustainable Agricultural Intensification (eds Mateete Bekunda, Irmgard Hoeschle-Zeledon and Jonathan Odhong) https://doi.org/10.1079/9781800621602.0008106

[19] Dinkissa A F., and Girgo U. G. 2022. Analysis of Lactation, Reproductive Performance and Disorders of Dairy Cows in Waliso and Ilu Districts Oromia, Ethiopia, Diyala Agricultural Sciences Journal 2022, Vol (14) No 2: 10-23.

[20] Endale S. 2022. Zoo-technical performance of indigenous dairy cows under small holder farmers management system in Hawella-Tulla district, Ethiopia. Online J. Anim. Feed Res., 12(3): 111-116. https://dx.doi.org/10.51227/ojafr.2022.15

[21] FAO, 2001. Urban and Peri-Urban Agriculture, A briefing guide for the successful implementation of Urban and Peri-urban Agriculture in Developing Countries and Countries of Transition, http://internal.fao.org

[22] Gebremichael A. and Hailemariam M. 2018. Dairy Cattle Husbandry Practices and the Major Constraints of Smallholder Farmers in Telo District, Ethiopia. International Journal of Sustainable Development Research. Vol. 4, No. 4, 2018, pp. 47-54. https://doi.org/10.11648/j.ijsdr.20180404.11

[23] Gezu T, and Azage T. 2018. Reproductive Performance and Wastage in Large Ruminant (Cattle) in Ethiopia-Review. Dairy and Vet Sci J. 2018; 8(1): 555729. https://doi.org/10.19080/JDVS.2018.08.555729

[24] Gizaw S, Megersa A, Muluye M, Hoekstra D, Gebremedhin B. and Tegegne, A. 2016. Smallholder dairy farming systems in the highlands of Ethiopia: System-specific constraints and intervention options. LIVES Working Paper 23. Nairobi, Kenya: International Livestock Research Institute (ILRI).

[25] Gizaw S, Woldehanna M, Anteneh H, Ayledo G, Awol F, Gebreyohannes G, Gebremedhin B and Wieland B. 2021. Animal Health Service Delivery in Crop-Livestock and Pastoral Systems in Ethiopia. Front. Vet. Sci. 8: 601878. https://doi.org/10.3389/fvets.2021.601878

[26] GRS (Gambella Regional State) 2003. Gambella Regional Land-use and Land Allotment Study, Amended Draft Final Report, Vol. II. Yeshi-Ber Consult (YBC). October 2003, Addis Ababa, Ethiopia.

[27] Hirpha K, Amanuel B. 2018. Study on On-farm Dairy Cattle husbandry Practices in Walmera District of Oromia Regional State. Curr Inves Agri Curr Res 4(4) 2018. CIACR. MS. ID. 000195. https://doi.org/10.32474/CIACR.2018.04.000195

[28] Hochiso AD, Beyene A, and Dessalegn K. 2020. Assessment of feed resources feeding systems and milk production potential of dairy cattle in Misha district of EthiopiaEthiop. J. Appl. Sci. Technol. Vol. 11(1): 13-22(2020)

[29] Hundie D. 2014. Assessment on Peri-Urban Dairy Production System and Evaluation of Quality of Cows' Raw Milk: A Case of Shambu, Fincha and Kombolcha Towns of Horro Guduru Wollega Zone, Ethiopia, Sci. Technol. Arts Res. J., July-Sep 2014, 3(3): 37-43.

[30] Hunegnaw Y. W. 2017. Production Practices, Milk Yield and Composition of Urban and Peri-Urban Dairy Cattle of De-bre-Markos Town, Ethiopia, A Thesis Submitted to the School of Animal and Range Science Postgraduate Program Directorate, Haramaya University.

[31] IAEA, 2007. Improving the Reproductive Management of Dairy Cattle Subjected To Artificial Insemination, IAEA, VIENNA, 2007 IAEA-TECDOC-1533 ISBN 92–0–114806–2 ISSN 1011–428.

[32] IAR (Institute of Agricultural Research) 1990. Abobo Research Center Progress Report 1988-1989. IAR, Addis Ababa, Ethiopia.

[33] Lakew L, Goshu G, Mengistu A, Mamo G and Demissie T. 2019 Dairy Cattle Husbandry Practices in Selected Urban and Peri-Urban Milk Shed Areas of North Shoa Zone, Ethiopia World J. Agric. Sci., 15(2): 86-92, 2019. https://doi.org/10.5829/idosi.wjas.2019.86.92

[34] Lijalem T, Asefa A, and Sharo A. 2015. Dairy Cattle Production at Small Holder Level in Sidama Zone Selected Districts, Southern Ethiopia, Food Science and Quality Management www.iiste.org ISSN 2224-6088(Paper) ISSN 2225-0557 (Online) Vol. 40, 2015.

[35] Livestock Production Programme (LPP), 2002. Peri-urban and urban livestock keeping in East Africa - A coping strategy for the poor.

[36] Mengistu G, Yadessa E, Tulu D, Aleme M, Bogale A and Effa K. 2017. Survey on Livestock Production System Characterization in Bench-Maji, Sheka and Mejenger Zones, South Western Ethiopia International Journal of Research in Agricultural Sciences Volume 4, Issue 5, ISSN (Online): 2348 – 3997.

[37] Regina R, Serge E. M, Tichaona M and Eva S. 2016. Emerging Development Pathways of Urban Livestock Production in Rapidly Growing West Africa Cities, Sustainability 2016, 8, 1199; https://doi.org/10.3390/su8111199

[38] T. Penev, N. Vasilev, K. Stankov, J. Mitevand V. Kirov 2014. Impact of heifers age at first breeding and first calving on some parameters of economic effectiveness at dairy cattle farms, Int. J. Curr. Microbiol. App. Sci (2014) 3(11) 772-778.

[39] Tenagne A, Taye M, Dessie T, Muluneh B, Kebede D. & Tarekegn G. M. 2023. Management practices, reproductive performances, and production constraints of indigenous cattle in north-western parts of Ethiopia, NJAS: Impact in Agricultural and Life Sciences, 95: 1, 2211533, https://doi.org/10.1080/27685241.2023.2211533

[40] Tsegaye K. 2016. Assessment of milk production and marketing systems, and evaluation of the productive performances of crossbred dairy cows in Bona Zuria district of Sidama Zone, Southern Ethiopia A Thesis submitted to School of Animal and Range science HAWASSA UNIVERSITY College of Agriculture.

[41] Umer AA, Bongase SA, Tolemariam T, Bulto AO.2023. Assessment of Milk Quality and Dairy Production Practices in Sebeta Town of Oromia Regional State, Ethiopia. Austin J Vet Sci & Anim Husb. 2023; 10(3): 1124.

[42] Ushimaru, S.; Iwata, R.; Amrullah, E. R.; Utami, A. W.; Ishida, A. 2024. Which Households Raise Livestock in Urban and Peri-Urban Areas of Eight Developing Asian Countries?. Agriculture 2024, 14, 443. https://doi.org/10.3390/agriculture14030443

[43] Weldegebriel, D. G. 2015. Assessment of Production and Reproductive Performances of Cattle and Husbandry Practices in Bench-Maji Zone, Southwest Ethiopia. Global Journal of Animal Scientific Research. 3(2): 441-452.

[44] Woldeyohannes T. 2020. Assessment of Husbandry Practices, Production and Reproductive Performance of Indigenous Cattle in Hadiya Zone, Southern Ethiopia., International Research Journal of Science and Technology, Volume 1, Issue 3, (2020), 177-198. https://doi.org/10.46378/irjst.2020.010301

[45] World Bank, 2014. Ethiopia's Great Run- the Growth Acceleration and How to face it, Report No. 99399. ET. November 2014. Washington D. C: world bank group.

[46] Yamane T. 1967. Statistics an Introductory Analysis, (2nd edn.), Harper and Row, New York, USA.

[47] Yasar S, Berhan TS, T. Tsadik E, Defar G and Dessalegn T. 2016. The husbandry practices of dairy cattle, feed resources, and dairy products processing and marketing in Sinana District of Bale Zone, Oromia Region, Ethiopia Int. J. Livest. Prod. Vol. 7(11), pp. 113-121, November 2016 https://doi.org/10.5897/IJLP2016.0315

[48] Yetera A., Urge, M., Nurfeta, A. 2018. Smallholder Dairy Cows Husbandry Practices in Selected Districts of Sidama Zone, Southern Ethiopia. Acad. Res. J. Agri. Sci. Res. 6(6): 357-369.

Research Fields

Yien Deng: dairy cattle, animal feed and forage, milk quality, fishery and aquaculture, animal health, Range Land

Ulfina Galmessa: animal physiology, Animal Nutrition, dairy cattle, cattle reproductive technologies, meat quality, fatty acids