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Characterization of cattle husbandry practices in Essera *Woreda*, Dawuro Zone, Southern Ethiopia

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This study was conducted in Essera Woreda, Dawuro Zone of South Nations Nationalities and People Region with the objectives of characterizing cattle husbandry practices as well as identifying and prioritizing cattle production constraints of the study area. Ninety households (HHs) owning cattle were selected randomly. A semi-structured questionnaire was prepared and used to collect data on cattle production system, production constraints and available feed resources. The average family size was 6.74±0.32 per HH. Crop-livestock mixed farming was the commonly used farming system (95.5%). The mean total land holding was 2.91±0.18 ha per HH and there was no significant (P>0.05) difference in total land holding among three agro-ecologies. The average land allocated for crop production, fallow land, others and grazing land were 1.00 ± 0.26, 0.92 ± 0.20, 0.46 ± 0.19 and 0.42 ± 0.19, respectively. The results of this study showed that the average cattle herd size per HH was 11.12 ± 0.69 and was significantly (p<0.05) varied across agro-ecologies. The purpose of keeping cattle in *Woreda* was for milk (46.7%), meat (44.4%), manure (100%), traction (4.4%), and others (37.8%). Natural mating (82.2%) was the most widely used breeding practice and was significantly (p<0.05) differed among agro-ecologies. Trypanosomiasis was the first ranked disease in the study area. The first three major feed resources were natural pasture (54.4 and 90%), crop residues (63.3 and 100%), and crop aftermath (65.5 and 90%) during dry and wet season, respectively. Grazing on natural pasture was the commonly used feeding system. Majority (93.3%) of HHs kept their cattle in their living house. The sources of water for cattle were river (75.5%), spring (13.3%) and tap (11.1%). The survey showed the major constraints of cattle production to be shortage of feed, diseases and shortage of water with indices of 0.385, 0.367 and 0.111, respectively. It was concluded that more emphasis should be given to improve cattle production through strong extension services in delivery of veterinary services, feed conservation and improved fodder cultivation and improved availability of water.

Key words: Cattle production, Essera *Woreda*, feed resources, Husbandry practices, production constraints.

INTRODUCTION

In Ethiopia, agriculture is the main economic activity and more than 80% of Ethiopian population is dependent on agriculture in which livestock play a very important role (CSA, 2009). In Ethiopia, agriculture contributes about

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50% to the overall GDP, generates 90% of export earnings and provides employment for 80% of the population (CSA, 2009). Livestock is an integral part of the agriculture and the contribution of live animals and their products to the agricultural economy accounts for 47% (IGAD, 2011). Among livestock species, cattle contribute significantly to the livelihoods of farmers. They serve as a source of draught power for the rural farming population, supply farm families with milk, meat, manure, serve as source of cash income, and play significant role in the social and cultural values of the society.

Cattle contribute nearly all the draught power for agricultural production at smallholder level in Ethiopia (Melaku, 2011). Cattle are also used to generate critical cash in times of scarcity, provide collateral for local informal credit and serve other socio-cultural functions in Ethiopia (Ulfina et al., 2005). Despite the importance of cattle to the farming community in particular and to the national economy at large, the sector has remained underdeveloped and underutilized. According to CSA (2011), Ethiopia has about 52.13 million heads of cattle. Cattle produce a total of 3.2 billion liters of milk and 0.331 million tons of meat annually (FAO, 2005; CSA, 2008). In addition, 14 million tons of manure are used annually primarily for fuel and 6 million oxen provide the draught power required for the cultivation of crops (Befekadu and Birhanu, 2000).

Ethiopia has an immense potential for increasing livestock production, both for local use and for export purposes. However, expansion and productivity was constrained quantitatively and qualitatively by inadequate and imbalanced nutrition, sporadic disease outbreak, scarcity of water, lack of appropriate livestock extension services, insufficient and unreliable data to plan the services, and inadequate information to improve animal performance, marketing, processing and integration with crop and natural resources for sustainable productivity and environmental health (Aynalem et al., 2011).

Improvement in cattle productivity can be achieved through identification of production constraints and introduction of new technologies or by refining existing practices in the system. In Ethiopia, the cattle production system in different agro-ecological zones is not studied fully and farmers' needs and production constraints have not been adequately identified (EARO, 2001). Assessment of the cattle production system and identification and prioritization of the constraints of production is a prerequisite to bring improvement in cattle productivity in the country. Prioritization of the production constraints is essential as it helps to use the scarce resources efficiently. Understanding the production system helps to design appropriate technologies, which are compatible with the existing system. In general, assessment of the production system is important to plan development and research activities and bring improvements in productivity.

Although cattle play a very significant role in the livelihood of smallholder farmers in the Essera *Woreda*, cattle production system, constraints of cattle production and feed resources have not been fully studied yet. Thus, assessment of the cattle production system, identifying and prioritizing the constraints and feed resources of cattle are necessary in *Woreda* in order to design appropriate technologies compatible with the existing system and to plan development and research activities aimed at improving cattle production. Therefore, this study was conducted to characterize cattle husbandry practices and to identify and prioritize the constraints limiting cattle production in the Essera *Woreda*.

MATERIALS AND METHODS

Description of the study area

This study was conducted in Essera *Woreda* of Dawuro Zone, Southern Nation Nationalities and People Region (SNNPR) (Figure 1). The *Woreda* is 575 km from Addis Ababa through Shashemane road and 350 km from Hawassa, the regional capital city. The area is topographically undulating and rugged. *Woreda* covers a total area of 1043.1 km^2 and lies between 6.7-7.02° latitude and 36.7 to 37.1° longitudes, with an elevation ranging from 501 to 2500 m.a.s.l. The *Woreda* has 29 *kebeles* (27 rural and 2 urban) with a total population of 77,265 (EWFEDO, 2013). *Woreda* lies in three agro-ecological regions: *Kolla* region, which is within 500 and 1500 m.a.s.l; *Woyna-dega* within 1501 and 2500 m.a.s.l; and *Dega* at above 2500 m.a.s.l. The annual mean temperature varies from 17.6 to 27.5°C. The rainfall is a bimodal type: The short rainy season is between February and March and the long between May and September. The average annual rainfall varies between 1401 and 1800 mm (EWARDO, 2008). According to the land use plan of the area, 38.4% is cultivated land, 13.39% grazing land 16.81% forest bushes and shrub land, 17.09% cultivable, and 14.31% is covered by others. The livestock resources of the *Woreda* include 54, 800 cattle, 21, 684 sheep, 7, 171 goats, 2, 360 horses, 932 mules, 317 donkey, 45, 890 chicken and 26, 155 beehives (traditional, transitional and modern hives) (EWARDO, 2013).

Study population and study design

All HHs cattle owning in Essera *Woreda* of Dawuro Zone were the study population. Cross-sectional study was carried out to assess cattle husbandry system and the constraints of cattle production.

Sample size determination and sampling procedure

Prior to undertaking any sampling procedure the background information on cattle population and potential for cattle production in Essera *Woreda* was collected through rapid exploratory field visits together with focus group discussions and available secondary information. The study sites were selected purposively taking into account the agro-ecological conditions, cattle population and suitability of the areas for cattle production. Based on the available information, Essera *Woreda* has a total of 29 *kebeles* distributed into *dega* (high altitude), *woyna-dega* (medium altitude) and *kolla* (low altitude). Then the *kebeles* in each agro-ecology were ranked according to their cattle population and the first two *kebeles* with highest cattle numbers from each agro-ecological zone making a total of six *kebeles* were selected purposively to represent the *Woreda*. The sample size was determined using the formula

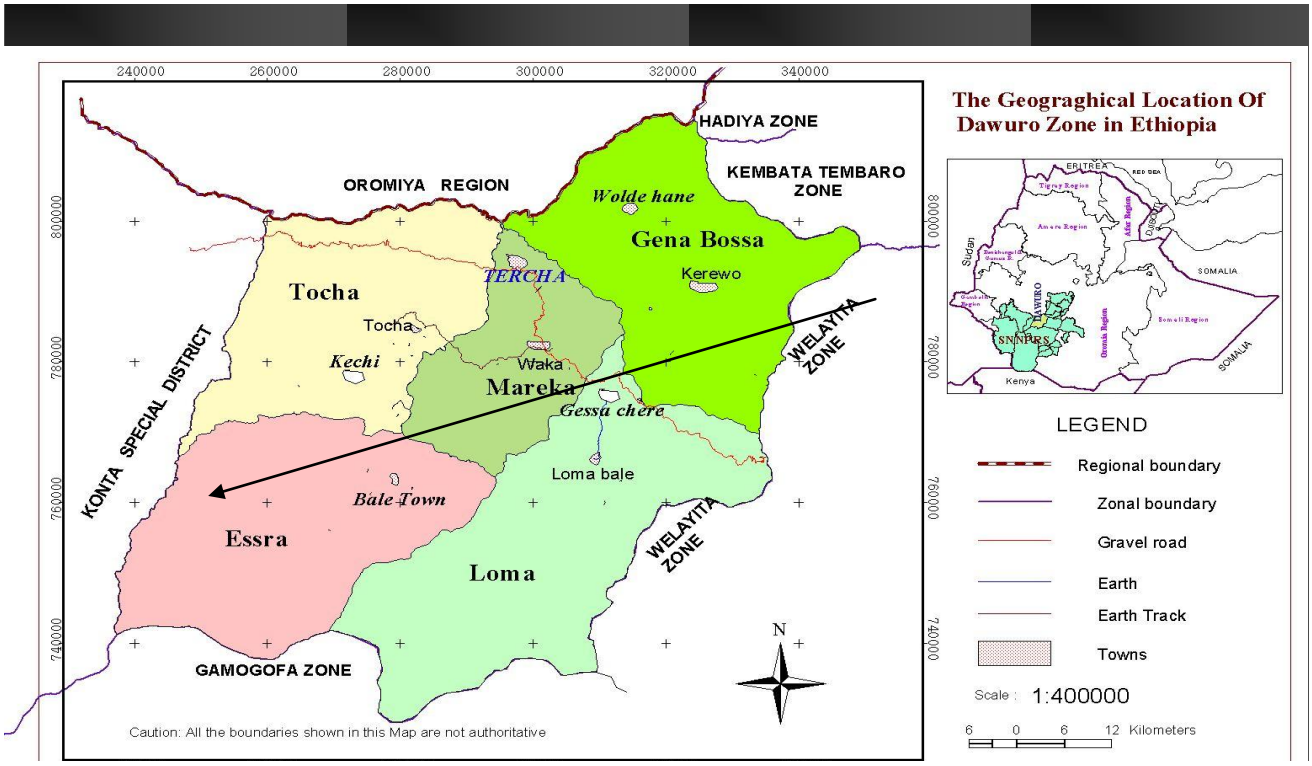

Figure 1. Map of the study area. Source: EWARDO (2013).

recommended by Arsham (2007) for survey studies:

$N=0.25/ (SE)^2$

Where: N= sample size, and SE= standard error of the proportion.

Assuming the standard error of 5.27% at a precision level of 5%, and the confidence interval of 95%, 90 households having cattle were selected by a simple random sampling technique for interview. Thirty from *dega*, thirty from *woyna-dega* and another thirty from *kolla* were selected randomly.

Sources and methods of data collection

Both qualitative and quantitative data were collected by employing the following methods.

Formal survey

A formal survey was conducted with the help of semi-structured questionnaire, with open-ended and closed-ended questions using trained enumerators. A semi-structured questionnaire was prepared and pre-tested before administration and some re-arrangements, reframing and corrections in accordance with respondents' perception were made. The questionnaire was administered to the randomly selected household heads by enumerators recruited and trained for this purpose with close supervision by the researcher. The questionnaire was designed to capture information such as: household demographics including sex, marital status and age of the respondent; cattle production practices, identification of constraints to production, feed resources, management practices including; feeding, watering, breeding and health provision.

Secondary data collection

Previous studies and literature and documented data were reviewed to characterize cattle husbandry practices and cattle production constraints. The secondary data pertaining to the investigation were collected from governmental organizations and various stockholders.

Focus group discussion

In each of the studied *kebeles*, discussions have been made with agricultural development agents, elders, village leaders and individuals who have knowledge about the cattle husbandry practices and cattle production constraints in the area. Group discussions consisting of 9 to 11 people were made per *kebele* to complement the survey work and the researcher facilitated the discussion at all sites. These households were selected by the help of agricultural extension workers considering their age and experience with cattle production activity, knowledge about land utilization pattern and major constraints of cattle production.

Field observation

Field observation was made to enrich the data about production practices, feed resources, watering, housing, healthcare of cattle, and any odd event pertaining to investigations were observed to strengthen the information obtained.

Key informants interview

Primary data were generated by informal interview with extension workers in addition to direct field observations and one informal discussion per *kebele* with village elders, and farmers groups was held. The informal interview was conducted with extension workers intended to gather information about the cattle production system, feed resources and constraints hindering cattle production.

Data management and statistical analysis

The computer software Excel was used for data management and entry. All the collected data were coded and entered into the computer with Excel. The SPSS software version 20 was used for data analysis (SPSS, 2013). The descriptive statistical analysis was also employed for descriptive data, which included frequencies, percentages, means and standard errors in the process of examining and describing cattle production practices, cattle production constraints and feed resources. Indices were calculated for major diseases and constraints affecting cattle production in the study area. The means of quantitative data between study sites were compared by employing one-way analysis of variance (One-way ANOVA) in SPSS. The differences between means were declared significant at $p<0.05$.

RESULTS AND DISCUSSION

Socio-economic characteristics

Socio-economic characteristics of household in the study area are shown in Table 1. The average family size was 6.74±0.32 heads/household (ranging from 2-13) and this figure seemed to be less than the Ethiopian national average (7.4) and greater than Sub-Saharan average (5.6) as reported by USAID (2009). The higher HH size could be attributed due to practices of polygamous marriage as well as meager family planning in the *Woreda*. The results of this study agreed with findings of Dhaba (2011) in *Ilubabore* zone. There were a comparatively larger number of children per household in the *Dega* and *Woyna-dega* kebeles of the study area. Having many children is thought as an asset for farming activities and being large in number in a household has social prestige showing the strength of that family or clan. Similarly, study by Agajie et al. (2005) indicated that having many wives is one of wealth indicators and commonly practiced type of marriage in the Central Rift Valley.

The statistical analysis revealed that about 70% respondents were males and remaining 30% were females of different age and educational status. The results of the current work differed from the report of Ayza et al. (2013) who reported 48.3% female-headed households and 51.7% male headed household dairy farmers in *Boditti*. Most of the respondents (36.7%) were in the age group over 55 years old, while about 21.1, 18.9, 15.6 and 7.8% were in the age group ranging from 35-44, 25-34, 45-54 and 15-24 years old, respectively. This was in congruence with the report of Ayza et al. (2013), where 38% of households were over 40 years in *Boditti*.

About 77.8% of the respondents were married followed by widowed, single and divorced at 8.9, 7.8 and 5.6%, respectively. Regardless of their gender, educational level of the surveyed households showed that 15.6, 7.8 and 4.4% had primary, secondary and junior secondary schools educational status, respectively. About 3.3% of the respondents could read and write whereby 68.9% of the respondents were illiterate, which agreed with the findings of Kechero et al. (2013), where 70% of the respondents in *Dedo* district of *Jimma* zone were illiterate. This indicates that farmers need to get basic education required for adopting new technologies. Education is an important factor if lacking can negatively influence features of enhanced cattle production. Farmers with high education levels adopt usually new technologies more rapidly than lower educated farmers (Ofuoku et al., 2009). The occupation of the sampled households is displayed in Table 1. About 71.1% of the respondents in the study area were farmers (cattle and crop production) followed by students (15.6 %) and housewives (13.3%). This figure is less than the findings of Tesfaye (2007) in *Metema* district, where 82.9% of interviewed HH practicing mixed farming agriculture. This clearly indicated that both crop and cattle farming is the main income sources for the households in *Woreda*.

Farming system

Farming system is characterized by mixed crop-livestock production system which was confirmed by 95.5% of HHs and is similar to most parts of the central southern region. Cattle are the dominant livestock species, mainly used for milk and draught power followed by meat production, income and manure for maintaining soil fertility. This is in line with the report of Belay et al. (2012) in *Dandi,* where cattle were the main species reared by the respondents and were used primarily for draught power, traction, milk, and meat as secondary interest. Cattle also have an important socio-cultural role in the study area. This was consistent with the findings of Belay et al. (2012) in *Dandi* district. Crop farming in this area was mainly practiced using oxen/draught power and oxen are given due attention next to lactating cows particularly with regard to better feeding.

The major annual food crops grown in the area included cereals such as maize *(Zea mays)*, sorghum (*Sorghum bicolor*), barley (*Hordeum vulgare*), wheat (*Triticum aestivum*), and teff (*Eragrostis teff*)), and pulses as beans (*Phaseolus vulgare*), peas (*Pisum sativum*). Maize and teff followed by beans, sorghum and peas were the dominant crops grown in the area. Perennial crops such as enset (*Ensete ventricosum)*, banana (*Musa paradisiaca*), coffee (*Coffea arabica*), sugar cane (*Saccharum officinarum*), avocado (*Persea americana*),

Table 1. Socio-economic characteristics of sampled households in the study area.

Variables	Category	Respondents	
		N	%
Sex	Male	63	70
	Female	27	30
Age	15-24	7	7.8
	25-34	17	18.9
	35-44	19	21.1
	45-45	14	15.6
	>=55	33	36.7
Occupation	Farmer	64	71.1
	Student	12	15.6
	Housewife	14	13.3
Marital status	Single	7	7.8
	Married	70	77.8
	Widowed	8	8.9
	Divorced	5	5.6
Education	Illiterate	62	68.9
	Read and write	3	3.3
	Primary school	14	15.6
	Junior secondary	4	4.4
	Secondary	7	7.8
Average family size		6.74±0.32	

mango (*Mangifera indica*), papaya (pawpaw) (*Carica papaya*), different agro-forestry tree species and eucalyptus plantations and root crop (potatoes (*Solanum tuberosum*), sweet potatoes (*Ipomoea batatas*), cassava (*Manihot cassave*), yam (*Dioscorea*) and taro (*Colocasia esculenta*)) are also grown in considerable amounts. This was in line with the report of Ayza et al. (2013) in *Boditti, Wolaita* zone of southern Ethiopia. Cash crops, which many farmers grow at back yard, are pumpkins (*Cucurbita spp.*), geeshoo (*Rhamnus prinoides*) for preparation of local alcoholic drinks, garlic (*Allium sativum*), onions (*Allium cepa*), ginger (*Zingibere officinale Rosc.*) and pepper (*Piper nigrum*).

Landholding and land use pattern

The average land holding per household of the overall study sites was 2.91±0.18 ha. The land holding reported in this study was higher than that reported by Belay et al. (2012), who observed 2.5 ha average landholding, per household in *Dandi* district of Oromia Regional State, which call for intensification of cattle production in the area. In the Southern Regional State and the country studies indicated that the minimum landholding is 2.01 ha and the maximum is 5 ha for 32.6% smallholder farmers in the country and 16.2% of the stallholder farmers in SNNPR, respectively and landholding ranged from 1.01 to 2.00 ha for about 30.8% of farmers in the SNNPR and for 33.3% of farmers at the national level (CACC, 2003). The results revealed significant variation ($p<0.05$) in landholding between agro-ecologies.

The average land allocated for crop production, fallow land, others and grazing land per HH were 1.00±0.26, 0.92±0.20, 0.46±0.19 and 0.42±0.19, respectively (Table 2). The average size of total landholding was significantly ($p<0.05$) higher in *woyna-dega* (3.31±0.17 ha) than *dega* and *kolla*, 2.93±0.18 and 2.43±0.21 ha, respectively. Likewise, land allocated to crop cultivation and fallow land varied in the three agro-ecologies. Grazing land and others (e*nset* and backyard cash crop cultivation and house construction) were not varied in the study district. Larger proportion of land was allocated for crop cultivation in *Woreda*. This was in agreement with the report of Belay et al. (2012), who indicated that majority of the land owned per household was used for crop production in *Dandi* district. In the study *Woreda*, less land was allocated for cattle grazing. This indirectly may indicates that there is less attention paid to grazing land, which results

Table 2. Landholding (ha) and land use pattern observed in the Essera *Woreda*.

Characteristics	Agro-ecology					
	Dega	***Woyna-dega***	***Kolla***	**Overall**	**Test**	
	N=30	**N=30**	**N=30**	**N=90**	**F-value**	**p-value**
Total land holding	2.93±0.18	3.31±0.17	2.43±0.21	2.91±0.18	6.086	0.003*
Crop land	1.05±0.17	1.13±0.07	0.84±0.20	1.00±0.26	3.549	0.033*
Grazing land	0.42±0.16	0.33±0.15	0.52±0.19	0.42±0.19	1.717	1.186
Fallow land	0.94±0.16	1.20±0.14	0.61±0.19	0.92±0.20	13.070	0.000*
Other land	0.51±0.16	0.40±0.14	0.46±0.18	0.46±0.19	1.954	0.148

*=Significance (p<0.05) difference; N= number of households; Other land includes land for Enset, backyard cash crops cultivation, both human and cattle house construction.

Table 3. Means and standard errors of cattle herd structure in the study area.

Herd type	Agro-ecology					
	Dega	***Woyna-dega***	***Kolla***	**Over all**	**Test**	
	N=30	**N=30**	**N=30**	**N=90**	**F-value**	**p-value**
Total cows	3.43±0.37	8.90±0.51	5.33±0.88	5.89±0.43	19.619	0.000*
Milking cows	1.33±0.16	2.27±0.22	1.67±0.29	1.76±0.14	4.319	0.016*
Dry cows	1.17±0.18	4.60±0.29	2.27±0.43	2.68±0.24	30.710	0.000*
Pregnant cows	0.93±0.13	2.03±0.21	1.40±0.24	1.46±0.12	7.647	0.001*
Oxen	1.33±0.18	1.60±0.13	2.60±0.43	1.84±0.17	5.788	0.004*
Total calves	1.60± 0.20	2.40± 0.22	2.00± 0.46	2.00± 0.18	1.591	0.209
Male calves	0.47± 0.09	1.27± 0.17	0.73± 0.20	0.82±0.10	6.444	0.002*
Female calves	1.13±0.18	1.13±0.13	1.27±0.28	1.18±0.12	0.137	0.872
Bulls	0.93± 0.08	0.27± 0.08	0.67 ±0.23	0.62±0.09	5.032	0.009*
Heifers	0.87± 0.12	0.67 ±0.11	0.53 ±0.23	0.69±0.09	1.056	0.352
Crossbred	0.07±0.05	0.17±0.10	0	0.08±0.04	1.831	0.166
Mean holding/HH	13.27±1.13	14.00±0.58	11.13±0.40	11.12±0.69	4.591	0.013*

* =shows significant difference (p<0.05); N=Number of households; HH=households.

in shortage of grazing land in all study *kebeles*. The findings of this study agreed with the work of Zewdie (2010) which illustrated shortage of grazing land as the major contributor to critical feed shortages in the Highland areas.

Cattle holding and herd structure

Cattle holding and the herd structure per household in the study area are given in Table 3. The overall mean of cattle holding per household was 11.12±0.69. This figure was less than that of Tesfaye (2007) with 12.25±0.6.23 cattle per household in Northwestern Ethiopia and greater than that of Belay et al. (2012) with 4.53±0.4 cattle per HH in *Dandi* district. There were differences in cattle holding within the studied area. The average size of cattle was significantly (p<0.05) higher in *woyna-dega* (14.00±0.58) than *dega* and *kolla*, 13.27±1.13 and 11.13±0.40, respectively. It was observed that the average number of cows, oxen, calves, bulls, heifers and crossbred were 5.89±0.43, 1.84 ±0.17, 2.00±0.18, 0.62±0.09, 0.69±0.09 and 0.08±0.04, respectively. This was in agreement with the findings of Belay et al. (2012), where oxen and milking cows accounted for 37 and 16%, respectively of the total cattle holding in *Dandi*. The reason for large proportion of cows was that they are maintained for producing replacement oxen, very important for draught power. The higher proportion of cows obtained in this study was in agreement with the report of Tesfaye (2007) in *Metema*. Next to calves, the higher number of oxen per HH indicated their importance for draught power. This was in agreement with the reports of CACC (2003), where cows and oxen represented 42 and 40% respectively of the total cattle in mixed farming system. The results revealed that there was a significant (p<0.005) difference in total cows, milking, pregnant and dry cows, oxen, male calves and bulls holding within the studied agro-ecologies. In *woyna-dega,* there was significantly large number of total cows

Table 4. Purposes of keeping cattle in the study area.

Variables	Category	Respondents							
		Agro-ecology							
		Dega		*Woyna-dega*		*Kolla*		Total	
		N	%	N	%	N	%	N	%
Purpose of keeping cattle	Milk production only	16	53.3	13	43.3	17	56.7	42	46.7
	Traction only	0	0	0	0	4	13.3	4	4.4
	Milk and traction	30	100	30	100	26	86.7	86	95.6
	Meat production only	10	33.3	13	43.3	17	56.7	40	44.4
	Manure	30	100	30	100	30	100	90	100
	Others	22	73.3	14	46.7	20	66.7	34	37.8

N=Number of households.

Table 5. Labor division of the family member for cattle management activities.

Type of activities	Agro-ecology								
	Dega (%)			*Woyna-dega* (%)			*Kolla* (%)		
	F	M	FM	F	M	FM	F	M	FM
Milking	100	0	0	100	0	0	93.3	0	6.7
Milk processing	100	0	0	100	0	0	100	0	0
Milk and milk products selling	100	0	0	100	0	0	100	0	0
Pregnant cow feeding and caring	73.3	26.7	0	40	60	0	86.7	0	13.3
Cattle herding	13.3	53.3	33.3	13.3	26.7	60	0	20	80
Bull feeding	0	100	0	0	100	0	0	100	0
Traction	0	100	0	0	100	0	0	100	0
Calf rearing	93.3	6.7	0	100	0	0	100	0	0
Heifer rearing	80	20	0	60	40	0	0	100	0
Barn cleaning	93.3	0	6.7	100	0	0	86.7	0	13.3
Herd feeding/watering	26.7	73.3	0	26.7	26.7	46.7	26.7	20	53.3
Feed collection	20	66.7	13.3	30	53.3	16.7	20	53.3	26.7

F=Female, M=male and FM=female and male.

(8.90 ± 0.51), milking (2.27±0.22), dry (4.60±0.29) pregnant cows (2.03±0.21) and male calves (1.27±0.17) than other agro-ecologies and there was significantly large number of bulls in *dega* (1.47±0.13) followed by *kolla* and *woyna-dega*.

Purpose of keeping cattle

The results of current study revealed that cattle in *Woreda* are kept for different purposes. Knowledge of reasons for keeping cattle is prerequisite for devising breeding goals (Rewe et al., 2006). As shown in Table 4, 95.6% of respondents keep cattle for both milk and traction. Etafa et al. (2013) reported that the primary purpose of keeping oxen in *Hararghe* was for draft power accounting for 99.4% of the responses, whereby cows were kept for sell of milk and for other purposes accounting for 86.6 and 12.5% of responses, respectively. In current study, about 46.7 and 44.4% of the farmers in the *Woreda* held cattle for only milk and meat production, respectively. All households keep cattle for manure purposes while 37.8% of farmers keep cattle for other purposes.

Labor division for cattle management

All HHs (100%), in *dega* and *woyna-dega* agro-ecologies indicated that only females were responsible for milking cows (Table 5). About 93.7% of the households in the *kolla* area designated that only female members of the household were responsible for cow milking (Table 5). The results were in agreement with the findings of Alganesh (2002) in eastern *Wollega*, Kedija, (2008) in *Mieso* district and Lemma (2004) in East Shoa zone where female members of the HH entirely undertook milking. However, Asaminew and Eyassu (2009) reported

Table 6. Breed, breeding system of cattle and major reasons for not using AI services.

Breed of cattle	Agro-ecology					
	Dega (%)	*Woyna-dega* (%)	*Kolla* (%)	*Overall* (%)	*Test*	
					F-value	p-value
Local breed	97.3	97.1	100	99.5	1.482	0.233
Crossbred	2.7	2.9	0	0.5		
Breeding systems						
Natural mating	80	66.7	100	82.2	6.407	0.003*
Both natural mating and AI	20	33.3	0	17.8		
Reasons for not using AI						
Lack of awareness	10	23.3	6.7	13.8	0.663	0.321
Inaccessibility to AI services	60	43.3	73.3	57.8	0.075	0.996
Difficulty of getting inseminator	16.7	23.3	10	16.7	1.251	0.293
Small size of indigenous cattle	13.3	10	13.3	15.6	1.01	0.298

*=Significance difference ($p<0.05$).

that for Bahir Dar Zuria and Mecha districts mainly males did milking. Only 6.7% of the households in *kolla* indicated that not only females but also males take part in milking of cows. According to respondents, in all agro-ecologies, males were not involved in milk processing, milk and milk products selling. This was in line with results reported for northwestern Ethiopia where female members of the HH performed marketing of dairy products (Asaminew and Eyassu, 2009). In contrast, traction and bull feeding activities were the task of males. Irrespective of the age of family members, about 33.3 and 13.3% in *dega*, 60 and 6.7% in *woyna-dega,* and 80 and 26.7% in *kolla* of the respondents reported that cattle herding and feed collection activities were the responsibility of both sexes, respectively, which agreed with reports of Ayalew et al. (2013) in *Ilu Aba Bora* Zone of South Western Ethiopia.

Cattle husbandry and management

Cattle breeds and breeding systems

About 99.5% of the respondents owned non-descriptive local breeds of cattle, whereas 0.5% of the respondents had crossbred heifers (Table 6). About 0.3% of crossbred (Holstein Frisian X Zebu) were distributed by MoA and the rest 0.2% of crossbred were obtained through artificial insemination. Also, Ayalew et al. (2013) reported that the cattle breeds kept in *Ilu Aba bora* zone were 100% non-descriptive indigenous cattle. Correspondingly, in Ethiopia according to CSA (2003), 99.4% of the total cattle populations in the country are local breeds while the hybrids and the exotic breeds accounted for about 0.5 and 0.1%, respectively. Of total respondents, 82.2% indicated that natural mating is the only breeding system practiced and the rest 17.8% practiced both natural mating and AI, which agreed with findings of Ayalew et al. (2013). Thus, the study suggested the need to introduce artificial insemination service to increase the genetic merit of the herd in order to improve milk production.

In the current study during the breeding season, some farmers mated their cows and heifers by using superior bulls owned by themselves or the neighbors, whereas most farmers bred their cows by any bull available in the herd when their cows are on heat. Some farmers who have superior bulls are not willing to give their bulls to their neighbor for breeding service because of the notion that their bull might lose its genetic superiority due to the interbreeding process. About 84.4% of the respondents selected the best bulls for breeding purpose. Coat color and body conformation; and behavior of bulls were indicated as parameters for selection by 80 and 37.8% of respondents, respectively and 81.7% of the respondents said that breeding was uncontrolled.

This result was in line with the result reported by Mekonnen et al. (2012) in which traits like body size, physical appearance, coat color and hump size were considered by farmers for bull selection. About 51.9% of respondents had breeding bull. About 65.2% of HH having bull indicated that bull serves their own and neighbor herd freely and the rest 34.4% HH pointed that they use their bull for their own herd only. Based on the survey, majority of respondents (77.8%) had no experience of using AI. About 57.8, 16.7, 15.6 and 13.8% of respondents indicated that the reasons for the limited use of AI in the study area were inaccessibility to AI services, difficulty of getting inseminator, their fear about the small size of local cows to carry the pregnancy and deliver the offspring of improved breeds and lack of awareness, respectively (Table 6).

Table 7. Traditional cattle diseases treatment in the study *Woreda* from focus group discussion.

Diseases	Method of treatment
Trypanosomiasis	Branding the area around the swelling with hot iron.
Blackleg	Smoking white *Eucalyptus tree* leaves, drenching cattle with grinded and homogenized with water and incising around the shoulder and depositing butter inside, and branding with a very hot sickle or iron bar.
Leech	Nasal administration of grinded fresh leaves of *Colocasia esculenta (Taro)*, *Nicotiana tobacum*, *Citrus aurantiflora*, *Allium cepa (Tumuwa), Aframomum corrarima (Okashiya), Zingibere officinale*, individually homogenized in water. Oral administration of albendazole dissolved in water
Ticks	Painting the area where ticks are present with Vaseline and diesel. Provide cattle with salt added drinking water.
Cough	Oral administration of homogenized inner part of *Solanum incanum (Buluwaa)* fruit.
Diarrhea	Drenching the crushed and homogenized fresh bark of *Syzygium guineense (Ocha)* and feeding of seeds of *Lepidium sativum (Fexo)* mixed with grinded leaves.
Dystocia/ placenta retention	Feeding the cattle red colored *Enset* leaf.

Cattle health condition and treatments

Different disease types were found in the study area, indicating the need to establishing and extending veterinary service in the future to increase production of cattle in the area through reducing disease incidence and severity. Therefore, it is essential to give attention through establishing different sites of veterinary service and veterinary technician in different sites at large. In current study, major animal diseases and parasites were identified through group discussion involving key informant farmers, development agents and veterinary technicians. As reported by Tajebe et al. (2011) economic losses due to disease and parasites have quadruplet their effect further when factors such as feed shortage, poor management practices and environmental factors are prevalent.

The result showed that trypanosomiasis, mastitis, *Zuluwa* (bloody urine symptom disease) and anthrax were the major diseases that affect cattle production with indices of 0.263, 0.200, 0.166 and 0.160, respectively (Appendix 1). Leech and others such as CBPP and pasteurellosis were the next important diseases with indices of 0.115 and 0.048, respectively (Appendix 1). Others such as black leg, ticks and FMD were least ranked diseases (Appendix 1). The reason for the existence of different diseases among the study areas was probably due to the variation in agro-ecology. Bloody urine (*Zuluwa*) was the most economically important disease in the *Dega* agro-ecology of the study area. This might be due to major feed resources at Essera *Woreda* which are majorly natural pasture and is seasonally water logged. Also *Woreda* lacks clean tap water for animals to drink which tends to increase the chances of exposure to fluke infection. However, farmers perceived that the source for blood urinating (*Zuluwa*) was due to '*Keste-damena.'* When cattle urinates directing their genital organ towards rainbow (*Keste-damena)* they suffer from *Zuluwa* and this works for human being also.

Ticks were major ectoparasites of cattle in the study area and they tend to result in milk yield reduction and reduction in weight gain of cattle. Belay et al. (2012) reported that mastitis and external parasites are the major diseases of importance in *Dandi* district. Ectoparasite infestations impose economic losses because of reduction in leather quality, reduction in body weight gain and milk yield, occasional mortality, reduction in performance of draught animals and losses associated with treatment and prevention of diseases (Regasa et al., 2006).

According to group discussion, farmers indicated that feed shortage was acute during the months of January to April. Cattle in the area get sick during these periods. This might be due to feed deficiency, which predisposes the animals to low disease resistance. The shortage of feed and inadequate supplementary feeding were reported to be major causes of livestock mortality and poor performances in highland agro-ecologies of southern and central Ethiopia (Desta and Oba, 2004; Hassen et al., 2010).

Total respondents of 83.3% in the study area have access to government based para-veterinary service. In the study area, there was one animal health technician for every two *kebeles* but the service delivery was not to the required extent owing to inadequate veterinarians and veterinary supplies, cost of veterinary drugs and inadequate transport facilities. Lack of veterinary services, un-affordability of veterinary drugs and shortage of skilled technician were some of the major constraints limiting cattle production. There was no even a single private veterinary clinic in *Woreda*. The present findings were in agreement with that reported by Mekete (2008) and Belete et al. (2010).

Sampled farmers of 68% in *Woreda* use an alternative measure of ethno-veterinary treatments and indigenous knowledge. Extracts from leaves and roots, local vegetation and other ingredients are used to be applied against various diseases and parasites (Table 7). About 72% of respondents in the area perceived ethno-veterinary treatments to have a potential either to reduce pathogenic

Table 8. Respondents ranking using different feed resources based on season in the study area.

Agro-ecology	TFR	Dry season				Wet season			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th
	NP	**66.7**	**20**	**13.3**	**0**	**100**	**0**	**0**	**0**
Dega	CR	6.7	66.7	26.7	0	0	0	100	0
	CAm	26.7	13.3	60	0	0	100	0	0
	Others	0	0	0	100	0	0	0	100
W. Dega	NP	46.7	20	33.3	0	80	20	0	0
	CR	40	60	0	0	0	0	100	0
	CAm	6.7	13.3	66.7	13.3	0	80	0	20
	Others	6.7	6.7	0	86.7	20	0	0	80
Kolla	NP	50	23.3	26.7	0	90	10	0	0
	CR	33.3	63.3	3.3	0	0	0	100	0
	CAm		13.3	16.7	70	10	90	0	0
	Others	0	0	0	100	0	0	0	100
Overall	NP	54.4	21.1	24.4	0	90	10	0	0
	CR	26.7	63.3	10	0	0	0	100	0
	CAm	15.6	14.4	65.6	4.4	3.3	90	0	6.7
	Others	2.2	2.2	0	95.6	6.7	0	0	93.3

TFR=Type of feed resource, NP=natural pasture, CR = crop residue, CAm=crop aftermath.

effects or cure completely. This is consistent with Kocho and Geta (2011). Farmers are using their indigenous knowledge to treat their sick animals using different mechanisms but the dosage of the treatments and the impact of the drugs are not known (Table 7). Burning of cattle body to treat their sick animal may have mechanical damage on their body. On the other hand, the efficacy and dosage of medicinal herbaceous plants should be studied for possible large-scale production and uses.

Feed resources and feeding system

Different feed types were used in the study area. Natural pasture, crop residue, crop aftermath and others were ranked 1st, 2nd, 3rd and 4th by 54.4, 63.3, 66.5 and 95.6% of HHs during dry season in overall agro-ecology, respectively (Table 8). In contrast, during wet season natural pasture, crop aftermath/stubble grazing, crop residues and others were the first, second, third and fourth ranked sources of cattle feed by 90, 90, 100 and 93.3% of HHs, respectively, which were in line with the report of Belay et al. (2012) in *Dandi* district. Free grazing on natural pastureland was the most dominating feeding system for the cattle in the study area. Natural pasture in the high altitudes was rich in pasture species, particularly indigenous legumes (Kechero et al., 2010). According to field observation and survey results, there was grazing of cattle on communal and private pastureland, roadside, swampy area and around homestead either free or tethered in the study area.

Feed shortage is prevalent throughout the year both in dry and wet seasons (Kechero et al., 2013). Results showed that there were no effects of the agro-ecology on cattle feeds, but season had effect on cattle feeds in the study area. Inadequate supply of feed in both quantity and quality was reported to be the single most important problem responsible for low productivity of livestock (Ulfina et al., 2005). Due to continuous stocking and over grazing of pastures and roadsides grasses, soil erosion has developed into major phenomenon. Encroachment of the less palatable and preferred plants like *Asracantha longifolia* locally known as *okaa* in the major grazing areas become a major problem of cattle production. Tethering and cut-and carry were mainly practiced in major cropping seasons.

Cattle housing system

Out of total HHs, 97.8% had experience of housing their cattle (Table 9). Similar results were reported by Jiregna (2007) and Oumer (2011). The results of present study also agreed with reports of Abrha (2007), who reported similar finding in Tigray National Regional State where livestock housing is very primitive even compared to sub-Saharan African standard. Out of total respondents included in the study, 93.3% kept their animals in their living house, which was not separated from the owners living houses and the rest 6.7% kept their cattle in simple

Table 9. Importance of cattle housing in the study area.

Variables	Responses		
	Yes (%)	No (%)	NC (%)
Protect from extreme climate	97.8	0	2.2
Protect from predators	97.8	0	2.2
Protect from theft	80	17.8	2.2
[1]Others	66.7	31.1	2.2

NC=not concerned: [1]Others=for ease of husbandry practices such as feeding, watering, milking, waste management.

Table 10. Water source and frequency of offering water in the study area.

Sources of water		Dega (%)	Woyna-dega (%)	Kolla (%)	Total (%)
River		100	66.7	60	75.6
Spring water		0	20	20	13.3
Tap water		0	13.3	20	11.1
Frequency of watering					
Once a day		20.3	4.7	6.7	10.56
Twice a day	Dry season	73.2	80	85.3	79.5
Ad libtum		6.5	10	13.3	9.9
Once a day		61.3	24.5	63.3	49.7
Twice a day	Wet season	5.1	5.1	16.7	8.96
Ad libtum		33.6	70.4	20	41.3

crashes within their own compounds. 93.3% of respondents housed their cattle in the dry as well as wet seasons. About 97.8% of respondents house their cattle in their home to protect them from extreme climate and predators, respectively, 80% house their cattle to protect them from theft, while 66.7% to protect from others (Table 9). Ayza et al. (2013) reported similar reasons, where Boditti cattle were housed together with the family because of protection from theft, extreme environmental hazards and ease of husbandry practices such as feeding, watering, milking, waste management.

Source of water and its utilization

Source of water and its utilization in the study areas is presented in Table 10. The sources of water for cattle were river (75.5%), spring (13.3%) and tap (11.1%). This general trend of water sourcing is in agreement with Zewdie (2010) who reported similar results in *Debre-Birhan* area. The quality of water and the distance traveled to reach are major concerns. With regard to the frequency of offering water to drink, majority (79.5%) of the respondents give water to their cattle twice a day during dry season, while 10.56% of the respondents offer water to their cattle once a day and 9.9% of the respondents offered water freely during dry season. Out of the interviewed cattle producers, 49.7% of HH offered water once a day and 41.3 and 8.96% of HH provided water to their animals freely and twice a day during wet season, respectively. About 91.1% of the respondents indicated the existence of water related problem. The major water related problems were scarcity (44%), access to water sources (35.5%) and hygiene problems (20.5%) especially during dry period. Poor quality of water leads to pathogens and helminthes infestation among the animals thereby resulting in disease outbreaks, higher morbidity and mortality, and lower productivity. The survey revealed that 71.1, 20 and 8.9% of respondents alleviated water related problems by going long distance to the river, fetching from rivers and digging the ground water, respectively. Descheemaeker et al. (2009) in the Blue Nile basin made similar observations.

Manure disposal and utilization

Hundred percent of cattle producers in the study area used animal dung as fertilizer. Similarly, Zewdie (2010) reported that animal dung around *Ziway* was used to fertilize croplands and few farmers used it for their grazing lands. In addition, according to 58.3 and 30.2% of respondents, it is also used for other purposes and

Table 11. Cattle manure utilization in the study area.

Utilization	Dega		Woyna-dega		Kolla		Over all	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Fertilizer	100	0	100	0	100	0	100	0
Fuel	43.6	56.4	27	73	20	80	30.2	69.8
[1]Other purposes	67.2	32.8	54.9	45.1	52.7	47.3	58.3	41.7

[1]Other purposes (mud house construction, pottery and wastage).

household fuel, respectively (Table 11). Belete et al. (2010) reported in *Fogera woreda* that the majority of the respondents (98.1%) used the dung as source of fuel. All HH had no practice of marketing animal dung (dung cake) for fuel or fertilizer purposes in the studied area, which is in agreement with findings of Ayza et al. (2013) in B*oditti* who reported no practice of marketing animal dung (dung cake) for fuel or fertilizer purpose. Contrastingly, Zewdie (2010) reported that dairy farmers from *Debre- Birhan* and *Sebeta* used dung mostly to make dung cake to sell at the local market or for satisfying family's own energy needs. The majority of the respondents (65.4%) indicated that they dispose manure from the barn once a day. Ayalew et al. (2013) reported also from *Ilu aba bora* zone that 43.3% of the respondents disposed manure from the barn once per day.

Major constraints of cattle production/improvement

Generally, cattle production was affected by several factors. According to respondents, feed shortage, diseases, water shortage and poor genetic makeup were the major constraints that affect cattle production with indices of 0.385, 0.367, 0.111 and 0.100, respectively (Appendix 2). Shortage of initial capital and lack of technical knowhow were other constraints. The first and second constraints of this study were in consonance with the study of Belay et al. (2012); it is also similar with the result of Ulfina et al. *(*2005), in which he reported feed shortage, diseases and parasites, labor scarcity and lack of capital and credit as the major constraints limiting livestock production. In the meantime, the third and fourth constraints were different for this study. However, all listed problems in the finding of Ulfina et al. (2005) and Belay et al. (2012) were also similar problems as observed in this study. Results of the present study were in line with the observations of Asaminew (2007) in *Bahir Dar Zuira* and *Mecha* districts.

CONCLUSION AND RECOMMENDATIONS

The study assessed cattle husbandry practices, like breeding system, watering, housing, healthcare and major feed resources. Results of the study showed that mixed crop-livestock production system was the dominant farming system in the study area. Cattle served as a source of draught power, food, manure and others like source of income. The current study showed that natural mating was the most mating system practiced. Trypanosomiasis is the first most important cattle disease followed by mastitis and anthrax in the study area. Feed availability in quantity and quality was ranked the first most important problem limiting cattle production. Natural pasture and crop residues were the main sources of feed for cattle. In the study area, the higher proportion of feed was derived from natural pasture and crop-residues, and natural pasture and stubble grazing during dry and wet season, respectively. There was cattle feed shortage in the study area. Feed shortage, diseases and parasites, water scarcity and poor genetic makeup of cattle were the major constraints limiting cattle production. Based on the results and conclusions of this study, the following recommendations are forwarded for improving cattle development in the study area. These are:

1. Provision of strong extension services and training on improved forage cultivation, cattle production and management practices.
2. The cattle breeds in the study area were not known which called for characterization of existing breeds to ascertain the different traits that will give better performance which will help in developing future intervention areas. The potential of existing breed for dairy production, beef production, etc. needs to be identified, so that specialization based improvement can be done for each breed.
3. Detailed monitoring study is imperative to investigate the productive and reproductive performance of cattle to further substantiate the results of the present study.
4. Cattle marketing and market related issues are not included in this study due to financial and time constraints. Therefore, further research on cattle marketing system and market related problems is commended to come up with recommendations to solve market related problems and play a vital role in helping farmers.

Conflict of Interest

The authors have not declared any conflict of interest.

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Appendix 1. Indices of prevalence of cattle disease in the study area.

Diseases	Agro-ecology															
	Dega				*Woyna-dega*				*Kolla*				Total			
	R1	R2	R3	Index	R1	R2	R3	Index	R1	R2	R3	Index	R1	R2	R3	Index
Trips	0	0	0	0.000	26.7	33.3	26.7	0.289	100	0	0	0.500	42.2	11.1	8.9	0.263
FMD	0	0	0	0.000	0	0	6.7	0.011	0	0	0	0.000	0	0	2.2	0.004
Anthrax	0	60	40	0.267	26.7	0	20	0.167	0	0	26.7	0.044	8.9	20	28.9	0.160
BL	0	0	0	0.000	6.7	6.7	0	0.056	0	0	26.7	0.044	2.2	2.2	8.9	0.033
Mastitis	0	40	60	0.233	40	20	6.7	0.278	0	26.7	0	0.089	13.3	28.9	22.2	0.200
BU	100	0	0	0.500	0	0	0	0.000	0	0	0	0.000	33.3	0	0	0.166
Leech	0	0	0	0.000	0	40	13.3	0.156	0	40	33.3	0.189	0	26.7	15.6	0.115
Ticks	0	0	0	0.000	0	0	13.3	0.022	0	0	6.7	0.011	0	0	6.7	0.011
Others	0	0	0	0.000	0	0	13.3	0.022	0	33.3	6.7	0.122	0	11.1	6.7	0.048
Total	100	100	100	1.00	100	100	100	1.00	100	100	100	1.00	100	100	100	1.00

Index = [3 for rank 1) + (2 for rank 2) + (1 for rank 3)] for each of the factor divided by sum of all of the factors, Trips=*Trpanosomiasis*, FMD=foot and mouth disease, BL= blackleg, BU=blood urinate.

Appendix 2. Major cattle production constraints in the study areas.

Constraints	Agro-ecology															
	Dega				*Woyna-dega*				*Kolla*				Over all			
	R1	R2	R3	Index	R1	R2	R3	Index	R1	R2	R3	Index	R1	R2	R3	Index
Feed shortage	53.3	0	33.3	0.322	60	40	0	0.433	66.7	13.3	13.3	0.400	60	17.8	15.6	0.385
Disease	20	73.3	6.7	0.356	40	60	0	0.400	20	66.7	13.3	0.344	26.7	66.7	6.7	0.367
Water scarcity	0	0	40	0.067	0	0	60	0.100	13.3	6.7	46.7	0.167	4.4	2.2	48.9	0.111
Poor genotype	26.7	26.7	6.7	0.234	0	0	0	0.000	0	13.3	13.3	0.066	8.9	13.3	6.7	0.100
Shortage of Initial capital	0	0	0	0.000	0	0	40	0.067	0	0	0	0.000	0	0	13.3	0.022
Lack of knowhow	0	0	13.3	0.022	0	0	0	0.000	0	0	0	0.000	0	0	8.9	0.015
Total	100	100	100	1.00	100	100	100	1.00	100	100	100	1.00	100	100	100	1.00

Index = [3 for rank 1) + (2 for rank 2) + (1 for rank 3)] for each of the factor divided by sum of all of the factors.