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Major Reproductive Disorders and other Determinants of Dairy Cows in West Shoa Zone, Oromia Regional State, Ethiopia

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Abstract
The study was undertaken in Ambo, Dandi and Dirre inchini districts of West Shoa Zone, Oromia region, Ethiopia to assess the major reproductive disorders and other determinants of dairy cows. A total of 240 household (80 household from each district) were selected for formal survey by using purposive sampling techniques. The study was based on both primary and secondary sources of data. The major reproductive disorders reported in the areas were repeat breeder, abortion, retention of fetal membrane, anoestrous, dystocia and stillbirth. The overall percentage of repeat breeder, abortion, retention of fetal membrane, anoestrous, dystocia and stillbirth, reported in the areas were 29.6%, 11.3%, 12.9%, 25%, 7.9% and 4% , respectively. The major constraints of dairy cattle reported in the districts were inadequate animal feed, genetic limitation, shortage of land, milk market constraint and inadequate extension service. Thus, it is suggested that, awareness creation to animal owners, and improved management such as proper feeding, accurate heat detection and health management should be improved to reduce the incidence of these reproductive problems. Feed scarcity was a serious problem (1st rank) in the study districts, especially during dry season. Therefore, to avoid and/or reduces shortages of feeds happening in the dry season, feed conservation strategy needs to be given due attention as there were abundant pastures in the districts during wet season.
Keywords: Dairy Cows, Determinants, Reproductive disorder, West Shoa
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INTRODUCTION

Ethiopia has the largest livestock population being the first in Africa countries and the 10th in the world. However, dairy industry is not developed as that of other east African countries such as Kenya, Uganda and Tanzania. In Ethiopia, despite the huge number of cattle, productivity is low due to constraints like disease, nutrition, poor management. These constraints result in poor reproductive performance of dairy cattle and lower economic benefit from the sector (Molalegn and Prased, 2011). The major reproductive problems that have direct impact on reproductive performances of dairy cows are abortion, dystocia, Retained Fetal Membrane, pyometra, metritis, prolapsed (uterine and vaginal), anoestrus and repeat breeder (Lobago *et al*., 2006). Where there is a high risk of abortion associated with a specific disease, for example endemic neosporosis, the abortion rate over a short period of a few months may be as high as 33% of all pregnancies (Dubey, 2005). According to Alemselam *et al*. (2015) causes of dystocia reported by farmers and veterinarians were failure of cervical dilatation, fetal oversize, twinning, abnormal presentation, position and posture of the fetus, uterine inertia, hypocalcaemia and obesity of the dam. Retention of placenta (ROP) is the failure to expel the fetal membranes within 12 to 24 hours after calving in bovines (Mohamed *et al*., 2009) or within 3hours after foaling in equines (Taylor *et al*., 2004). Such phenomenon is a common, even if poorly understood postpartum disorder that has a detrimental effect on milk yield and subsequent reproductive efficiency (Malky *et al*., 2010). Metritis is an acute systemic illness because of infection of the uterus with bacteria, usually occurring within 10 days after parturition and is characterized by the following clinical signs viz a red-brown watery uterine discharge, in severe cases, reduced milk yield, dullness, anorexia, elevated heart rate and apparent dehydration ((Drillich *et al.*, 2001). Repeat breeder cow is a cow that looks apparently healthy and has regular oestrous cycle (Katagiri, 2011; Warriach *et al*., 2008). However, it does not conceive when bred three times continuously, either with a bull of well-known fertility or through artificial insemination with excellent semen quality (Dehghan, 2007). Repeat breeding is one of the major infertility problems of herds (Kimura *et al*., 1987).

Reproductive disorder of dairy animals was mostly studied throughout the country, however study regarding with this problem is not conducted and documented in West Shoa Zone. Hence, the present survey had been designed to assess the major reproductive disorders and other determinants of dairy cows.

MATERIALS AND METHODS

Description of the Study Areas

The study was conducted in Ambo, Dandi and Dirre inchini districts of West Shoa Zone, Oromia Regional State, Ethiopia.

Ambo is located 105 km West of Addis Ababa. Agro-ecologically it is classified in to lowland (50%), mid land (35.5%) and highland (14.5 %). Its altitude ranges from 1350 to 3300 m.a.s.l. The minimum and maximum temperature of the area is 15^0c & 29^0c, respectively while the minimum and maximum rainfall of the area is 800 mm and 1000 mm, respectively. The district is sub divided into 35 kebeles and is potential for development of improved forages and forage seed multiplication to enhance livestock production and productivity. According to the Office of Agriculture and Rural Development report, 144243 cattle, 30009 goats, 65652 sheep, 92030 poultry, 6684 equines and 21643 honeybee colonies are found in the district. Cattle and sheep are the major livestock species in the area.

Dandi is located 78 km West of Addis Ababa at a distant of 35 km East of the Zonal town, Ambo. Currently the district is sub divided in to 47 rural kebeles and 7 town kebeles. Agro ecologically, it is classified into mid altitude (71%) and highland (29%). The altitude ranges from 2000 - 3288 m.a.s.l. The minimum and maximum temperature of the area is 9.3^0c & 23.8^0c, respectively while the minimum and maximum rainfall of the area is 750 and 1170 mm, respectively.The district is potential for development of improved forages and forage seed multiplication to enhance livestock production and productivity in the area. According to the Office of Agriculture and Rural Development report (2015) 210,255 cattle, 23202 goats, 103868 sheep, 114176 poultry, 51349equines, and 19351 honeybee colonies are found in the district. Cattle and sheep are the major livestock species in the area. The major livestock feed resources of the area include natural pasture, crop residues, crop aftermaths and improved forages.

Dirre inchini is located 162 km West of Addis Ababa and 50 Km from Zonal town Ambo. It is one of the potential agricultural (Livestock and crops) productions. The total area coverage of the district is 38687 hectare of which 22766 hectare is cultivated land and 8265 hectare is grazing land and the others covered with forest and mountain with stone (West Shoa Zone Agriculture and Rural Development, 2014). Agro ecologically it is classified in to mid altitude 5% and highland 95%. It has an elevation range from 2200 to 3023 m.a.s.l. The minimum and maximum temperature of the area is 6^0c & 24^0c, respectively while the minimum and maximum rainfall is, 1000 mm and 1400 mm, respectively. The district has potential for development of improved forages and forage seed multiplication to enhance livestock production and productivity in the area.

The crop types of the area include cereals, *Enset*, oil crops, vegetables and other perennial crops. According to the Office of Agriculture and Rural Development of the study area report (2015), 89965 cattle, 4652 goats, 49110 sheep, 34592 poultry, 43626 equines and 5786 honeybee colonies are found in the district. Cattle and sheep are the major livestock species in the area. It is dominated by *Enset* based agriculture and livestock production.

Sampling Techniques and Household Selection

The three districts of West Shoa Zone (Ambo, Dandi and Dirre inchini) were purposely selected based on accessibility and importance of dairy production in the areas. Initially discussions were held with districts' livestock experts; secondary data were collected; published and unpublished information were assessed; in addition, the districts were visited for better understanding. Random sampling techniques were employed to select kebeles of each district. Accordingly, 4 kebeles from each district (total = 12 kebeles) were selected. Then a total of 240 households (80 households from each district) were selected. Semi- structured questionnaire was used to collect primary data. The major questions included in the questionnaire were, major reproductive disorder and other determinants of dairy production in the areas.

Sources and Methods of Data Collection

The study was based on both secondary and primary sources of data. Secondary data were obtained from livestock resource, production and health office and Agricultural and rural development office of the study areas. Primary data were collected using semi-structured questionnaire through formal interview method.

Data Analysis

The collected data were analyzed by using SPSS (version 20) soft ware and Microsoft Excel 2007. The results were summarized by using figures, percentages and chart. An index was calculated to provide overall ranking of constraints of dairy cattle according to the formula: Index = sum of [4 for rank 1 + 3 for rank 2 + 2 for rank 3 +1 for rank 4] for particular purpose divided by sum of [4 for rank 1 + 3 for rank 2 + 2 for rank 3 +1 for rank 4] for all constraints mentioned.

RESULT AND DISCUSSIONS

Major Reproductive Disorders

The major reproductive disorders reported in the areas were repeat breeder, abortion, retention of fetal membrane, anoestrous, dystocia and stillbirth.

Repeat breeding

The overall percentage of repeat breeder reported in the areas was (29.6%). It significantly varies between the study site where maximum repeat breeder was reported from Dirre inchini (36.3%) followed by Ambo (30%) and Dandi (22.5%). The current result was higher than the prevalence rate (26.5%) of repeat breeder reported by (Hunduma, 2013) from Asella, (8.9%) prevalence rate reported by (Gizaw *et al*., 2007) from Adama and 4.6% prevalence rate reported by Tigre (2004) from Holetta. According to Arthur *et al*. (1996) among reproductive disorder, repeat breeder can be caused by a number of factors, including sub-fertile bulls, endocrine imbalance, malnutrition reproductive tract infection and poor management practices such as wrong time of insemination or faulty heat detection, inappropriate semen handling and insemination techniques. The finding of the current result may be attributed to one or mixed of the above mentioned factors.

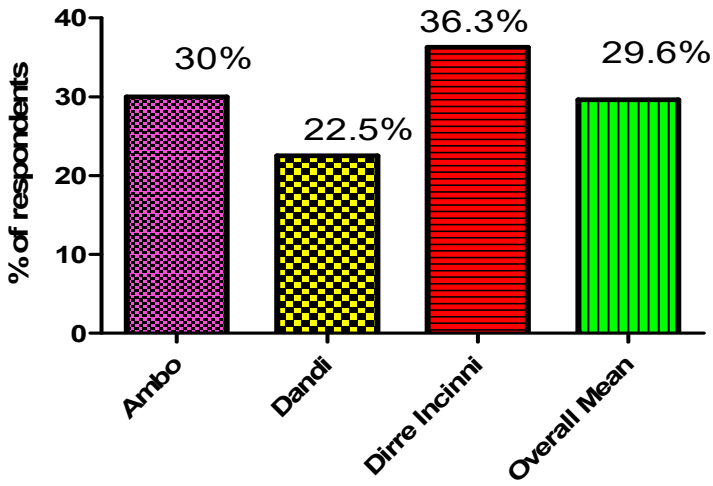

Figure 1: Proportion of households reported the incidence of Repeat breeder

Abortion

The overall percentage of abortion reported in the area was (11.33%). There is significant variation between the study sites. The lowest proportion of abortion (7.5%) reported from Ambo. This might be attributed to better health and other management in the area as compared to that of Dandi (15%) and Dirre inchini (11.3%). The overall percentage (11.3%) of abortion in the study areas were lower than the prevalence rate (14.6%) reported by Hunduma (2013) from Asella and the prevalence rate (13.0%) reported by Molalegne and Shiv (2011) in and around Bedelle. But the prevalence rate reported in the present study was higher than the value (2.23%, 3.19% and 6.30%) reported by Gizaw *et al*. (2007), (Shiferaw, 1999) and (Kassahun, 2003) from Adama, Holetta and Hawassa, respectively. According to WHO (2006), abortion is a frequent complication of brucellosis in animals, where placental localization is believed to be associated with erythritol, a growth stimulant for Brucella abortus reported earlier by (Gizaw *et al*. 2007), (Shiferaw ,1999), (Kassahun, 2003) from Adama, Holetta and Hawassa, respectively.

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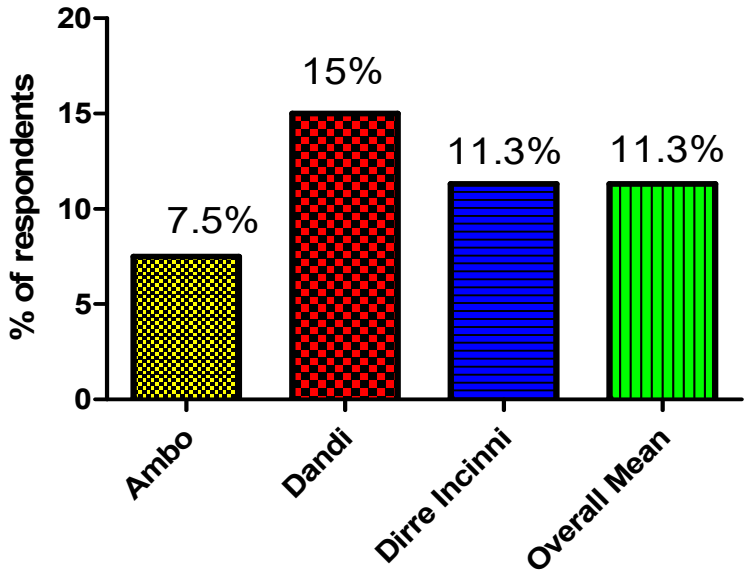

Figure 2: Proportion of households reported the incidence of Abortion

Retention of fetal membrane

Retention of fetal membrane (RFM) in bovine is one of the most frequently occurring pathological conditions following parturition. Cows that failed to expel the placenta spontaneously within 12 hours postpartum were considered to have retention of placenta. Serious complications are commonly associated with it which adversely affects the future fertility and productivity of the animal resulting in major economic losses. The overall percentage of retention of fetal membrane reported was (12.93%). The current finding was lower than the figure (16.7%) by (Ulfina *et al*., 2015) at Karnal, Haryana, India, (14.28%) by (Mamo, 2004) at around Bishoftu Oromia regional state and (19.2%)by (Gashaw *et al*., 2011) at Jimma town South Western Ethiopia. It was noticed from the present findings that retention of fetal membrane is lower in Ambo than Dandi and Dirre inchini (Figure 3). This might probably due to better management practices in terms of health, feeding and other aspects in Ambo area. The incidence of retention of fetal membrane in the area is lower than (31 %) incidence of placenta observed during rainy season in buffalo (Yadav *et al*., 2007).

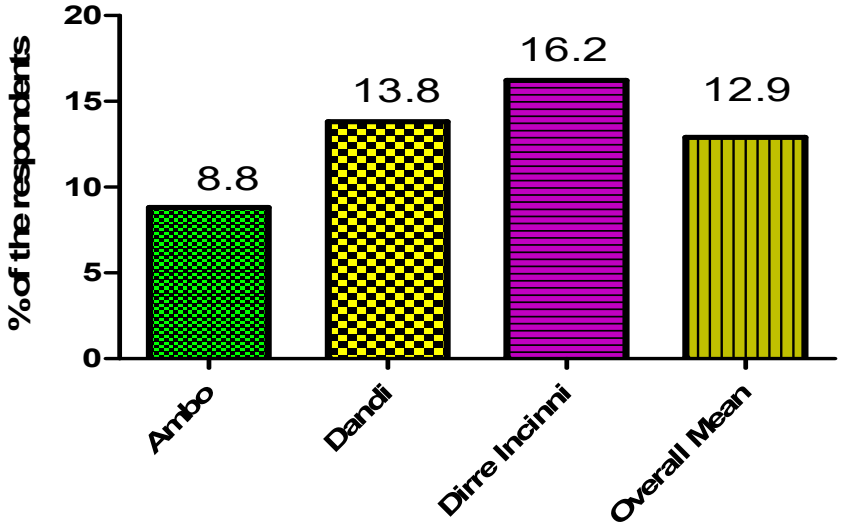

Figure 3: Proportion of households reported the Incidence of Retention of Fetal membrane

Anoestrous

The overall percentage of Anoestrous reported in the study area was (25%). The result of the current study is similar with Befekadu (2007) who reported 24% of anoestrous problem in cross breed dairy cows in central high lands of Ethiopia. The prevalence of anoestrous observed in the study districts were higher than value (12.26%)

reported by Adane *et al*. (2014) in urban and peri urban of Hosanna, Southern Ethiopia; 12.9% reported by Hadush *et al*. (2013) in dairy cattle at Bishoftu and 10.2% reported by Amene (2006) in Holstein Frisian cows at Alage dairy farm. This wide variation in the prevalence of anoestrous condition probably indicated poor heat detection and management practices in the areas.

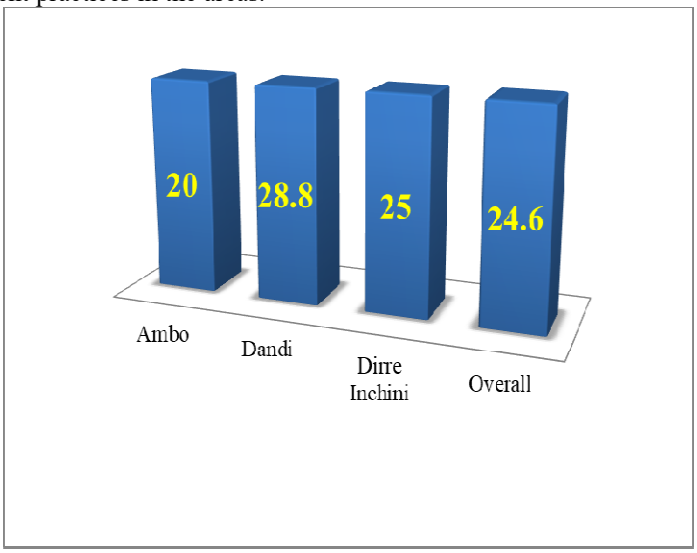

Figure 4: Proportion of households reported the incidence of Anoestrous

Dystocia

The overall percentage of dystocia /calving difficulties/ reported was (7.9%).The present value is almost similar with (7.75%) reported by Dawit and Ahmed (2013) in Kombolcha, North east Ethiopia. Previous report on the prevalence of dystocia by Mamo (2004) (5.79%) in small holder dairy cows in and around Bishoftu was lower than the current result (7.9%) However, the current finding is higher than (Hadush *et al*., 2013) (2.9%) in central Ethiopia. This variation in the occurrence of dystocia might be due to the fact that it is influenced by the factors such as, age and as well as breed of the sire.

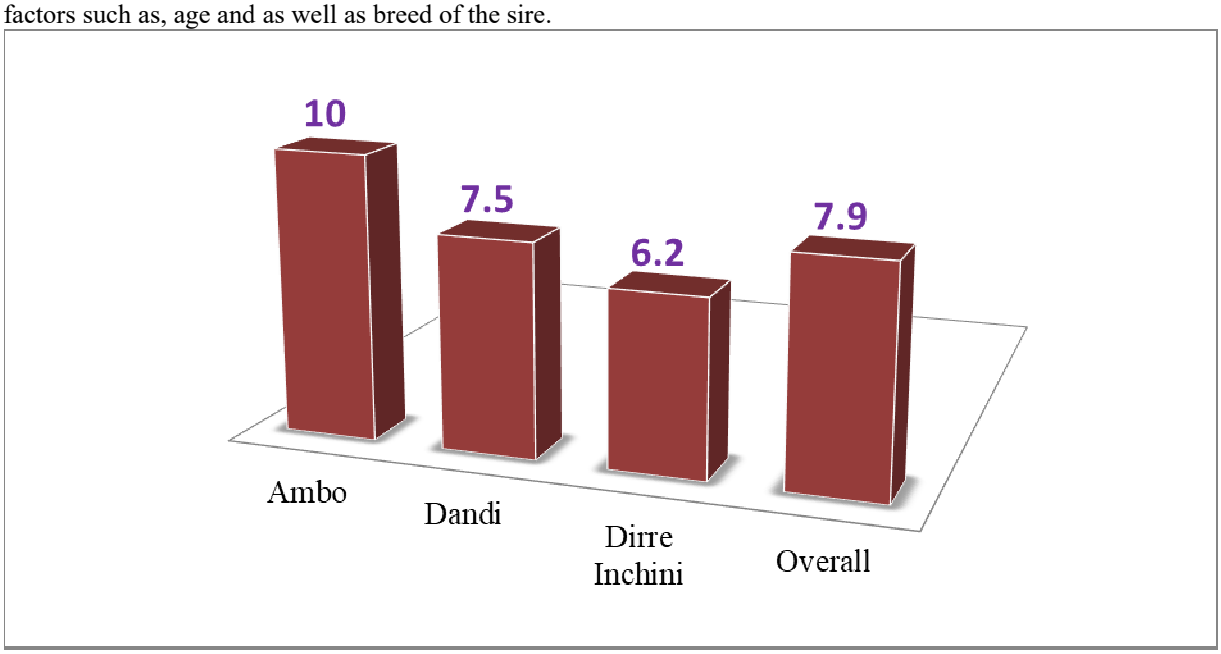

Figure 5: Proportion of households reported the incidence of Dystocia

Still birth

The overall percentage of still birth reported in the study area was (4%). The prevalence of still birth reported from Ambo (4%), Dandi (2.4%) and Dirre incinni (5.6%) are lower than the range of still birth (10-13%) reported by Meyer *et al*. (2001), Hansen (2003) and Harbers *et al*. (2000).

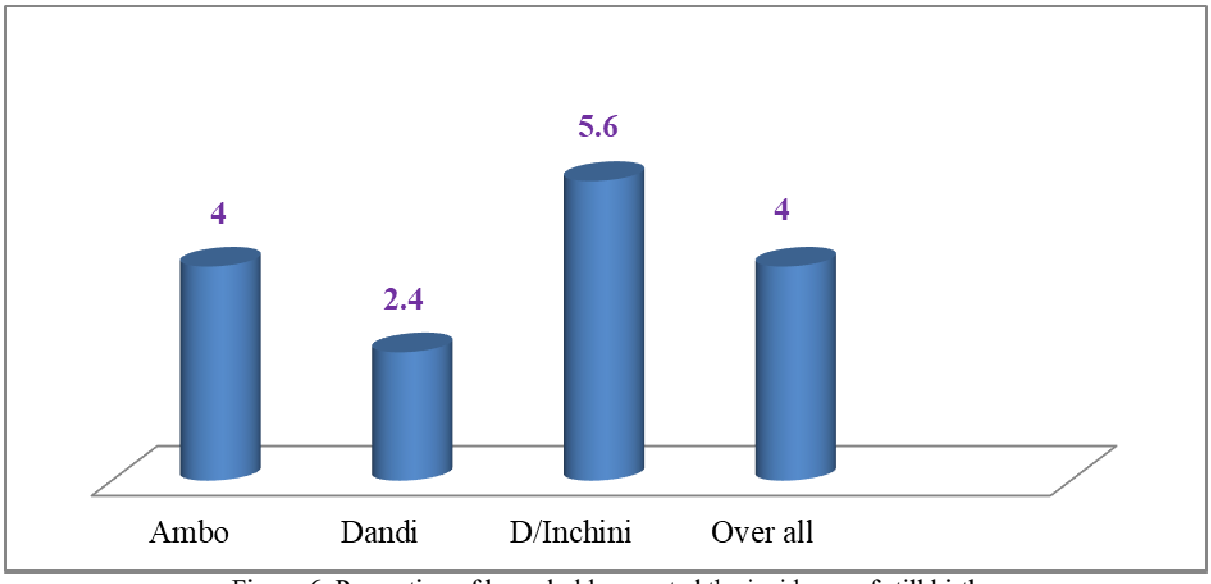

Figure 6: Proportion of households reported the incidence of still birth

Determinants of dairy production

Major determinants of dairy production in the areas were presented in (Table 1).

Inadequate animal feed is the major constraints of dairy production followed by genetic limitation, shortage of land, milk market and inadequate extension service. The current finding is agree with Solomon *et al*. (2014) who reported that feed shortage is the major constraint /first rank/ in Metekel zone, Benishangul Gumuz regional state, Ethiopia.

Inadequate Animal Feed resources and Cost of Feed

The primary constraint reported areas to increase milk production were inadequate feed resources; poor pasture development and the ever increasing feed prices. The current study was ideal with Yenesew *et al*. (2013) there was feed shortage problem both during the dry and the rainy seasons. Farmers tend to keep cattle at stocking rates that far exceed the carrying capacity of their grazing lands. This has resulted in degraded pastures and eroded soils. The availability and quality of feed resources and efficient nutritional management is the principal constraint related to feeds and feeding. The current result is ideal with (Sisay, 2006) who reported that lack of adequate feed resources as the main constraint to animal production is more pronounced in different agro ecologies of North Gonder, Ethiopia. The problem is also exacerbated by the higher nutrient demand of improved dairy animals, for example crossbreeds, for milk production and the perception of farmers that crossbred animals consume more without taking into account the economic analysis. The common feeds available include natural pasture (72.9%), crop residues (100%), concentrates (28.75%) and local brewery (40.25%). In some cases, during the dry season, conserved hay and crop residues can be the only feeds available to the animals. However, the improvement of the utilization of these feedstuffs through physical and chemical processing methods to increase the availability of nutrients is only practiced on a limited number of farmers. On the other hand the use of non-conventional feed as alternative sources of feed is not well utilized in the area.

Genetic limitation of indigenous breeds

Poor genetic potential of the indigenous cattle, which gives rise to low milk output, was reported to be one of the main constraint (2^{nd} rank) in a the area. It is fact that improving the feeding, water availability and health care of the indigenous cattle alone did not increase the quantity of milk per day to allow the animals to be used for commercial market-oriented milk production. This necessitates the improvement of local breed of cattle by using blood from exotic breed of improved genotypes using AI. Even though, there have been AI service and strong interest from the extension system to improve the productivity of local breeds using exotic blood level from abroad, there are several stumbling block that hinder the improvement of livestock sector in the study area. Concerning the availability of improved genotypes, crossbreeding programs have lacked coordination and have been further constrained by problems of infertility, instability of the crossbreeds and inefficient artificial insemination services at the farm level. The level of exotic blood in the crossbreeds, is highly variable, and ranges from 25-75%.

It was observed that poor heat detection, perception of the farmer toward artificial insemination like low conception rate from AI were the most important constraints in the area that worth mentioned. The current

finding is agree with Damron (2000) who reported that heat detection, AI technician's efficiency and fertility level of the herd was the most severe problems of AI delivery. Of the total respondents, (45%) reported that they prefer to keep local breed because they believe crossbreed animals require more feeds and are susceptible to feed shortage and disease. About (28%) of respondents believed that AI leads calving difficulties (dystocia) also bout (20%) of the respondents reported problems associated with days like Saturday and Sunday.

Shortage of Land

The shortage of land and the ever declining of grazing land mainly due to conservation of the existing grazing land to crop land, in the area in general and in the peri-urban dairy production system in particular is one of the major problems of livestock production in general and dairy production particularly. The problem of inadequate feed is as a result of the limited land available for pasture establishment, especially in the productive highland zones that have a potential for dairy development. In urban and peri-urban dairying, lack of grazing land is often a limiting factor and hence the intensification of the dairy industry by using fewer numbers of improved dairy cows with increased productivity per cow should be a strategy to be followed.

Milk Market Related Constraints

The amount of milk to be sold by dairy owners to the consumers depends on the demand of consumers and transportation facilities.

There are also no price regulatory mechanisms in place that can make such an important food item easily available and reasonable to a large segment of the population. It was also observed that there are no functional quality control and payment systems in the area. In Ethiopia milk marketing system is not well developed (Ahmed *et al*., 2003) especially, market access in pastoral production system is a critical factor (Tsehay, 2002). Results of the study showed that only (43.75%) from Dirre Inchini was sold raw milk to dairy cooperative at morning only. Because of far from Zonal town and less milk demand in Dandi and Dirre Inchini the price of raw milk is relatively lower than Ambo. According to respondents in the study areas, the demand of milk and milk products are decreased when the orthodox followers restricted from eating food of animal origin. All most all of dairy owners those have local bred are processed the milk to butter, cottage cheese, and yogurt to increase sweetness (butter), shelf life of the product and make it available for transportation. Milk market in the study area was varied. The idea is line with Ulfina *et al*. (2013) the major marketing constraints are fluctuation in demand and supply of dairy products as a result of feed shortage and different socio cultural reasons, poor infrastructure such as: lack of cooling facilities, simple processing equipments and quality testing skills and equipments and the long time fasting of the members of the Ethiopian Orthodox church. The milk market is affected by poor quality of milk and insufficient animal feed in terms of quality and quantity.

Prevalence of animal diseases and inadequate veterinary service provision

The prevalence of LSD (37.9%), Anthrax (23.8%), Black leg (22.9%), Bovine pasteurolosis (26.7%) and mastitis (39.2%) are highly affect dairy cows in the area. The animal health services provided are inadequate; the cost of drugs and acarisides is very high, while services are not readily available to the dairy farmers. According to Ibrahim &Olalocu (2002) poor animal health service and lack of improved management are the major constraints for dairy development in Ethiopia, which caused poor performance across the production system. This is partly attributed to the insufficient budget allocated to veterinary services, insufficient man power and extension systems in the area.

Inadequate extension and Weak linkages between research

It was evident from the study that lack of modern animal husbandry and mank8agement, limited skilled manpower in dairy technology and marketing, inadequate distribution systems and limited packaging choices, are affected the sector. Result from the study area revealed that among total respondents about 48.5% of the respondents had no access to extension service and they lack awareness on how to use improved forage, improved breed, frequent health care, AI technology, market opportunities, conservation of crop residue and hay and how to use and conserve local available of non conventional feed. Among others, weak linkages between research, extension, and technology users are one of the critical factors that have hindered dairy development in the area.

	Ranking						
Constraints	1st	2nd	3rd	4th	5th	Index	Rank
Inadequate animal feed	44.21	21.20	9.30	11.21	-	0.28	1st
Genetic limitation	23.20	24.60	-	19.50	39.40	0.23	2nd
Shortage of land	19.70	-	32.00	26.80	7.2	0.20	3rd
Milk market constraint	33.10	-	16.23	8.60	-	0.18	4th
In adequate extension service	19.40	12.65	-	-	4.20	0.11	5th
Total	139.61	58.45	57.53	66.11	50.80	**1.00**	

Table **1**: Ranking of major constraints of dairy cattle production as identified by farmers (n=240) in three districts of West Shoa Zone, Oromia Region, Ethiopia.
Index = sum of [4 for rank 1 + 3 for rank 2 + 2 for rank 3 +1 for rank 4] for particular purpose divided by sum of [4 for rank 1 + 3 for rank 2 + 2 for rank 3 +1 for rank 4] for all constraints mentioned.

Conclusion and Recommendation

Repeat breeder, abortion, retention of fetal membrane, anoestrous, dystocia and stillbirth were among the mentioned important reproductive disorders of dairy cattle production in the districts. Lack of planned breed improvement scheme, insufficient AI service, shortage of land, inadequate feed in quality and quantity, market related problems, inadequate veterinary service and inadequate extension services were some of the identified determinants for the improvement of dairy cows in the area. It is obvious that especially during pregnancy and lactation period dairy cows are highly influenced by feed shortage, disease and parasites and shortage of water.
Based on the result of the study it was concluded that the dairy cows of both local and cross breeds were generally affected by one or more of the above reproductive disorders. Hence the following recommendations have been made to divert the existing situation and improve dairy cattle productivity in the areas.

- Management together with proper feeding, accurate heat detection, as well as health management should be improved to reduce the incidence of reproductive disorders mentioned.
- Feed scarcity was a serious problem in the study districts, especially during dry season. Therefore, to avoid and/or reduces shortages of feeds happening in the dry season, feed conservation strategy needs to be given due attention as there were abundant pastures in the districts during wet season.
- Animal health centers should be expands and distribute in to all target areas in order to reduce disease problem.
- The market facility and market chain development needs attention to solve market related problems.

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