

Study on Major Reproductive Health Problems in Indigenous and Cross Breed Cows in and Around Bedelle, South West Ethiopia

¹Molalegne Bitew and ²Shiv Prasad

¹College of Agriculture and Veterinary Medicine, Jimma University, P.O. Box 307, Jimma, Ethiopia

²Faculty of Veterinary Medicine, Addis Ababa University, P.O. Box 34, Debre Zeit, Ethiopia

Abstract: Questionnaire survey and regular follow up were conducted to determine the major reproductive health problems of dairy cows in and around Bedelle, South Western Ethiopia from November 2003 to April 2004. From 302 cows which were under investigation 80 (26.5%) had at least one of the reproductive problems. The reproductive problems according to their relative importance in and around Bedelle were Metritis 51 (16.9%), abortion 42 (13.9%), Retained Fetal Membrane (RFM) 26 (8.6%), dystocia 20 (6.6%), repeat breeding 9 (3%), anoestrous 5 (1.7%), prolapse (vaginal and uterine) 3 (1%) and 2 (0.65%), respectively. The prevalence rates of reproductive problems had significant difference ($p < 0.05$) between semi intensive production system (38.8%) and extensive production system (24.4%). Based on breed, the problems were significantly different ($p < 0.05$) in cross breed (43.7%) than indigenous breed (24.5%). Parity and body condition resulted significant difference ($p < 0.05$) in the occurrence of reproductive problems. The degree of association of risk factors was assessed and parity found to be directly associated ($r = 0.66$) and the association was significant ($p < 0.05$). However, body condition scores were negatively associated and had significant differences ($p < 0.05$) on the occurrence of reproductive problems. This particular study indicated clinical reproductive problems which included metritis, abortion RFM, dystocia and repeat breeding were one of the major reproductive problems responsible for the low reproductive performance of smallholder dairy cows in and around Bedelle town, South West Ethiopia.

Key words: Bedelle, cows, crossectional study, reproductive problems, breed, Ethiopia

INTRODUCTION

Agriculture (mainly crop and livestock production) is the mainstay of the Ethiopian economy, employing approximately 85% of the total population. Livestock production accounts for approximately 30% of the total agricultural GDP and 16% of national foreign currency earnings (IBC, 2004). Moreover, Ethiopia has diverse animal genetic resources and its relatively large livestock population (approximately 100 million) is well adapted to and distributed among diverse ecological conditions and management systems (Lobago *et al.*, 2006). In Ethiopia as many developing countries, livestock play multiple roles. Despite the huge number of cattle and their economic importance, the productivity is low due to the constraints of disease, nutrition, poor management and poor performance of indigenous breeds. These constraints result in poor reproductive performance of dairy cattle. Among the major problems that have direct impact on reproductive performance of dairy cows are abortion, dystocia, Retained Fetal Membrane (RFM), metritis,

prolapse (uterine and vaginal), anoestrus and repeat breeder. These could be classified as prepartum and postpartum reproductive problems (Shiferaw *et al.*, 2005; Lobago *et al.*, 2006).

These result in considerable economic loss to the dairy industry due to slower uterine involution, reduced reproductive rate, prolonged interconception and calving interval, negative effect on fertility, increased cost of medication, drop in milk production, reduced calf crop and early depreciation of potentially useful cows (Gebremariam, 1996; Lobago *et al.*, 2006). But in dairy industry the reproductive goals that we need to follow are 12 months of calving interval, 85 days open, 1.6 services per conception rate and 85% of cows observed in estrus and recorded by 60 days fresh (Msangi *et al.*, 2005). In addition to abortion, the cause of infertility are many and can be complex. It is very difficult to diagnose the problem by one particular disorder or symptom because there is interrelation between predisposing factors (Gizaw *et al.*, 2007) such as management at caving, hygiene and parity, stage of gestation, nutrition and environment

(Tackacs *et al.*, 1990; Msangi *et al.*, 2005). Although, major reproductive disorders greatly responsible for high economic loss in dairy cows, the research done on the prevalence, etiology and relative importance of these problems in and around Bedelle was less. So, this study was designed to investigate the magnitude of major reproductive disorders in indigenous and cross breed cattle in and around Bedelle. Therefore, the objectives of the study was to identify major reproductive disorder in indigenous and cross breed cattle in and around Bedelle, to compare their relative importance, to collect base line data for future study in the area and to forward possible recommendations for the prevention and control approaches.

MATERIALS AND METHODS

Study area: The study was conducted in western Ethiopia, Illubabor zone, Bedelle wereda that is 480 km from the capital Addis Ababa. Bedelle is located at an altitude of 1900-2000 m above sea level and 8-9° N latitude and 36-37°E longitudes. The mean annual rainfall in the area is 1500 mm. The mean seasonal temperature varies from 20-25°C from October to January and decline to a level of 15-25°C during the rest of the months (CSA, 2009).

Sample size and study animals: The sample size required for this study was determined depending on the expected prevalence of reproductive problems and the desired absolute precision by the formula given by Thrusfield (2005) as follows. The previous study on prevalence of RHPs in and around Mekelle town indicated 27%. Therefore, 27% expected prevalence was used to estimate the sample size.

Using 95% confidence interval, 5% precision and 27% expected prevalence the number of cows needed to demonstrate the prevalence of reproductive health problems in Bedelle were 302 dairy cows with different parity and body conditions. Both indigenous and cross breed dairy cows which were kept under different management systems by small scale private owners and/or farmers were investigated.

Study design: The crosssectional type of study was undertaken from November 2003 to April 2004. The study constituted questionnaire survey and regular follow up on the randomly selected dairy cows.

Questionnaire survey: In order to get co-operation of the dairy owners and obtain reliable information about their animals, thorough explanation on the objectives of the

study was given before the start of the interview. Then questions were asked about major reproductive problems like abortion, dystocia, retained fetal membrane, metritis, uterine and vaginal prolapse, anestrous, repeat breeder, management systems and parity. Body condition score was based on the criteria adopted by Richard (1993). Animals were grouped, those having the major reproductive problems and those with out these problems. Questionnaire survey included about 238 cows.

Regular follow up: About 66 pregnant cows were randomly selected in seven kebeles in and around Bedelle that were expected to give birth within the study period. These cows were subjected to different clinical and gynecological examinations including rectal palpation and finings were recorded once a week.

Body condition scoring: The Body Condition Scoring (BCS) was determined according to Richard (1993). For all cows under the study their body condition were grouped from 0-5.

Data management and analysis: The data were entered and managed in MS Excel. SPSS version 16 and Win Episcope 2.0 statistical softwares were applied for the data analysis. Both descriptive and analytical statistical techniques were used for data analysis. The differences in parameters like breed, management, body condition and parity on reproductive problems were analyzed by using χ^2 (Chi-square) technique. The degree of association between parity and reproductive problem and the association between body condition and reproductive problems were analyzed by using correlation coefficient (Thrusfield, 2005).

RESULTS AND DISCUSSION

In this study, a total of 302 dairy cows were examined for major reproductive problems by classifying the method of study as questionnaire survey and regular follow up (Table 1). Owners of 238 cows were questioned for major reproductive problems and found that 59 (24.8%) were affected by at least one of the reproductive problems. Again 66 cows were regularly followed and out of them 21 (31.8%) were diagnosed at least one major reproductive problems. From over all 302 cows, 80 (26.5 %) were diagnosed for the problems (Table 1).

Table 1: The reproductive problems in and around Bedelle on different method of study

Method of study	No. of cows examined	No. cows positive (%)
Questionnaire	238	59 (24.8)
Regular follow	66	21 (31.8)
Total	302	80 (26.5)

Table 2: The relative occurrence of major reproductive problems in Bedelle

Type of reproductive problem	Type of the study		
	Questioner survey No (%)	Regular follow up No (%)	Total
Abortion	31 (13.00)	11 (17.0)	42 (13.90)
Dystocia	12 (5.10)	8 (12.3)	20 (6.64)
RFM	16 (6.70)	10 (15.4)	26 (8.64)
Metritis	31 (13.00)	20 (31.0)	51 (16.90)
Vaginal prolaps	2 (0.84)	0 (0.0)	2 (0.66)
Uterine prolaps	3 (1.26)	0 (0.0)	3 (1.00)
Anoestrus	4 (1.70)	1 (1.5)	5 (1.66)
Repeat breeder	7 (2.90)	2 (3.1)	9 (3.00)
Total	106 (44.50)	52 (80.0)	158 (52.50)

Table 3: Abortion at different stages of gestation in and around Bedelle

Stages of gestation	No. of abortion (%)	χ^2 (p value)
1st trimester	6 (14.3)	13.48 (0.021)
2nd trimester	12 (28.6)	-
3rd trimester	24 (57.1)	-
Total	42 (100.0)	-

The study found that metritis, abortion RFM, dystocia and repeat breeding were the major reproductive problems in the area in their relative importance compared with others (Table 2). The study accessed the occurrence of abortion at different stages of gestation and found that there is significant difference ($p < 0.05$) in the occurrence of reproductive problem at each trimester (Table 3). The prevalence rate of reproductive problems in relation to breed difference was considered and there was significant difference ($p < 0.05$) of these problems in indigenous and cross breed cattle in Bedelle (Table 4).

Management system resulted significant differences ($p < 0.05$) in the occurrence of reproductive problems which is high at semi-intensive management systems than extensive management system (Table 4). There was a significant difference ($p < 0.05$) in the occurrence of reproductive problems due to body condition and parity. It was indicated that there was inverse relation ($r = -0.54$) between body condition score at caving and the occurrence of reproductive problems. However, parity had direct association ($r = 0.66$) on the occurrence of reproductive problem (Table 5).

This is in agreement with Gebremariam (1996) in Mekelle, Ebrahim (2003) around Kombolcha town reported 26.7 and 34.89%, respectively. This is because both towns are similar in altitude, annual temperature but different rainfall with Bedelle.

On the contrary, Berisha (1990) around Addis Ababa, Melkamu (1999) in Holleta reported higher prevalence rates of 74.8 and 50.9%, respectively. The prevalence of abortion in Bedelle was 13.9% fairly agrees with Tekely *et al.* (1991) that was 16.3% during the year 1988-1989 at Ghibe valley. This is due to seasonal flare up of trypanosomosis most of pregnant cows abort due to fever induced by trypanosomosis.

Table 4: Reproductive problems in relation to breed and management in and around Bedelle cows

Risk factor	No. examined	No with RHP (%)	χ^2 (p value)
Indigenous	269	66 (24.5)	5.41 (0.001)
Cross breed	33	14 (42.4)	-
Total	302	80 (26.5)	-
Extensive	254	62 (24.4)	3.92 (0.000)
Semi intensive	48	18 (38.3)	-
Total	302	80 (26.6)	-

Table 5: The occurrence of reproductive problems in cows relation to body condition and parity

Body condition	No. examined	No. affected (%)	χ^2 (p value)	r
0	14	6 (42.8)	11.94 (0.0031)	-0.54
1	93	34 (36.6)	-	-
2	101	23 (22.7)	-	-
3	63	13 (20.6)	-	-
4	28	4 (14.3)	-	-
5	3	0 (0.0)	-	-
Total	302	80 (26.6)	-	-
1	75	12 (16.0)	12.8 (0.0075)	0.66
2	63	15 (23.8)	-	-
3	74	19 (25.6)	-	-
4	39	13 (33.3)	-	-
5 and above	51	21 (41.2)	-	-
Total	302	80 (26.6)	-	-

r = Person's correlation coefficient

Again Bekele *et al.* (1991) found out that abortion rate at a range of 1.7-20.2% in their study to establish the rate of abortion in three state dairy farms in central high lands of Ethiopia. However, Berisha (1990) 2.2% around Addis Ababa, Zewdu (1992) 1.5-7.8% in ILCA herd, Debrezeit, Gebremariam (1996) 6.1% at Mekelle and its Environs, Yoseph (1999) 11.11 in Holleta, central high lands of Ethiopia and Ebrahim (2003) 3.19% in and around Kombolcha were lower than the above.

The prevalence of metritis was 16.9% which is in agreement with Gebremariam (1996), Melkamu (1999), Yoseph (1999), Ebrahim (2003) and Shiferaw *et al.* (2005) with 16.6, 25.5, 16.7, 18.7 and 15.5%, respectively. Although, Zewdu (1992) Debre Zeit, ILCA herd reported a lower rate of metritis 3.1-9.9%, Some researchers have reported very high rate of metritis like Ruder *et al.* (1990) 67% and Markusfeld (1984) 37%. The similarity of the present finding with the findings of Ebrahim, Gebremariam and Melkamu might be due to the similarity of management of cows in Mekelle, Kombolcha and Holleta with Bedelle.

This study also assessed the prevalence of retained fetal membrane and found that 8.6% cows were positive. This result is in accordance with the research of Zewdu (1992) in Debrezeit ILCA herd and Tekely *et al.* (1991) with percents of 8.1-12.5, 7.1 and 7.1-2.8%, respectively. There were also higher reports by Yoseph (1999) 16.7% in Holleta. This was due to high prevalence of Brucellosis (22-38%). Gebremariam (1996) in Mekelle 16.8%, Ebrahim (2003) in and around Kombolcha 15.5% and

Shiferaw *et al.* (2005) in central highlands of Ethiopia 14.7%. The dystocia which was 6.6% would be serving as a predisposing factor for the prevalence of retained fetal membrane. The prevalence of dystocia was in agreement with Correa *et al.* (1990) 7% on Holstein-Friesian cows, Yoseph (1999) 5.5% in Holleta and Melkamu (1999) in Holleta 7.8%.

However, there are also researchers reported less than the above like Zewdu (1992), Gebremariam (1996) and Ebrahim (2003), 2.2-4.4, 3.7 and 4.3% , respectively. It is difficult to give exact figures on the incidence of dystocia because it is influenced by several factors such as nutritional status, age and parity of the dam, breed of the sire and the dam. Attention was also given for the prevalence of prolapse in Bedelle and found that 1% uterine prolapse and 0.66% vaginal prolapse. These were in line with the research of Melkamu (1999) and Ebrahim (2003) with 1.9 and 1.28%, respectively. In the present findings, anoestrus was recorded at a prevalence of 1.7%. There are also similar reports with this study Zewdu (1992) and Ebrahim (2003) reported 0.7-20.4 and 1.7%, respectively. Anoestrus is man to cow related incidence. The finding of anoestrus in this study was low. It was due to lack of close observation of the cows when they are at estrus since, the cows lived far apart from their owners.

However, Yoseph (1999) and Shiferaw *et al.* (2005) reported an incidence rate of anoestrus as 38.5 and 38.6%, respectively. Both researchers proposed that the high rate of anoestrus was due to genital infections. Repeat breeder was also studied and found a prevalence rate of 3%. This fairly agrees with Ebrahim (2003). The similarity with Ebrahim was due to similar management of cows between Bedelle and Kombolcha. It is worthwhile to discuss the influence of breed on the occurrence of reproductive problem.

This study revealed that crossbreeds (43.7%) were more affected ($p < 0.05$) than indigenous (24.5%). Zebu cattle are adapted to tropical conditions of high temperature and humidity, diseases and low quality of feed than the European breeds (Mukasa-Mugerwa, 1989; Tekely *et al.*, 1991). So, the findings of this study agree with these researchers. In addition to breed, management also affected the occurrence of reproductive problems and the study found that semi-intensively managed cows (38.4%) experienced RHPs more than ($p < 0.05$) extensive (24.4%) one's.

This is best explained due to semi-intensively managed ones are housed in barns all the time which increase the possibility of contamination during caving (Gebremariam, 1996). This is in agreement with Mukasa-Mugerwa (1989) reported that parturition, lactation and

uterine involution require energy. The energy used by these processes must be sufficiently supplied. Otherwise, it will meet from the cow's body reserve/fat (Mukasa-Mugerwa, 1989). Thus, it is possible that a cow with good body condition can convene the energy requirement. But if the cow is poor in body condition peasants attempt to pull out the fetus causing uterine infection and the cows have weak defense mechanism with the high possibility of contamination end up with high infection rate (Gebremariam, 1996). It indicated that the rate of infection of uterus was considerably higher after the third parturition. This is due to lack of uterine tone and slow involution of the uterus at higher parities (El-Din *et al.*, 1995). Thus, the findings of this study were consistent with the above researchers and showed direct association ($r = 0.66$) between increment of parity and occurrence of reproductive problems.

CONCLUSION

The ultimate goal in each herd should be to lower carving interval, decrease the number of services per conception there by increasing herd production. But reproductive health problems such as metritis, abortion, RFM, dystocia, prolapse (uterine/vaginal), anoestrus and repeat breeder affect the reproductive performance of the dairy cows, the number of potential replacement needed to maintain a constant herd size and the longevity of the cow in the herd. From this study, it is found that reproductive disorders, most of the times occur as a complex rather than appearing as a single abnormality. The cows in Bedelle were affected by different major reproductive health problems with varying amounts. So, this study tried to point out the magnitude of major reproductive problems and their relative importance, the association of the problems with the management, breed, body condition and parity.

RECOMMENDATIONS

- The reproductive problems in the study site were multifactorial. Therefore, detailed studies should be conducted to identify their etiology, distribution and prevalence
- This study showed that direct association of metritis with predisposing factors like abortion, dystocia and RFM. It is possible to control metritis by controlling the predisposing factors
- Proper feeding is very important to control the reproductive problems as found in this study that those cows having high body conditions were affected to some extent by RHPs

ACKNOWLEDGEMENTS

The researchers would like to thank Addis Ababa University Faculty of Veterinary Medicine for financial support to execute this research work. It is also my pleasure to extend my gratitude to Bedelle regional veterinary diagnostic and investigation center for its technical, financial and material support in the realization of this study.

REFERENCES

- Bekele, T., O.B. Kasali and T. Alemu, 1991. Reproductive problems in cross breed cattle in Ethiopia. *Anim. Reprod. Sci.*, 26: 41-49.
- Berisha, K., 1990. Major constraints of reproduction in small scale dairy farms around AddisAbaba. DVM Thesis, FVM, AAU, Debre-Zeit, Ethiopia.
- CSA, 2009. The Federal Democratic Republic of Ethiopia. Central Statistical Authority, Ethiopia.
- Correa, M.T., C.R. Curtis, H.N. Erb, J.M. Screlett and R.D. Smith, 1990. An ecological analysis of risk factors for postpartum disorders of Holstein-Friesian cows from thirty-two New York farms. *J. Dairy Sci.*, 73: 1515-1524.
- Ebrahim, O., 2003. Study on major reproductive health problem of small holder dairy farms in and around Kombolcha. DVM Thesis, AAU, FVM, Debre Zeit, Ethiopia.
- El-Din, A.Z., T. Nokao, M. AbdelRaouf, M. Moriyoshi, K. Kawata and Y. Moritus, 1995. Factors in the resumption of ovarian activity and uterine involution in postpartum dairy cows. *Anim. Reprod. Sci.*, 38: 203-214.
- Gebremariam, T., 1996. Survey on major prepartum and post partum reproductive problems of dairy cattle in Mekelle and its Environs. DVM Thesis, AAU, FVM, Debre Ziet, Ethiopia.
- Gizaw, Y., M. Bekana and T. Abayneh, 2007. Major reproductive health problems in smallholder dairy production in and around Nazareth town, central Ethiopia. *Int. J. Vet. Med.*
- IBC (Institute of Biodiversity Conservation), 2004. The state of Ethiopias farm animal genetic resources-country report. A contribution to the First Report on the State of the Worlds Animal Genetic Resources. <ftp://ftp.fao.org/docrep/fao/010/a1250e/annexes/CountryReports/Ethiopia.pdf>.
- Lobago, F., M. Bekana, H. Gustafsson and H. Kindahl, 2006. Reproductive performance of dairy cows in smallholder production system in Selalle, central Ethiopia. *Trop. Anim. Health Prod.*, 38: 333-342.
- Markusfeld, O., 1984. Factors responsible for post parturient metritis in dairy cattle. *Vet. Record*, 114: 539-542.
- Melkamu, T., 1999. Studies on major post partum reproductive problems in Holleta Research station and small holders dairy cattle. DVM Thesis, AAU, FVM, Debre-Zeit, Ethiopia.
- Msangi, B.S., M.J. Bryant and P.J. Thorne, 2005. Some factors affecting variation in milk yield in crossbred dairy cows on smallholder farms in North-East Tanzania. *Trop. Anim. Health Prod.*, 37: 403-412.
- Mukasa-Mugerwa, E., 1989. ILCA Monograph No. 6. International Livestock Centre for Africa, Addis Ababa, Ethiopia, pp: 34.
- Richard, W., 1993. *Dairying Tropical Agriculturalist*. 1st Edn., Macmillan Press Ltd., London, pp: 56.
- Ruder, C.A., R.G. Sasser, R.J. Williams, J.K. Ely, R.C. Bull and J.E. Butler, 1990. Uterine infections in the postpartum cow II. Possible synergistic effects of *Fusobacterium necrophorum* and *Corynebacterium pyogens*. *Theriogenology*, 15: 573-580.
- Shiferaw, Y., B.A. Tenhagen, M. Bekana and T. Kassa, 2005. Reproductive disorders of crossbred dairy cows in the central highlands of Ethiopia and their effect on reproductive performance. *Trop. Anim. Health Prod.*, 37: 427-441.
- Tackacs, J., T. Gathy, Z. Macanty and E. Bajmocy, 1990. Bacterial contamination of the uterus after parturition and its effect on the reproductive performance of cows of large scale dairy farms. *Theriogenology*, 33: 851-865.
- Tekely, B., O.B. Kasali and A. Tsion, 1991. Reproductive problems in cross breed cattle in central Ethiopia. *Anim. Reprod. Sci.*, 26: 41-49.
- Thrusfield, M., 2005. *Veterinary Epidemiology*. 3rd Edn., Blackwell Publishing, Incorporated, Ames, Iowa.
- Yoseph, S., 1999. Fertility status of cross breed dairy cows under different production systems in Holleta. M.Sc. Thesis, Central High Lands of Ethiopia, Debrezeit, Ethiopia.
- Zewdu, H., 1992. Studies on postpartum uterine infection in Zebu and Zebu crosses and the incidence rate of reproductive disease in Debre zeit, ILCA herd. DVM Thesis, FVM, AAU, Debrezeit, Ethiopia.