

Major Post-Partum Reproductive Health Problems of Small Holder Dairy Cows in and Around Nekemte Town, Oromia Regional State, Western Ethiopia

Husen Balcha¹, Diriba Lemma^{2*} and Birhanu Abera²

¹Livestock Resource Development Office, Negelle Arsi, Ethiopia

²Asella Regional Veterinary Laboratory, Asella, Ethiopia

Abstract

The study was performed in small holder dairy cows in and around Nekemte town from October, 2011 to May, 2012 to determine major postpartum reproductive health problems in the area through retrospective data analyses, questionnaire survey and clinical follow-up study. A total of 2295 recorded reproductive cases were examined in the retrospective study of which, reproductive health problems accounted over all prevalence of 11.2% (N=256). Of the 256 affected dairy cows, retained fetal membrane accounted for 4.84%, where as abortion, dystocia, prolapse (uterine or vaginal) and metritis accounted for 2.48%, 1.83%, 0.9% and 0.8%, respectively.

Of a total of 385 cows included in the questionnaire survey (N=355) and clinical follow-up (N=30), 102 (25.1%) were found with major reproductive health problems. The major reproductive health problems obtained were retained fetal membrane, followed by dystocia, repeat breeding, abortion and metritis with prevalence rates of 10.9%, 7.5%, 3.1%, 1.82%, and 1.04%, respectively.

The prevalence rates of major reproductive health problems were significantly different with respect to breed, ($p=0.013$), age ($p=0.000$), body condition ($p=0.028$), management ($p=0.000$) and parity number ($p=0.0183$) of dairy cows. Risk factors analysis revealed that prevalence of the major reproductive health was higher in adult cows (OR=3.6; 95%CI=1.72, 7.55), primi para cows (OR=4.3; 95%CI=2.17, 8.5), cows kept intensively (OR=3.2; 95%CI=1.93, 5.4), cows with poor body condition (OR=0.65; 95%CI=0.390, 1.066) and those exotic breeds (OR=1.9; 95% CI=1.13, 3.14) than those corresponding animals. In Conclusion, retained fetal membrane, dystocia, repeat breeding, abortion and metritis were found to be the major reproductive health problems in and around Nekemte town, west of Ethiopia.

Keywords

Dystocia • RFM • Abortion • Prolapse • Metritis • Prevalence

Introduction

Cattle production has been considered as the main component of agricultural development in most parts of the world including Sub-Saharan Africa. The overall cost of keeping cattle in terms of costs associated with the health care, nutrition and management, however has not matched to their contribution to the livelihood and the economics of the people in the area (That is, Sub-Saharan Africa) [1].

Agriculture (mainly crop and livestock production) is the main stay of the Ethiopian economy, employing approximately 85% of the total population. Livestock population accounts for approximately 30% of the total agricultural GDP and 16% of national foreign currency earning [2]. 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 [3].

In Ethiopia as many developing countries, livestock plays multiple roles; being a source of milk, meat, hides etc [4]. Despite the huge number

of cattle and their economic importance, the productivity is low due to various constraints such as disease, nutrition poor management and poor performance of indigenous (zebu) breeds. These constraints result in poor reproductive performance of dairy cattle [5]. Among the major problems that have direct impact on reproductive performance of dairy cows are abortion, dystocia, retained fetal membranes, metritis, prolapses (uterine/vaginal), anoestrus, repeat breeder, and pyometra have been reported to be the most common clinical and economic problems [6-8].

Reproductive health problems of dairy cattle have been implicated to cause a considerable economic loss to the dairy industry to slower uterine involution, reduced reproductive rate, prolonged interconception period 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 [3,9]. It has also been shown that low reproductive efficiency hinders genetic improvement in zebu (*Bos indicus*) cattle and causes direct economic losses [10].

Generally, it is very difficult to diagnose the major reproductive health problems on dairy cows by symptoms or by particular disorder because there is interrelation between predisposing factors such as management at calving, hygiene and parity, stage of gestation, nutrition and environment [11-13].

Although major reproductive disorders are attributed to high economic loss in dairy industries, few researches were done on the reproductive health problems of dairy cattle in and around Nekemte town. Therefore, the objectives of the study are:

- To identify major reproductive disorders in indigenous and cross breed dairy cattle in and around Nekemte
- To collect base line data for future study in the study area
- To forward possible recommendations for the prevention and control approaches

*Address for Correspondence: Diriba Lemma, Asella Regional Veterinary Laboratory, Asella, Ethiopia; Tel: 0910172216, Email: Diribalema@gmail.com

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Materials and Methods

Description of the study area

The study was conducted in small holder dairy farms in and around Nekemte town from October, 2011 to May, 2012. Nekemte is located at 331 km west of Addis Ababa, East Wollega Zone, Oromia Regional State, Ethiopia at latitude and longitude of 90 5'N and 360 33' respectively and with an elevation of 2088 meters above sea level. The minimum and maximum annual rain fall is in the range of 1450 mm-2150 mm and the daily temperature ranges between 15°C-27°C. Nekemte is characterized by mixed farming system; wheat, barley, teff, maize, sorghum, beans, peas, nug, linseeds, chick-pea, and rape seed are the major annual crops grown in the area. Besides these, other cultivated crops in the area includes anchote, banana, mango, pulses and coffee. The estimated human population of the area according to 2008 statistical data is around 5,03,623. The estimated animal population of the area is 78,178 cattle; 9894 sheep; 6477 goats; 3284 donkeys; 1598 horses; 665 mules; 89,311 poultry; 2428 cats and 4572 dogs. The total land area of the region is about 769,725 hectares of which 336,220 hectares are used for crop production; 182,412 hectares for animal grazing; 256,901 hectares forest covered and 20,492 hectares for other activities [14].

Study animals and sample size

The study population for this study was dairy cows from different areas in and around Nekemte town. The sample required for this study was determined depending on the expected prevalence of major reproductive health problems and the desired absolute precision by the formula given by Thrusfield [15]. By rule of Thumb where there is no information for an area it is possible to take 20% or 50% prevalence with 5% desired level of precision and 95% of confidence interval are used to calculate the sample size using the following formula:

$N = 1.962(P)(1-P) / D^2$ N=Sample size P=Expected prevalence D=Desired level of precision

Therefore, $N = 1.962(0.5)(1-0.5) / (0.05)^2 = 384$ Animals

Study methodology

The methodology used was cross-sectional study based on questionnaire survey and clinical follow-up on the randomly selected dairy cows. A five year major post-partum reproductive health problem in the area was made through retrospective study.

Retrospective study

A five year (2007-2011 GC) recorded reproductive cases were examined thoroughly in this study to determine major post-partum reproductive health problems on dairy cows in the study area with the intention of appreciating the progress of the problem in comparison to current findings.

Questionnaire survey

Structured questionnaires were prepared and used in order to collect information from the owners regarding age, management systems (intensive, semi-intensive or extensive), parity numbers and major reproductive health problems encountered on the dairy cattle such as abortion, dystocia, retained fetal membrane, prolapses (uterine/vaginal), repeat breeding, anoestrus and metritis. Body condition score was determined based on the criteria adopted from Richard [16]. The questionnaire was prepared in English and interpreted whenever it was required. Prior to interview the objective of the study was clearly expressed to the owners so as to obtain real information about their animals. Out of 385 dairy cattle about 355 of them are identified based on questionnaire survey.

Clinical follow-up

About thirty pregnant cows having more than two months of pregnancy were randomly selected in 12 small holder dairy farms that were expected

to give birth within the study period. These pregnant cows were subjected to different clinical and gynecological examinations and findings were recorded once a week.

Data management and data analysis

Data related with post-partum reproductive health problems were entered in MS Excel and analyzed using SPSS version 16.0. Descriptive statistics were used to present data. Chi-square (χ^2) test is used to determine the association between variables and the relative risk factors were determined based on Odds ratio.

Results

The retrospective study was enabled to investigate the major post-partum reproductive health problems of dairy cattle for the last five years (2007-2011 G.C) in the study area. The study comprises a total of 2295 dairy cattle. The overall prevalence of major post-partum reproductive health problems during this year was summarized (Table 1).

Year	No. of animals(n=2295)	No. of positive(n=256)	Prevalence
2007	520	72	13.90%
2008	507	51	10.10%
2009	392	42	10.70%
2010	403	49	12.20%
2011	473	42	8.90%
Total	2295	256	11.20%

Table 1. Retrospective findings of major reproductive health problems of dairy cattle 2007-2011 G.C.

A total of 355 dairy cattle were examined based on questionnaire survey and found that 89 (25.0%) affected by one or more reproductive health problems. Retained fetal membrane 37 (10.4%), dystocia 25 (7.04%) and 12 (3.4%) repeat breeder were the major post-partum reproductive health problems (Table 2).

Reproductive health problems	Questionnaire survey(N=355)	Clinical follow-up(N=30)	Total
RFMs	37(10.4%)	5(16.70%)	42(10.9%)
Dystocia	25(7.04%)	4(13.30%)	29(7.50%)
Repeat breeder	12(3.4%)	0(0.00%)	12(3.1%)
Abortion	5(1.4%)	2(6.70%)	7(1.82%)
Metritis	3(0.85%)	1(3.33%)	4(1.04%)
Prolapse	2(0.56%)	1(3.33%)	3(0.78%)
Milk fever	2(0.56%)	0(0.00%)	2(0.52%)
Still birth	2(0.56%)	0(0.00%)	2(0.52%)
Anoestrus	1(0.28%)	0(0.00%)	1(0.26%)
Total	89(25.0%)	13(43.3%)	102(26.5%)

Table 2. Summary of the prevalence of major reproductive health problems based on questionnaire survey and clinical follow-up.

Up on clinical follow-up that was conducted on 30 pregnant dairy cattle, an overall prevalence of reproductive health problem accounted 13 (43.3%). Still, the prevalence of retained fetal membrane was high; 5 (16.70%) followed by dystocia; 4 (13.30%) and abortion that accounted 2 (6.70%). According to the current study there is an association between those animal intrinsic factors such as breed, age, body weight and parity and extrinsic factor like management with major post-partum reproductive health problems which was presented (Table 3).

Animal factors	No. of animals	No. of positive	Prevalence	X ²	P-value
Age					
3-4 years	93	9	9.70%	16.32	0
5-9 years	186	46	24.70%		
>9 years	76	27	35.50%		
Total	355	82	23.10%		
Breed					
Local	239	46	19.20%	6.11	0.013
Exotic	116	36	31.00%		
Total	355	82	23.10%		
Parity number					
Primiparas	239	11	9.20%	19.81	0
Pluriparas	116	71	30.20%		
Total	355	82	23.10%		
Management					
Extensive	246	40	48.80%	21.09	0
Intensive	109	42	51.20%		
Total	355	82	23.10%		
Body condition					
0	12	7	58.30%	12.52	0.028
1	63	19	30.20%		
2	111	23	6.50%		
3	120	23	19.20%		
4	39	9	23.10%		
5	10	1	10.00%		
Total	355	82	23.10%		

Table 3. Association of animal intrinsic factors with major reproductive health problems.

Risk factors analysis revealed that prevalence of the major reproductive health problems is higher in adult cows (OR=3.6; 95%CI=1.72-7.55), Primipara cows (OR=4.3; 95%CI=2.17-8.5), cows kept intensively (OR=3.2; 95%CI=1.93-5.4), cows with poor body condition (OR=0.65; 95%CI=0.39-1.07) and those exotic breeds (OR=1.9, 95%, CI=1.14-3.14) than those corresponding animals (Table 4).

Animal factors	No. of positive	No. of negative	Total	Odds Ratio (95%, CI)
Age				
Young	9	84	93	3.6(1.72-7.55)
Adult	73	189	262	
Total	82	273	355	
Breed				
Local	46	193	239	1.9(1.14-3.14)
Exotic	36	80	116	
Total	82	273	355	
Management				
Extensive	40	206	246	3.2(1.93-5.4)
Intensive	42	67	109	

Total	82	273	355
Parity number			
Primiparas	11	109	120
Pluriparas	71	164	235
Total	82	273	355
Body condition			
Poor	26	49	75
Good	56	224	280
Total	82	273	355

Table 4. The odds ratio to determine the relative risk of different animal factors and management.

Discussion

The study found that retained fetal membranes, dystocia, repeat breeding, abortion and metritis were found to be the major reproductive health problems accounting 10.42%, 7.04%, 3.38%, 1.41% and 0.84%, respectively in the area. Other reproductive health problems observed with lower frequency included prolapses (uterine/vaginal), milk fever, still birth and anoestrus having prevalence rates of 0.56%, 0.56%, 0.56%, and 0.28%, respectively. The prevalence rate of RFM (10.42%) in recent study is in line with those reported in central high lands of Ethiopia (7.1-28.9%) by Teklay et al., and other parts of the world (10%) by Gainse [17,18]. The result was also in accordance with the research of Zewdu in Debre ziet ILCA herd and Tekely et al. with percentages of 8.1-12.5% and 7.1-9.8%, respectively. However, the result obtained in this work is higher than the works of Correa et al., who reported prevalence rates of 5%-8% [19,20].

On the other hand, there was higher reports by Shiferaw 16.7% in Holleta; which was due to high prevalence of brucellosis (22%-38%); Gebremariam in Mekelle 16.8%, Ebrahim in and around Kombolcha 15.5%; Shiferaw et al., in central high lands of Ethiopia 14.7% and Mamo 14.28% in and around Debre zeit [9,21-24]. The variation in the incidence of RFM may be attributed to variations in predisposing factors to which the animals are subjected to among which include nutritional status and management systems. The relatively higher prevalence rate of RFM in the current study could also be due to dystocia that accounted 7.04% of the problems, which is an important predisposing factor for the occurrence of RFM.

The prevalence rate of dystocia in current study (7.04%) is in agreement with Correa et al., 7.5% on Holstein-Friesian cows; Tadesse in Holleta 7.8% and Tigre 7.5%. The previous report on prevalence of dystocia by Shiferaw 5.5% in Holleta fairly agrees to the 7.04% obtained in this study. However, there are also researchers reported less than the above like Zewdu, Gebremariam and Ebrahim who reported 2.2-4.4%, 3.7%, and 4.3% respectively. But it is lower than the 9.65% prevalence reported by Kassahun [9,19,21,22,25-28]. This variation in the occurrence of dystocia may be due to the fact that it is influenced by factors such as age and parity number; as well as breed of the sire [29,30]. Inseminating cows with semen collected from large sized bulls without considering the size and age of cows is an important factor in the development of dystocia.

The current study revealed that the prevalence rate of repeat breeding is 3.38%. This fairly agrees with Ebrahim [22]. The similarity with Ebrahim may be due to similar management of cows between Nekemte and Kombolcha. However, this recent prevalence is lower than 5-15% reported by Pun-tam and 4.6% reported by Tigre [27,31]. Repeat breeding can be caused by a number of factors including sub fertile bulls, endocrine imbalance, malnutrition, reproductive tract infections and poor management practices such as wrong time of insemination or faulty heat detection, inappropriate semen handling and insemination techniques [32]. In addition to these, communal use bull for natural services also considered as contributing factor. Hence,

the difference between the findings of the current study and previous reports may be attributed to the above mentioned factors.

The prevalence rate of abortion in Nekemte was 1.41% and this fairly agrees with the reports of Berisha 2.2% around Addis Ababa. However, it is lower than reports of Tekely et al., 16.3%, in their study to establish the rate of abortion in three state dairy farms in central highlands of Ethiopia; Zewdu 1.5-7.8% in ILCA herd, Debre Zeit; Gebremariam 6.1% at Mekelle and its environments; Shiferaw 5.4% in Holleta, central highlands of Ethiopia; Ebrahim 3.19% in and around Kombolcha, and Kassahun 6.3% [9,19,20-22,28,33]. The lower prevalence rate of abortion may be attributed to low prevalence of brucellosis in the area and increasing practice of AI (Artificial Insemination) techniques in the area.

The prevalence rate of metritis in and around Nekemte was low, that is 0.84%. This is lower than previous reports of Zewdu 3.1-9.9, Ebrahim 18.7%, Kassahun and Mamo who reported an incidence rates ranging 11.5-13.6%, each; Shiferaw 16.7%, and Shiferaw et al., 15.5%. However, some researchers reported very high prevalence rate of metritis like Ruder et al., 67% and Tackacs et al., 50% [19-24,28,34,35]. The variation in the prevalence of metritis compared to the above mentioned reports is probably due to differences in the management system in each of the above studies under which the animals were maintained and relatively low prevalence of retained fetal membrane since it has been indicated to increase the prevalence of metritis up to 100% [7].

Attention was also given for the prevalence rate of prolapses (uterine/vaginal) in Nekemte and found that 0.28% uterine prolapses and 0.28% vaginal prolapses. These were fairly agrees with the research of Ebrahim 1.28% but lower than the report of Tadesse 1.9% [22,26]. The probable causes of low prevalence rate of prolapses in Nekemte may be due to reduced effect of predisposing factors like excessive traction of the fetus to relief dystocia or retained fetal membranes; low prevalence of hypocalcemia, and absence of estrogenic plants (like *Trifolium subterraneum*) in Nekemte [36-48].

In the current study anoestrus was found with prevalence rate of 0.28%. It is lower than the reports of Zewdu and Ebrahim reported as 0.7-20.4% and 1.7%, respectively. The low prevalence of anoestrus in this current study may be due to close observation of dairy cows when they are at estrus by their owners. On the other hand, Shiferaw and Shiferaw et al., reported an incidence rate anoestrus as 38.5% and 38.6%, respectively. Both researchers proposed that the high rate of anoestrus was due to genital infections [49-59].

Conclusions and Recommendations

The major goal in each herd should be to reduce calving interval, decrease the number of services per conception thereby increasing herd production. But reproductive health problems such as RFM, dystocia, repeat breeder, abortion, metritis, prolapses (uterine/vaginal), still birth and anoestrus affect the reproductive performance of the dairy cows. Hence, in the present investigation, the observation of a considerably higher prevalence of reproductive problems (especially, RFM, dystocia, repeat breeding, abortion and metritis) recorded and the occurrence of the associated risk factors (like breed, age, body condition, management and parity) generally indicate the importance of management related constraints for profitable production of small holding dairy herds in Nekemte. Consequently based on the above conclusion, the following recommendations are forwarded:

- Veterinarians, communities and government should co-operate on prevention and control of the occurrence of major reproductive health problems by controlling predisposing factors.
- Good management (that is, improving animal feed, housing system, keeping farm hygiene, and close observation for animals in heat) should be experienced in small holding dairy farms.
- Appropriate health care (that is, infected animals should be treated well and animals at risk should be vaccinated against diseases like

brucellosis to reduce prevalence rate of abortion and others) should be maintained in the farm.

- Small holder dairy producers should be aware of the impact of reproductive health problems (on animal health, on the economy and on the public health), should be trained for better animal managements and accurate record keeping in their farm.

Further detailed investigations on the various reproductive health problems in this area should be conducted when necessary.

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