

Assessment of Small Holder Dairy Production System and Their Reproductive Health Problems in Jimma Town, Southwestern Ethiopia

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ABSTRACT

A study was conducted to assess the small holder dairy production system and to determine the prevalence of major reproductive problems of dairy cows and to learn the possible risk factors that play major roles in precipitating such problems in Jimma town from October 2008 – March 2009. After a total of 396 dairy cows (51 Local and 345 Cross- breeds) were assessed with a survey (n=361), regular clinical examination and personal observation (n=35), 33.59% (n=133) were found to be affected with one or more of the clinical reproductive problems. The effect on the production system is that 233 cows were kept under an extensive management system, while 163 were kept under a semi-intensive management system. Retained fetal membrane, dystocia, unidentified endometrities and other assorted problems were found to be the major clinical reproductive problems with prevalence of 19.2%, 3.8%, 2%, and 5.6%, respectively. Additionally, repeat breeder (1.3%), abortion

(1%), uterine prolapse (0.5%) and anoestrus (0.3%) were minor clinical reproductive problems observed in smallholder dairy cows. The prevalence of clinical reproductive problems showed significant difference ($p < 0.05$) with respect to parity and body condition of dairy cows. Breed was found to be insignificant ($p > 0.05$) for the prevalence of these problems according to the χ^2 analysis of the data. Therefore, this particular study revealed that the major clinical reproductive problems in Jimma town included retained fetal membrane, dystocia and unidentified endometrities were the major factors responsible for the low reproductive performance of smallholder dairy cows. It was recommended that feeding, housing and health management should be improved to minimize the occurrence of reproductive health problems in Jimma town, Southwestern Ethiopia.

INTRODUCTION

Ethiopia is known for its huge livestock population. Livestock production is the main component of agricultural development in most of the regions. The Ethiopian economy is highly dependent on agriculture,

which, in the 2004/05 fiscal year, contributed about 48% of the GDP, followed by 39% from the service sector and 13% from the industrial sector. The agricultural sector provides employment for about 80% of the population (The Economic Intelligence Unit, 2007). The livestock subsector plays a vital role as source of food, income, services and foreign exchange to the Ethiopian economy. Agriculture and livestock contribute 12 and 33% of the total and agricultural GDP, respectively, and account for 12–15% of the total export earnings, which is second in order of importance (Ayele et al., 2003). According to FAOSTAT 2007, among the 20 major food and agricultural commodities ranked by value in 2005, whole fresh cow milk is ranked third. Milk production in the same year was estimated at 1.5 million tones which is equivalent to 398.9 million USD (FAOSTAT, 2007).

For years, Ethiopia ranked first in cattle population in Africa. However, the dairy industry is not as developed as that of East African countries like Kenya, Uganda and Tanzania. National milk production remains among the lowest in the world, even by African standards (Zegeye, 2003).

The overall cost of keeping cattle in terms of cost associated with the health care, nutrition and management, however, does not reflect their contribution to the livelihood and the economics of the people in the region. As part of the effort to increase milk production, cross breeding programs are being introduced in many tropical countries (Ehui et al., 1995).

Dairy production, among other sectors of livestock production systems, is a critical issue in the Jimma zone of Oromiya region, where dairy cows and their products are important sources of food and income. Yet dairy production has not been fully promoted in the zone. Jimma town is a large, historical city in the region and the majority of rural dwellers in the zone are migrated and concentrated. Current development in the town is characterized by rapid population growth in the region in general, and

towns like Jimma in particular. The demand for dairy products is greater than ever.

Despite its huge numbers, the livestock subsector is generally low in production. Compared to its potential, the direct contribution livestock makes to the national economy is limited. Many production constraints, mainly reproductive health problems, form a bottle neck in the production process and productivity in the livestock sub-sector. Therefore, it is justifiable to generate scientific information on the production system and the major reproductive problems of dairy cows in the study area. Therefore, the objectives of this particular study are:

1. to determine the prevalence of reproductive health problems of dairy cows
2. to assess the small holder dairy production system and
3. to know the possible risk factors, which play major roles in precipitating such problems in dairy farms at Jimma town.

MATERIALS AND METHODS

Study Area

The study was carried out from October 2008 to April 2009 in Jimma town. The town is located 357 km southwest of Addis Ababa at about 70° 33' N latitude and 36° 57' E longitude, at an altitude of 1710 meters above sea level (m.a.s.l). The mean maximum and minimum temperature are 26.80C and 11.40C, respectively, and the mean maximum and minimum relative humidity are 91.4% and 39.92%, respectively. The mean annual rainfall of the area is 1500mm (BPEDORS, 2000).

Sample Size and Sampling Method

A total of 396 dairy cows from both cross and local (zebu) breeds, at parturition and postpartum period were included. The purposive sampling method was employed to select study farms that keep reproductive history of dairy cows to willingly be part of the study.

Table 1. The prevalence of reproductive problems in smallholder dairy farms at Jimma town.

Method of study	Total No. of cows examined	No. of cows without reproductive problem	Number of cows with reproductive problem
Regular follow up	35	19 (4.04%)	16
Questioner survey	361	244 (29.55%)	117
Total	396	263 (66.41%)	133 (33.59%)

Table 2. The relative frequency of major reproductive health problem in dairy cows in smallholder dairy farms at Jimma town

Major reproductive problems encountered	Frequency	Percent
Abortion	4	1.0 %
Dystocia	15	3.8 %
Unidentified Endometritis	8	2.0 %
Retained Fetal Membrane (RFM)	76	19.2 %
Uterine prolapse	2	0.5 %
Repeat breeder	5	1.3 %
Anoestrus	1	0.3 %
Mixed problems	22	5.6 %
Total	133	33.59

Data Collection

Dairy farm owners were interviewed with structured questionnaires and data were collected on individual cows' reproductive status, particularly information on reproductive health problems. About 72 farm owners were interviewed on the management system and individual cows' reproductive health status. A total of 361 dairy cows were included in this survey. Regular clinical examination of pregnant cows during late pregnancy, parturition and postpartum conditions were considered, and a total of 35 dairy cows were included. Classification of management systems was done based on the criteria adopted by Richard, 1993.

Data Processing and Analysis

The collected data was sorted manually and questionnaires were numbered (coded) before processing. In addition, data was checked again for completeness and consistency. The prevalence and the relative frequencies of reproductive health problems were determined as the proportion of affect-

ed animals out of the total animals examined and the total number of cases, respectively. During processing, data was summarized on the data master sheet (excel) and SPSS software and Pearson chi-square (X²) test were used to assess the effect of risk factors such as breed, parity number and body condition of the cows on the prevalence of reproductive health problems (Clark, 1982).

RESULTS AND DISCUSSION

A study on the production system indicated that from a total of 396 dairy cows, 233 dairy cows were kept under an extensive management system and 163 dairy cows were kept under a semi-intensive management system.

According to the results of current study in table 1, from the total of 396 dairy cows included in the study, 33.59 % (n=133) were found to be affected either with one or more reproductive health problems. The prevalence of major clinical reproductive problems agrees with Gizaw et al., 2007, but is higher than Berihu and Abebaw, 2009. This

Table 3. Prevalence of clinical reproductive health problems with respect to body condition in smallholder dairy farms at Jimma town

Body condition score	No. of cows examined	No. of affected cows	No. of non-affected cows	Percent affected	X_2	p-value
0	1	0 (0.34)	1 (0.66)	0 %	$X_2=96.82$	P<0.05
1	4	3 (1.34)	1 (2.66)	0.76%		
2	77	32 (25.86)	45 (54.14)	8.08%		
3	264	74 (86.67)	190 (175.3)	18.69%		
4	44	20 (14.78)	24 (29.22)	5.05%		
5	6	4 (2.02)	2 (3.98)	1.01%		
Total	396	133	263	33.59%		

Numbers in bracket indicates expected value

Table 4. The Prevalence of major reproductive health problems with respect to the breed of the cows in Jimma town small holder dairy farms

Breeds of the cow	Total no of cows examined	Total no of cows examined	No of non affected cows	Percent affected	X_2	p-value
Local	51	18 (17.13)	33(33.87)	4.55%	$X_2=2.389$	p>0.05
Cross	345	115 (115.9)	23(229.1)	29.04%		
Total	396	133	263	33.59%		

Numbers in bracket indicates expected value

variation in prevalence might be due to the difference in management and breed of the animals, as well as environmental factors.

The results of the current study shown in Table 2 indicate that Retained Fetal Membrane (RFM), mixed problems, dystocia and endometrities were found to be the major reproductive health problems. They occur with 19.2%, 5.6%, 3.8% and 2.0% frequencies respectively. Other reproductive health problems observed with lower frequency include repeated breeder, abortion, uterine prolapse and anoestrus. They have incidences of 1.3%, 1%, 0.5%, and 0.3%, respectively. The prevalence of RFM of this study is within the range of 11.9 to 24.0%. This is consistent with Markusfeld, 1984 in Israeli dairy herds, and 7.1 – 28.9% in central highlands of Ethiopia (Tekelye et al., 1992). It is higher than the incidence found by Erb and Marthin, 1980; Gaines, 1989; and Correa et al., 1990, who reported 7.1%, 10%

and 5-8%, respectively. The variation in the incidence of RFM may be attributed to variations in predisposing factors, including nutritional status and management. The relatively higher prevalence rate of RFM in the current study could also be due to dystocia, accounting for 3.8% of the problems, which is an important predisposing factor for occurrence of RFM. The 5.6% prevalence of mixed reproductive problems found in this study was not noted by previous researches. Its relatively higher prevalence compared with RFM could be due to the interrelationship of reproductive problems as predisposing factors for each other.

In the present study, the prevalence of dystocia is lower than in a previous report by Gizaw et al., 2007. However, this result agrees with the report done by Berihu and Abebaw, 2009. This variation in the occurrence of dystocia may be due to the fact that it is influenced by factors such as age, parity

and breed of the sire (Morrow, 1986). Inseminating cows with semen collected from large sized bulls without taking in to account the size and age of cows is an important precipitating factor for dystocia.

The prevalence of endometritis in this study (2.0%) agrees with the 3.21% prevalence reported by Berihsu and Abebaw, 2009 in a study of small holder dairy cows in and around Bako, The prevalence in this study is lower than the prevalence values (13.8%) documented by Erb and Marthin, 1980, and the prevalence values (16.63%) reported by Gizaw et al., 2007. Higher incidence rate of 67%, 34%, 37% and 50% have also been reported by Ruder et al., 1990, Bretzlaff et al., 1982, Markusfeld, 1984 and Tackacs et al., 1990, respectively. The variation in the prevalence of endometritis compared to the above-mentioned reports is probably due to difference in the management system under which the animals were maintained. Furthermore, RFM has been indicated to increase the prevalence of endometritis up to 100% (Bekana, 1994b).

The 1.3% prevalence rate of repeat breeder found in the present study is significantly lower than the previous values documented by Berihsu and Abebaw, 2009, and Gizaw et al., 2007. Repeat breeder can be caused by a number of factors, including sub-fertile bulls, endocrine imbalance, malnutrition and reproductive tract infection. Poor management practices such as incorrect timing of insemination, faulty heat detection (Arthur et al., 1996) and communal use of a bull for natural services are also contributing factors.

The prevalence of abortion recorded in this study is similar to the 2.23% reported by Gizaw et al., 2007, and significantly lower than the 5.96%, 6.3%, 5.33%, 5.4% and 6.3% prevalence values reported by Berihsu and Abebaw, 2009 and Shiferaw et al., 2003. Tekleye et al., 1992 has also reported higher, 16.3% prevalence rate of abortion. Moreover, Forar et al., 1995 documented prevalence rate of abortion ranging from 0.4-10.6%. These results suggest that breed,

geographic position, case definition and procedural differences are all sources of differences in prevalence of abortion.

The significantly higher occurrence of reproductive health problems observed in pluripara cows (23.99%) in this work is similar to the previous finding by Gizaw et al., 2007. This is possibly due to the repeated exposure of the genital tract of pluripara cows to environmental risk factors that can cause uterine infection.

Reproductive health problems showed significant variation with regard to body condition scores that ranged from 0 to 5. Highest prevalence was found in cows with a body condition score of 3, followed by body condition score of 2, while the lowest prevalence was found in cows with body condition score of 0 (Table3). A statistically significant association (χ^2 : 96.82; $p < 0.05$) was found between body condition score and reproductive problems, with higher prevalence of reproductive health problems in cows with relatively good body condition. Body condition scores of 3 and 2, accounted for 18.69% and 8% respectively. These results contradict previous explanations, which indicate that cows in poor condition are the most susceptible to reproductive health problems due to weakness preventing expulsion of the fetal membrane, leading to secondary complications (Roberts 1986) and poor defense mechanisms that increase the rate of infection (Isahk et al., 1983). The current findings may be attributable to the confounding effect of other factors such as parity, breed and management in cows with fairly good body condition (body condition 3 and 2).

According to Table 4, reproductive problems were assessed with respect to the breed of the cows and there was no significant association ($p > 0.05$). Cross breed cows were more susceptible to reproductive problems at 29.04% ($n=115$) than local breeds at 4.55% ($n=18$). The higher prevalence rate of reproductive problems in cross breed animals may be due to the fact that European breeds are less adapted to tropical conditions such

Table 5. The association of prevalence rate of major reproductive problems with parity status of the cow

Parity of the cows	Total no of cows examined	No of cows affected	No of non affected cows	Percent affected	X ²	p-value
primipara	116	38(38.96)	78(77.04)	9.59%	X ² =2.906	P<0.05
pluripara	280	95 (94.04)	185 (186)	23.99%		
Total	396	133	263	33.59%		

Numbers in bracket indicates expected value

as high temperature and humidity, disease and low feed quality (Mukasa-Mugerwa, 1991), making them more susceptible than indigenous zebu. Tekleye et al., 1991 also reported that cross breeds require more elaborate management, feeding and better health care than the indigenous zebu to attain better reproductive and performance productivity in the tropics Table 5 indicates that no significant association ($p<0.05$) between prevalence rate of major reproductive problems and parity status (lactation stage) of the cow. The prevalence was higher in pluripara cows 23.99% ($n=95$) as compared to primipara cows 9.59 % ($n=38$) (Table 5).

CONCLUSIONS

This study revealed a high prevalence of reproductive health problems in the study area. Retained Fetal Membrane (RFM), mixed reproductive problems, dystocia and endometritis were the most significant reproductive health problems encountered in smallholder dairy farms in Jimma town. Parity and body condition are possible risk factors identified for the occurrence of reproductive health problems in the study area.

RECOMMENDATION

From the study results, it can be recommended that improvements in management systems - such as housing, feeding and health care - heat detection and proper selection of bulls for breeding that takes into account the size of cows could help minimize or alleviate reproductive health problems.

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