Full Length Research Paper

The Major reproductive problems of dairy cows in and around Asella town, Central Ethiopia

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Reproductive disorders are one of the most important problems that affect the production and productivity of dairy cows. A cross sectional study was conducted to determine the prevalence of major reproductive disorders of dairy cows in and around Asella town, Central Ethiopia. For this purpose, a total of 82 owners and/or attendants of dairy cow herds were interviewed using structured questionnaire, and in addition, a total of 300 blood samples were randomly collected and analyzed from dairy cows in the study areas. Accordingly, the overall prevalence of reproductive disorders in the study area was 18.3%, with bovine brucellosis (32.9%), repeated breeding (26.8%) and abortion (14.6%) as the major reproductive disorders of dairy cows. It was also revealed that abortion is mostly common in exotic breeds (48.8%) and relatively less in local cows (9.8%) varying among parity and stage of pregnancy. Thus, it is recommended that strict animal husbandry especially animal feed and health management should be in place to minimize the risk of reproductive disorder occurrence in order to increase the production and productivity of dairy cows in the study area.

Key words: Reproductive disorder, bovine brucellosis, repeated breeding, dairy cows.

INTRODUCTION

Cattle production has been considered as the main component of agricultural development in most parts of sub-Saharan Africa. The overall cost of keeping cattle in terms of costs associated with the health care, nutrition and reproduction management, however, has not matched to their contribution to the livelihood and the economy of the people in the region. As in many countries, livestock, particularly cattle play multiple roles in Ethiopia being a source of milk, meat, hide, etc (Mekonnen et al., 1989). However, their productivity is low due to various constraints such as disease, feed, poor management and poor reproductive performance of indigenous zebu breeds (ILCA, 1988). Hence, income derived from livestock sector could not impart a significant role in the economic development of the country (Mukasa-Mugerwa, 1989).

It has been reported that among infectious diseases, brucellosis is a common genital disease which induces abortion in animals and humans, continues to cause heavy economic losses and public health concern throughout the world (Arthur et al., 1996). It is transmitted to people by direct or indirect contact with infected animals or their products (FAO, 2010). Abortion in cattle is an important fertility problem causing a serious economic setback due to direct losses of concepts and consequent impairment of fertility. Moreover, the incidence of retained fetal membrane after birth is often high in *Brucella* infected herds (Mukasa-Mugerwa, 1989);

however, varieties of factors are responsible and it causes considerable losses at farm level, especially when the incidence exceeds the average rate of 5 to 10% (Arthur et al., 1996). In Ethiopia, even though dairy cattle are maintained under different production systems (ILCA, 1994; Shiferaw et al., 2003), the differences in management (production) systems and environmental conditions under which cattle are maintained could greatly affect the occurrence of reproductive disorders. In spite of this fact, little has been known about the magnitude of the major reproductive disorders in dairy cows in and around Asella town. Therefore, this study was designed to determine the prevalence of the major reproductive disorders of dairy cows in and around Asella town, Central Ethiopia.

MATERIALS AND METHODS

Study area

The present study was conducted in and around Asella town located in Oromia region, Central Ethiopia. Asella town, the capital of Arsi zone, is located at about 175 km Southeast of Addis Ababa at 7°57'N and 39°7'E with an altitude of 2430 m above sea level. Agricultural production system of the study area is of mixed crop and livestock production. Dairy farming using improved breeds is a common practice in urban and peri-urban areas (KARC, 2008).

Study population and their management

A total of 300 dairy cows and 82 households rearing dairy cows were included in this study. Classification of management systems was done based on the criteria adopted by Richard (1993). Accordingly, by taking the history of animals from owners as: semi-intensive management system for those animals that were kept indoor and fed and watered in their house/shade by cut and carry system while extensive management system for all animals that were kept outdoor during the day time and allowed to graze on a communal or private owned pasture land.

Study design and method of data collection

Questionnaire survey

A total of 82 households (owners and/or attendants of dairy cows) rearing dairy cattle were randomly selected and interviewed using structured questionnaire. In the survey, information on reproductive disorders as well as management system and particulars related to individual cow such as parity, breed, age, and history of abortion were collected and documented.

Blood sample collection and serological tests

A total of 300 dairy cows more than 6 months old were randomly selected, included for the study purpose where animals greater than 2 years represents adult animals (used for breeding purpose) while less or equal to 2 years of age represents young animals. Accordingly, about 10 ml of blood was collected from the jugular vein of each selected animal using plain vacutainer tubes and allowed to clot overnight at room temperature. The serum samples were separated and transported in iceboxes to National Veterinary Institute (NVI), Debre Zeit, Ethiopia, and were stored at -20°C until testing. Serum samples were screened for antibodies for *Brucella* species using the Rose Bengal Plate test (RBPT). In brief, 30 μl of serum was mixed with an equal volume of antigen suspension on a glass plate and was agitated. After 4 min of rocking, any visible agglutination was considered as positive (OIE, 2008). Agglutinations were recorded as 0, +, ++ and +++, according to the degree of agglutination (Millan, 1990). A score of 0 indicates the absence of agglutination; + indicates barely visible agglutination; ++ indicates fine agglutination; and +++ indicates coarse clumping. Samples with no agglutination (0) were recorded as negative while those with +, ++ and +++ were recorded as positive. RBPT *Brucella* antigen (Institute Pourquier, France), positive control and negative control sera (National Veterinary Institute, Debre Zeit, Ethiopia) were used for the RBPT.

Data analysis

The data collected from the field were entered into a computer on a Microsoft Excel spreadsheet and analyzed using Statistical Package for Social Sciences Inc. (SPSS, 2010). Descriptive statistics such as mean, range, frequency and percentage were used to summarize and present the results. Categorical variables (breed, age, parity number, stage of pregnancy and others) were expressed in percentages. The seroprevalence of *Brucella brucellosis* was calculated as the number of animals testing positive by the RBPT, divided by the total number of animals tested. Prevalence of reproductive disorders of dairy cows was determined based on the proportion of the respondents involved in the interview. The degree of association between or among each risk factor was assessed using Chi-square (χ^2) test (http://www.fourmilab.ch/rpkp/experiments/analysis). For all analyses, a p-value of less than 0.05 was taken as significant.

RESULTS

Socioeconomic characteristics of the respondents and animal husbandry

The educational level of the respondents involved in dairy cattle rearing in the study area were diverse from literate to illiterate people in that they do have degree (2.4%), diploma (7.3%), grade 9 to 12 (29.3%), grade 1 to 8 (40.2%) and no education level (20.7%). There are no female respondents having higher educational level (diploma and degree) and majority of the illiterates were female (70.6%) when compared with male respondents (29.4%) engaged in dairy cattle rearing. Accordingly, 75.6% of the respondent's dairy cattle are reared for both home consumption (23.2%) and market (1.2%) purposes. Individuals involved in milk selling sell a litter of milk on the average by 4.5 Ethiopian Birr (ETB) which is very cheap when compared with a litter of high land water in terms of its nutritional value.

The farm type in majority of the respondent is dairy (87.8%) and some of them mixed (dairy and beef) type of farms categorized under small scale dairy farm in different kind of management practices such as extensive (20.7%), semi-intensive (46.3%) and intensive (33.0%) system. Most of the farmers in the study area use cross breed (64.6%), local breed (22.0%) and both local and

cross breed cows (9.8%), where some of them use pure exotic breeds (3.7%) for their dairy purpose. The types of the cross bred dairy cows in the study area were Holstein Friesian with Arsi (75.6%) and Borena (24.4%) breeds. In majority of the cases, women and husbands were the ones involved in dairy cattle husbandry such as feeding, milking, herding and others (Table 1).

This study showed that 4.9% of the respondents do not have house or fenced enclosure (barn) for their animals. The most common housing systems for dairy cattle in the study area were indoor (separate house) and outdoor (tether) system, 69.5 and 25.6%, respectively where their sanitary condition vary from poor, medium to excellent accounting 39.0, 56.1 and 4.9%, respectively. Most (81.7%) of the respondents on the average posses 1 to 5 dairy cattle, whereas 15.9% of them have 6 to 10 cattle.

Reproductive disorders of dairy cows in the study area

The three top major constraints of dairy cattle in the study area were animal feeds, animal diseases and reproductive disorders figuring 40.2, 30.5 and 18.3%, respectively, where bovine brucellosis (32.9%) and repeated breeding (26.8%) were the major reproductive disorders (Figure 1).

Participants were asked the type of breeding system they were accustomed to breed their dairy cattle. Accordingly, most of the respondents (62.2%) used artificial insemination whereas others were using natural mating (29.3%) and both type (8.5%) of breeding system. From their practice and experience, most of the respondents prefer the utilization of artificial insemination services (65.9%) than natural mating (bull services) (34.1%) to breed their dairy cattle even though it is only 37.8% of the respondents who knows, as there is a risk of disease transmission in using bull or artificial insemination services.

In the study area, it was reported by 14.6% of the respondent's that they encountered abortion in their dairy cattle. It was also revealed that abortion is mostly common in exotic breeds (48.8%) and relatively less in crossbred, local cows and all breed types figuring 28.0, 9.8 and 13.4%, respectively where it also vary among parity and stage of pregnancy (Table 2). According to 53.7% of the respondents, by the time they encounter abortion cases in their herd they do not take any measure, whereas some of them take them to veterinary clinic and traditional healers, 25.6 and 20.7%, respectively.A relatively high proportion (73.2%) of the interviewed household members in the study population reported consumption habit of milk and milk product in their family by boiling, whereas 26.8% of them as raw. About three fourth (75.6%) of the respondents do not have awareness on bovine brucellosis as it can be transmitted to human through raw milk and milk products

consumption from infected cows. Similarly, 79.3% of the respondents do not have awareness on bovine brucellosis as it can also be transmitted to human through handling aborted fetus and other reproductive organ discharges from infected cows.

Blood sample collection and serological test results

The overall individual animal level sero-prevalence, 5.3% (16/300), of bovine brucellosis was recorded from the study area on the basis of RBPT. The higher prevalence was detected in Pluriparous females than primiparous animals.

DISCUSSION

This study showed that 18.3% of dairy cattle in the study areas were affected by either one or more reproductive disorders based on questionnaires to the owners. This is in close agreement with the questionnaire survey result report by Gizaw et al. (2007) and Molalegne and Shiv (2011) from Adama and Bedelle accounting for 25.81 and 24.8%, respectively.

Repeated 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 (Arthur et al., 1996). The higher proportion of repeated breeding (26.8%) found in the present study is closer to the 21.8% prevalence rate reported by Mekonnen (2000) from Ada'a district of Central Ethiopia, but higher than the 8.9 and 4.6% prevalence rate reported by Gizaw et al. (2007) and Tigre (2004) from Adama and Holetta, respectively.

The overall individual animal level seroprevalence, 5.3% (16/300), of bovine brucellosis was recorded from the study area on the basis of RBPT. This is in agreement with previous report, 8.26%, by Bayleyegn (1989) from the same area using RBPT.

In the study area, abortion in dairy cattle was found to be more common in pluriparous cows. Pluriparous, primiparous and at any other parity status accounted for 67.1, 18.3 and 14.6%, respectively. It was also reported by 14.6% of the respondents' as they encountered abortion mostly at third trimester and any stage of pregnancy, 45.1 and 36.6%, respectively, in their dairy cattle. This is inconsistent with the previous findings (Tadesse, 1999; Oumer, 2003; Mamo, 2004) which is possibly due to the repeated exposure of the genital tract of pluriparous cows as their age increases to environmental risk factors that can impart uterine infection. The prevalence, 14.6%, of abortion recorded by questionnaire survey in this study is similar to the 13.0% reported by Molalegne and Shiv (2011) in and around

Table 1. Family members responsible for dairy animal husbandry.

Type of activity	Family member responsible for dairy animal husbandry					
	Husband (%)	Wife (%)	Son (%)	Daughter (%)	Daily laborer (%)	All family (%)
Feeding	9 (11)	33 (40.2)	9 (11)	6 (7.3)	7 (8.5)	18 (22.0)
Milking	8 (9.8)	64 (78.0)	-	2 (2.4)	8 (9.8)	-
Breeding	47 (57.3)	25 (30.5)	7 (8.5)	-	3 (3.7)	-
Herding	16 (19.5)	28 (34.1)	24 (29.3)	4 (4.9)	10 (12.2)	-
Health care	49 (59.8)	27 (32.9)	6 (7.3)	-	-	-
Housing	45 (54.9)	25 (30.5)	2 (2.4)	6 (7.3)	4 (4.9)	-

Table 2. Abortion at different stage of pregnancy and parity in and around Asella town.

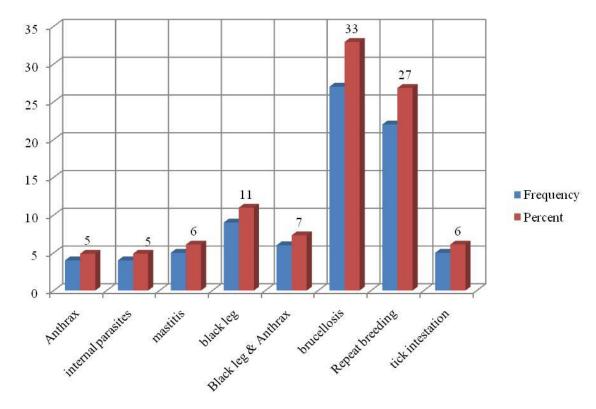| Risk factor	Group (Categories)	No. of cases of abortion	Prevalence (%)
Stage of pregnancy	First trimester stage	8	9.8
	Second trimester stage	7	8.5
	Third trimester stage	37	45.1
	At any stage	30	36.6
Parity status	Primiparous	15	18.3
	Pluriparous	55	67.1
	At any stage	12	14.6

Figure 1. Major reproductive disorders and animal diseases in the study area.

Bedelle and significantly higher than the 2.23, 3.19, 5.33, and 6.30% reported earlier (Gizaw et al., 2007; Oumer, 2003; Shiferaw, 1999; Kassahun, 2003) from Adama, Kombolcha, Holetta and Hawassa, respectively. Higher percentage of abortion may be attributed, because Arsi zone is one of the districts in Ethiopia where dairy production using high yielding breeds of cattle has been started earlier, due to its agro-ecology that fairly favors the introduction and development of crossbred dairy cattle, where the problem is more common in exotics than local animals. 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* (WHO, 2006).

Conclusively, reproductive disorder problems were prevalent in smallholder dairy cows in the study area calling for formulation of strategic control measures, including health education about the disease transmission, in order to reduce associated reproductive wastage and their risks factors.

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