

INCIDENCE OF REPRODUCTIVE AND PRODUCTION DISEASES OF CROSS-BRED DAIRY CATTLE IN BANGLADESH

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ABSTRACT

Reproductive and production disorders (PD) of cross-bred dairy cattle significantly reduce their productivity which is of great concern of dairy producers worldwide because most reproductive disorders adversely affect the future fertility. The present study was conducted to determine the incidence of some reproductive diseases (RD) like abortion, anoestrus, metritis, repeat breeder, retained placenta and one production disease like clinical mastitis in cross-bred dairy cattle in Shahjadpur upazila of Sirajgonj district in Bangladesh. Two hundred fifty (250) farms having at least two cross-bred dairy cattle were randomly selected for this study using an active surveillance system. The study was conducted over a period of twelve months from March 2012 to February 2013. Epidemiological data and samples from diseased cattle were collected and analyzed. The recorded reproductive disorders were diagnosed and treated by the veterinarians on the basis of history, physical examination, clinical and laboratory findings. The incidence rate, cumulative incidence and seasonal incidence of reproductive (RD) and production (PD) disorders were measured. The overall incidence rate and cumulative incidence of RDs and PDs were 33/tcm (10000 cattle-months at risk) and 3.9% respectively. The incidence rate and cumulative incidence of repeat breeder were highest as 11/tcm and 1.29% respectively followed by anoestrus (7/tcm and 0.81%), metritis (3/tcm and 0.34%), retained placenta (2/tcm and 0.27%) and abortion (2/tcm and 0.20%). The incidence rate and cumulative incidence of clinical mastitis were 8/tcm and 1.0% respectively. A decreasing trend of cumulative incidence of mastitis, metritis and abortion was noted from summer, rainy to winter seasons. The cumulative incidence of anoestrus was highest in rainy (0.34%) then summer (0.27%) and lowest in winter (0.21%). The proportionate incidence was highest for repeat breeder (32.76%) followed by mastitis (25.86%) and anoestrus (20.69%). The incidence of the diseases we reported were low in comparison to the published prevalence of these diseases. When the incidence of a disease is low but animals affected have the condition for a long period of time, the prevalence will be high relative to the incidence. Repeat breeder, anoestrus and mastitis should get top priority in reproductive and production disease research to gain more knowledge and in extension to control them in Bangladesh context.

Key words: Incidence, reproductive disease, cross-bred dairy cattle

INTRODUCTION

In order to increase the milk production in the tropical regions of the world, cattle cross breeding program have long been used as one of the main strategies and temperate breeds have been introduced in many developing countries (Ehui *et al.*, 1995). Reproductive and production disorders (PD) of cross-bred dairy cattle significantly reduce their productivity which is of great concern of dairy producers worldwide because most reproductive disorders (RD) adversely affect the future fertility. Ten to 30% of lactations may be affected by infertility and RD (Erb and Martin, 1980), and 3-6% of the herd is culled annually in developed countries for these reasons. The major problems that have direct impact on reproductive performance of dairy cattle are abortion, dystocia, retained placenta (retention of fetal membrane), metritis, prolapse (uterine and/or vagina), anoestrus and repeat breeder. These result in considerable economic loss to the dairy industry due to slower uterine involution, reduced reproductive rate, prolonged inter-conception and calving interval, negative effect on fertility, increased cost of medication, drop in milk production, reduced calf crop and early depreciation of potentially used cows (Lobago *et al.*, 2006). It has been reported that reproductive disorders are responsible for remarkable economic losses to the dairy farmers in Bangladesh (Talukder *et al.*, 2005). There are some reports on the prevalence of reproductive problems in cow of Bangladesh (Alam and Rahman, 1979; Ahmed, 1984; Dewan and Rahman, 1987; Shamsuddin *et al.*, 1988; Mollah *et al.*, 1989; Rahman *et al.*, 1993; Samad, 1996; Talukder *et al.*, 2005; Sarder *et al.*, 2010). The prevalence represents existing cases at a specific moment and incidence measures how fast new cases occur. Incidence measures are helpful to monitor the intervention against a disease. But, no report on the incidence of RD and PD in dairy cows in Bangladesh has been noted.

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In the last few decades, as the major infectious diseases of cattle in Bangladesh are brought under control by vaccination and farmer's awareness, emphasis has increasingly been shifted to economically important diseases to the dairy producers and the reproductive health problems. Therefore, the present study was conducted to determine the incidence of reproductive diseases in cross-bred dairy cattle in the study area.

MATERIALS AND METHODS

Study areas, period and population

Shahjampur Upazilla in Sirajgonj district of Bangladesh, the most important dairy zone of Bangladesh was selected as study area. Two hundred and fifty (250) farms having at least two cross-bred dairy cattle were selected conveniently. Active surveillance system was used to collect data from the selected farms over a period of 12 months from Mar'2012 to Feb'2013.

Calculation of incidence rate of reproductive and production disorders

The incidence rate (true incidence rate) of reproductive and production disorders (PDs), cumulative incidence and proportionate incidence were estimated. To calculate the overall incidence rate of reproductive disorders (RDs) and PDs, all cattle found with RDs and PDs during the study period were included in the numerator and the total number of animal months at risk in the denominator. To calculate season incidence, the number of cattle in the denominator for a particular season was the arithmetic mean of the number of cattle in the respective season. Cumulative incidence of RDs/PDs was calculated by taking the number of cattle with a specific disorder as the numerator and the average number of cattle at risk as denominator. Proportionate incidence was calculated by using the number of RDs/PDs due to a specific disease as numerator divided by the total diseases as denominator during the study period.

Collection of information and samples

For collection of epidemiological data, routine monitoring of the farm and samples from diseased cattle a Research Assistant was recruited. Before sending him for farm investigation he was trained for this work. He was provided with a motor cycle and a cell phone for easy access to communicate and surveillance of the farms. His work was monitored by the Veterinary Surgeon of the respective study area and the research team in BAU.

Definition of recorded diseases taken mostly from Sarder *et al.* (2010)

Abortion

Abortion is a condition in which the foetus is delivered live or dead before reaching the stage of viability and in which the delivered foetus is generally visible by naked eyes.

Anoestrus

Lack of expression of the oestrus at an expected time is called anoestrus. Clinically if a heifer is 18 or more months old or a cow has passed 40 days post-partum but did not show oestrus the condition is referred as anoestrus.

Metritis

Metritis is the inflammation of the uterus generally caused by infectious agents. Usually cows have red to brown discharge during the first two first two weeks after calving. If discharge persists beyond two weeks or if the discharge is foul smelling, this is an evidence of metritis.

Mastitis

The term Mastitis refers to inflammation of the mammary gland regardless of the cause. It is characterized by physical, chemical and usually bacteriological changes in the milk and by pathological changes in the gland (Radostits *et al.*, 2006). Diagnosis of mastitis was based on history, physical abnormalities of udder and gross abnormalities in the milk like discoloration and presence of clots/flakes. Palpation of udder revealed enlarged and painful with the presence of clots/ flakes in the milk confirmed the diagnosis of mastitis.

Retained placenta (RP)

A cow was considered to have RP when the foetal membranes were visible at the vulva or were identified in the uterus or vagina by vaginal examination more than 24 h after calving.

Repeat breeders (RBs)

Cows failing to conceive after a defined number of inseminations (generally three or more) with fertile semen, have been classified as repeat breeders (Zemjanis, 1980; Gunther, 1981; Levine, 1999).

RESULTS AND DISCUSSION

The overall true incidence rate of RD and PD was 33 per 10000 cattle-months at risk. The highest incidence of reproductive disorder was found with repeat breeders as 11 per 10000 cattle-months at risk and the lowest incidence rate was found for abortion and retained placenta as 2 per 10000 cattle-months at risk. Similarly the overall cumulative incidence of RD and PD was 3.93% . The highest and lowest cumulative incidence of RD respectively were 1.29% for repeat breeder and 0.20% for abortion. The true incidence rate and cumulative incidence of clinical mastitis were 8 per 10000 cattle months at risk and 1.0% respectively (Table 1) .

Table 1. True incidence rate and cumulative incidence of reproductive and production disorders in cross-bred cow

Variables	Abortion	Anoestrus	Metritis	Repeat breeder	Retained placenta	Mastitis
Average number of cattle studied	1476					
Cattle months at risk	17695					
Total disorders	3	12	5	19	4	15
Overall incidence per cm	0.0002	0.0007	0.0003	0.0011	0.0002	0.0008
Incidence per tcm	2	7	3	11	2	8
Cumulative incidence (%)	0.20	0.81	0.34	1.29	0.27	1.0

cm-cattle month at risk, tcm-ten thousand-cattle month at risk

The seasonal cumulative incidence of RD and PD were 1.88% in summer (March to June), 1.55% in rainy (July to October) and 0.48% in winter (November to February). A decreasing trend of cumulative incidence of mastitis, metritis and abortion was noted from summer to winter (Table 2).

Table 2. Season wise cumulative incidence of reproductive and production disorders in cross-bred cow

Seasons	Population at risk	Total disorder	Cumulative Incidence (%)	Abortion (%)	Anoestrus (%)	Metritis (%)	Repeat breeder (%)	Retained placenta (%)	Mastitis (%)
Summer	1490	28	1.88	2 (0.13)	4 (0.27)	3(0.20)	9 (0.60)	1 (0.06)	9 (0.60)
Rainy	1482	23	1.55	1 (0.07)	5 (0.34)	2(0.14)	9 (0.60)	1 (0.07)	5 (0.34)
Winter	1464	7	0.48	0	3 (0.21)	0	1 (0.07)	2 (0.14)	1 (0.07)
Total	4436	58	1.31	3 (0.07)	12(0.27)	5(0.11)	19(0.44)	4(0.09)	15(0.34)

Repeat breeder and mastitis are two most frequently occurred RD and PD contributing 32.76% and 25.86% of the total cases (Table 3).

Table 3. Proportionate incidence of reproductive and production disorders in cross-bred cattle

Total disorders	Abortion	Anoestrus	Metritis	Repeat breeder	Retained placenta	Mastitis
58	3 (5.17%)	12 (20.69%)	5 (8.62%)	19 (32.76%)	4 (6.9%)	15 (25.86%)

Abortion

The reported incidence of abortion/pregnancy loss vary widely between 0.4 and 10.6% (Paisley *et al.*, 1978; Gröhn *et al.*, 1990; Markusfeld-Nir, 1997; Lopez *et al.*, 2002). Our study reported relatively lower cumulative incidence of abortion (0.20%) than published reports. These discrepancies may be due to differences in the etiology of abortion in respective countries.

Anoestrus

We estimated the true incidence and cumulative incidence of anoestrus that were 7 per 10000 cattle months at risk and 0.81% respectively. Suckling and nutrition are by far the most important factors determining the length of postpartum anoestrus (Walters *et al.*, 1982; Randel, 1990). Season, breed, age, parity, milk yield and biostimulation (presence of a bull and or cows in oestrus) also have role in determining the length of postpartum anoestrus (Hansen, 1983; Fonseca *et al.*, 1983; Garel *et al.*, 1987; Wright *et al.* 1994). In our study seasonal variation in the cumulative incidence of anoestrus was also noted: highest in rainy (0.34%) and lowest in winter (0.21%).

Metritis

The cumulative incidence of metritis in our study was 0.34% and no inland published report available to compare this findings. Primiparous cows, dystocia, retained placenta and negative energy balance had been reported to be associated with metritis (Giuliodori *et al.*, 2013). The reported prevalence of metritis in cows in Bangladesh varied from 7.6-11.9% (Faruq, 2001; Sarder *et al.*, 2010). These risk factors and the possible others should be studied in Bangladesh context following either by case-control or cohort study designs so that appropriate control measures can be suggested.

Repeat breeders

We estimated 1.29% cumulative incidence of RBs. The reported incidence of RBs varied from 5.5-33.3% (Kaikini *et al.*, 1983; Kumaresan *et al.*, 2009). The reported prevalence of RBs in cows in Bangladesh varied from 5-20.2% (Shamsuddin, 1995; Sarder *et al.*, 2010). Jainuddin and Hafez (1993) reported that incidence of RBs is higher at artificially inseminated cows than naturally bred cows. Metritis (clinical and sub-clinical), milk fever, dystocia and retained placenta had significant association with RBs (Erb and Martin, 1980; Alam *et al.*, 2007; Salasel *et al.*, 2010). Error in estrus detection and improper timing of AI further aggravates the situation (Kumaresan, 2001). Variation in incidence of these disease/conditions may partially explain the wider variation of RBs in different countries. Veterinary extension services intended to inform farmers about the risk factors and their mitigation will definitely reduce the extent of this problem in dairy cattle population in Bangladesh.

Retained placenta

The cumulative incidence retained placenta we estimated was 0.27%. The reported prevalence of retained placenta in cows in Bangladesh varied form 1.3-8.8% (Shamsuddin *et al.*, 1988; Sarder *et al.*, 2010). In a meta-analysis Bourne *et al.* (2007) suggested that Vitamin E supplementation during the dry period reduce the risk of retained placenta and the synthetic forms of Vitamin E were more effective than the natural compound. Veterinary extension work is needed to inform this fact to farmers in Bangladesh context to control this disease.

Mastitis

The incidence rate and cumulative incidence of clinical mastitis we reported were 8 per 10000 cattle-months at risk and 1% respectively. Islam *et al.*(2010) reported 2.12% prevalence of clinical mastitis in dairy cattle.

The incidence of RDs and PDs we estimated seem to be low in comparison to the previous reports. When the incidence of a disease is low but animals affected have the condition for a long period of time, the prevalence will be high relative to the incidence as we have seen in this study. To estimate incidence or prevalence of a disease, the sample must be representative of the population. Representativeness depends on the randomness of the sampling protocol. Taking sample from cattle population following probability or random sampling techniques is not easy in Bangladesh context as the animals and their herd are not properly identified. Animals or at least their herds must have to be identified for undertaking any research or extension work effectively. Policy makers should focus on this issue. All humans of Bangladesh are not yet identified so it may be overzealous to expect identification system at animal level but at least herd level identification is possible taking geographic coordinate of each herd as its identity. Similar to human birth and death registration act, animal herd/flock identification act may be passed and implemented.

The implementation of this kind of act will be possible if certain services like vaccination, deworming, artificial insemination, etc. are provided only to the animals/birds of the registered herd/flock.

CONCLUSION

According to our study repeat breeders, mastitis and anoestrus are three important reproductive and production diseases. Knowledge in terms of risk factors and their mitigation already available about these diseases should be extended to farmers to control them. Low incidence of these diseases indicate that the rate of progression of these diseases is slow in cattle population.

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