Prevalence of Various Reproductive Disorders in the Foothills of Himalaya

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ABSTRACT

The study was carried out to investigate the incidence of reproductive disorders in Assam region of India. A total of 554 crossbred cows were screened and survey was made to rule out prevalence of reproductive diseases. The risk factors such as age and parity were also taken into account to find the relation with occurrence of reproductive disorders. The anestrus (51.12%), repeat breeding (RB; 33.71%), retention of fetal membrane (RFM; 5.06%), dystocia (4.50%), abortion and cervico-vaginal prolapse (2.81%) were recognized as major reproductive disorder in Assam. Age had non-significant (P>0.05) effect in the prevalence of the diseases. However, incidences of anestrus, dystocia and RB, abortion, cervico-vaginal prolapse and RFM were found highest in age group of ≤ 3 and 4-7 and ≥ 8 years, respectively. Parity had significant effect on incidences of anestrus (P<0.05) and RB (P<0.01) however, had no significance effect on other disorders. The result specified adverse climatic condition, low pH of soil, poor managemental practices by dairy producers had contributed in the occurrence of reproductive disorders. Therefore, knowledge regarding the prevalence and factor associated with reproductive diseases could be fruitful to alleviate the problem.

HIGHLIGHTS

- ◎ Incidence of reproductive disorder in crossbred cows was 32.13 per cent.
- ◎ The anestrus and repeat breeding were most common reproductive disorder in Assam region.
- ◎ The age and parity were the predisposing factors of infertility

Keywords: Cow, incidence, age, parity, anestrus, repeat breeding

The livestock sector is an important component of agriculture in the Indian economy. The sector has been an important source of livelihood for small and marginal farmers. India is the world's highest livestock owner with 192.49 million cattle. Even with the huge population of cattle and their economic significance, the productivity is low due to the poor reproductive performance. The productivity of a farm depends on the management of herd fertility and act as an important component of a profitable farm whereas reproductive inefficiency in dairy cows can affect the economy of the dairy industry. Reproductive problems cause significant economic loss to the dairy industry due to prolonged inter-calving period, slower uterine involution, lower reproductive rate, drop in milk production, diminished calf crop, early depreciation of high yielding cows (Kumar *et al.,* 2014). Cows with reproductive problems is a challenge for both veterinarians and dairy producers. It has been reported that reproductive disorders could result in loss of INR 1,63,800 in 180 days (Rawat *et al.,* 2014) which could impact heavily to dairy producer of farmer. Therefore, it is reasonable to

generate scientific information and database to determine the incidence of the various reproductive disorder in dairy cows. It is expected that the generated information could be used as a basis for prevention and interventions against reproductive disorder with an objective to improve dairy productivity.

MATERIALS AND METHODS

Area and period of study

Assam, the North-Eastern state lies between 26° 19' 00" N - 27° 59; 00" N latitude to 89° 57' 00" E - 96° 00' 00" E longitude. Heavy rainfall (1500 mm to 2600 mm) and hot humid climate are the characteristics weather of the study area. The study was conducted in and around Guwahati city of Assam during the period of one year from May 2018 to June 2019 to investigate the incidence of various reproductive disorders. All the animals reared under the intensive system, with alike pattern of feeding and housing were selected.

Data collection

A total of 554 crossbred cows were screened to study the incidence of various reproductive disorders based on history and clinico-gynaecological examination. The incidence of reproductive health disorders was determined as a proportion of affected animal out of the total animal surveyed. The organized questionnaire was drawn up and used to gather information from dairy owners. The objective of the study and its importance and how it will help their dairy farms were briefed to the owners using local language (Assamese). The information includes the age, parity, feeding system, date of last artificial insemination (AI), date of last calving, type of feed and history of reproductive disorders such as anestrus, repeat breeding (RB), retained fetal membrane (RFM), abortion, dystocia and cervico-vaginal prolapse were collected on individual cattle basis.

Data management and analysis

The data obtained from the questionnaire and regular follow up were entered and percentage of various reproductive disorder was derived using a Microsoft Excel version 10. The prevalence of reproductive problems was determined as the proportion of affected animals out of the total animal examined. The differences or association between different risk factors such as age and parity among all incidence of reproductive problems was analyzed by $\chi2$ (Chi-square) technique using SPSS version 16. The value of $p<0.05$ considered as significant.

RESULTS AND DISCUSSION

The incidences of various reproductive disorders in crossbred cattle are presented in Table 1. In the present study, out of 554 crossbred cows surveyed, 178 (32.13%) cow had reproductive disorders. The results were found well comparable with earlier reports of Acharya (2016) and Khan *et al.* (2016), who recorded the incidence of reproductive disorders as 33.85 and 30.23 per cent, respectively. In contrast, higher incidence of reproductive disorder was reported by Benti and Zewdie (2014; 47.7%), Haile *et al.* (2014; 43.07%) and Moges (2015; 49.29%). While, Dutta (2017) recorded lower (14.63%) population of crossbred cows affected with reproductive disorder under field conditions of Assam. The variation in the incidences of various reproductive disorders might be due to genotype of the animal, feeding practices, housing and breeding conditions, body condition score, environment stress, age, breed, parity, plane of nutrition, area of study, hormonal imbalance and management practices (Short *et al.,* 1990; Heath *et al.,* 1997; Baruselli *et al.,* 2001; Quintans *et al.,* 2009; Khan *et al.,* 2016). The state receives heavy rainfall which might be responsible for the leaching of the nutrients from soil. The fodder grown in such soil is deficient in certain minerals and could not fulfill the nutrient requirement of the livestock. This might act as predisposing factor in occurrence of reproductive disorder in region of Assam.

The incidence of anestrus (51.12%) recorded in the present study is in close agreement with Sorur *et al.* (1982) who recorded 49.9% incidence of anestrus. The findings were higher than the report of Khan *et al.* (2016; 31.79%) while lower than the observation of Kutty and Ramachandaran (2001; 65%) in crossbred cattle. The prominent explanation for higher incidence of anestrus in crossbred cattle is might be due to provision of low quality ration to the animals in the study area. It is well established that ultimate body condition score (BCS)

extremely low or high at different stages of gestation leads to delay in onset of cyclicity (Butler and Smith, 1989; Pryce *et al.,* 2000). Baruah *et al.* (2013) reported that the acidic pH of the soil during rainy season replaces basic cations (Ca^{2+}, Mg^{2+}, Na^+ and K^+) leading to deprivation of minerals. Further, it is well known that nutrients play an important role in resumption of follicular growth (Smith and Akinbamijo, 2000), steroidogenesis and oxidative mechanism. Low energy availability decreases the LH pulse frequency which is critical to ovarian follicular development (Ibtisham *et al.,* 2018). Higher incidence of parasitic infestation in the study area as well as inadequate scientific knowledge and poor managemental practices may be the reason for anestrus (Barkawi, 1984; Heath *et al.,* 1997; Baruselli *et al.,* 2001).

The RB was observed to be second prevalent disorder in the study with incidence of 33.71%. Singh and Singh (2015) recorded the incidence as 37.44% which was in conformity with the present investigation. While the incidence recorded by Khan *et al.*(2016) was found lower (24.61%) than the present observation. The predominant reason for repeat breeding was hormonal imbalance leading to anovulation, delayed ovulation as well cystic ovarian degeneration, early embryonic mortality. Further, low plane of nutrition and limited adaptability to the climatic condition by the crossbred cows in and around Guwahati city. Studies have also confirmed that nutrition can alter the follicular environment which affect oocyte maturation and development competence (Callaghan and Boland, 1999) or can cause early embryonic mortality. Furthermore, error in oestrus detection and lack of experienced inseminator are also responsible for repeat breeding (Noakes *et al.,* 2009; Jainuddin and Hafez, 1993; Kumaresan, 2001).

The incidence of RFM in the study was recorded as 5.06% which was well accord with the findings of Haile *et al.* (2014, 7.18%). It is well known that dystocia is the main predisposing factor for RFM (Gashaw *et al.,* 2011) which is supported by the incidence rate of RFM corresponding to incidence of dystocia (4.50%) in the present study. The present finding for dystocia is well comparable with report of Khan *et al.* (2016; 5.12%) but was lower (7.75%) and higher (3.8%) than the observations of Dawit and Ahmed (2013) and Gashaw *et al.* (2011), respectively.

The incidence of abortion (2.81%) reported in the present

study is similar to the report of Haile *et al.* (2014; 2.56%) but found lower (11.25%) than the observation of Khan *et al.* (2016). The lower incidence of abortion might be due to growing practice of AI in the study area where semen is obtained from the disease free bulls under sanitation practices (Robert, 1986; Noakes *et al.,* 2009; Gashaw *et al.,* 2011).

In the present report, incidence of cervico-vaginal prolapse (2.81%) was fairly consistent with the findings of Haile *et al.* (2014; 3.44%). The observation was higher than reports of Hadush *et al.* (2013; 1.95%), Khan *et al.* (2016; 1.53%) and lower than the Kidhusan (2009; 5.2%). The variation in the incidence of cervico-vaginal prolapse might be due to sample size and managemental practices (Noakes *et al.,* 2009; Haile *et al.,* 2014).

Table 1: Incidence of various reproductive disorders in crossbred cows (n=178)

Reproductive disorders	Number of affected animals	Incidence (%)
Anestrus	91	51.12
Repeat breeding	60	33.71
Abortion	5	2.81
Retention of fetal membrane	9	5.06
Dystocia	8	4.50
Cervico-vaginal prolapse	5	2.81
Total	**178**	**100**

n = total animal affected; Age-wise incidence of various reproductive disorders.

The age wise incidence of various reproductive disorders in crossbred cows has been shown in Table 2. In the present study, non-significant ($p>0.05$) difference was observed among various reproductive disorders between different age groups. In the present investigation, highest incidence of anestrus and dystocia was observed in the age group of ≤3 years. The incidence of RB and abortion, cervico-vaginal prolapse were observed in age group of 4-5 and 6-7 years, respectively. The cows in age group of ≥8 years showed highest incidence of RFM in this study.

Short *et al.* (1990) reported that the cows in first lactation require more time to resume ovarian activity than pluriparous cows. Such animals have higher energy priority for growth and lactation rather than reproduction resulting in state of postpartum anestrus. The poor body

Table 2: Effect of age on the incidence of various reproductive disorders in crossbred cows

Reproductive Disorders	Age groups								Value of χ^2 between age groups
	≤ 3 yrs (n=33)		4-5 yrs (n=46)		6-7 yrs (n=64)		≥8 yrs (n=35)		
	No. of observation	Incidence (%)	No. of observation	Incidence (%)	No. of observation	Incidence (%)	No. of observation	Incidence (%)	
Anestrus	21	63.64	21	45.65	32	50.00	17	48.57	2.72[NS]
Repeat breeding	6	18.18	20	43.48	22	34.38	12	34.29	5.50[NS]
Abortion	1	3.03	1	2.17	2	3.13	1	2.86	0.09[NS]
Retention of fetal membrane	1	3.03	1	2.17	4	6.25	3	8.57	2.17[NS]
Dystocia	4	12.12	2	4.35	1	1.56	1	2.86	5.30[NS]
Cervico-vaginal prolapse	0	0.00	1	2.17	3	4.69	1	2.86	1.86[NS]

n indicates number of animals in different age groups; NS indicates non significant.

Table 3: Effect of parity on the incidence of various reproductive disorders in crossbred cows

Reproductive Disorders	1st Parity (n=57)		2nd Parity (n=46)		≥3rd Parity (n=75)		Value of χ^2 between parity groups
	No. of observation	Incidence (%)	No. of observation	Incidence (%)	No. of observation	Incidence (%)	
Anestrus	38	66.67	18	39.13	35	46.67	8.77*
Repeat breeding	11	19.30	22	47.83	27	36.00	9.57**
Abortion	1	1.75	2	4.35	2	2.67	0.63[NS]
Retention of fetal membrane	2	3.51	2	4.35	5	6.67	0.73[NS]
Dystocia	5	8.77	1	2.17	2	2.67	3.59[NS]
Cervico-vaginal prolapse	0	0.00	1	2.17	4	5.33	3.46[NS]

n indicates number of animals in different parity groups; *P<0.05, **P<0.01; NS indicates non significant.

condition score due to unavailability of good quality fodder in the area of Assam may result in poor pelvic growth and development leading to dystocia. The mineral deficit soil of the study area may employ the occurrence of RB, abortion and cervico-vaginal prolapse. Further, the hot and humid climate negatively affect the oocyte, corpum luteum, embryo quality and steroidogenesis resulting in conception failure and embryonic mortality (Wolfenson and Roth, 2019). This ultimately leads to RB and abortion as a resultant of heat stress. However, the effect of mineral deficiency and heat stress on age group of 4 to 7 years in the study remain unknown. The higher observation of RFM with advancement of age in this report might be due to poor tonicity of uterus leading to inability to expel the fetal membrane.

Parity-wise incidence of various reproductive disorders

The parity-wise incidence of animals affected with various reproductive disorders are presented in Table 3. Test of significance (χ^2) indicated significant difference in the incidence of anestrus ($p<0.05$) and RB ($p<0.01$) between different parity groups. However, Chi square test indicated non-significant difference ($p>0.05$) in the prevalence of abortion, RFM, dystocia and cervico-vaginal prolapse between parities. The incidences of anestrus and dystocia were observed to be highest in 1st parity. The prevalence of RB and abortion were found greatest in 2nd parity. While, highest incidence of RFM and cervico-vaginal prolapse were observed in 3rd parity group. The higher incidences of anestrus, RB and dystocia were observed in animals with ≤3 parity by Khan *et al.* (2016) and Bhat *et al.* (2012).

Greater difficulty has been reported in resumption of postpartum ovarian cyclicity in primiparous by Ahmadzadeh, *et al.* (2011). The authors stated that the heavy energy requirement for growth and lactation negatively affect reproduction in first-calver cows. It is

the widely known that feto-maternal disproportion is the leading cause of dystocia in primiparous animals (Noakes *et al.,* 2018). This might be responsible for higher prevalence of dystocia in 1st parity in the present study. Furthermore, artificial breeding using semen from the large size bull without taking into account the size and age of recipient cows is the precipitating cause of dystocia (Haile *et al.,* 2014). Similar to the present finding, increased services per conception in 2 parity has been reported by Yusuf *et al.* (2017). The authors stated that greater risk of embryonic mortality with increase in parity consequently increases the prevalence of RB (Yusuf *et al.,* 2010). The high yielder cows has increase hepatic blood flow which might be responsible for rapid steroid metabolism (Vasconcelos *et al.,* 2003). As progesterone is requisite for maintenance of pregnancy, low level of progesterone during lactation stress compromises embryo survival leading to abortion (Jousan *et al.,* 2005). The hypocalcemia with increase in lactation yield during $\geq$ 3rd parity serve as predisposing factor in occurrence of RFM and cervico-vaginal prolapse. The lower plasma calcium concentration in cows affected with RFM (Melendez *et al.,* 2004) and cervico-vaginal proplase (Honnappagol and Tandle, 2010) has been reported which might be responsible for poor uterine atony leading to failure of expulsion of placental membrane and genital prolapse.

CONCLUSION

The study investigated incidence of various reproductive disorders in the North-Eastern region of India. The study revealed anestrus followed by RB, RFM, dystocia, abortion and cervico-vaginal prolapse as the major reproductive problems in the region of Assam. The age and parity of an animal were found to be the risk factors in the occurrence of reproductive diseases. The hot and humid climate, mineral deficit soil of the area and lack of breeding knowledge were observed to be the bigger constraint faced by the farmers against the fertility improvement. The knowledge about the incidences could be beneficial to the farmers and dairy producers for the improvement and management of reproductive diseases. The implementation of preventive measures could be helpful in enhancement of fertility. Emphasis on proper nutrition and management is highly imperative in order to maximize the productivity of dairy cows.

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