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Article

Study on the hormonal profile in crossbred dairy cows in relation to repeat breeding at Baghabari milk shed areas, Bangladesh

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Abstract: Repeat breeding (RP) is a one of the most significant problem in dairy cattle because it increased production cost of insemination, treatment, feed, labor and management and also increased calving interval with decreased milk production. This study was conducted at the different Bathan areas of Shahjadpur Upazila under Sirajgonj district. The total of 30 repeat breeder cows was selected randomly to determine their reproductive hormonal profile before and after synchronization at the selected areas and repeat breeder cows were marked by ear tag and collected breeding history of each individual cow. All experimental RP were synchronized by the administration of GnRH (day- 0), PGF2α (day-7) and Artificial Insemination (AI) with GnRH (day-9). Blood samples were collected before and after synchronization during standing heat period of estrous cycle of each cow. The total experiment was done and analyzed in the laboratory by using endocrine detection kits (Mono Lelac^{R} USA). This present study revealed that the level of luteinizing hormone (LH), follicle stimulating hormone (FSH), progesterone (P4) were significantly differed between repeat breeder cows and synchronized repeat breeder cows. These findings clearly indicated that reproductive hormonal aberrations might be one of the major causes of repeat breeding in Baghabari milk shed areas.

Keywords: reproductive hormone; repeat breeding; synchronization

1. Introduction

Dairy cattle reproduction is controlled by multiple hormones which are produced by numerous endocrine glands. These hormones are secreted by the glandular cells and pass into the blood where they are transported throughout the body to complete their respective functions (Lafi and Kaneene, 1992). Reproductive hormones can be used in the management of production animals. Hormones can be used either diagnostically or therapeutically (Islam *et al*., 2010). However, different biochemical components in normal levels are indispensible for the normal function as well as reproductive systems of the body. Variation of the hormonal constituents of the animal body has been reported for the reproductive failure (Adler *et al*., 2009; Lequin, 2009). Repeat Breeding (RB) is a major reproductive disorder caused a great economic loss in dairy herds due to increased milk production cost with increased management and calving interval. RB is a multi-factorial problem involving a number of extrinsic factor as well as intrinsic factors coupled to the individual animal. Lack of balanced feed, poor quality semen, hormonal deficiency, incidence of reproductive diseases, unskilled Artificial Insemination Workers (AIW), maltreatment of RB cows, crossbred genotype, high yielding cow, improper heat detection at the time of artificial insemination, seasons and lack of deworming were found the major causes of repeat breeding problems at Baghabari milk pocket areas. It was also found that incidence of repeat breeding

problems was about 29 percent in dairy cattle which is very much alarming for dairy cattle production in the Baghabari milk shed areas (Islam et.al., 2018). Presently, dairy farmers have been suffered a lot due to this problem. However, these farmers produce two-third milk to meet up the demand of milk of the country. It is necessary to solve the RB problems for producing more milk to achieve the vision 2021 of Bangladesh. Hence, this study was undertaken to determine the hormonal profiles of repeat breeder cows before and after synchronization. Repeat breeding is a major reproductive disorder always caused a great economic loss in dairy herds (Lucy, 2001). All most all cows are crossbred (viz. Local X Sahiwal, Local X Holstein Friesian, Local X Jersey, Local X Sahiwal X Friesian etc.) in Baghabari milk shed areas. It was found from a recent survey work that incidence of repeat breeding problems was about 29 percent which is very much alarming for dairy cattle production in the Baghabari milk shed areas (Islam *et al*., 2018). Responsiveness of the pituitary for LH release after GnRH is restored by 8 to 10 days after calving. Several studies have stressed the economic importance of reproductive efficiency of dairy cattle. Thatcher and Wilcox (40) reported that fertility for dairy cows was enhanced by increased number of estrous cycles before first service. The number of ovulations before 65 days postpartum was improved after GnRH (Macmillan *et al*., 1996). Administration of GnRH (100//g) 2 wk postpartum contributed to a numerical advantage in conception rates at first service (Roche *et al*., 2000). Studies of GnRH in postpartum cows provided inconclusive results on fertility rates. Recent reports showed that administration of GnRH at first postpartum breeding resulted in higher conception rates. This phenomenon also was observed when GnRH was administered to repeat breeder cows. Our study was designed to investigate changes of LH and progesterone (P) in cows given GnRH at first postpartum breeding to examine hormonal profiles that might account for higher fertility. (Royal *et al*., 2000).

The total percentage of RB animals was 10.1% and the median proportion of RB animals in the herds studied was 7.5%. The proportion of RB cows in herds increased with decreased herd sizes with decreased average days from calving to first AI, with increased herd incidence of clinical mastitis, with decreased reproductive disorders, and increased other diseases treated by a veterinarian. On animal level, the risk factors were milk yield, lactation number, difficult calving or dystocia, season at first service, days in milk at first service and veterinary treatment for reproductive disorders before the first service. Cows being an RB animal in the previous lactation had a higher risk of becoming an RB animal also in the present lactation. In conclusion our results show that the repeat breeding syndrome is a multifactorial problem involving a number of extrinsic factors as well as intrinsic factors coupled to the individual animal.

2. Materials and Methods

The present study was conducted at the different sheds of dairy farmers at the Bathan area of Shahjadpur Upazila under Sirajgonj district. A total of 30 repeat breeder cows were selected randomly to determine their hormonal profile at bathan area under the Sahjadpur Upazila of Sirajgonj district. Selected repeat breeder cows were marked by ear tag and collected breeding history of each individual cow. Experimental cows were reared under the bathatan feeding and management system. In addition, mineral supplementation was given to all experimental cows. All experimental cows were synchronized by the treatment of GnRH (day- 0), PGF2α (day-7) and Artificial Insemination-AI + GnRH (day-9) by following the below estrous synchronization protocol for more efficient reproductive management of RBC.

0 days	7 days	9 days
GnRH	PGF2α	GnRH

A total of fifty-three (53) blood samples were collected into vacutainer tube from the jugular vein of each experimental repeat breeder cow. Blood samples were collected before synchronization from all experimental cows. Poor rates of estrous detection combined with poor conception rates (CR) make management of reproduction in lactating dairy cows a challenge in most dairy herds. Blood samples were collected after synchronization during standing heat period of estrous cycle of each cow measured by Estrous Detector Device for AI in appropriate time.

The serum samples were prepared in the Animal Health Laboratory of Bangladesh Livestock Research Institute, Regional Station, Baghabari, Sahjadpur, and Sirajgonj-6770.The plasma serum was separated by centrifugation (1500 rpm for 20 minute). The separated serum was collected in a sterile vial and preserved at -20°C Laboratory Deep Freezer until analysis.

All serum samples will be analyzed in the Laboratory of the Department of Biochemistry and Molecular Biology, Faculty of Biological Sciences, Jahangirnagar University (JU), Savar, Dhaka, Bangladesh. The Laboratory will be maintained the required levels in the low, normal and high range for monitoring assay performance. It will be treated as unknowns and values determined in every test procedure performed. Quality

control charts will be maintained to follow the performance of the supplied reagents. Pertinent statistical methods will be employed to ascertain trends. Assay performance limits will be set by the Laboratory in each test method. Fresh reagents will be used to determine the reason for the variations. Significant deviation from established performance can indicate unnoticed change in experimental conditions or degradation of kit reagents.

Collected samples will be analyzed by using kits from Monobind International, Lake Forest, CA 92630, USA. The data were statistically analyzed as per Snedecar and Cochran (1957).

3. Results and Discussion

Mean values of different reproductive hormones between before and after synchronized repeat breeder (RB) cows are shown in Table 1. The mean values of LH were 0.8251 ± 0.08153 mIU/ml and 2.481 ± 0.4806 mIU/ml for before and after synchronization of repeat breeder cows and differed significantly between two periods as shown in Figure 1. The mean concentration of FSH was 17.04 ± 2.743 mIU/ml in after synchronized which was significantly fourth fold more than the mean FSH concentration in before (4.647 ± 0.7999 mIU/ml) as shown in Figure 2. The mean value of progesterone hormone in after synchronization was significantly higher (5.927 ± 0.4219 ng/ml) compared to before synchronization. From the results of the present study clearly found that different reproductive hormones of LH, FSH and progesterone were significantly differed between before and after synchronization of repeat breeder cows except estradiol value. These results may be attributed due to synchronized of repeat breeder cows.

Table 1. Values of different reproductive hormones between before and after synchronized repeat breeder (RB) cows.

Name of hormones	Hormonal values before Synchronization of RB cows	Hormonal values after Synchronization of RB cows	Level of significance
	Mean ± SE	Mean ± SE	
LH (mIU/ml)	0.8251 ± 0.08153	2.481 ± 0.4806	***
FSH (mIU/ml)	4.647 ± 0.7999	17.04 ± 2.743	***
Progesterone (ng/ml)	1.807 ± 0.2148	5.927 ± 0.4219	***
Estradiol (E2)(pg/ml)	82.23 ± 2.402	107.3 ± 6.974	NS

SE=Standard error, ***= highly significant, NS=Non-significant, LH=Luteinizing hormone, FSH=Follicle stimulating hormone.

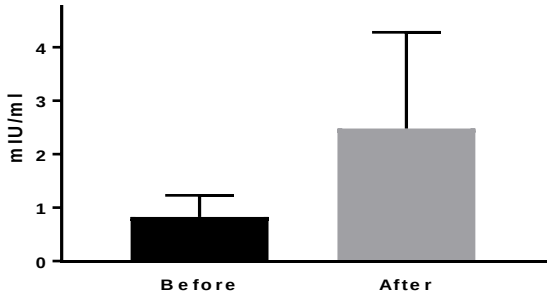

Figure 1. Comparison of mean concentration of LH between before synchronized and after synchronized repeat breeder cows. ***p<0.001. (n=39)

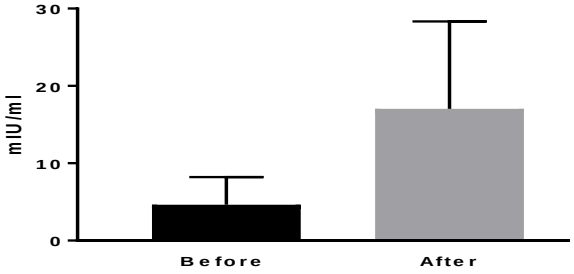

Figure 2. Comparison of mean concentration of FSH between before synchronized and after synchronized repeat breeder cows. ***p<0.001 (n=37)

4. Conclusions

It can be concluded that the level of luteinizing hormone (LH), follicle stimulating hormone (FSH), progesterone was significantly differed between repeat breeder cows and synchronized repeat breeder cows. It may also be inferred from the present findings that synchronized effect might be influence the results of hormonal values. However, more detailed studies s may be needed for drawing a specific inference.

Conflict of interest

None to declare.

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