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Reproductive Problems of Cows at Bangladesh Agricultural University Dairy Farm and Possible Remedies

M.A.S. Talukder, M.A.M.Y. Khandoker, M.G.M. Rahman, M.R. Islam and [1]M.A.A. Khan
Department of Animal Breeding and Genetics,
Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
[1]Dairy Farm Manager, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

Abstract: The reproductive disorders are major causes of reduced fertility in cows that result in failure to produce or delay in producing the total annual calf crop. To identify the reproductive problems of dairy cows of Bangladesh Agriculture University (BAU) dairy farm initially different reproductive parameters in five genetic groups of cows were compiled in this study and 10 cows were identified as less performer. Jersey cross and Holstein Friesian cross were found as the less performer (30% reproductive disorder) followed by Sindhi and Sahiwal crossbred cows (20% reproductive disorder) and Red Chittagong was found as the best performer (0% reproductive disorder). The reproductive records of these 10 cows further taken into consideration and found to be anestrus. The cause of anestrus were further confirmed by rectal palpation and led to the anestrus due to unknown reason (20%) and ovarian abnormalities (80%). The ovarian abnormalities recorded to be as hypoplasia, deformed ovaries and cystic ovaries and their incidence percentages were 30, 20 and 30, respectively. For probable remedies related reproduction management were provided and the incidence (%) of improvement found in Jersey, Sindhi, Holstein Friesian and Sahiwal crossbreds cows were 66.7, 0.0, 33.3 and 100.0, respectively. It is concluded that Red Chittagong cows encountered least reproductive complains in BAU dairy farm. Moreover, Jersey and Holstein-Friesian crosses were found to be more susceptible to reproductive disorders than crosses of Sindhi and Sahiwal cows.

Key words: Reproductive disorder, ovarian abnormalities, hypoplasia, cystic ovaries, anestrus

INTRODUCTION

Reproductive disorder among farm animals is the great economic problems. It is particularly widespread among dairy cattle, but is of lesser significance in the beef breeds[1]. In the sheep and goat, the condition is not a major cause of loss. In cattle it results in failure to produce or delay in producing the total annual life calf crop. It has a negative effect on efficient milk production, since pregnancy and parturition are prerequisite for the initiation and maintenance of lactation. In European and American dairy herds about one third of total cows are culled because of reproductive disturbance. There are a lot of reproductive problems and the causes are also numerous, varied and complicated. Basically, many factors are concerned in successful reproduction. The development of graafian follicle to maturity, the onset of heat, fertile coitus, the expulsion of the ovum from the follicle, its arrest by the fimbria and its meeting in the pavilion of the oviduct with a swarm of virile spermatozoa. Moreover, the passage of fertile ovum along with the oviduct-there undergoing cleavage; the attachment of the blastocyst to the endometrium, the progressive development of foetus and its membranes and finally the expulsion of the full-term foetus with its membranes from the uterus also the factors. If the mechanism is broken down at any point, perfect reproduction will fail and the animal becomes infertile.

The reproductive problems in the female animals are: ovarian dysfunction- the main function of the ovary, the production of ova and secretion of ovarian hormones, are intimately related and directed toward successful reproduction. The ovarian dysfunctions are anestrus, atypical estrus, short estrus, prolonged estrus, split estrus and silent estrus. Ovulatory failure-anovulatory estrus and cystic ovaries. Vaginitis, cervicitis, metritis, endometritis, pyometra are also important reproductive disease which reduced the reproductive herd health[2,3].

Corresponding Author: Dr. M.A.M. Yahia Khandoker, Associate Professor, Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
Tel: +880 91 55695-7 Ext: 2610 Fax: +880 91 55810

Presently a total of about 100 dairy cows are reared at BAU dairy farm and most of the cows are upgraded. At present, the first service conception rate is 44%, number of service per conception is 1.85, pregnancy rate 74% and mortality rate is 4.44%[4]. However, the specific causes related to reproductive problem of BAU Dairy Farm are not studied and their plausible remedies are not suggested yet. In view of the stated facts, the present study was planned to measure the reproductive efficiency of dairy cows at BAU farm; to identify the specific reproductive problem(s) and to suggest possible remedies of the prevalent reproductive problem(s).

MATERIALS AND METHODS

Animals and data used: The information on the reproductive performance of 53 cows of different genetic groups was collected from record books of Bangladesh Agricultural University (BAU) Dairy Farm. The experimental animals were divided into five genetic groups as Local × Sindhi, Local × Sahiwal, Local × Jersey, Local × Holstein Friesian and Red Chittagong.

Parameter studied: An animal reaches age at first service means when an animal able to release gametes and to manifest complete sexual behavior sequences, heat. The age at first service was recorded in days. Similarly service per conception was determined as the average number of service or insemination required for each successful conception. It is also an important indicator of the fertility as well as reproductive efficiency of cows. Gestation length was also calculated as the interval between conceptions to parturition. Records of five to six consecutive gestation lengths on each cow belonging to each genotype were taken into account. Gestation length was recorded in days. Calving interval is defined as the interval between two successive calving. In this study five to six calving intervals were available from six to seven consecutive calving. The length of first calving to the length of second calving constituted the first calving interval. Similarly, the length of second calving to the length of third calving constituted the second calving interval and so on. The calving intervals were recorded in days. Postpartum heat period is defined as the number of days from calving to the first subsequent heat of a cow[5]. The postpartum heat period was recorded also in days.

Statistical analysis: The collected data were compiled and tabulated in proper form for statistical analysis. Calculation of the mean and Standard Error (SE) for each of the parameter and Student's t test were done using computer package SPSS/PC+[6] program.

Rectal palpation profile: The reproductive history of each cow under consideration was monitored. Reproductive parameters such as, age at first service, number of services per conception, gestation length, calving interval, postpartum heat period were taken into consideration for screening the animals. The cows were belonged in reproductive failure group, thoroughly checked and confirmed their specific reproductive problem(s). Rectal palpation examination was done to detect abnormal anatomical deformities of each part of the genital tracts of the cows.

Anestrus was observed regularly either after parturition as postpartum or pre-service anestrus or following service as post-service anestrus. The anestrus condition was observed mainly in heifers due to unknown reason. The condition was confirmed by taking complete history and careful examination of the genital tract by rectal palpation. The actual cause of the anestrus condition is very difficult to explain because some mineral deficiency (iodine, phosphorus etc) is responsible for the anestrus condition.

The vulva was opened by the thumb and indicator finger and the disease condition was observed. The left hand was introduced through the rectum of the cow. Grasped the cervix to feel the thickness, tonacity and to determine other abnormalities. Subsequently, the other part of the reproductive organ such as uterus, horn of the uterus, fallopian tube, ovarian bursa and ovary were also palpated to detect any kind of abnormality in these organs.

In case of cervicitis the external os of the affected cervix appeared edematous and swollen. The external folds were often prolapsed and mucopurulent was found. Prolapse of vagina and cervix involved a prolapse of the floor, the lateral walls and a portion of the roof of the vagina through the vulva with the cervix. Among these tested cows of the experiment no vaginitis and cervicitis condition were found.

Uterus palpations were also done to detect any kind of abnormality. Metritis is the inflammation of the uterus. Where as endometritis is the inflammation of the uterine wall. In most cases of pyometra, the cervix was relaxed and expulsion of pus or pusflexes in the uterine exudates during rectal palpation. Some times the corpus luteum (CL) was present in the ovary. On rectal palpation the uterine wall was not found to be thickend, flaccid and atonic. The condition of pyometra was not found among the reproductive failure animals in this study. The uterine horn was examined for its size and symmetry, consistency, thickness and contents of the wall if any.

Ovaries were palpated to determine the shape, size, consistency and functional status. The ovaries were also

palpated to detect cystic condition. During rectal palpation, the ovary was felt very large in size, having a fluctuating structure on it. The follicular cyst is thinner-walled and the wall is more tense and distended than the softer thicker-walled luteal cyst. The follicular cyst and luteal cyst have the smooth surface, indicating absence of ovulation. Follicular cysts are much more common than the luteal cyst[7]. The luteal cyst wall is thicker due to the presence of a thin lining of luteal tissue. The follicular cyst was confirmed by the rectal palpation and was reconfirmed by examination after 10 days.

Improvement of dairy cows through effective treatment: For probable remedies, the manual rupturing and hormonal treatment (gonadotropin releasing hormone and prostaglandins) were performed and the incidence of improvement was recorded.

RESULTS

Reproductive performances

Age at first service: The Red Chittagong (RC) cows were purchased from unknown sources, so the data of age at first service of RC was not possible to include in this study. The age at first service were found in three genotype of Sindhi, Jersey, Holstein Friesian cross cows. The significantly ($p<0.05$) lowest (943.67 days) age at first service was found in Sahiwal cross cows while highest (1410.50 days) was found in Holstein Friesian cross (Table 1).

Gestation length: The gestation lengths found in genotypes of Shindhi cross, Sahiwal cross, Jersey cross, Holstein-Friesian cross and Red Chittagong were 274.56, 284.96, 274.20, 275.91 and 279.58 days, respectively.

Calving interval: It was observed that calving intervals were 600.20, 409.52, 536.58, 530.87 and 374.73 days in Sindhi, Sahiwal, Jersey, Holstein-Friesian cross and Red Chittagong cows, respectively (Table 1). Statistical analysis showed that no significant variation was found among Sindhi, Sahiwal, Jersey, Holstein Friesian cross and Red Chittagong cows. The lowest calving interval was observed in Red Chittagong cows (374.73 days) though the difference was not reached in significant level.

Service per conception: Statistical analysis showed that the significantly ($p<0.01$) highest service per conception was found in Sahiwal cross (2.37) followed by Holstein Friesian cross (2.09), Sindhi cross (2.04), Jersey cross (1.83) and Red Chittagong cows (1.45) (Table 1).

Postpartum heat period: It was found that the average days of postpartum heat period of Sindhi cross, Sahiwal cross, Jersey cross, Holstein-Friesian cross and Red Chittagong cows were 285.46, 115.41, 223.75, 198.71 and 99.10 days, respectively (Table 1).

Reproductive failure

Clinical examination: Reproductive information of 53 dairy cows was collected from record books of BAU dairy farm. After compiling the data stated above among 100 cows, 10 were screened as less performer and their reproductive profile were confirmed by rectal palpation. The result is summarized in Table 2 and the incidences of various clinical conditions have been summarized in Table 3. The less performer cows were found to be anestrus. The cause of anestrus were further confirmed by rectal palpation and led to the anestrus due to the unknown reason, ovarian abnormalities i.e., hypoplasia, deformed ovaries and ovarian cyst. Out of 10 cows, 2 were confirmed as anestrus and 8 cows were subjected to be ovarian abnormalities. These problems were confirmed as-hypoplasia, deformed ovaries and cystic ovaries. Out of 8 cows, 3 were confirmed as hypoplasia, 2 were in deformed ovaries and 3 were as cystic ovaries.

DISCUSSION

The variation in age at first service among three genotypes of Sindhi, Jersey, Holstein Friesian cross cows might be due to genetic difference though the management of these four genotypes was similar and further investigation would require for more confirmation. The productive and reproductive characteristics of crossbred cows were investigated by Nahar *et al.*[8] and they showed that the mean age at first heat of F_1 heifers of Sahiwal, Sindhi, Jersey and Holstein-Friesian crossbred were 1018.18, 1019, 706.48 and 885.48 days, respectively. They also reported that the age at first puberty of Sahiwal × Local, Sindhi × Local, Jersey × Local and Friesian × Local were 1058.71, 1057.60, 854.4 and 919.6 days, respectively.

The average gestation length ranges between 274.56 to 284.96 days, within the standard gestation length of cows of 285±5 days[7]. The present result supported by the previous observation of Nahar *et al.*[8]. They reported that the mean gestation length of different dairy breeds at BAU dairy farm of Sindhi, Sahiwal, Jersey and Holstein-Friesian cross cows under farm condition were 280.55, 279.81, 279.76 and 279.91 days, respectively.

The findings of lowest calving interval in Red Chittagong cows is really interesting and give an indication that this type of cattle might be more suitable

in our farming condition. Nahar *et al.*[8] observed that the mean calving interval of Sindhi, Sahiwal, Jersey and Holstein-Friesian cross under farm conditions were 451.74, 485.84, 436.28 and 749.41 days, respectively.

The variation of service per conception among the Sindhi, Holstein Friesian and Jersey cross were not reached in significant level. The significantly lowest ($p<0.05$) service per conception was found in Red Chittagong cows (1.45) found to be interesting and further strengthening the previous statement that Red Chittagong might be more suitable in our farming condition. The results of the present study are more or less similar to the findings of Sultana[9] who showed that average number of service per conception of Local, Local × Jersey (F_1) and Local × Friesian were 1.78, 1.96 and 1.68, respectively. Mondal *et al.*[10] stated that the number of service per conception were 1.63, 1.63, 1.60, 1.60 and 1.67 for Jersey cross, Sahiwal cross, Sindhi cross, Holstein-Friesian cross and Red Chittagong cow, respectively

Though the difference of postpartum heat period was not in significant level but again least postpartum heat period was observed in Red Chittagong. From this parameter it is possible to suggest that Red Chittagong and Sahiwal cross cows are suitable to rear in our farming condition. Nahar *et al.*[8] studied that the postpartum heat period varied significantly ($p<0.01$) among different genotypes. They found that postpartum heat period in different genetic group at BAU dairy farm ranged between 113.93 to 150.71 days. The results of these studies are more or less similar with the findings of Rahman *et al.*[11] found that the average postpartum heat period of SL × F (F_1) was 191.40 days. These results also differ with the findings of Majid *et al.*[12] that a little variation in postpartum heat period among different genetic groups but it was statistically non significant.

Reproductive failure

Anestrus: About 20% cows were confirmed as anestrus due to unknown reason. Size and shape of both ovaries seems to be normal and few small follicles were palpated in both ovaries. Regress state corpus luteum (CL) palpated in ovaries but fail to sign of heat. It was the second common cause of infertility among the affected cows. Francos[13] recorded 12% anestrus; Kakar *et al.*[14] were diagnosed 19% anestrus in indigenous cattle. In another study Gonzalez *et al.*[15] observed the 24.7% anestrus in dairy cows. Bulter and Smith[16] proposed that negative energy balance probably depresses ovarian activity by inhibiting pulsatile LH release. Low levels of glucose and insulin during early lactation depress LH pulsatile secretion or act directly on the ovary to depress steroid secretion. Deficiency of mineral-phosphorus and vitamin-A and E cause anestrus. Phosphorus deficiency in range cattle causes depressed sign of estrus[17]. The present results are more or less similar to the findings of Kumar and Kumar[18], Ahmed *et al.* [19], the anestrus condition in dairy cows were recorded to be 30.1 and 29.69%, respectively.

Ovarian abnormalities: Ovarian abnormalities were found in 80% of cows. These problems were confirmed as-hypoplasia, deformed ovaries and cystic ovaries by rectal palpation. Phosphorus deficiency in range cattle causes ovarian abnormalities, which in turn leads to delayed puberty and eventually cessation of estrus[17]. Armstrong[20] reported that stresses may disrupt the hypothalamohypophyseal system, resulting in disruption of the normal pattern of gonadotropin secretion or may alter ovarian function.

Hypoplasia: Hypoplasia was confirmed by the rectal palpation and found in 30% cases. Hypoplasia in both ovaries but few small follicles was palpated. During rectal palpation both ovaries seems to be very small. Ovarian hypoplasia affected animal have infantile reproductive tract and never exhibit estrus. The morphology of the ovary differs from that of seasonal anestrus. Follicles of varying diameter up to the preovulatory size, which commonly are present in the ovaries of anestrus animals, are absent in ovarian hypoplasia. Ovarian hypoplasia tends to be associated with white coat color, being inherited as an autosomal recessive[7].

Deformed ovaries: Deformed ovaries were recorded in 20% cases. Freemartinism, or heifers born co-twin to bulls, have poorly developed ovaries and fail to show estrus, might be one cause of the deformed ovaries.

Cystic ovaries: Cystic ovaries were recorded in 30% cases among the reproductive failure animal group. The cysts were seems to be more than 2 cm in diameter. One or both ovaries contain multiple small cysts or one or more large cysts. These are either follicular or luteal cysts. Follicular cysts undergo cyclic changes, i.e., they alternatively grow and regress but fail to ovulate. Luteal cysts contain a thin rim of luteal tissue, also fail to ovulate, but persists for long period. The cysts were thin walled and feel soft on rectal palpation. Soonwuk *et al.*[21] examined in 800 cows and they observed luteal cyst of 24%, follicular cyst of 10% and persistent CL of 1% and ovarian adhesion 0.6%. Bierschwal[22] found the incidence of ovarian cyst was 11 to 17%. It was confirmed by reexamination after 10 days through rectal palpation of the cows. The present results

Table 1: Reproductive status of five genotypes of dairy cows at Bangladesh Agricultural University (BAU) farm

	Reproductive parameters				
Genotype	Age at first service (Days) Mean±SE (N)	Gestation length (Days) Mean±SE (N)	Calving interval (Days) Mean±SE (N)	Service per conception (No.) Mean±SE (N)	Postpartum heat period (Days) Mean±SE (N)
Sindhi cross	1000.80±70.59** (10)	274.56±1.08** (10)	600.20±39.26** (10)	2.04±0.19 (10)	285.46±25.75** (9)
Sahiwal cross	943.67±210.99* (3)	284.96±5.64** (6)	409.52±29.12** (6)	2.37±0.59** (6)	115.41±25.49** (5)
Jersey cross	1061.00±72.11** (11)	274.20±1.68** (11)	536.58±29.52** (9)	1.83±0.15 (11)	223.75±24.36** (10)
Holstein Friesian cross	1410.50±101.67** (10)	275.91±1.71 ** (11)	530.87±49.22** (5)	2.09±0.25 (11)	198.71±33.22** (8)
Red Chittagong	-	279.58±1.85** (14)	374.73±16.19** (12)	1.45±0.18* (14)	99.10±7.56* (14)

Differed significantly (*, $p<0.05$; **, $p<0.01$) within the column, SE: Standard error

Table 2: Rectal palpation profile of 10 less performed dairy cows and probable treatment at BAU farm

Genotype	Rectal palpation profile	Inference	Treatment	Response
Jersey cross	Size and shape of both ovaries were found normal and few small follicles were palpated in both the ovaries. Regressed state corpus luteum (CL) palpate in right ovaries	Anestrus (due to unknown reason)	Intramuscular injection Gonadotropin releasing hormone (GnRH) 2.5 mL. After 10-12 days 5 mL $PGF_2\alpha$ was injected in same manner. After injection of $PGF_2\alpha$ then the animal was observed for next 72-96h	Positive
Jersey cross	Hypoplasia in both ovaries but few small follicle were palpated both of them	Hypoplasia	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL) for the development of the follicle. After injection of GnRH then the animal was observe for 10-12 days	Positive
Holstein Friesian cross	Ovarian cyst (luteal cyst) in right ovary. Hypoplasia in left ovary	Luteal cyst	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL). After 10-12 days (5 mL) $PGF_2\alpha$ was injected in intramuscularly. After injection of $PGF_2\alpha$ then the animal was observed for 72-96h	Negative
Sindhi cross	Hypoplasia (both ovaries are small in size and follicle not found both them)	Hypoplasia	Gonadotropin Releasing Hormone (GnRH) injected intramuscularly (2.5 mL) for the development of the follicle and then animal was observed for 10-12 days	Negative
Sindhi cross	Hypoplasia in both ovaries, few small follicles were palpated	Hypoplasia	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL). After 10-12 days (5 mL) $PGF_2\alpha$ was injected in intramuscularly. After injection of $PGF_2\alpha$ then the animal was observed for 72-96 h	Negative
Sahiwal cross	Both ovaries seem to be normal. Few small follicles were also palpated but fail to sign of heat	Anoestrus (due to unknown reason)	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL). After 10-12 days (5 mL) $PGF_2\alpha$ was injected in intramuscularly. After injection of $PGF_2\alpha$ then the animal was observed for 72-96 h	Positive
Holstein Friesian cross	Size and shape of the ovary seems abnormal	Deformed ovaries	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL). After 10-12 days (5 mL) $PGF_2\alpha$ was injected in intramuscularly. After injection of $PGF_2\alpha$ then the animal was observed for 72-96 h	Negative
Holstein Friesian cross	Ovarian cyst (luteal cyst) in right ovary. Left ovary seems normal	Luteal cyst	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL). After 10-12 days (5 mL) $PGF_2\alpha$ was injected in intramuscularly. After injection of $PGF_2\alpha$ then the animal was observed for 72-96 h	Positive
Jersey cross	Both the ovaries seem quite abnormal and no remarkable follicles were palpated	Deformed ovaries	Intramuscular injection Gonadotropin Releasing Hormone (GnRH) (2.5 mL). After 10-12 days (5 mL) $PGF_2\alpha$ was injected in intramuscularly. After injection of $PGF_2\alpha$ then the animal was observed for 72-96h	Negative
Sahiwal cross	Ovarian cyst (follicular cyst)	Follicular cyst	Manual rupture of the cyst	Positive

Table 3: The incidence of various reproductive disorders of dairy cows at BAU farm

Reproductive disorder		No. of cases	Incidence(%)
Anestrus		2	20
Ovarian abnormalities	Hypoplasia	3	30
	Deformed ovaries	2	20
	Cystic ovaries	3	30
	Total	10	100

were contradicted with other researcher[23-25]. They found the cystic condition in dairy cows was 3 to 4%. A clinical study on cystic condition of the bovine ovary was performed in two herds of Holstein-Friesian and one herd of Guernsey[22] and found the incidence of ovarian cysts were 11 and 17%, respectively. The result of the

Table 4: Improvement of different genotypes of dairy cows after effective treatment at BAU farm

Genotype	No. of cows screened for reproductive disorder	Incidence of reproductive disorder (%)	No. of cows treated	No. of response	Improvement (%)
Jersey cross	3	30	3	2	66.67
Sindhi cross	2	20	2	0	0
Holstein Friesian cross	3	30	3	1	33.33
Sahiwal cross	2	20	2	2	100
Red Chittagong	0	0	-	-	-

present study was more or less similar to the findings of Kang *et al.*[26]. They examined 60 cattle and recorded inactive ovaries 33.3%, follicular cyst 11.7%, luteal cyst 11.7%, persistent CL 11.7% and cystic corpus luteum 1.7%. When the incidence of ovarian abnormalities considered separately, hypoplasia and cystic ovaries was found in same and high incidentally (30%) and deformed ovaries were found in 20%.

Improvement of dairy cows by effective treatment: The incidence of various reproductive disorders were highly provoked in Jersey and Holstein Friesian crosses (30%) than those of Sindhi and Sahiwal cross (20%). The reproductive disorder was not found in Red Chittagong cows in the present study. When the disordered cows treated for improvement, 100% response was found in Sahiwal cross, followed by Jersey cross (66.7%) and Holstein Friesian cross (33.3%). While the response was not recorded at all in Sindhi cross cows (Table 4).

The reproductive disorders are found to be the major causes of reduced fertility in cow that results in failure to produce or delay in producing the total annual calf crop. From the results of the present study, it became apparent that about 80% of ovarian abnormalities were found among the reproductive disorders and remain 20% was confirmed as anestrus due to unknown reason. Moreover, it was also suggests that the Red Chittagong cows might be suitable to rear in our farming condition. On the other hand, Jersey and Holstein Friesian crosses were found to be more susceptible to reproductive disorders. Effective remedies of reproductive disorder is suggested in Sahiwal cross followed by Jersey cross cows.

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