Original Research Article

A cross sectional study on some aspects of reproduction scenario and prevalence of reproductive disorders in dairy cattle in Bangladesh

Abstract

A cross sectional survey was carried out in dairy herds in four districts of Bangladesh to determine some aspects of reproduction and the prevalence of reproductive disorders that affect the dairy cattle industry. A total of 2850 dairy cows (local 1020; 35.8% and crossbred 1830; 64.2%) were surveyed in 256 local (204; 79.7%) and commercial (52; 20.3%) dairy herds located in Dhaka, Narayanganj, Gazipur, and Manikganj were investigated using interviewer-administered questionnaire survey and face-to face interviews with the owners. Sizes of the dairy herds visited were small (1-5 cows; 47.7%), medium (6-10 cows; 30.5%), and large (≥10 cows; 21.8%). The estrus of most of the dairy herd cows (197/256; 76.9%) were determined by observing signs or taking history from owners. Furthermore, only 26.1% (67/256) of the dairy herds kept reproductive records using a log book or a computer, whereas 32.8% (84/256) of the dairy herds used a reproductive calendar for breeding purposes. The results indicated that 71.5% (146/204) locals were using artificial insemination (AI) for the dairy cows reproduction when classified according to service method while, 73.1% (38/52) commercials were using AI other than natural service (NS), and AI and NS. The use of the Department of Livestock Service (DLS) semen rate was higher 67.2% (137/204) in locals while, Bangladesh Rural Advancement Committee (BRAC) semen rate was higher 61.5% (32/52) in commercials. According to the study's findings, anestrus rates of 8.6% (88/1020) in locals and repeat breeding syndrome (RBS) rates of 9.8% (180/1830) in commercials were the major reproductive issues in the investigated dairy herds, followed by poor heat detection at 5.2%

(54/1020) in locals and anestrus at 4.7% (86/1830) in commercials. Finally, it is recommended that nationwide studies of reproductive characteristics and diseases be conducted, as well as owner education, to establish effective control measures for reproductive management in Bangladesh's dairy cattle industry.

Key Words: Dairy cows, Reproductive disorders, Prevalence, Artificial insemination, Semen.

INTRODUCTION

Livestock's contribution to Bangladesh's gross domestic product (GDP) was 1.9% in 2021-22 (DLS, 2022). Livestock plays a major role in agriculture and livelihoods. Cattle, buffalo, sheep, and goat are mainly considered as livestock animals in Bangladesh. However, dairy farming is an important and potential agricultural sector in Bangladesh. Nearly 85% of the population of the country is engaged in agriculture and livestock sector (Raha 2000). In Bangladesh, there are about 24.7 million cattle, 1.5 million buffaloes, 3.7 million sheep, and 26.7 million goats (DLS 2022) are available as per latest livestock census. Among them the total of 6 million milking cows, 85–90% of them are indigenous and 10–15% are crossbred (DLS, 2013).

Reproduction is a vital factor in determining the efficiency of animal production. In cattle production, good reproductive performance is essential for efficient management and production as a whole. However, successful economy of a dairy farm either large or small scale lies in proper and optimal reproductive rhythm of each individual cow within the normal physiological range. Reproductive and production disorders of dairy cattle significantly reduce their productivity which is of great concern to dairy producers worldwide because most reproductive disorders adversely affect the future fertility. Furthermore, mastitis is a major threat of dairy industry in Bangladesh and its effect on conception rate (Khokon et al., 2017). Poor reproduction performance is a critical limitation factor. It has been reported that reproductive disorders are accountable for huge economic losses to dairy farmers in Bangladesh (Talukder et al., 2005). In European and American

dairy herds, about a third of all cows are culled because of reproductive disturbances (Faruq, 2001). The occurrence of various reproductive disorders is increased in Bangladesh due to introduction of intensive cross breeding programme through artificial insemination (Faruq, 2001; Khair et al., 2013). The occurrence of different reproductive disorders in cows has been reported in Bangladesh by several authors (Shamsuddin et al., 1988; Das et al., 1995). Despite the large number of cattle and their economic importance in Bangladesh, the productivity is low due to the constraints of reproductive disorders, nutrition, poor management, poor performance of local breeds, lack of use of reproductive tools and technologies to manage the disorders. Therefore, the present study was undertaken and designed with the objectives of investigating the prevalence of reproductive disorders and collecting the base line data needed for formulating possible strategies for prevention and control of reproductive disorders.

MATERIALS AND METHODS

Study area

The study covered four districts (out of 64 districts) in Bangladesh; these were Dhaka, Narayanganj, Gazipur, and Manikganj (Figure 1). The dairy herds were randomly selected from different Upazila's among these districts from September 2021 to June 2022.

Study design and animals

Cross-sectional study using questionnaire survey and field visit, was carried out in dairy farms in four districts in Bangladesh. A total of 2850 dairy cows (local 1020; 35.8% and crossbred 1830; 64.2%) were surveyed in 256 local (204; 79.7%) and commercial (52; 20.3%) **(Table1)** dairy herds located in Dhaka (local 31; 15.3% and commercial 10; 19.3%), Narayanganj (local 54; 26.4% and commercial 12; 23%), Gajipur (local 57; 27.9% and commercial 19; 36.7%), and Manikganj (local 62; 30.4% and commercial 13; 25%) (Table2) were investigated using questionnaire survey and face-to face interviews with the

owners. The dairy herds were categorized into small (1-5 cows; 47.7%), medium (6-10 cows; 30.5%), and large (≥10 cows; 21.8%) **(Table1)**.

Questionnaire survey

A total of 256 owners of dairy herds were interviewed face-to-face using close ended questions to ease data processing; minimize variation and improve precision of responses. In the survey, information on reproductive parameters (estrus detection method, reproductive calendar, reproductive records, service methods, source of semen, and breed of semen) as well as reproductive disorders were collected.

Data processing and analysis

Questionnaires were numbered (coded) before processing and the collected data were sorted manually. Data collected on reproductive parameters, prevalence and relative frequency of reproductive disorders were calculated in percentages.

RESULTS and DISCUSSION

A total of 256 questionnaire was obtained to all the dairy herds investigated. Out of the 256 dairy herds visited, 57 were local and 19 were commercial in Gazipur district while, 147 were local and 33 were commercial dairy herds in the other areas (**Table 1**).

A total of 256 dairy herds (Local 204 and Commercial 52) were examined with a maximum of 47.7% (n = 122/256) of small dairy herds categorized against medium and large dairy herds. Of these, 35.8% (n=1020/2850) were locals and 64.2% (n=1830/2850) were crossbred dairy cows (**Table 1**). In Bangladesh, there are about 24.7 million cattle, 1.5 million buffaloes, 3.7 million sheep, and 26.7 million goats (DLS, 2022). Out of the 6 million milking cows, 85–90% are indigenous and 10–15% are crossbred (DLS, 2013). Smallholder producers dominate the dairy sector in Bangladesh. More than 70% of the dairy farmers are smallholders and produce around

70–80% of the country's total milk (Uddin et al., 2012). It is estimated that there are about 1.4 million dairy farms with an average herd size of 1–3 cows (Hemme et al., 2008).

The details on estrus detection methods, reproductive calender and records of these dairy herds are presented in **Table 3**. Most of the dairy herds (n=197; 76.9%) were observing estrus signs or taking history from the herd owner to detect the estrus of dairy cows rather than calling of a veterinarian and using digital technologies. Moreover, 32.8% (n=84/256) of the dairy herds were using reproductive calendar for breeding purposes while only 26.1% (n=67/256) were keeping the reproductive records either by log book or a computer. Detection of estrus in cows may often be difficult due to short periods of standing estrus, silent estrus, changing nutritional regimens, environmental temperatures and estrus onset during the late night to early morning hours (Hasib et al., 2020). There is a report that about 40% of cows remained undetected when they were in estrus in small holding farms in Bangladesh (Shamsuddin et al., 2001).

Of the 256 dairy herds in the study, 71.5% (n=146/204) locals used artificial insemination (AI) for the dairy cows reproduction when classified according to service method while, 73% (n=38/52) commercials were using AI other than natural service (NS), and AI and NS (**Table 4**). Artificial Insemination (AI) is the first-generation reproductive biotechnology that has made a profound contribution to the genetic improvement of the cattle. Failure of cows to become pregnant and the need for repeated AI result to frustration and economic losses of the cattle farmers (Stevenson et al., 1990). Although AI is a widely recognized breeding tool but farmers in Bangladesh are not yet able to adopt it perfectly. This is due to facing some problems while practicing AI at farmers' level. Some of the problems are poor ability to adapt services, low pregnancy rate, poor communication, inability to select the desired breed and to practice AI inappropriate time etc. (Alam, 2005; Paul et al., 2013).

The source of semen for dairy cows reproduction are presented in **Table 5**. The use of Department of Livestock Service (DLS) semen rate was higher (67.1 %) in locals compared with BRAC (21.5%) and Lal Teer (11.2%). On the other hand, BRAC semen rate was higher 61.5% (n=32/52) in commercials compared with DLS 34.6% (n=18/52) and Lal Teer 3.8% (n=2/52). The present

finding is consistent with other investigators where cows inseminated with frozen semen derived from BRAC showed higher (61.6%) pregnancy rate than that of semen derived from DLS (55.0%) (Shikder, 2011).

Moreover, the breed of semen of dairy cows reproduction are presented in **Table 6**. Most of the locals were using Holstein breed 60.2% (n=109/204) semen compared with Sahiwal 37.1% (n=77/204) and Red Chittagong 2.7% (n=5/204) while, 75% (n=39/52), 19.2% (n=10/52) and 5.7% (n=3/52) using in commercials, respectively. The crossbreds and purebreds are mostly in Bangladesh Sindhi,Sahiwal, and Holstein Friesian breeds (Miazi et al., 2007).

Prevalence of reproductive disorders was 21.6 % in locals and 31.4% in commercials in total investigated population. Among the disorders, anestrus was 8.6% (n=88/1020) in locals and repeat breeding syndrome (RBS) was 9.8% (n=180/1830) followed by poor heat detection was 5.2% (n=54/1020) in locals and anestrus was 4.7% (n=86/1830) in commercials (**Table 7**). The other disorders reported in locals included RBS was 2.7% (n=28/1020), dystocia was (n=19/1020), and retained placenta (RP) was 1.1% (n=11/1020) while, poor heat detection was 3.5% (n=65/1830), metritis was 3.1% (n=57/1830), RP was 1.7% (n=32/1830), and dystocia was 1.4% (n=27/1830) in commercials. In addition, less than 1% of local and crossbreed reproductive disorders are detailed in Table 7. Similar prevalence of reproductive disorders in cross-bred dairy cows was reported as post calving anoestrus was 8.6%, delayed puberty was 6.8%, repeat breeding was 5.7%, retained placenta was 4.7%, metritis was 3.9%, dystocia was 3.3%, vaginal prolapse was 2.7%, abortion was 2.1% and uterine prolapse was 1.6% (Alam et al., 2014). Contrasting to the present finding, 23.0% prevalence of reproductive diseases was reported in crossbred cows in Chittagong district (Maruf et al., 2012). Reproductive disorders reported in goats were dystocia (41.2%), abortion (21.8%), mastitis (21.8%), retained placenta (11.8%), and pyometra (3.4%) (Sultan *et al.*, 2015). Similarly, major reproductive disorders in sheep were dystocia (53.7%), abortion (25.0%), pyometra (7.1%), mastitis (7.1%), and retained placenta (7.1%) (Sultan *et al.*, 2015). The occurrence of anoestrus was 6.79%, which was lower than that (26.52%) observed in South West

Ethiopia (Bitew and Prasad, 2010), and 27.73% cases of retained placenta reported in Karan Fries cows (Satya Pal, 2003). Other researchers reported lower incidence of retained fetal membrane (0.31%, 1.47%, 8.28%, and 7.84% respectively) (Shamsuddin *et al.*, 2010). The occurrence of metritis was recorded 25.57% in South West Ethiopia (Molalegne and Shiv, 2011). Retained placenta is an important post-parturient problem in cattle farming. The prevalence of RP was 12% even in normal delivery, which was about 63% of the RP on 750 calvings on the Savar dairy farm (Shamsuddin et al., 1988). The incidence of repeat breeding in the present studies was 3.20% which was lower than the findings in Ethiopia (Getachew and Nibret, 2014). Similarly, communal use of bulls for natural services is also considered as contributing factor reported 5% repeat breeding cases (Shamsuddin et al., 2010). The prevalence rate of pyometra 0.2% recorded in this study is lower than the prevalence rate of 8.2% observed in Savar dairy farm (Shamsuddin et al., 1988). A 47.7% of dairy cows were having at least one of the reproductive problems observed by (Benti and Zewdie, 2014) in indigenous Borena breed cows in Borena zone in Southern Ethiopia. Contrasting to the present finding, 39.4% prevalence of reproductive disorders was reported in cross-bred dairy cows at Ullapara upazila under Sirajganj district (Alam et al., 2014). Haile et al. (2014) recorded 43.07 % of cows were found to be affected either with one or more of reproductive problems. Variation in the prevalence of reproductive disorders in the dairy industry between studies may be due to variation in dairy herd management and agroclimatic conditions in the regions.

CONCLUSION

This study revealed a wide variety of reproductive parameters and reproductive disorders affecting local and commercial dairy industry in Bangladesh. The situation calls for further investigations in both crossbred and local breed of dairy cows to determine causes, economic impact, and appropriate control strategies under different management systems.

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Table 1. Study areas and categories of dairy herds investigated

Locality	Number of dairy herds investigated			
	Local	Percentage (%)	Commercial	Percentage (%)
Dhaka	31	15.3	10	19.3
Narayanganj	54	26.4	12	23
Gazipur	57	27.9	19	36.7
Manikganj	62	30.4	13	25

Table 2. Frequency table showing the characteristics of the dairy herds visited

Types of dairy Herd	Local	204	79.7%
	Commercial	52	20.3%
Herd Size	Small (1-5)	122	47.7%
	Medium (6-10)	78	30.5%
	Large (≥10)	56	21.8%
Dairy Cows	Local cows	1020	35.8%
	Cross-bred	1830	64.2%

Table 3. Reproductive aspects of dairy herds reported by the participants.

Estrous detection	History/Signs	197	76.9%
	Veterinarian observation	57	22.3%
	Digital technologies (Ultrasound, CCTV camera etc) observation	2	0.8%
Reproductive calendar	Yes	84	32.8%
	No	172	67.2%
Reproductive records	Log book	48	18.7%
	Computerization	19	7.4%
	None	189	73.9%

CCTV: Closed circuit camera

Table 4. Dairy cows service methods reported by the participants

Number dairy herds	Type of dairy herds	AI only	Percentage (%)	NS only	Percentage (%)	AI and NS	Percentage (%)
204	Local	146	71.5	23	11.2	35	17.1
52	Commercial	38	73.0	0	0	14	26.9

AI: Artificial insemination; NS: Natural Service

Table 5. Sources of semen used for insemination of the dairy cows

Type of dairy herds	Number dairy herds	DLS	Percentage (%)	BRAC	Percentage (%)	Lal Teer	Percentage (%)
Local	204	137	67.1	44	21.5	23	11.2
Commercial	52	18	34.6	32	61.5	2	3.8

DLS: Department of Livestock Service; BRAC: Bangladesh Rural Advancement Committee

Table 6. Breeds from which semen used for insemination were sourced

Type of dairy herds	Number dairy herds	Holstein	Percentage (%)	Sahiwal	Percentage (%)	Red Chittagong	Percentage (%)
Local	181	109	60.2	77	37.1	5	2.7
Commercial	52	39	75	10	19.2	3	5.7

Table 7. Types and prevalence of reproductive disorders in the dairy cows

Dairy cows	Breed of Cows		Reproductive disorders	Affected cows		Prevalence (%)	
	Local	Crossbred		Local	Crossbred	Local	Crossbred
2850	1020	1830	Anoestrus	88	86	8.6	4.7
			Repeat breeding	28	180	2.7	9.8
			Metritis	9	57	0.8	3.1
			Retained placenta	11	32	1.1	1.7
			Early embryonic death	7	13	0.7	0.7
			Poor heat detection	54	65	5.2	3.5
			Ovarian cyst	0	7	0	0.3
			Uterine prolapsed	0	12	0	0.6
			Vaginal prolapsed	1	7	0.09	0.3
			Still birth	0	12	0	0.6
			Abortion	1	8	0.09	0.4
			Fetal mummification	1	5	0.09	0.2
			Dystocia	19	27	1.9	1.4
			Pyometra	4	9	0.3	0.4
			Ovarian tumor	0	1	0	0.05
			Cervicitis	0	4	0	0.2
			Sulphingitis	0	3	0	0.1
			Ovobarsal adhesion	1	2	0.09	0.1
			Ovarian atrophy	0	3	0	0.1
		Total		**309**	**533**	**21.6**	**31.4**

Figure 1. The map of the study area (Modified from https:// www. google. com. bd/ search? Black circle: 1Dhaka, 2Narayanganj, 3Gazipur, and 4Manikganj)