Research Article

Occurrence and risk factors of repeat breeding on household dairy cows of Hathazari in Chattogram

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ABSTRACT

Repeat breeding is one of the important problems in dairy sector of Bangladesh causing economic loss due to reduced production and additional cost on management of cows. This study was conducted to estimate the occurrences of repeat breeder and its frequency distribution in household dairy cows. Total 120 cows from 15 selected households in Hathazari Upazilla, Chattogram during January to March 2018 were considered for this study. Repeat breeding defined as cows less than 10 years old failure to conceive after 3 or more regularly successive services (AI/Natural) in the absence of detectable abnormalities. Households were selected with the history of cow(s) failure to concept even after three or more regular services without any detectable abnormality. Cow's level factors, households level factors and few organisms in uterine environment were studied as risk factors on repeat breeding.The results revealed25 % (N=120) repeat breeder cows in the household dairy. Cows level factors find out that aged with >6-8 years (33%) and having uterine infection (52%) had significantly influenced the occurrence of repeat breeding. In regards of household level factors, minimum level of farmer's education, poor drainage system and dirty cows were influenced (P≤0.05) repeat breeding cows. Uterine fluid bacteriological culture showed that *Staphylococcus* spp. (76%) and *E. coli* (13%) were commonly found in repeat breeder cows.

1. INTRODUCTION

Hathazari is a big livestock populated upazilla in Chattogram division consisting 78371cattle population. Household dairy farming is an important source of income for farmers particularly in peri-urban area in this upazilla. The dairy industry in Hathazari, significantly contribute in agricultural GDP (16.77%) and provide livelihoods and incomes for people (BBS, 2007). However, despite its increasing productivity and economic importance, a large number of household dairy cows in this upazilla suffering from repeat breeding problem leading to infertility (personal communication). This infertility ultimately makes a gap between dairy production and people's demand in this rapid changing life. It has been reported that reproductive disorders are responsible for remarkable economic losses to the dairy farmers in Bangladesh (Talukder et al., 2005) and a large number of repeat breeding cows at field level considered as one of the emergent reproductive disorder. A repeat breeder is generally defined as any cow that has not conceived after three or more services, has normal estrus cycle, is free from palpable abnormalities, shows no abnormal vaginal discharges, has calved at least once before and is less than ten years oldis a costly problem for the dairyproducer (Gustafsson and Emanuelson, 2002).

The incidence of repeat breeding in dairy cows ranges from 3 to 10% is worldwide. One of the studies showed that overall prevalence of repeat breeder cow in commercial dairy farm of Chattogram was 11.3% (Nath et al., 2014).The occurrence of repeat breeding in India was 37.4% among the reproductive disorders (Singh

et al., 1996). In Swedish dairy cattle has 10.1% repeat breeding and the cause was multifactorial involving a number of extrinsic factors as well as intrinsic factors associated with individual animals (Gustafsson and Emanuelson, 2002). Usually about 9-12% cows are expected to be repeat breeder in a herd with normal fertility (Reneau and Conlin, 1985). Reproductive inefficiency of cattle due to repeat breeding syndrome is an expensive hitch in profitable dairy production as the inter calving interval is extended by delayed conception. Repeat breeding clearly increase the calving interval and as the calving interval increased, the milk production also reduces because of their reverse relationship. The twelve-month calving interval is advantageous for maximal milk yield per cow per year with good economic return (Opsomer et al., 1996).

There are many reasons for the repeat breeder syndrome. Researchers are trying to detect the causesof repeat breeding but none can identify a specific cause. Generally, non-specific infection of the genitalia is considered to be the main cause of repeated conception failure (Singh et al., 1996). Fertilization failure and early embryonic death are the major causes of repeat breeding those are influenced by ovulatory failure, uterine infection, genetics, error in estrus detection, improper timing of service. When artificial insemination is used, some of the animals might have been inseminated at wrong time (Shamsuddin et al., 2001) leading to increased proportion of repeat breeding in Bangladesh. Moreover, Jainudeen and Hafez (2000) reported higher incidence of repeat breeding in dairy herds using artificial

insemination than that used natural services. Further, many risk factors such as breed of cows, herd body condition score (BCS), number of breedable cows in each farm may influence the occurrence of repeat breeding in population. Poor farm management, chromosomal aberrations, hormonal imbalance, anatomical defects of reproductive tract, improper timing of insemination, inadequate estrus detection, improper semen handling, infertile bulls, poor nutrition and heat stress etc. all are non-infectious causes (El-Khadrawy et al., 2011). Microbes sometime which are normal commensals may produce a marked change in pH of uterine and vaginal secretions, inflammation uterine mucosa and thereby interfere with the implantation of fertilized egg (Singh et al., 1996). Till now, there is a lack of study in Hathazari with household cows regarding repeat breeding. Considering these situations, this study was designed to assess the occurrences of RB in household cows, analyze the potential risk factors and identify the bacterial flora in the uterine sample.

2. MATERIALS AND METHODS

Study areaand selection of cows

The study was conducted in household dairy cows at Hathazari, Chattogram, Bangladesh during January to March 2018. A total of 120 cows from 15 households were selected in this study. Households were selected on the basis of simple randomization, history of conception failure and owner's cooperation. Cows were considered as repeat breeder on the basis of criteria including not conceived after three or more consecutive services, normal estrus cycle, free from palpable abnormalities,

shown no abnormal vaginal discharges, calved at least once before and less than ten years old. Before selection of cow as repeat breeder, history of the individual cow and other information were collected and recorded from record book. Physical examination and rectal palpation was performed to observe the uterine and ovarian state and data recorded. Household hygienic score was estimated by Schutz et al. (2019).

Questionnaire design and datacollection

A standard questionnaire was developed to record data regarding household, cow's level factors and uterine sample collection. Individual cow's level factors; age, lactation number and events during gestation and around parturition period were included in the questionnaire to observe if they have risk on repeat breeding. Farmer's educational status, drainage system, cow's hygienic score, feed, person involved in AI and method of retained placenta management information were also set upon the questionnaire studied as the risk factors of repeat breeding in households. The questionnaire was designed to comprise mostly closed and open ended face to face questions to ease data processing, minimize variation, and improve precision of responses.

Animal examination and rectal palpation

A complete clinical history of individual selected cow and household was taken and data was recorded. Physical examination and rectal palpation of reproductive tract in individual selected cow was done to ensure the cows were free from any abnormality.

Uterine sample collection and culture for bacteria

Uterine samples were drawn from repeat breeder cows with the help of a sterilized intrauterine catheter connected to a syringe containing 30-40 ml of sterile saline. It is deposited into the uterus and then removed giving negative pressure during the estrous period. Before taking uterine samples from cows, the perineal region thoroughly clean with normal water and iodine solutions. After collection of samples were promptly transferred into sterilized 10 ml test tube and brought to laboratory in an ice box maintaining 4°C temperature. Each sample of uterine mucus inoculated in Nutrient agar (NA) and Blood agar (BA) to promote growth of bacteria. The colonies on primary cultures were repeatedly sub-cultured by streak-plate method (Cheesbrough, 1985) until the pure culture with homogenous colonies were obtained. Media such as NA, BA, Eosin methylene blue, Mannitol salt agar were used for these repetitive sub-cultures. The aerobic culture plates were incubated at 37°C in bacteriological incubator for 72 hours. The cultural examination of uterine discharge for bacteriological analysis was done according to the standard methods (Cowan, 1985).A tentative identification of bacteria was done based on colony morphology, Grams staining and

biochemical test (Farin,1989; Cruickshank et al., 1980; Behera et al., 2017).

3. RESULTS

The frequency of RB in household dairy cows was represented in Table 1. A total of 120 cows were surveyed from 15 households. The frequency of RB was 30 (25%) where 90 (75%) found normal.Age, lactation number, gestation and previous peri-parturient events were studied and the results revealed that the cows those were belonging more than 6-8 years old (33.92%) andduring postpartum period they were suffering from peri-parturient events like uterine infection (52.38%) had significant effect on RB syndrome. The cows with the aged >5-6 yrs old (12.5%) and normal delivery (4.77%) showed lowest effects on RB syndrome. Lactation number had no significant effects on RB syndrome ($p \geq 0.05$) (Table 2).In this study, farm level data revealed that educational status of owner ($p \leq 0.05$), drainage system ($p \leq 0.03$), hygienic score of farm ($p \leq 0.02$) were identified as risk factors for occurrence of RB. Nature of feed offered ($p \leq 0.07$), frequency and time of feeding ($p \leq 0.17$), amount of green grass offered (Kg)/day ($p \leq 0.27$), person involved to insemination ($p \leq 0.17$), techniques followed for retained fetal membrane management ($p \leq 0.39$) have no significant effect on RB (Table 3).

Table 1: The frequency of repeat breeding in household dairy cows

No of cow	Category	Frequency	% (95% CI)
N= 120	Normal	90	75 (66-81)
	Repeat Breeder (RB)	30	25 (18-33)

Table 2. Association between repeat breeding and cow level exposures

Factors	Category	Repeat Breeder (%)	Normal (%)	P value
Age	Up to 4 year	7 (21.87)	25(78.13)	0.05
	>5-6 years	4(12.5)	28(87.5)	
	>6-8 years	19(33.92)	37(66.07)	
Lactation	1st	8(29.63)	19 (70.37)	0.35
	2nd	7 (19.45)	29 (80.55)	
	3rd	15 (22.39)	42 (73.68)	
Gestation and Peri-parturient events	No event	3 (4.77)	60 (95.23)	0.01
	Dystocia	12 (50.00)	12 (50.0)	
	Uterine infection	11 (52.38)	10 (47.61)	
	Abortion	4 (33.33)	8 (66.67)	

Table 3. Association of risk factors for repeat breeding in household dairy cows

Factors	Category	Repeat Breeder Frequency (%)	Normal Frequency (%)	P value
Educational Status	Up to secondary	10 (41.66)	14 (58.33)	0.05
	Higher secondary	7 (31.82)	15 (68.18)	
	Graduate	13 (17.58)	61 (82.42)	
Drainage system	Good	7 (11.86)	52 (88.14)	0.03
	Moderate	15 (34.88)	28 (65.12)	
	Poor	8 (44.44)	10 (55.56)	
Hygienic score of cows	Clean	14 (16.67)	70 (83.33)	0.02
	Dirty	16 (44.44)	20 (55.56)	
Nature of feed offered	Concentrate with irregular roughage	24 (24.24)	75 (75.76)	0.17
	Green grass with irregular concentrate	6 (28.57)	15 (71.43)	
Frequency of feeding	Twice	11 (21.15)	41 (78.85)	0.17
	Thrice	19 (27.95)	49 (72.05)	
Amount of green grass offered (Kg) /day	Up to 15	14 (35.00)	26 (65.0)	0.27
	≥ 15	16 (20.0)	64 (80.0)	
Person involved in insemination	Govt. technician	24 (25.81)	69 (74.19)	0.17
	Private technician	6 (74.19)	21 (77.78)	
RFM management	Hormonal	14 (35.90)	25 (64.10)	0.39
	Manual removal	16 (19.75)	65 (80.25)	

Primarily diagnosed repeat breading cows were considered for isolation of organisms from uterine sample collected. Out of 30 uterine samples, 76% and 13% cows showed 2 bacterial isolates was *Staphylococcus* spp. *and E. coli,* respectively.

4. DISCUSSION

The occurrence of repeat breeding in household dairy cows in this study was 25% out of 120 cows. The factors related with individual cow as well as household were significantly influenced to make a cow repeat breeder. Aged cows >6-8 years old, history of peri-parturient event like uterine infection were the factors concerning with cows had positively influence repeat breeding. Similarly, comparatively minimum level of academic qualification of owners, poor drainage system of the farm and dirty cows indicating household risk factors in this study were significantly forced the cows towards repeat breeding.

This research find out that 25% repeat breeding in household dairy cows which was unexpected as about 9-12% cows are might be expected to repeat breeder in a herd with normal fertility (Reneau and Conlin, 1985). However, one of the research finding showed that 23% prevalence of RB in dairy cows (Khaja et al., 2012) close to the findings of present study. On the other hand, Sarder et al. (2010) reported 20.2% incidence of RB which was slightly lower than the current findings. The variations might be due to the measures used to define RB, study design, difference in geographical location, agro-climatic zones and individual variations. The study identified age as a potential risk factor for repeat breeding which is similar to the findings of Gani et al. (2008) reported that repeat breeding is more prevalent in cows those were in 7 years old. Though the study proved that the aged cows >6-7 yrs old were more prone to repeat breeding. However, the younger cows (up to 4 years old) showed higher percentages of repeat breeding (21.87%) compared to the cows were aged >5-6 years old (12.5%). The causes of higher percentages of repeat breeding in younger group household dairy cows were not clearly understood. However, it could be due to struggling of the first calving growing heifer with nutritional deficiency. The present study also found, the cows those were have had periparturient events they were significantly affected by repeat breeding (p<0.05) syndrome. It was reported that periparturient events act as a risk factors having repeat breeding in cows (Bonneville-Hebert et al., 2011; Gustafsson and Emanuelson, 2002).Other events like dystocia during parturition and abortion also influenced the household cows to occurrence of repeat breeding compared with the cows have had no any event around the parturition or during gestation period. Cows with the history of incident or accident during gestation and/or in and around parturition may lead to repeat breeding even they have apparently recovered from those reproductive disorders. It is hypothesized that previously infected cows may carry some infection which were changed the uterine environment was not suitable for early embryo. Abortion and dystocia were the major reproductive disorders impaired the function of reproductive system fail to produce a calf regularly in dairy cows (Mekonnin *et al*., 2015).

Farmers require ongoing emerging education to help their farm sustainable. There are many important criteria need to know the farmer to remedy repeat breeding in the farm including estrous detection, time of AI, cow's nutritional management etc. and an array of other

skills and fields that affect farm or cow operations. Because farm or household level factor is another important issue which may cause repeat breeding leading to infertility ultimate economic loss (Lafi et al., 1992 and Bartlett et al., 2086). Prihatno et al. (2012) reported the level of farmer's education influenced the incidence of repeat breeding. In this studyit was observed that poor level of owner'seducation significantly affect on their cows made repeat breeding (P≤0.05). Owner's those had up to secondary school certificate their cows were suffering more (41.66%) due to repeat breeding. Comparatively less number of cows (31.83% and 17.58%) were detected in repeat breeding in the household dairy farms those owners had higher secondary and graduate certificate, respectively in this study. These results clearly indicated that higher educated farmers need to require for reducing the incidence of repeat breeding cows in household dairy.

Hygienic score of cows (dirty) is one another most important risk factors influenced significantly to occurrence of repeat breeding (44.44%) in household dairy cows. Similar number of cows was also affected (44.44%) by poor drainage system. Prihatno et al. (2012) reported the worst drainage system of the farm affected the cows to repeat breeder. This study showed that type of feed (concentrate plus roughage irregular or green grass plus concentrate irregular), frequency of feeding (twice or thrice per day), amount of green grass (up to 15 kg or <15 kg per cow per day) offered had not found any significant effect (p≥0.05) on repeat breeding. Similar statement was also reported by other researchers (Celik et al., 2009 and Asaduzzaman et al., 2016).

However, nutritional management has significant effects of fertility of cows (Rogers, 2001). Study design, farm management, sample size of the experimental animals might be the reasons behind non significant effect of feed related parameters on repeat breeding study. Generally it is defined that skill of AI technicians has an effect on repeat breeding. This results showed that, person involved either governmental or private AI technician to AI the cows was not any significant effect on repeat breeding. This finding positively guides us to say that level of skill of AI technician in different organizations in our country is similar.

Usually uncomplicated retained fetal membrane is not harmful to the animals. However, cows with retained placenta may risk to unnoticed uterine infection lead to repeat breeding. In the field, frequently it has been observed that animal handlers removing uncomplicated retained placenta manually with inconveniently. We thought that this type of management for retained placenta in cows increasing the occurrence of repeat breeding in household dairy. Beside this manual removal, hormonal treatment is also popular to treat the retained placenta in cows in our country. However, management practice (hormonal and manual removal) of retained fetal membrane at households' dairy had not any effect to repeat breeding in this study. Our study was supported by their similar findings of others (Matubber et al., 2018; Asaduzzaman et al., 2016). Bacteriological examination of uterine mucous showed *Staphylococcus* spp. (77%) and *Escherichia coli* (13%) in repeat breeder cows. Recently, endometritis becoming a matter of

concern in repeat breeder cattle (Sharma and Singh, 2012). *E. Coli* Spp. and *Staphylococcus* spp are the common opportunistic bacteria were identified in repeat breeder cows (Ahmadi et al., 2007 and Ahuja et al., 2017).

5. CONCLUSIONS

The study results concluded that occurrence of repeat breeding in household dairy in Hathazari, Chattogram was high. Cow's level factors like comparatively older cows and history of uterine infection in last peri-parturient period were act as risk for repeat breeding. The household factors such lower level of farmers' education, poor drainage system and dirty cows influenced repeat breeding. *Staphylocoocus* and *E.* coli were found in uterine environment in repeat breeding cows. Further study should be conducted to culture sensitivity with molecular identification of isolates bacteria in repeat breeding cows towards standard management.

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