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Fertility and parasitic infestation of Red Chittagong cattle

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Abstract

Fertility of Red Chittagong bulls (RCB) using Non-Return Rate (NRR), reproductive efficiency of Red Chittagong cows (RCC) using pregnancy rate and number of services per pregnancy and parasitic infestation of two different ages and sexes were studied. The NRR ranged from 53.1% to 70.6% with an overall mean of 63.9%. Overall pregnancy rate was 65.8% and about 1.4 services were required per pregnancy. Overall 47.7% animals were infested with parasites. Five species of parasites were detected in the faeces: *Balantidium coli* (40%), *Paramphistomum* spp (47.7%), *Fasciola* spp (5.8%), *Coccidia* spp (4.5%), and Moniezia spp (1.9%). The prevalence of parasites in animals over four years age was higher ($P<0.05$) than in animals below four years of age: the prevalence was higher in female than in male hosts ($P>0.05$). (*Bangl. vet*. 2010. Vol. 27, No. 2, 74 – 81)

Introduction

The profit of a dairy farm depends on the production of calves and milk. Calving interval, age at puberty, services per pregnancy and interval to onset of post-partum heat are considered important parameters to measure farm economy (Azizunnesa, 2002). Low production of dairy cows may be due to their poor genetic make-up, inadequate feeding and disease control and harsh environments (Jabber and Green, 1998; Shamsuddin, 1988). The cattle of Bangladesh are mostly non-descript indigenous type and among these Red Chittagong cows (RCC) is an important resource, having characteristics of small size, regular breeding, and good adaptability in hot humid climate (Habib *et al.*, 2003).

In order to evaluate the fertilizing capacity of bull spermatozoa, at least 525 cows are to be inseminated and after 60 days non-return rate (NRR) of the bulls can be calculated (Willett and Salisbury, 1942). Payne (1970) suggested that (NRR) is a useful method of expressing fertility of bulls in Artificial Insemination (AI) programmes. The climatic conditions in Bangladesh favour parasites. To improve productivity of Red Chittagong Cattle (RCC), it is necessary to investigate the parasitic infestation and fertility.

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Materials and Methods

Individual records of animals of RCC nucleus herd and AI centre of the Bangladesh Agricultural University were used. The reproductive performance of 52 RCC and six RCB was collected from the record books. Results of faecal samples examination of RCC nucleus herd were used to identity parasitic infestation. NRR, pregnancy rate, services per pregnancy and parasitic infestation were studied using standard procedures. Fertility of bulls was measured as the percentage of cows that did not return to oestrus by 60 days after AI. Cow's fertility was measured from the number of cows found pregnant divided by total number of animals served. Pregnancy was confirmed by rectal examination at 60 days after AI. The following formulae were used :

$$(1)\ \text{Non return rate of bull (\%)} = \frac{\text{Cows not returned to oestrus within 60 days}}{\text{Total number of cows inseminated by the bull}} \times 100$$

$$(2)\ \text{Pregnancy rate (\%)} = \frac{\text{Number of animals found pregnant}}{\text{Total number of animals served}} \times 100$$

Faecal samples of all RCC animals were collected at six-month intervals. About 10-20g fresh faecal samples were directly collected by inserting the hand in to the animal's rectum: samples were put into polythene bags with 10% formalin solution and refrigerated until examination. The quantitative estimation of faecal eggs or cysts of *Balantidium coli*, ova of *Paramphistomum* and other parasites were done by employing 'Modified Stoll's Dilution Technique' as described by Soulsby (1982). In brief, three grams of well-mixed faecal sample were put into a 100 ml beaker containing 42 ml of water, some glass beads were added to it. Then it was thoroughly mixed with a stirrer. The mixture was then strained with a coffee strainer, shaken well and 0.15 ml was taken using one ml special pipette and put on glass slide and covered with cover slip. Care was taken to avoid bubble formation. The slide was then examined under microscope and eggs were identified on the basis of morphological features and counted. The counts were made from each sample and the total number of eggs of parasites found in the slide was multiplied by 100 to get the eggs per gram of faeces (EPG).

Statistical analysis

The data generated were entered into Microsoft Excel Worksheet. Descriptive statistics were performed to calculate mean, standard error of mean and percentage. One-way Analysis of Variance (ANOVA) was done. All statistical analysis was performed using SPSS (Statistical Package for Social Sciences) in Windows package.

Results and Discussion

Non-Return Rate (NRR %) of Bulls

The 60-day NRR rate of different RCB were estimated between 53.1 ± 11.6 to 70.6 ± 11.4 % with an overall mean of 63.9%. Almquist *et al.* (1954) reported NRR for high fertility bulls from 65 to 74% and for low fertility bulls 52 to 65%. Schaeffer (1993) reported the value of this trait ranging from 52.1 to 75.7% for exotic dairy breeds of different ages. Our results were slightly lower than those of Almquist *et al.* (1954); Schaeffer (1993). Williamson *et al.* (1978) reported NRR to first insemination from 58.2 to 69.3% for dairy herds in Victoria. Fryer *et al.* (1958) reported the value of this trait ranging from 44 to 71% in different ages of reputed exotic dairy breeds. Our results were within the range of Williamson *et al.* (1978); Fryer *et al.* (1958). The variation among different authors might be due to small sample and poor management. Non-return rate was largely dependent on the management, number of services, age and environment.

Pregnancy rate

The average pregnancy rate of RCC was 65.8 ± 4.5% (n = 94). Gaur *et al.* (2002) found pregnancy rate 54% for cows and 46% for heifers in Ongole cattle in India, which was lower than this study. The pregnancy rate depends on genetic and non-genetic factors including the cow herself, semen quality, time of insemination, proper heat detection efficiency on skill-ness of inseminator. Das *et al.* (1990); Rodriguez and Hernandez (1992) found significant variations in pregnancy rate when cows were inseminated at different times after the first sign of heat. The pregnancy rate of cows markedly reduced when a higher ambient temperature prevailed for two days before insemination to 4-6 days after insemination (Gwazdauskas *et al.,* 1975). Higher environmental temperature and relative humidity and poor management affected fertility of cattle (Zakari *et al.,* 1981).

Number of services per pregnancy

The mean number of services per pregnancy in RCC was 1.4 ± 0.06 (n = 94), which was lower than other crossbred cows: these results agree with the findings of Islam and Bhuiyan (1997); Singh *et al.* (1997). The latter reported services per pregnancy of 1.2 (± 0.2) in Jersey cross cows (JR), 1.4 (± 0.2) in JR × SN (Sindhi) and 1.5 (± 0.1) in PM (Pabna Milch) × SL (Sahiwal), 1.2 (± 0.1) in ¼ PM × SL cows at Baghabarighat milk-shed area of Bangladesh. Sultatna (1995) showed the number of services per pregnancy of Local, Local × Jersey (F_1), and Local × Friesian was 1.8, 2.0 and 1.7, respectively. Nutritional status of cattle, management, poor heat detection and efficiency of inseminator play a vital role for this trait. Shiferaw *et al.* (2003) found that cows with reproductive disorders required more services for pregnancy. Proper and accurate heat detection is a key to efficient reproduction and four to five checks each day to determine the sign of standing heat gives a better idea when to inseminate.

Parasitic infestation

A total of 155 faecal samples from cattle of different ages and both sexes were examined from August 2006 to September 2008. The overall prevalence of parasitic infestation was 47.7%.

A total of five different parasites were detected (Table 1): *Balantidium coli* (40%), *Paramphistomum* (47.7%), *Fasciola* (5.8%), *Coccidia* (4.5%) and *Moniezia* spp. (2.0%). The overall mean EPG was maximum for *Balantidium coli* (267.7) followed by *Paramphistomum* (127.7), *Moniezia* (50.0) and *Fasciola* (47.2). The overall mean Oocyst per gram (OPG) for *Coccidia* was 96.4. Sardar *et al.* (2006) reported maximum prevalence for *Paramphistomum* (45.3%) followed by *Fasciola* (25%) and *Moniezia* (8.3%) for native cattle in Mymensingh, which partially agrees with this study. According to the report of Garrel (1975), 83.7% cattle were suffering from parasitic infestation in Bangladesh. In India, Bhattacharyya and Ahmed (2005) and Singh *et al.* (2008) recorded the incidence of gastrointestinal helminths of 65.2% and 80.0%, respectively. In Japan, Nakazawa (1986) found 79% cattle with gastrointestinal helminths. The variation in prevalence of parasites among different workers could be due to environment, feeding, management, and genetic variation in host resistance.

Table 1. Prevalence of parasitic load in Red Chittagong cattle

Name of parasite	N	Prevalence (%) n =155	Egg per gram of facees (Mean ± SE)
Balantidium coli	62	40.0	267.7 ± 38.7
Paramphistomum spp	74	47.7	127.7 ±10.5
Fasciola spp	9	5.8	47.2 ± 13.5
Coccidia spp	7	4.5	96.4 ± 14.9
Moniezia spp	3	2.0	50.0 ± 0.0

Age had a significant effect ($P<0.05$) on the prevalence of parasites: young animals were more susceptible than adult except *Fasciola* and *Coccidia*.

In animals under four years 42.6% were infested with parasites (Table 2). Prevalence of *Paramphistomum* (51.5%) and *B. coli* (40.9%) were highest followed by *Fasciola* and *Coccidia* (both 3%) and *Moniezia* (1.5%). The highest parasitic infestation was found for *Coccidia* (113) followed by *Paramphistomum* (70), *B. coli* (60), *Moniezia* (50) and *Fasciola* (38). In adult cattle (>4 years) 57.4% were infested. The highest rate of infestation was *Paramphistomum* (45.0%) followed by *B. coli* (40%), *Fasciola* (8%), *Coccidia* (6%) and *Moniezia* (1%). The highest parasitic infestation in that age was found for *B. coli* (355) followed by *Paramphistomum* (177), *Coccidia* (90), *Fasciola* and *Moniezia* (both 50). Age had significant ($P<0.01$) effect on the prevalence of *B. coli* and *Fasciola*. Prevalence of *Paramphistomum* varied significantly ($P<0.01$) in both young

and adult animals. The animals below four years of age had a higher prevalence of *Paramphistomum*, *B. coli* and *Moniezia* and for a lower prevalence of *Fasciola* and *Coccidia* than did animals of more than four years. Sardar *et al.* (2006) recorded higher prevalence of *Fasciola* and lower prevalence of *Moniezia* with age, which coincides with this study, but differs with regard to *Paramphistomum*. Adult livestock had higher overall prevalence than young cattle (Ibrahim *et al.,* 2008), which was consistence with the present findings.

Table 2. Prevalence of different parasites according to age

Age	No.	Parasite	Prevalence (%) n = 155	Egg per gram of facees (Mean ± SE)
<4 Years	66	*Paramphistomum* spp	34 (51.5%)	69.9 ± 10.3
		B. coli	27 (40.9%)	59.7 ± 8.6
		Fasciola spp	2 (3.0%)	37.5 ± 12.5
		Coccidia spp	2 (3.0%)	112.5 ± 12.5
		Moniezia spp	1 (1.5%)	50.0 ± 0.0
		Total	66 (42.6%)	
>4 years	89	*Paramphistomum* spp	40 (44.9%)	176.9 ± 13.1
		B. coli	36(40.4%)	354.9 ± 59.6
		Fasciola spp	7 (7.9%)	50.0 ± 17.3
		Coccidia spp	5 (5.6%)	90.0 ± 20.3
		Moniezia spp	1 (1.1%)	50.0 ± 0.0
		Total	89 (57.4%)	

n = Number of positive specimens

Sex of the host had no significant effect on prevalence of helminths but females had higher prevalence of *Paramphistomum* and *Coccidia* than males. On the other hand males had higher prevalence of *Fasciola* and *Monieziea* than females (Table 3). Prevalence of parasites was higher in female (82.6%) than male (17.4%). The rate of infestation in female was highest in case of *Paramphistomum* (50%) followed by *B. coli* (40%), *Coccidia* (5.5%), *Fasciola* (4%) and *Monieziea* (1%). The higher parasitic load in female was for *B. coli* (301) followed by *Paramphistomum* (141), *Coccidia* (96), *Fasciola* (55) and *Monieziea* (50). In males, the prevalence was highest in case of *B. coli* (41%) followed by *Paramphistomum* (37%), *Fasciola* (15%), *Monieziea* (7%) and *Coccidia* (0%). The highest mean parasitic load in male was *B. coli* (116) followed by *Paramphistomum* and *Monieziea* (both 50) and *Fasciola* (38). Raza *et al.* (2007) and Islam and Taimur (2008) observed higher rates of nematode infection in female hosts than in males. Prevalence of infestation was higher in females (82.7%) than in males (53.4%; Singh *et*

al., 2008). Their results were in agreement with this finding. In contrast, Ibrahim *et al.* (2008) reported higher prevalence of parasitic infestation in male than female hosts. Higher prevalence of parasites in females compared with males might be due to lower resistance of female during pregnancy.

It could be concluded that reproductive efficiency of RCC was reasonable when compared to published reports in other breeds. The prevalence of parasitic infestation was lower than in other breeds. Thus, steps should be taken to control those parasites.

Table 3. Prevalence of parasites according to sex

Age	No.	Name of parasites	Prevalence (%)	Egg per gram of facees (Mean ± SE)
Female	128	*Paramphistomum* spp	64 (50.0%)	140.6 ± 11.3
		B. coli	51(39.8 %)	300.5 ± 12.7
		Coccidia spp	7 (5.5%)	96.4 ± 14.9
		Fasciola spp	5 (3.9%)	55.0 ± 11.2
		Monieziea spp	1 (0.8%)	50. 0 ± 0.0
		Overall	128 (82.6%)	
Male	27	*Paramphistomum* spp	10 (37.0%)	50.0 ± 8.3
		B. coli	11 (40.7%)	115.9 ± 17.3
		Coccidia spp	-	-
		Fasciola spp	4 (14.8%)	37.5 ± 7.2
		Moniezia spp	2 (7.4%)	50.0 ± 0.0
		Overall	27 (17.4%)	

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