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Short Communication

Serum lipid profiles in repeat breeding and normal cyclic cows in Bangladesh

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Abstract: Repeat breeding reduces calf and milk production in crossbred cows. Serum lipid profiles in repeat breeding (RB) and normal cyclic (NC) cows were examined. Blood samples from 10 of each type cows were collected and TC, TG, HDL and LDL were estimated by spectrophotometer using enzymatic commercial kit. The serum TC in NC and RB were found within normal range (167.43 vs. 174.95mg/dl) ($P>0.05$). The TG in RB cows (121.92mg/dl) were significantly ($P<0.05$) higher than NC cows (115.03mg/dl). The HDL and LDL in NC (49.74 and 98.82mg/dl) and RB cows (46.40 and 103.09mg/dl) were found within normal range ($P>0.05$). Serum lipids have no effect on repeat breeding problem for crossbred cows.

Keywords: repeat breeding cow; normal cyclic cow; serum lipid profile

1. Introduction

Baghabari is one of the potential milk pocket areas in Bangladesh, as many small and large-scale crossbred dairy farms have been established there. But, repeat breeding (RB) is one of the utmost problems which cause a great economic loss of dairy production. Our previous observation reveals that the incidence of repeat breeding is higher in crossbred cows than those of native or indigenous cows. Among many factors, lipid is one of the nutrients which apparently enhances postpartum reproductive behavior by increasing the energy status of the animals and thus stimulates the ovarian follicular growth and luteal functions (Highshoe *et al.*, 1991). According to Kumar and Sharma (1993), high incidence of repeat-breeding and anoestrous are associated with the deficiencies of cholesterol. It has been reported that there are lower plasma cholesterol in RB than normal cyclic (NC) buffaloes and cows (Amle *et al.*, 2014). On the other hand, Guzel and Tanriverdi (2014) reported no significant difference in blood cholesterol levels between RB and NC cows.

In the present study, certain serum biochemical parameters of the RB have been examined and compared them with that of the NC crossbred cows in Baghabari, Shahzadpur, Sirajganj in where severe RB problem is in existence. To the best of our knowledge, this study is the first one that has examined the crossbred RB cow from a blood serum biochemical point of view. Therefore, it is probably helpful in treatment of the RB syndrome by correcting the blood serum levels of cholesterol (TC), triglycerides (TG), high density lipoproteins (HDL) and low density lipoproteins (LDL).

2. Materials and Methods

2.1. Study area and animals

All the animals under this study were owned by the dairy farmers of Baghabari, Shahzadpur, Sirajganj near Milk Vita, a cooperative milk producer organization in Bangladesh. For this study 20 both uniparous and

multiparous high yielding dairy crossbred cows (10 normally cyclic and 10 RB cows) were taken into consideration from the respective study area during the period from April to May 2017. The age of the experimental cows ranged from 5 to 9 years old and body condition scores were from 3 to 3.5, according to the five-scale point system. The experimental cows were divided into two groups having 10 cows in each group. The first group was the RB cows which were recognized according to the case history from the cow owners, farm records, visual diagnosis and by rectal palpation. The second group served as a reference group including healthy normal cyclic (NC) cows.

2.2. Serum collection and preservation

By abiding the existing animal handling rules prevailing in Bangladesh, 10ml of blood samples were collected from the jugular veins of both RB and NC cows and were kept in 6 ml EDTA anticoagulant-coated tubes. The sample tubes were transferred in an ice container to the laboratory. Blood cells were removed from sera by centrifugation at 1000 rpm for 10 minutes. Blood serum was stored at -20°C until further analysis.

2.3. Laboratory analysis

TC, TG and HDL levels were determined by using commercial standard kits as per the protocol of the manufacturer (Coral Clinical Systems, India). Serum TC was estimated by cholesterol esterase/peroxidase anti-peroxidase method (CHOD/PAP, liquid kit) as described by Röschlau *et al.* (1974). Serum TG was estimated by glycerol-phosphate oxidase/ peroxidase anti-peroxidase method (GPO/PAP, liquid kit) as described by Burtis and Asheood (2006). Serum HDL was estimated by direct enzymatic method (liquid kit) same procedure as TC estimation. The absorbance of the dye was measured spectrophotometrically at 546 nm. All the samples were replicated twice during the laboratory testing for getting more accurate results. LDL in the blood serum was estimated using the method adopted by Friedewald equation 1992 (Cohn *et al.*, 1988) as follows: LDL = TC-(HDL+TG/5).

2.4. Statistical analysis

The biochemical data reproduced from the laboratory analysis were analyzed statistically using the independent two sample t-test (Snedecor and Cochran, 1994) to compare means between the groups. Result was expressed as mean±standard error (SE); P-value < 0.05 was considered as significant. The data analysis was conducted using SPSS version 20.

3. Results and Discussion

Cholesterol is a steroid and is a precursor of the steroid hormones that include sex hormones (Berg *et al.* 2002). Lipids are rich energy source and required for oocyte maturation (Dunning *et al.* 2014). The concentration of blood serum cholesterol as obtained in this study (Table 1) is within the normal range of 139-177mg/dl (Weatherby and Ferguson, 2002). Hesti *et al.* (2016) obtained 159.37 to 161.43mg/dl plasma cholesterol for lactating Holstein cows fed two types of diet which is very closely in agreement with this study. The results obtained in this study reveal that the concentrations of TC in serum for repeat breeding cows were not significantly different from those of normal cycling cows. This is in agreement with Ahmed *et al.* (2017), although they found comparatively lower levels of plasma cholesterol (74.5mg/dl in NC cows 87.9mg/dl for RB cows with p-value of 0.075) than this study. Burle *et al.* (1995) and Singh and Pant (1998) reported higher cholesterol levels in normally cycling cows than repeat breeders, whereas Dutta *et al.* (1991) had observed higher cholesterol levels in repeat breeders than normally cycling cows. Our finding is also consistent with a previous study of Guzel and Tanriverdi (2014). However, it is inconsistent with Amle *et al.* (2014).

As shown in Table 1 that TG was recorded to differ significantly (p-value = 0.027) and remained higher in blood serum of RB cows in comparison to NC cows, but still higher within the normal range 63-77mg/dl (Tighe and Brown, 2008). Ahmed *et al.* (2017), although found higher plasma TG in RB cows (68.9mg/dl) than those of NC cows (62.4mg/dl), but difference between groups was not significant. TG are fatty acid esters of glycerol and represent the main lipid component of dietary fat and fat depots of animals. TG, produced in the liver by binding glycerol and other fatty acids are transported by LDL and act as a storage source for energy.

The serum HDL concentration shows no significant differences (p-value = 0.067) between groups (Table 1). Hesti *et al.* (2016) studied lipid profile of lactating Holstein fed two different diets and obtained serum concentration of HDL to be 70.52 and 67.48mg/dl which are somewhat higher than this study, but still within the normal range between 40-90mg/dl (Tighe and Brown, 2008) for dairy cows. HDL composed of low cholesterol (13% cholesterol and <5% triglycerides) and high protein (50%) which plays for transportation of cholesterol from tissues to liver (Weatherby and Ferguson, 2002).

The LDL concentration in blood serum did not differ significantly (p-value = 0.718) between RB and NC cows as shown in Table 1. Hesti *et al.* (2016) reported serum LDL to be 74.77 and 80.21mg/dl for two dietary groups of cow, which are somewhat lower than this study, although both experimental results are within the normal range between 60-130mg/dl (Tighe and Brown, 2008) for dairy cows. LDL contains low protein and high cholesterol (50% cholesterol and 10% triglycerides) which serves a major carrier of essential fatty acids from the liver to the peripheral tissues for cell absorption and metabolism (Weatherby and Ferguson, 2002). Most species preferentially use LDL cholesterol as a precursor for ovarian steroid synthesis (Grummer and Carroll, 1988).

Table 1. Comparison of serum lipid profiles between normal and repeat breeder cow.

Lipid profiles	Normal cyclic cow (N = 10)	Repeat breeder cow (N = 10)	P-value
TC (mg/dl)	167.43^{a}±7.01	174.95^{a}±5.65	0.423
TG (mg/dl)	115.03^{b}±1.83	121.92^{a}±2.44	0.027
HDL (mg/dl)	49.74^{a}±1.54	46.40^{a}±0.76	0.067
LDL (mg/dl)	98.82^{a}±10.08	103.09^{a}±5.82	0.718

Values with different superscripts within a parameter in the same row differ significantly ($P<0.05$); TC, total cholesterol; TG, triglycerides; HDL, high density lipoproteins; LDL, low density lipoproteins; N, number of samples; P, level of significance.

4. Conclusions

The study demonstrates the normal ranges of serum lipid concentrations for both NC and RB cows and also exposes no significant differences between groups of cows, except that of TG. Nevertheless, our results concluded that lipids in blood serum have no effect on repeat breeding syndrome, at least in our case. Other biochemical properties still need to be tested in future studies for the detection of repeat breeding causes.

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Conflict of interest

None to declare.

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