EFFECT OF LACTATION STAGES ON SOME SERUM LIPID PARAMETERS IN UPGRADED MURRAH BUFFALOES

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ABSTRACT

A study was carried out to investigate the changes in serum lipid profile in different lactation stages in upgraded Murrah buffaloes (n=6). The entire lactation period was divided in three successive stages – early (0-13 weeks), mid (14-26 weeks) and late lactation stage (27-40 weeks). Blood samples were collected from each lactation stage and analyzed for total serum cholesterol, HDL cholesterol, LDL cholesterol and triglycerides. The results revealed that all the parameters differed significantly amongst the three lactation stages, except LDL cholesterol. The serum total cholesterol, HDL cholesterol and triglycerides increased from early to mid lactation and then declined significantly.

KEY WORDS: lipid profile, buffalo, lactation, Cholesterol.

INTRODUCTION

Lactation represents a physiological stress which is reflected on animal's biological system. Milk production requires a continuous supply of metabolites and hormones to the mammary glands and thus certain changes in serum metabolites are expected. Blood lipids are fundamental for the synthesis of milk fat (Kaneko, 2008). The main sources of this fat are triglycerides, phospholipids, cholesterol esters (part of the total cholesterol) and blood stream non-esterified fatty acids (NEFA) derived from lipolysis (Iverson *et al.,* 1995). The present study was undertaken to evaluate alterations in the some of the serum lipid parameters according to stage of lactation in upgraded Murrah buffaloes.

MATERIALS AND METHODS

Six apparently healthy lactating upgraded Murrah buffaloes 7 years of age and of 4th calving were included in the study. The animals were raised in the dairy farm of College of Veterinary Science and AH, Mhow (MP). All the buffaloes under investigation were maintained under standard nutritional and managemental conditions. The entire lactation period was divided into 3 successive stages – Early (0–13 weeks), Mid (14– 26 weeks) and Late lactation (27– 40 weeks) as per Akasha *et al.* (1987).

Blood samples (10 ml) were collected from all animals at weekly interval at each lactation stage in the morning from jugular vein into glass tubes without anticoagulant, and kept at room temperature for 20 minutes, the tubes were centrifuged at 3,000 rpm for 10 minutes and serum was separated. The serum samples were analysed for total cholesterol by CHOD–PAP method (Allain *et al.,*1974), HDL cholesterol by phosphotungstic acid method (Burstein *et al.*, 1970), LDL cholesterol by Friedewald *et al.* (1972) and triglycerides by GPO-Trinder method (McGowan *et al.,*1983) employing commercial kits (Erba Mannheim) on an autoanalyser (STAT FAX 2000). The data were subjected to two way statistical analysis of variance as per Pillai and Sinha (1968).

RESULTS AND DISCUSSION

Table shows the mean (±SD) values of various lipid parameters evaluated at different stages of lactation in buffaloes. Significant effect of the lactation stages was found on total cholesterol

(P<0.05), HDL cholesterol (P<0.01) and triglycerides (P<0.01), whereas no statistical difference was found in LDL cholesterol between stages.

Table : Mean± SE values of lipid parameters according to stages of lactation

PARAMETERS	Stage of Lactation		
	Early Lactation	Mid Lactation	Late Lactation
Total cholesterol	237.41^{b}±4.99	254.90^{c}±4.81	210.33^{a}±4.24
HDL cholesterol	128.73^{b}±0.95	149.45^{c}±1.14	113.05^{a}±1.00
LDL cholesterol	103.39± 4.93	103.15± 5.14	91.82 ± 4.11
Triglycerides	26.09^{a} ±0.32	36.35^{c}± 0.28	27.27^{b}±0.36

Means bearing uncommon superscripts within the row differ significantly (P<0.05).

Serum Total Cholesterol:

The stage of lactation had significant effect (P<0.05) on the level of serum total cholesterol. There was significant increase in serum total cholesterol from early to mid and then significant decrease from mid to late lactation stage. The increased levels from early to mid lactation may be due to high energy requirement of animal during first stage of lactation. The higher level of cholesterol with advancement of lactation was a physiological adjustment to meet the lactation requirements. Endocrine profiles change and lipolysis and lipogenesis are regulated to increase lipid reserve during pregnancy, and subsequently these reserves are utilized following parturition and the initiation of lactation (Roche *et al.,* 2009). Similar results were found by Balusami *et al.* (2008) and Hagawane *et al.* (2009) in Murrah buffaloes.

Serum HDL Cholesterol:

Lactation stages exerted highly significant effect (P<0.01) on serum HDL cholesterol. The serum HDL cholesterol followed the similar trend to that of serum total cholesterol. The decreased level of HDL cholesterol during early and late lactation may be related to the lower total cholesterol level during same period as HDL cholesterol consists of about 60 per cent of total cholesterol. Persechino *et al.* (1991) in buffaloes and Pechova *et al.* (2006) in dairy cows reported increase in HDL cholesterol level after parturition similar to our findings.

Serum LDL Cholesterol:

The observation of the present study was that the serum LDL cholesterol concentration showed progressive non-significant decrease with advancement of lactation. However the lower levels of LDL cholesterol during late lactation are due to increased LDL catabolism or reduction in the transformation of VLDL into LDL. In contrast to our findings, Basoglu *et al.* (1998) reported progressive increase in LDL cholesterol with progression of lactation in dairy cows.

Serum Triglycerides:

The analysis of variance exhibited highly significant effect of lactation stages (P<0.01) on serum triglycerides concentration. On the contrary, Grasso *et al.* (2004) in water buffalo reported non-significant effect of lactation on triglycerides level. Low triglycerides level recorded during early lactation can be thought to be caused by an influx of free fatty acids from adipose tissue near the time of parturition and a low output of lipoprotein by liver. The rapid increase in the triglycerides during lactation may be attributed to increased demand of the udder for fatty acid synthesis for

milk fat, and also to lowest level of circulatory estrogen and thyroxin profile which influence the lipid metabolism. The observations of the present study are in accordance with Fahmy *et al.* (2004) in Friesian cows.

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