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Blood Profiles of Mithun (*Bos Frontalis*) under Different Stages of Reproduction

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Abstract

The study was carried out in the herd of mithun maintained at Jharnapani farm, NRC on Mithun, Nagaland. In total 64 (n=64) mithun of which, are divided in to four groups such as heifer (4), oestrus cows (4), pregnant cows (4) and non pregnant cows (4) for four strains namely Arunachalee (16), Mizoram (16), Nagaland (16) and Manipur (16) based on per rectal examination and farm records and were clinically normal. The blood samples were examined for the biochemical and heamatological profiles. Significant (p<0.05) difference was observed in ESR (mm/Hr) in pregnant and non pregnant stage between the different strains of mithun and also significant (p<0.05) difference was observed between the different stages of reproduction in Mizoram and Manipur strains. Results of bio-chemical parameters revealed that glucose concentration was showed a significant (p<0.05) different between the different strains in non pregnant stage of mithun. Other biochemical and haematological parameters were not significant different between the strains and between the different stages of reproduction.

1. Introduction

Mithun *(Bos frontalis),* the pride animal of north eastern states of India and is threatened bovine species, believed to descend from *Bos gaurus*. The animal has an important place in the social, cultural, religious and economic life of the tribal population particularly the states of Arunachal Pradesh, Nagaland, Manipur and Mizoram. The metabolic profile test is intended to be a measure of balance between input in terms of nutrients absorbed from gastrointestinal tract and output in terms of requirements of those nutrients for maintenance, pregnancy and lactation. Blood serum constituents, which reflect the metabolic status have been measured to assess the effects of different feeding regimens on production and reproduction status of the animal. Most of these parameters fluctuate with different strains of mithun, physiological stages, level of nutrition, diet composition and change in relative body condition. Keeping these factors in view, the present study was undertaken to find out the relationship between blood profiles with different strains of mithun and different stages of reproduction.

2. Material and Methods

The study was carried out in the herd of mithun maintained at Jharnapani farm, NRC on Mithun, Nagaland. In total 64 (n=64) mithun of which, are divided in to four groups such as heifer (4), oestrus cows (4), pregnant cows (4) and non-pregnant cows (4) for four strains namely Arunachalee (16), Mizoram (16), Nagaland (16) and Manipur (16) based on *per rectal* examination and farm records and were clinically normal. They were maintained in standard feeding ration of farm. The animal has a matured graffian follicle (fluctuation), has showing oestrous signs were considered as cyclic oestrous animals, the pregnant animals were selected between the 3- 7 months of pregnancy. The blood samples were collected from jugular vein into collection tubes containing EDTA at early morning between 7.0-9.0 AM during from November to January, 2012. They were maintained in standard feeding ration of farm. The blood samples were examined for the biochemical parameters such as alkaline phosphatase (ALK), SGPT (ALT), SGOT (AST), total protein, albumin, globulin, AG ratio and glucose and heamatological profiles were total red blood cells (TRBC), haemoglobin (Hb), erythrocyte sedimentation rate (ESR),

packed cell Volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and total white blood cell (TWBC).

Estimation of hematological profiles was carried out by standard methods described by Coles (1986) and Sastry (1989). The biochemical parameters were carried out using commercial diagnostic chemical kits procured from RFCL Limited, Uttarkahnd, India by using double UV spectrophotometer in animal reproduction laboratory in the institute. Each sample was analyzed twice and the averages of the two readings were taken as the estimated value. Statistical analysis was carried out SPSS 15 software (SPSS, Chicago, IL, USA)

3. Results and Discussion

The parameters of different stages of reproduction of mithun were revealed that a significant (p<0.05) difference was observed in ESR (mm/Hr) in pregnant and non-pregnant stage between the different strains of mithun and also there

Table 1: Haematological parameters of different strains of mithun (*Bos frontalis*) at different stages of reproduction

Sl.No.	Parameters	Reproductive status	Strains			
			Arunachalee	Mizoram	Nagaland	Manipur
1.	TRBC ($x10^6$ mm^{-3})	Heifer (4)	7.03±0.31	7.10±0.10	7.18±0.37	7.25±0.67
		Estrus (4)	7.45±0.07	7.84±0.65	7.45±0.69	7.68±1.27
		Non-pregnant (4)	5.68±0.09	5.58±0.23	5.84±0.28	5.54±0.82
		Pregnant (4)	6.37±0.24	6.98±0.19	7.01±0.16	6.05±0.25
2.	Hb ($g\ dl^{-1}$)	Heifer (4)	10.87±0.53	10.40±0.70	11.02±0.36	11.45±0.87
		Estrus (4)	11.40±0.12	11.56±0.54	11.56±0.93	11.71±0.82
		Non-pregnant (4)	10.17±0.36	10.10±0.21	9.88±0.25	9.20±0.77
		Pregnant (4)	11.25±0.71	10.82±0.38	11.17±0.16	10.78±0.42
3.	ESR ($mm\ hr^{-1}$)	Heifer (4)	3.50±0.70	$2.50±0.41^{AB}$	2.75±1.30	$2.98±1.43^{A}$
		Estrus (4)	3.20±0.28	$3.60±0.38^{A}$	3.48±0.38	$3.43±0.38^{A}$
		Non-pregnant (4)	$3.00±0.42^{a}$	$2.45±0.35^{abAB}$	$3.86±0.55^{a}$	$1.30±0.14^{bAB}$
		Pregnant (4)	$3.65±0.21^{a}$	$1.35±0.21^{bB}$	$2.35±0.38^{ab}$	$0.75±0.21^{cB}$
4.	PCV (%)	Heifer (4)	45.00±4.24	42.50±0.70	39.00±4.69	39.00±4.69
		Estrus (4)	45.00±1.41	46.26±1.56	44.93±1.76	44.21±1.39
		Non-pregnant (4)	31.00±1.41	31.50±2.12	34.33±2.08	28.50±4.94
		Pregnant (4)	37.00±1.41	38.50±0.70	38.16±2.48	32.50±2.12
5.	MCV (μm^3)	Heifer (4)	63.93±3.20	59.89±0.73	54.13±4.46	55.76±4.27
		Estrus (4)	60.39±1.31	60.47±1.67	60.52±1.42	61.71±1.82
		Non-pregnant (4)	54.55±3.36	56.52±6.15	58.79±3.57	51.06±1.36
		Pregnant (4)	58.12±4.47	52.19±0.49	54.49±4.41	54.14±0.60
6.	MCH (pg)	Heifer (4)	15.46±0.07	14.65±0.16	15.35±0.83	15.76±0.39
		Estrus (4)	15.29±0.50	15.43±0.62	15.85±0.50	14.98±0.71
		Non-pregnant (4)	17.76±0.08	18.08±0.37	16.93±0.37	16.69±2.31
		Pregnant (4)	17.64±0.43	15.49±0.12	15.93±0.47	17.99±0.90
7.	MCHC ($g\ dl^{-1}$)	Heifer (4)	24.21±1.11	24.47±0.24	28.59±3.57	28.39±3.98
		Estrus (4)	25.34±0.63	25.65±0.74	25.85±0.76	25.62±0.79
		Non-pregnant (4)	32.62±2.17	32.15±2.13	28.84±1.70	32.76±5.42
		Pregnant (4)	30.47±3.09	28.11±0.49	29.35±1.52	33.23±2.03
8.	TWBC ($x10^3$ mm^{-3})	Heifer (4)	10.67±0.39	10.16±0.26	9.85±0.64	9.90±0.79
		Estrus (4)	8.49±0.12	8.62±0.22	8.51±0.15	8.75±0.94
		Non-pregnant (4)	11.41±0.21	11.75±0.27	10.79±0.13	10.89±0.31
		Pregnant (4)	9.48±0.07	8.32±0.31	8.81±0.27	10.76±0.28

Different superscripts (a, b, c) in different column indicates significant (p<0.05) difference between the strains; Different superscripts (A, B, C) in different rows indicates significant difference between stage of reproduction; Figures in parenthesis indicate number of experimental animals

was a significant (p<0.05) difference was observed between the different stages of reproduction in Mizoram and Manipur strains (Table 1). Results of bio-chemical parameters revealed that glucose concentration was showed a significant (p<0.05) different between the different strains in non-pregnant stage of mithun (Table 2). Other biochemical and haematological parameters were not significant different between the strains and between the different stages of reproduction. The TRBC count was non-significantly higher in oestrus cows than other stages of reproduction and was lower in non-pregnant stage of mithun. The increased amount of TRBC in the oestrus cows is due to hyperactivity and excitement, which may be due to high level of estrogen (anabolic effects) from graffian follicle (Coles, 1986; Perumal et al., 2013c). The TWBC was higher in non-pregnant mithun as compared to pregnant and estrus mithun because during estrous period excessive migrating of these cells to the uterus for uterine defense mechanism and during the pregnant stage the progesterone induce the immune suppressive effect (Sastry, 1989; Perumal et al., 2013a). The other blood parameters were non - significantly higher in estrus than heifer,

Table 2: Bio-chemical parameters of different strains of mithun (*Bos frontalis*) at different stages of reproduction

Sl.No.	Parameters	Reproductive status	Strains			
			Arunachalee	Mizoram	Nagaland	Manipur
1.	Alkaline Phosphatase (IU l^{-1})	Heifer (4)	152. 62±0.49 ^{A}	154.47±1.24 ^{A}	142.73±1.72 ^{A}	147.89±1.38 ^{A}
		Estrus (4)	117.93±8.93 ^{B}	105.52±0.36 ^{B}	109.74±10.13 ^{B}	110.45±9.56 ^{B}
		Non-pregnant (4)	225.34±0.86 ^{AB}	213.68±0.12 ^{AB}	217.54±5.32 ^{AB}	211.67±0.79 ^{AB}
		Pregnant (4)	137.90±1.46 ^{AB}	134.70±1.44 ^{AB}	142.18±6.17 ^{A}	137.10±6.32 ^{AB}
2.	SGPT (ALT) (IU l^{-1})	Heifer (4)	38.49±2.10	38.25±1.75	39.24±2.45	37.56±1.82
		Estrus (4)	46.65±5.12	46.65±8.70	53.03±3.12	54.24±2.75
		Non-pregnant (4)	49.55±0.77	49.49±0.25	47.57±2.10	49.38±0.71
		Pregnant (4)	36.22±0.37	44.85±12.86	36.39±3.12	37.09±0.61
3.	SGOT (AST) (IU l^{-1})	Heifer (4)	76.82±2.47	78.32±0.35	76.98±2.56	77.72±1.54
		Estrus (4)	88.60±8.02	93.84±0.61	103.70±5.27	109.38±5.87
		Non-pregnant (4)	86.54±1.40	92.61±5.05	94.14±5.54	95.15±6.17
		Pregnant (4)	122.39±1.48	135.51±0.39	123.37±10.98	120.22±2.82
4.	Total Protein (g dl^{-1})	Heifer (4)	6.75±0.49	6.70±0.21	6.82±0.74	7.98±0.67
		Estrus (4)	7.20±0.40	7.19±0.14	7.13±0.29	7.43±0.37
		Non-pregnant (4)	7.82±0.38	7.09±0.42	7.16±0.10	7.24±0.42
		Pregnant (4)	8.79±0.73	8.77±0.86	8.16±0.77	8.11±0.14
5.	Albumin (g dl^{-1})	Heifer (4)	3.66±0.05	3.68±0.91	3.67±0.56	3.93±0.52
		Estrus (4)	4.17±0.02	4.47±0.19	4.27±0.80	4.56±0.93
		Non-pregnant (4)	4.36±0.87	4.30±0.19	4.15±0.96	3.52±0.77
		Pregnant (4)	4.99±0.06	4.54±0.35	4.36±0.28	3.99±0.56
6.	Globulin (g dl^{-1})	Heifer (4)	3.12±0.13	3.21±0.70	3.80±0.16	3.91±0.54
		Estrus (4)	3.02±0.38	2.70±0.49	3.17±0.63	3.23±0.71
		Non-pregnant (4)	3.72±0.11	2.78±0.26	3.10±0.36	4.29±0.28
		Pregnant (4)	3.48±0.37	3.92±0.07	3.62±0.12	4.65±0.62
7.	AG ratio	Heifer (4)	1.18±0.05	1.20±0.21	1.23±0.56	1.27±0.73
		Estrus (4)	1.39±0.16	1.64±0.70	1.39±0.52	1.45±0.65
		Non-pregnant (4)	1.04±0.16	1.54±0.56	1.37±0.43	0.91±0.04
		Pregnant (4)	1.82±0.37	1.23±0.18	1.24±0.83	0.88±0.13
8.	Glucose (mg dl^{-1})	Heifer (4)	69.88±1.24	70.13±0.89	67.68±1.54	68.72±2.36
		Estrus (4)	55.26±0.40	51.46±3.30	52.48±2.48	51.47±2.56
		Non-pregnant (4)	54.58±0.28^{a}	56.14±0.75^{a}	51.84±1.46^{a}	89.86±0.55^{b}
		Pregnant (4)	48.96±1.43	53.50±6.20	47.10±1.82	42.10±6.61

Different superscripts (a, b, c) in different column indicates significant (p<0.05) difference between the strains; Different superscripts (A, B, C) in different rows indicates significant difference between stage of reproduction; Figures in parenthesis indicate number of experimental animals.

pregnant and non-pregnant animals (Kumar and Sharma, 1991; Perumal et al., 2013b). The heamatological and biochemical parameters were showing non-significant difference between the different strains except the ESR (p<0.05) at pregnant and non-pregnant stage of reproduction (Table 1). There is no information regarding to the blood parameters at different stages of reproduction in mithun and between the different strains of mithun. The biochemical parameters such as total protein, albumin, and globulin were showing non- significantly higher in pregnant than heifer, estrus and non-pregnant mithun cows because progesterone hormone have to increase the total protein and albumin level for fetal development. The higher globulin concentrations are may be due to longer exposure to the various antigens and pathogens and production of antibodies and led to higher total serum proteins and lower albumin to globulin ratio (Bogin, 1994; Kaneko et al., 1997). Among the enzymes measured ALP showed a significant (p<0.05) difference, being much higher in young animals (Table 2). This difference is seen as in other species and is the result of the faster growth rate in young animals and leakage of the enzyme from the growing bones and intestines into the blood (Bogin, 1994; Kaneko et al., 1997). Decrease in alkaline phosphatase with advancement of pregnancy was due to transportation of alkaline phosphatase from mother's blood to foetus (Sharma and Luktuke, 1981). SGPT was higher in oestrus cows, is due to excessive hormone metabolism in liver leads to release of liver enzyme. Increased SGOT during gestation may probably be because of origin of this enzyme from either placenta or uterine muscle (Singh et al., 1992; Perumal et al., 2013c). The blood and bio-chemical profiles between the different strains was not showing significant difference except ESR at pregnant and non-pregnant stage and glucose at non-pregnant stages. This may be due to the different strain are maintained at the same management and environment conditions.

4. Conclusion

High ESR value was observed in Nagaland and Arunachalee strains in non-pregnant and pregnant stages, respectively and glucose concentration was higher in non-pregnant stage of Manipur strains. Alkaline phosphatase concentration was significantly (p<0.05) higher in mithun heifer. SGOT and SGPT were significantly (p<0.05) higher in pregnant and oestrous mithun cows, respec]tively.

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