

## Transferrin polymorphism and its correlation with lactation length and dry period in Tarai buffalo and Sahiwal cattle

Jaswant Singh\*, RB Prasad and Sunil Kumar

*Department of Animal and Genetics Breeding, College of Veterinary Science & Animal Husbandry, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad*

### ABSTRACT

In the present study a total of 50 Tarai buffalo and 30 Sahiwal cattle were typed for transferrin. Two transferrin phenotypes were found viz.  $T_f^{BC}$  and  $T_f^{CC}$  in Tarai buffalo with gene frequency of  $T_f^B$  and  $T_f^C$  as 0.14 and 0.86, respectively. Whereas, five transferrin phenotypes were observed in Sahiwal cattle viz.  $T_f^{AA}$ ,  $T_f^{AE}$ ,  $T_f^{DE}$ ,  $T_f^{EE}$  and  $T_f^{DD}$  with a gene frequency of  $T_f^E$  (0.6161),  $T_f^D$  (0.2283) and  $T_f^A$  (0.1551), respectively. The higher lactation length was observed in  $T_f^{CC}$  (297.95 days) as compared to 281.25 days in  $T_f^{BC}$  group of transferrin phenotypes in Tarai buffalo. The dry period of 137.87 and 132.90 days were reported in  $T_f^{BC}$  and  $T_f^{CC}$  groups, respectively in Tarai buffalo. The lactation length for different transferrin types viz.  $T_f^{AA}$ ,  $T_f^{AE}$ ,  $T_f^{DE}$ ,  $T_f^{EE}$  and  $T_f^{DD}$  were reported to be 274.00,  $292 \pm 13.20$ ,  $251.00 \pm 32.58$ ,  $272.66 \pm 30.58$  and  $244.25 \pm 25.30$  days, respectively where as dry period for these transferrin types were reported as 256.00,  $184.25 \pm 25.80$ ,  $202.22 \pm 41.72$ ,  $266.41 \pm 42.54$  and  $322.50 \pm 70.02$  days, respectively in Sahiwal cattle. The production traits viz. lactation length and dry period were found to be non-significant with different transferrin types in Tarai buffalo and Sahiwal cattle.

**Key Words:** Transferrin, Polymorphism Gene frequency, Polyacrylamide, Lactation length

\*Corresponding author: dr.jaswant75@gmail.com

Manuscript received: 09.7.2017; accepted: 28.7.2017

### INTRODUCTION

The early evaluation of animal that is selection practice followed long back can be made possible if economic traits are associated with any character expressed during early stage of life. Thus, a gene marker associated with economic character could be ideally utilized for evaluating the breeding worth of dairy cattle at an early age. In recent years, attention has been directed to study the genetic variation of serum protein owing to their vital role in the metabolic process.

Transferrin is an iron binding protein. The transferrin also participates in the regulation and control of iron absorption and protect against iron intoxication (Putnam 1965). Polymorphic variants of transferrin were separated by vertical

slab electrophoresis in polyacrylamide gel (Ballewar et al., 1997). Polymorphism studies on transferrin exhibits different variants in Holstein cows (Dragomir, L. and Vidovic, V.; 2013). There is a growing convention among researchers that a better understanding of the biochemical differences and their genetic basis may help in conventional selection procedure as an important supplement. The polymorphism of serum transferrin was first of all described independently by (Ashton 1957) and (Hickman & Smithies 1957) in British breed of cattle. It has not been studies in Tarai breed of buffalo, therefore this study was undertaken to study the transferrin polymorphism in Tarai breed and compare it with the Sahiwal cattle.

## MATERIALS AND METHODS

Blood sample was taken out from 30 females of Tarai breed of buffalo from different villages of U.S. Nagar maintained under scheme "Animal Genetic Resources Biodiversity: Characterization and Conservation of Tarai Buffalo" (NATP scheme) and 30 Sahiwal cattle maintained at Instructional Dairy Farm G.B. Pant University of Agriculture and Technology, Pantnagar. Serum was taken out aseptically and freeze-dried at -20°C until used for further analysis.

The polymorphic variants of transferrin were separated by vertical gel electrophoresis in polyacrylamide gel (PAGE) using a discontinuous buffer system according to method suggested by Gahane et al. (1977) with modification. One microgram of standard transferrin viz. holo transferrin of bovine iron saturated, >95% powder, cell culture and endotoxin tested was loaded in one well in each gel along with other test-sample.

## RESULTS AND DISCUSSION

Mean lactation length, standard error (SE) and coefficient of variation (C.V.) for different transferrin groups were presented in table 1. Only TfBC and TfCC transferrin groups could be isolated in Tarai breed of buffalo where as TfAA, TfAE, TfDE, TfEE and TfDD were observed in Sahiwal cows. As per the transferrin group, animals were classified for lactation length and dry period. The result of high lactation length in Tarai buffalo was observed in TfCC as compared to TfBC group (297.95 days and 281.25 days), respectively. The result also revealed that the mean dry period was higher in those animals grouped in transferrin type TfBC as compared to transferring TfCC group 137.87 days and 132.90 days, respectively.

When comparison was made with Sahiwal cattle it was observed that mean lactation length was higher in TfAE (292.00 days) and lowest was in TfDD (244.25 days) type of cows. It was also observed that

**Table 1:** Lactation Length and Dry Period in different transferrin groups of Tarai buffalo and Sahiwal cattle

Type of transferrin groups	No. of animals	Mean $\pm$ SE (days)	CV (%)
<i>Lactation length in different Transferrin groups of Tarai Buffalo</i>			
BC	8	281.25 $\pm$ 9.71	9.77
CC	22	297.95 $\pm$ 6.71	10.57
Overall	30	289.60 $\pm$ 8.21	10.17
<i>Dry Period in different Transferrin groups of Tarai Buffalo</i>			
Type of transferrin groups	No. of animals	Mean $\pm$ SE (days)	CV (%)
BC	8	137.87 $\pm$ 2.40	5.06
CC	22	132.90 $\pm$ 3.03	10.71
Overall	30	135.58 $\pm$ 2.71	7.88
<i>Lactation length in different Transferrin groups of Sahiwal cattle</i>			
Type of transferrin groups	No. of animals	Mean $\pm$ SE (days)	CV (%)
DD	4	244.25 $\pm$ 25.30	20.71
EE	12	272.66 $\pm$ 30.38	38.60
AE	4	292.00 $\pm$ 13.20	9.04
DE	9	251.00 $\pm$ 32.58	38.95
AA	1	274.00	-
Overall	30	266.78 $\pm$ 25.36	26.82
<i>Dry Period in different Transferrin groups of Sahiwal cattle</i>			
Type of transferrin groups	No. of animals	Mean $\pm$ SE (days)	CV (%)
DD	4	322.50 $\pm$ 70.02	43.42
EE	12	266.41 $\pm$ 42.54	56.59
AE	4	184.25 $\pm$ 25.87	28.01
DE	9	202.22 $\pm$ 41.72	61.89
AA	1	256.00	-
Overall	30	246.27 $\pm$ 45.02	47.47

\*The mule population of Goa, Mizoram, Sikkim, Tamilnadu and Tripura is <10. (Source: Livestock Census, 2012)

**Table 2.** ANOVA of Lactation Length and Dry Period in Tarai buffalo and Sahiwal cattle

Source	d. f.	Mean sum of square	
		Lactation Length	Dry Period
<i>Tarai buffalo</i>			
Between groups	1	1637	144.68
Error	28	932.87	164.16
<i>Sahiwal cattle</i>			
Between groups	3	2264.75	24632.38
Error	25	4085.34	16261.13

mean dry period was higher in TfDD cows (322.50 days), while lowest dry period was reported in TfAE (184.25 days)

In Tarai buffaloes around 70% animal characterized in TfCC group and showed higher lactation length as compared to those of TfBC groups of animals. Only around 30% of animals were of TfBC groups. The mean dry period was higher in the animals of TfBC groups. When compared with Sahiwal cattle TfAE groups animal showed highest lactation length and lowest was reported in TfDD groups of animals and highest dry period was exhibited by TfDD groups of animals and lowest in TfAE groups of animals.

Analysis of variance was carried out for ascertaining the effect of different transferrin types on lactation length (L.L.) and dry period (D.P.) in Tarai buffalo and Sahiwal cattle. The perusal of the table 2 revealed that lactation length and dry period have non-significant correlation with different transferrin types in both Tarai buffalo and Sahiwal cattle. These finding was totally different as reported by Ballewar et al. (1997) who reported significant difference in different transferrin groups and lactation length and dry period; breed being different.

#### CONCLUSION

Serum transferrin polymorphism was studied by polyacrylamide gel electrophoresis method. The electrophoresis studies revealed 5 phenotype of transferrin in Sahiwal cattle viz. TfAA , TfDD , TfEE , TfAE and TfDE in the present study and two phenotypes in Tarai buffalo viz. TfBC and TfCC . All homozygotes in Sahiwal cattle had three bands whereas heterozygotes had bands ranging from 4 to 6. In Tarai breed the homozygotes transferrin produces three bands whereas heterozygotes

transferrin presents four bands. The analysis of variance for lactation length and dry period revealed that these traits were statistically non-significant in different transferrin types for both Tarai buffalo and Sahiwal cattle. It can thus be concluded that comprehensive studies involving large sample size be undertaken to have the clear relationship of these traits with different transferrin groups in Tarai buffalo and Sahiwal cattle.

#### REFERENCES

- Ashton GC. 1957. Serum protein differences in cattle by starch gel electrophoresis. *Nature*, 188: 917-919.
- Ballewar VR, Ali SZ and Sirothia AR. 1997. Transferrin polymorphism in Murrah and Berari buffaloes. *J. Rmt. And Corps.* 36 (4): 131-136.
- Lukac D and Vidovic V. 2013. Genotypic frequency of  $\beta$ - lactoglobulin, k-casein and transferrin in Serbian Holstein-Friesian dairy cattle. *Mljekarstvo casopis za unaprjedenje proizvodnje.* 63 (4): 203-210.
- Gahane B, Juneja RK and Grolmus J. 1977. Horizontal polyacrylamide gradient gel electrophoresis for the simultaneous phenotyping of transferrin, post transferrin, albumin and post albumin in the blood plasma of cattle. *Anim. Blood Grps Biochem. Genetics*, 8: 127-137.
- Hickman CG and Smiths O. 1957. Evidence for inherited differences in serum proteins of cattle. In: *Proc. Genet. Sec. Can.*, 2: 39.
- Putnam FW. 1965. Structure and function of plasma proteins. In *the Proteins*. Ed.H. Neurath. Academic Press, NewYork, pp:3.