

ASSOCIATION OF TRANSFERRIN POLYMORPHISM WITH REPRODUCTIVE TRAITS OF GIR CATTLE

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ABSTRACT : The present study on 28 known genotype of Gir cattle was carried out to investigate the association of transferrin polymorphism with different reproductive traits at the Department of Animal Genetic and Breeding, West Bengal University of Animal and Fishery Sciences, Kolkata during the period April-September 2009. The overall mean of different reproductive traits namely age at first calving, age at second calving and calving interval of Gir cattle population were 1651.61 ± 45.19 days, 2531.64 ± 87.28 days and 894.17 ± 58.77 days respectively. The result of this present finding indicated that the animal with TfAE genotype was found to be superior for these reproductive trait of Gir cattle in this herd. The estimate of age at first calving, age at second calving and calving interval of the animal having the TfAE genotype were 1566.12 ± 80.21 days, 2196.33 ± 174.72 days and 696.33 ± 83.70 days respectively. The animal with TfD1E genotype was most inferior for Age at second calving and Calving Interval, whereas the animal with TfAD1 genotype was most inferior for age at first calving and the estimate was 1767.52 ± 242.54 days. The Age at second calving and Calving Interval were 2783.33 ± 29.49 and 1130.66 ± 142.62 days for TfD1E type Gir cattle. The heterozygote superiority at transferrin locus as observed in Gir cattle may be due to adaptive advantage in harsh climate of India. The polymorphic nature of transferrin in Gir cattle could be useful in marker assisted selection to improve reproduction performance.

Key Words : Gir Cattle, Transferrin polymorphism, Reproductive traits.

INTRODUCTION :

Livestock is an important component of Indian agricultural economy which plays a multi-faceted role in providing food security and livelihood support to the rural population. For profitable Dairy Business, we need to evolve a breed, which not only economically sound but also have good capability for reproductive performance. So selection programme should be taken to increase their productivity by selecting the animal at their early age. Transferrin, one of class I genetic markers, is the most heterogeneous polymorphic blood protein in cattle can be used as marker for early selection. Considerable polymorphism and various biological functions of transferrin resulted

in a situation when it may be used as genetic markers of reproductive traits in cattle. The information on the association of transferrin polymorphism with the reproduction traits of Gir cattle are scanty. These association will provide insight into the underlying mechanism of transferrin polymorphism and results may be used in future breeding programme. Keeping in view of the potential of transferrin as candidate gene and the lack of information regarding its possible association with reproduction traits, the present study was undertaken with the aim of selecting the animals which are superior in genetic make-up for different reproduction traits of Gir cattle.

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MATERIALS AND METHODS :

The Site of Experiment:

The present study on Gir cattle were carried out at the Department of Animal Genetics and Breeding of West Bengal University of Animal and Fishery Sciences, Belgachia, Kolkata-37, West Bengal, India during the period May- October, 2009.

Experimental Animals:

A total of 28 milch Gir cattle of known genotypes for transferrin protein were selected from Haringhata farm, Mohanpur, Nadia , West Bengal, India. The breeding policy of the farm is to conserve precious indigenous germplasm of the Gir cattle which were obtained from Gujarat and also used for training purpose of livestock development assistants.

General Appraisal of Data:

Data on different reproduction traits were obtained from the registers maintained at the farm office. Reproductive Traits : Age at first calving(Days), Age at second calving(Days) and Calving interval(Days) were considered for this present study. These traits were subjected to statistical analysis.

STASTICAL ANALYSIS:

The data were analysed to measure the effect of different phenol-variants of Transferrin (Tf) on different Reproductive with the help of computer system available at the Department of Animal Genetics and Breeding of W.B.U.A.F.S. Statistical analysis were performed by SPSS 10.0 software package . The following univariant, general linear statistical model was used to traits:

GENOTYPE / PHENO-VARIANT	NUMBER OF CATTLE
AD1	2
AD2	8
AE	6
D1E	3
D2E	9
TOTAL	28

Agro-climatic condition:

The Haringhata farm at Mohanpur, Nadia is situated at 23.50 N latitude and 89° longitude. The farm is situated at an altitude of 9.75 meters above the sea level. Being closer to tropic of Cancer the farm records a temperature as high as 38°c in summer and minimum at 8.2°c in winter. But generally the ambient temperature of the farm varies from 11°c to 36°c. Though the rainfall ranges from 10 -100 cm, but the average rainfall is 14.16 cm. The percentage of humidity varies in between 36 to 92 [Source: Metrological Agricultural Report, Directorate of Animal Resources and Animal Health, Govt. of West Bengal (1984-1995).

$$Y_{ij} = \mu + T_{fi} + e_{ij}$$

Where,

Y_{ij}: Data pertaining to jth individual in the ith transferrin type.

μ = Over all mean.

T_{fi} = Effect of ith transferring type (i= 1-5).

E_{ij} = Random error on observation distributed NID (0, ee)

The mean and standard error of the different reproductive traits under the study were calculated and tests for significance were adjudged by standard methods described by Snedecor and Cochran (1967).

Association of transferrin polymorphism with reproductive traits of Gir cattle

RESULTS AND DISCUSSION :

The effect of transferrin genotypes on reproductive traits were analysed statistically and the mean along with S.E. of reproduction traits according to the Tf genotypes were represented in the Table 1.

Age at First Calving (Days) :

The average age at first calving of Gir cattle belongs to different genotypes of transferrin were meas-

(1727.33 ± 89.83 days) genotypes. The animals with TfAD1 genotype observed the highest days age at first calving (1767.5 ± 242.5 days). Statistical analysis of this present results indicated that the transferrin genotype types had no significant effect on days of age at first calving in Gir cows. The non significant effect of transferrin genotypes on age at first calving was also reported by Petre *et al.* (1984) in Romanian brown Cows Prasad *et al.* (1984) in cat-

Table no.1 : Mean with S.E. of different Reproductive Traits as per Transferrin types.

TRAITS	TRANSFERRIN TYPES	NO. OF OBS	MEAN± SE.
REPRODUCTION TRAITS			
Age at first calving(days)	AD1	2	1767.52 ± 242.54
	AD2	8	1601.25 ± 80.24
	AE	6	1566.12 ± 80.21
	D1E	3	1652.67 ± 157.74
	D2E	9	1727.33 ± 89.83
	Total	28	1651.61 ± 45.19
Age at second calving(days)	AD1	2	2491.51 ± 23.51
	AD2	8	2555.63 ± 115.78
	AE	6	2196.33 ± 174.72
	D1E	3	2783.33 ± 29.49
	D2E	9	2658.88 ± 206.45
	Total	28	2531.64 ± 87.28
Calving interval(days)	AD1	2	724.36 ± 266.25
	AD2	8	954.37 ± 83.39
	AE	6	696.33 ± 83.70
	D1E	3	1130.66 ± 142.65
	D2E	9	931.55 ± 131.55
	Total	28	894.17 ± 58.77

ured in days. The overall age at first calving was obtained as 1651.61 ± 45.20 days for whole studied population. The research result of the present investigation indicated that the animals with TfAE genotype had the lowest age at first calving (1566.00 ± 80.20 days) followed by TfAD2 (1601.25 ± 80.24 days), TfD1E (1652.67 ± 157.74 days), TfD2E

tle which are in accordance with this present finding. However, Skripnichenko (1985) studied the transferrin types of Ayrshire cows in different generations and reported that cows with TfDD genotype averaged the highest age at first calving (27.8 month). He also pointed out that cows with TfEE type were the youngest at first calving (24.4 months).

Since the TfDD type and TfEE genotypes were not observed in the present study hence the results cannot be comparable with that of Skripnichenko (1985).

Age at Second Calving(Days) :

The overall age at second calving of investigated Gir cattle was 2531.64 ± 87.29 days. The animals with the TfAE genotype had the lowest age at second calving whereas the animal with the Tf D1E genotype had the highest age at second calving. The respective estimates were 2196.33 ± 174.73 and 2783.33 ± 29.49 days. The age at second calving of the others transferrin genotype were 2491.5 ± 23.50 days for TfAD1, 2555.62 ± 115.78 days for TfAD2 and 2658.89 ± 206.45 days for TfD2E. Statistical analysis also failed to show any significant effect of transferrin genotypes on age at second calving in Gir cattle. Since the TfDD type and TfEE genotypes were not observed in the present study hence the results cannot be compared with that of Skripnichenko (1985). No literature was available regarding the effect of transferrin polymorphism on age at second calving.

Calving Interval (Days) :

The average calving interval for the overall population was obtained as 894.18 ± 58.77 days. The research results of this present investigation indicated that the TfAE cows possessed the lowest calving interval (696.33 ± 83.70 days) followed by TfAD1 (724 ± 266 days), TfD2E cows (931.56 ± 131.56 days), TfAD2 cows (954.38 ± 83.40 days) and TfD1E cows (1130.67 ± 142.66 days). The calving interval was also not significantly varied due to Transferrin polymorphism. The non significant effect of transferrin genotype on calving results obtained in the present study was in accordance with the results obtained by Petre *et al.* (1984) and Prasad *et al.* (1984) but differed from that of Kliment and Novy (1987) in different Pied cattle. Since the Tf DD type and TfEE genotype were not observed in the present study hence the results cannot be compared with that of Skripnichenko (1985).

CONCLUSION:

The result of this present finding indicated that the Gir Cattle having the Tf AE genotype was found to be superior for these reproductive trait of Gir cattle in this herd. The estimate of age at first calving, age at second calving and calving interval of the animal having the TfAE genotype were heterozygous animals. The heterozygote superiority at transferrin locus as observed in Gir cattle may be due to adaptive advantage in harsh climate of India. The polymorphic nature of transferrin in Gir cattle and highest amount of heterozygosity facilitate the intra breed variability status and could be useful in marker assisted selection to improve reproductive performance.

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