

Contents lists available at Sjournals



Journal homepage: [www.Sjournals.com](http://www.Sjournals.com)



### Short communication

## Clinical cytogenetic investigation of nondescript cow

**H. Mustafa\*, K. Javed, M. Abdullah, N. Ahmad, A. Ajmal**

*Department of Livestock Production, University of Veterinary and Animal Sciences, Lahore-Pakistan*

\*Corresponding author; Department of Livestock Production, University of Veterinary and Animal Sciences, Lahore-Pakistan.

#### ARTICLE INFO

#### ABSTRACT

##### *Article history:*

Received 03 September 2013

Accepted 19 September 2013

Available online 29 September 2013

##### *Keywords:*

Chromosomes

Repeat breeder

Reproductive efficiency

Present study was carried out on some reported repeat breeder individuals (n=08) of nondescript cows at Para-veterinary hospital, University of veterinary and Animal Sciences, Ravi Campus, Pattoki. Nondescript cows has major share, which is approximately 70% in cattle farming in Pakistan. Chromosomal preparations were made using blood culture from animals under study. About 50 metaphase spreads were screened to detect the chromosomal aberrations and prepare the karyotype. The results showed that the percent of total numerical aberrations for repeat breeder group was 19.95%, while the percent of total structural aberrations were predominant and reached 62%. These results concluded that cytogenetic studies should be used as a diagnostic tool to determine the causes of low reproductive efficiency.

© 2013 Sjournals. All rights reserved.

### 1. Introduction

Cattle have been known as the most important farm animal in Pakistan. There is approximately 34 million cattle population in which 70 % population is nondescript (GOP, 2012-13; Khan et al., 2007), which show a peculiar type of reproductive performance. Reproductive efficiency is a critical component of a successful dairy operation, whereas reproductive inefficiency is one of the most costly problems facing the dairy industry today including repeat breeding (reproductive disorders), which frequently occur in a dairy herd (Fricke et al., 2007). Cytogenetic applied to domestic animals was born with the discovery of (1/29) robertsonian translocation in Swedish cattle in 1964 especially when the deleterious effects on the fertility of carriers were demonstrated (Krumrych 2009). The

role of chromosomal abnormalities as a cause of reproductive failure is very important and very often associated with infertility of carriers, early mortality of embryos and newborns, underdevelopment or degeneration of reproductive organs, poor semen quality and lower body mass increase in the offspring as well as functional and more seldom phenotypic disturbances (Ioana-Nicolae 2007). Alteration in chromosomes number and structure and the best known genetic based variations, which have direct effects on fertility and reproductive outcome in cattle (Maria and King, 2004). High percentages of chromosomal aberrations were recorded in repeat breeder and anestrus animals (Hondt et al., 1988). The objective of this study was establishing the karyotype survey of nondescript repeat breeder cows.

## **2. Materials and methods**

This work was conducted at the Animal Genetic Laboratory (AGL), Department of Livestock Production, Faculty of Animal Products and Technology, University of Veterinary and Animal Sciences, Ravi Campus, Pattoki.

### **2.1. Sampling and investigation**

This investigation was carried out on 8 reported cases of repeat breeding individuals at Para-veterinary hospital, University of veterinary and Animal Sciences, Ravi Campus, Pattoki. The age of cows ranged from 1-8 years old. Under hygienic measures 3ml blood sample was collected from jugular vein of each animal into sterilized sodium heparinized vacutainers tube with special care in handling. The cultures were set up using RPMI media 1640 with L-glutamine, fetal calf serum, Penicillin Streptomycin and Phytohaemagglutinin was added to stimulate mitotic activity of the lymphocytes and to facilitate the identification of chromosomes. The culture was harvested with 0.2 ml of 0.05% colchicines and hypotonic treatment (0.075 MKCl) and fixed in methanol: acetic acid (3:1). Air dried slide were prepared and stained in 10 % Giemsa. After 50 metaphase spreads were screened to detect the chromosomal aberrations and prepare the karyotype (Halnan 1977). Data were analyzed using chi-Square procedure of the SPSS.

## **3. Results and discussions**

### **3.1. Chromosomal aberrations recorded in repeat breeder individuals**

The percent of total numerical aberrations for repeat breeder group was 19.95% including 9.5% polyploidy and 10.45% aneuploidy, while the percent of total structural aberrations were predominant and recorded 62% including 5.5% gaps, 12.5% breaks, 13.75% deletions, 11.75% fragments, 4% ring chromosome and 14.5% centromeric attenuations (Table, 1) (Figures; 1 a, b, 2 a, b). Both types of numerical aberrations recorded highly significant differences compared to normal group, moreover the total structural chromosomal aberrations showed highly significant differences than normal group. The sex chromosomes aberrations recorded no significant difference comparing to normal groups. These results were agreed with those reported by Maria and King (Maria and King, 2004) as a highly significant difference for total numerical aberrations including polyploidy and aneuploidy between normal fertile 4.66% and repeat breeder group 18.9% and concluded that the numerical chromosomal aberrations associated with early embryonic death and return to service. Also, Maity et al. (1996) recorded a highly significant percent for break 15% in cows suffering from repeat breeder and explained that gaps and breaks either in chromatid or chromosomes play an important role in fertility problems. These losses (gaps and breaks) of part of chromosome mean the missing of genes carried. Increasing their frequencies accompanied mostly by losses of genes responsible for fertility performance. On the other hand these results disagree with Barik et al. (1995) they stated that there were no chromosomal abnormalities were detected and chromosome length did not differ significantly between normal and repeat breeder cows.

## **4. Conclusion**

Clinical Cytogenetic studies should be used as a diagnostic tool to determine the causes of low reproductive efficiency in cattle. The animals showing high levels of chromosomal aberrations should be culled from breeding programs.

**Table 1**

Total numerical and structural aberrations detected in repeat breeder individuals of nondescript cows.

Category	N	M. No.	Numerical aberrations			Structural aberrations						Sex chromosomes aberrations			
			Poly	Aneu	Total	G	B	D	F	R	C.A	Total	59, XO	60, XY	61, XXX
Repeat breeder of aberrations %	8	400	38	41	79	22	50	55	47	16	58	248	3	0	2
			9.5	10.45	19.95	5.5	12.5	13.75	11.75	4	14.5	62	0.75	0	0.5
X2 Cal			39.22 **	24.28**	66.61**	12.92**	39.73**	34.46**	58.64**	16.2**	62.82**	307.05**	0.007ns	Ons	Ons

M. No. = Metaphase number, Poly= Polyploidy, Aneu= Aneuploidy G= Gap, B=Break, D=Deletion, F=Fragment, C.A= Centromeric Attenuation, R=Ring Chromosomes, X2= Chi Square Value, ns= Non- Significant, \*\*= Highly Significant at (p<0.01).

## Acknowledgment

The author wishes to thank Higher Education Commission of Pakistan for providing financial assistance for this study.

## References

- Barik, S.C., Maity, B., Sahoo, A.K., Ghaudhuri, G., 1995. Studies on the metaphase chromosomes in the reproductively problem Holstein X Hariana. *Ind. J. Anim. Health.*, 34 (2), 109.
- Fricke, M.P., T. Revay and D.R. Saver, 2007. Managing Reproductive Disorders in Dairy Cows. *Cytogenet Genome Res.*, 116, 80-84.
- Halnan, C.R.E., 1977. Autosomal deletion and infertility in cattle. *Vet. Rec.*, 90, 572.
- Hondt, H.A., E. El-Nahass and K. Fathy, 1988. Cytogenetic studies on Egyptian native cattle and some of its crossbreds. *J. Anim. Bred. Genet.*, 105, 400.
- Ioana- Nicolae, 2007. The role of cytogenetics in the genetic improvement of cattle. 3rd Joint Meeting of the Network of Universities and Research Institutions of Animal Science of the South Eastern European Countries. Thessaloniki 2007.
- Krumrych, W., 2009. Overview of the cytogenetic evaluation of young bulls bred in the north-western part. *Bull Vet. Inst Pulawy.*, 53, 669-672.
- Maria, I.N., W.A. King, 2004. Genetic Factors that Affect Normal Reproduction and Fertility in Domestic Cattle. *Vet. Bull.*, 74(11), 147-150.
- Maity, B., Sahoo, A.K., Ghaudhuri, G., 1996. Cytogenetic studies on the Taurus-indicus crossbred cows of poorer breeding status. *Ind. J. Anim. Health.*, 35 (1), 7-11.