

Sex chromosome mosaicism (60, XX/61, XXX) in an infertile HF heifer

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ABSTRACT

A blood sample was collected from a 4-year old HF heifer because of repeat breeding problem, for cytogenetic investigation. The female had normal external and internal genitals. Chromosome slides were prepared using short term lymphocyte culture. Sex chromosomes mosaicism was detected as 4% cells were found with abnormal number of sex chromosomes (61,XXX) because of an additional X chromosome, which could be possible reason for infertility in HF heifer.

Key words : Sex chromosome, mosaicism, infertility

Reproductive problems are very common in farm animals which result in significant economic losses. In pig, sheep and cattle, 5-10 percent of all zygotes exhibit chromosomal abnormalities (Wisner and Willer, 1979) which lead either to early embryonic losses or the birth of young with defects. The commonly found sex chromosome anomalies are chimerism (XX/XY), mosaicism (XX/XXX and XY/XXY) and trisomy (XXX) etc. The occurrence of mosaicism is due to mitotic non-dysfunction. Certain viruses cause aneuploidy (Nicholls, 1974). The occurrence of mosaicism and their clinical significance have been well documented in animals (Swartz and Vogot, 1983; Halnan, 1976; Patel and Patel, 1999). This paper describes the case of mosaicism in a 4 years old repeat breeder HF heifer.

Blood was collected from a 4 years old HF heifer showing repeat breeding problem and chromosomal smears were prepared using short term lymphocyte culture technique as described earlier (Patel, 1999). Giemsa stained 100 metaphase plates were screened under light microscope to detect possible chromosomal abnormalities.

The normal somatic chromosome number of the cattle is 60 ($2n = 60$). All autosomes are acrocentric however, sex chromosomes in females are submetacentric. Therefore, it was possible to identify X-chromosome even without G-banding. Out of 100 scored metaphase cells, 96 exhibited normal chromosomal number i.e. 60, XX (Fig. A). However, 4 cells (4%) were found with abnormal number of sex chromosomes, 61,XXX (Fig. B) because of an additional X-chromosome. The female had normal external and internal genitals. The female



Fig. A. Metaphase cell (60 XX) arrow indicate two X chromosome

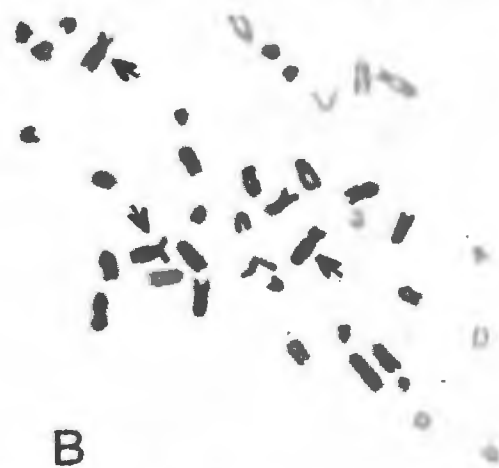


Fig. B Partial metaphase (61, XXX), arrow indicator three X chromosomes

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showed heat many times but never conceived even after repeated inseminations. Mosaicism is associated with reduced fertility or infertility in both males and females. Mosaicism with 60,XY/61,XXY (Buters and Vandeplassche, 1972) was observed in case of marked bilateral testicular hypoplasia. A bull showing depressed libido, poor sperm motility and with 60,XY/61,XXY was described by Halnan, 1976. Similarly, a case of mosaicism with 59,X/60,XX/61,XXX (Swartz and Vogot) was observed in heifer with repeat breeding problems. The present case of XX/XXX mosaicism is similar to the above case as female was repeat breeder.

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