**Fig. 1:** Genomic organization of the bovine casein locus.

The genes encoding the four caseins are depicted by green (calcium sensitive caseins) and black (k-casein) boxes and the major biochemical properties (length of the peptide chain, number of amino acid residues, number of phosphoseryl residues, number of cystein residues and glycosylation status) of the proteins synthesized starting from the corresponding genes are given under each gene.

**Fig. 2:** Structural organization of the four bovine casein transcription units.

Open black lines represent introns, and exons are depicted by large boxes, black (5’ and 3’ untranslated regions), striated green (part of exon encoding the signal peptide) and green (exons and part of exons encoding matured proteins) boxes. Sizes of exons are given, in base pairs, under each exon whose numbering is indicated on the top.
**Fig. 3:** Nucleotide sequence polymorphisms in 5’ flanking regions of bovine $\alpha_{s1}$-casein gene.

Mutations were identified by Koczan et al. (1991) and Schild and Geldermann (1996). Mutations are shown as red arrow along with their respective nucleotide position and change.

**Fig. 4:** Nucleotide sequence polymorphisms in 5’ flanking regions of bovine $\alpha_{s2}$-casein gene.

Mutations were identified by Schild and Geldermann (1996). Mutations are shown as red arrow along with their respective nucleotide position and change.

**Fig. 5:** Nucleotide sequence polymorphisms in the 5’ flanking regions of bovine $\beta$-casein gene.

Mutations are shown previously identified by Schild and Geldermann (1996) and Bleck and Bremel. (1993). Mutations are shown as red arrow along with their respective nucleotide position and change.
Fig. 6: South Kanara she buffalo

Fig. 7: Surti she buffalo

Fig. 8: Murrah she buffalo
**Fig. 9:** Diagrammatic representation of amplified bovine alpha $\alpha_S^2(A)$ casein gene.

**Fig.10:** PCR amplification of *Bubalus bubalis* alpha $\alpha_S^2(A)$ casein gene.

- Lane 1 and 2 - South Kanara breed.
- Lane 3 and 4 - Surti breed.
- Lane 5 - Murrah
**Fig. 11:** Diagrammatic representation amplified of bovine alpha S₂ (B) casein gene.

**Fig. 12:** PCR amplification of *Bubalus bubalis* alpha S₂ (B) casein gene.

- Lane 1 and 2 - South Kanara breed.
- Lane 3 and 4 - Surti breed.
- Lane 5 - Murrah breed
**Fig.13:** Diagrammatic representation of amplified bovine beta casein gene.

**Fig.14:** PCR amplification of *Bubalus bubalis* beta casein gene.

Lane 1 and 2 - South Kanara breed.
Lane 3 and 4 - Surti breed.
Lane 5 and 6 - Murrah breed
**Fig.15:** Diagrammatic representation of amplified bovine kappa casein gene.

**Fig.16:** PCR amplification of *Bubalus bubalis* kappa casein gene.

Lane 1 and 2 - South Kanara breed.
Lane 3 and 4 - Surti breed.
Lane 5 - Murrah breed
**Fig. 17:** PCR-RFLP pattern of the *Bubalus bubalis* alpha S2 (A) casein gene (5' untranslated region) by restriction enzyme *MaeII*

- Lane 1 to 3 - South Kanara breed.
- Lane 4 to 6 - Surti breed.
- Lane 7 and 8 - Murrah breed

**Fig. 18:** PCR-RFLP pattern of the *Bubalus bubalis* alpha S2 (B) casein gene (5' untranslated region) by restriction enzyme *MaeII*

- Lane 1 and 2 - South Kanara breed.
- Lane 3 - Surti breed
- Lane 4 - Murrah breed
**Fig.19:** PCR-RFLP pattern of the *Bubalus bubalis* alphaS2 (A) casein gene (5’ untranslated region) by restriction enzyme *EcoRV*

- Lane 1 and 2 - South Kanara breed.
- Lane 3 - Surti breed.
- Lane 4 - Murrah breed

**Fig.20:** PCR-RFLP pattern of the *Bubalus bubalis* kappa casein gene by restriction enzyme *Hinf I*

- Lane 1 and 2 - South Kanara breed.
- Lane 3 - Surti breed
- Lane 4 - Murrah breed
**Fig. 21:** PCR-SSCP pattern of the *Bubalus bubalis* alpha S2 (B) casein gene (5' untranslated region)

- Lane 1 and 2 - South Kanara breed.
- Lane 3 and 4 - Surti breed.
- Lane 5 - Murrah breed

**Fig. 22:** PCR-SSCP pattern of the *Bubalus bubalis* beta casein gene

- Lane 1 to 3 - South Kanara breed.
- Lane 4 and 5 - Surti breed.
- Lane 6 and 7 - Murrah breed

**Fig. 23:** PCR-SSCP pattern of the *Bubalus bubalis* kappa casein gene

- Lane 1 to 5 - South Kanara breed.
- Lane 6 to 10 - Surti breed.
- Lane 10 to 14 - Murrah breed
**Fig. 24:** Electropherogram showing monomorphic results for the buffalo breeds at site - 1084 bp of alpha S2 casein gene (5’ untranslated region)

**Fig. 25:** Electropherogram showing monomorphic results for the buffalo breeds at site - 317 bp of alpha S2 casein gene (5’ untranslated region).

**Fig. 26:** Electropherogram showing monomorphic results for the buffalo breeds at site - 186 bp of alpha S2 casein gene (5’ untranslated region).

Bases highlighted in red color are the bases at – 184 and -185 positions, which were altered leading to loss of restriction site for enzyme Eco RV. The base present at -184 bp position was “A” instead of “G”, and was “G” instead of “A” at the -185 bp position. This was one of the exclusive mutations observed in case of *Bubalus bubalis* species.
**Fig. 27:** Electropherogram showing monomorphic results for the buffalo breeds at site + 8267 bp of beta casein gene (a part of exon VII).

**Fig. 28:** Electropherogram showing monomorphic results for the buffalo breeds at site +5345 bp of kappa casein gene (a part of exon IV).