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Bovine Heat Shock Protein 70 and Its Application in Cellular Thermo Tolerance

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Genetic selection of animals based on their thermo tolerance, is one of the possible move towards reducing the impact of heat stress on cattle productivity. Genetic differences for thermotolerance at the cellular levels are mediated by a family of heat shock proteins (HSP). Heat Shock Protein 70 (HSP70) is one of the important molecular chaperon that can protect cells from thermal damage and apoptosis. These proteins, as molecular chaperons, are involved in the maintenance of the intra cellular homeostasis primarily by controlling the process of protein folding [1].

Hsp70 proteins are known to be either expressed constitutively or it is inducible by various stress stimulies [2,3]. Higher and low expression of heat shock proteins indicates induced stress factors; the transcripts level reflects both cell response and stress intensity [4]. Induced expression of Hsp70 genes synchronized mainly at transcription level [5]. Expression profiles of HSP70 are under the direct control of upstream elements located at promoter regions. It is reported that Single Nucleotide polymorphisms (SNPs) at promoter region may alter gene expression pattern of bovine HSP70 [6]. It is also studied that, 3' UTR region of HSP70 are also associated with mRNA stability as well as stress response in swine [7]. Earlier several studies reported the association of SNP in HSP to respiration rate, body temperature of cattle under stress to ascertain relative thermal tolerance [8,9]. Schwerin et al. [10] reported the association of SNP within hsp70 promoter with shorter productive life of cattle. Again, certain studies demonstrated the role of polymorphism within hsp70 promoter region to the reproductive parameters including pregnancy rate, calf weaning weights and fertility in dairy cattle [11-13]. Together the above findings may indicate the significance of SNPs at promoter elements of HSP70 are one of the reference to be added for selecting dairy cattle in terms of thermo adaptability.

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