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Impact of different seasons on the milk somatic and differential cell counts, milk cortisol and neutrophils functionality of three Indian native breeds of cattle

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Abstract

The present study was undertaken to compare the effect of different seasons on the mammary immunity of three Indian native breeds of cows (Tharparkar, Gir and Sahiwal) well adapted to the tropical region. For this milk samples were collected from cows in winter (THI= 57, comfortable zone), hot-dry (HD; THI= 76, heat stressful zone) and hot-humid (HH; THI= 82, severe heat stress) and estimated for milk somatic cell counts (SCC), phagocytic activity (PA) of milk neutrophils, milk cortisol and heat shock proteins and function associated genes in milk neutrophils. Milk SCC was evaluated using a cell counter and differential cell counts measured microscopically. Cortisol was quantified in skimmed milk by competitive ELISA. Milk PA was estimated using nitro blue tetrazolium assay, and for gene expression studies, milk neutrophils were isolated and studied for heat shock proteins (HSP40, HSP70, HSP90α) and cell adhesion molecules (CD11b, CD25, CD44) using real-time polymerase chain reaction. All the studied parameters increased in HD and HH seasons with highest values observed in Sahiwal cows. However, PA of neutrophil was highest in Tharparkar cows in winter and decreased gradually at higher THI values during hot seasons. Milk cortisol was positively correlated with expression of various CD molecules and HSPs ($p<0.05$) in milk neutrophils but negatively correlated ($p<0.05$) with PA during HH season in all breeds. The study revealed that Indian native cows were at considerable risk in HH season and Sahiwal cows were more heat stressed followed by Gir and Tharparkar cows, respectively, and thus may require managemental interventions. Also,