

Impact of Climate Change on Some Physiological Parameters of Cyclic Female Egyptian Buffalo

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Abstract : The aim of this investigation is to study the effect of seasonal variations in Egypt on hematological parameters, reproductive and metabolic hormones of Egyptian buffalo-cows. This study lasted one year extending from December 2009 to November 2010 and was conducted on sixty buffalo-cows. Group of 5 buffalo-cows at estrus phase were selected monthly. Then, after blood sampling through tail vein puncture in the 2nd day after natural service, they were divided in two samples: one with anticoagulant for hematological analysis and the other without anticoagulant for serum separation. Results of this investigation revealed that the highest atmospheric temperature was in hot summer $32.61 \pm 1.12^{\circ}\text{C}$ versus $26.18 \pm 1.67^{\circ}\text{C}$ in spring and $19.92 \pm 0.70^{\circ}\text{C}$ in winter season, while the highest relative humidity % was in winter season $43.50 \pm 1.60\%$ versus $32.50 \pm 2.29\%$ in summer season. The rise in temperature-humidity index from 63.73 ± 1.29 in winter to 78.53 ± 1.58 in summer indicates severe heat stress which is associated with significant reduction in total red blood cell count ($3.20 \pm 0.15 \times 10^6$), hemoglobin concentration (8.83 ± 0.43 g/dl), packed cell volume ($30.73 \pm 0.12\%$), lymphocytes % ($40.66 \pm 2.33\%$), serum progesterone hormone concentration (0.56 ± 0.03 ng/ml), estradiol17-B concentration (16.8 ± 0.64 ng/ml), triiodothyronin (T3) concentration (2.33 ± 0.33 ng/ml) and thyroxin hormone (T4) concentration (21.66 ± 1.66 ng/ml), while hot summer resulted in significant increase in mean cell volume (96.55 ± 2.25 fl), mean cell hemoglobin (30.81 ± 1.33 pg), total white blood cell count ($10.63 \pm 0.97 \times 10^3$), neutrophils % ($49.66 \pm 2.33\%$), serum prolactin hormone (PRL) concentration (23.45 ± 1.72 ng/ml) and cortisol hormone concentration (4.47 ± 0.33 ng/ml) compared to winter season. There was no significant seasonal variation in mean cell hemoglobin concentration (MCHC). It was concluded that in Egypt there was a seasonal variation in atmospheric temperature, relative humidity, temperature humidity index (THI) and the rise in THI above the upper critical level (72 units), which, for lactating buffalo-cows in Egypt is the major constraint on buffalo-cows' hematological parameters and hormonal secretion that affects animal reproduction. Hence, we should improve climatic conditions inside the dairy farm to eliminate or reduce summer infertility.

Keywords : buffalo, climate change, Egypt, physiological parameters

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