Proceeding of the Biennial Conference of the Association for Applied Animal Andrology

July 28-29, 2012 - Vancouver, Canada

9th Association for Applied Animal Andrology Biennial Conference will be held in 2014. Visit www.animalandrology.org for more information and updates

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Effect of vitamin C and electrolytes supplementation on exotic and local poultry semen quality under thermal stress in Pakistan

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Poultry exhibit reduced fertility under the warm, stressful environment of tropical regions. Antioxidants may counterbalance stress and improve semen quality. The objective of the present study was to determine the effect of vitamin C and electrolyte supplementation on semen quality in exotic and local roosters submitted to different semen collection frequencies. The study was conducted at Peshawar, Pakistan during July, 2011 when ambient temperatures ranged from 38 to 44°C. All roosters were reared in floor pens having free access to drinking water. The effects of vitamin C/electrolytes supplementation (0, 1, and 2 ml/L in drinking water), breed (Cobb-500, Starbro, and local), and semen collection frequency (daily, every other day, and every third day) were determined using 243 roosters in a 3 x 3 x 3 factorial design (n = 9/group). Vitamin C/electrolytes supplement consisted of 60 g ascorbic acid, 9.5 g sodium citrate, 3.9 g sodium chloride, and 1.5 g potassium chloride per liter of solution. The supplement was added to the drinking water during a pre-experimental (two weeks) and the experimental period (three weeks). Semen was collected using the cloacal rubbing method during the experimental period. Semen volume and sperm concentration (Hemocytometer), motility (Microscopic observation 40X), viability (Eosin-nigrosin stain), and morphology were evaluated. Overall means from results obtained during the experimental period were calculated and used for analysis. There were vitamin C/electrolytes supplementation effects (P < 0.05) on sperm concentration, motility, and viability; all these parameters were greater in roosters receiving 1 mL (4.6± 0.12 x 10⁹ sperm/mL, 53.7 ± 1.03 %, and 53.6 ± 1.01%, respectively) or 2 mL of supplementation (4.6 ± 0.13 x 10⁹ sperm/mL, 54.9 ± 1.04%, and 55.2 ± 1.02%, respectively) when compared to controls receiving no supplementation (4.3 ± 0.11 x 10⁹ sperm/mL, 48.6 ± 1.01%, and 46.8± 1.04%, respectively). There were breed effects (P < 0.05) on semen volume and sperm concentration, motility, and viability. Semen volume was less in local roosters (0.146 ± 0.01 mL; mean ± SEM) than in Cobb-500 and Starbro roosters (0.306 ± 0.01 and 0.284 ± 0.01 mL, respectively). However, sperm concentration, motility, and viability were greater in local roosters (5.98 ± 0.13 x 10⁹ sperm/mL, 76.8 ± 1.0%, and 74.4 ± 1.2%, respectively) than in Cobb-500 (4.11 ± 0.11 x 10⁹ sperm/mL, 40.1 ± 0.9%, and 40.7 ± 1.1%, respectively) and Starbro roosters (3.33 ± 0.12 x 10⁹ sperm/mL, 40.4 ± 1.0%, and 40.8± 1.0%, respectively). There were no significant supplementation or breed effects on sperm morphology and no collection frequency or interaction effects on any of the semen quality parameters evaluated. In conclusion, vitamin C/electrolyte supplementation improved semen quality in poultry under thermal stress and semen quality was better in local than in exotic poultry breeds under these circumstances.