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A STUDY ON SERUM COPPER AND CERULOPLASMIN IN FOALS

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To investigate the relationship between the occurrence of developmental orthopedic diseases (DOD) and mineral metabolism, serum concentrations of zinc (Zn), manganese (Mn), calcium (Ca), inorganic phosphorus (P) and copper (Cu), as well as total ceruloplasmin (Cp) and holo-Cp levels were measured in 15 pairs of foals and their brood mares.

Single radial immunodiffusion (SRID) and oxidase activity were used for the quantification of total Cp and holo-Cp, respectively. Five pairs of horses, with genetic backgrounds suspected of DOD made up the DOD group, and others with no clinical evidence of orthopedic disorders during this period were in the control group. This evaluation was done during the perinatal period in mares and up to the 17th month of age in foals.

Serum Zn decreased with growth in control foals, the values at 17 months were about half those at 1 week. In control mares, there was a tendency for zinc values to decrease during the perinatal period without any statistical significance. Serum Mn varied a great deal, while serum Ca was almost at the same level during this term in the control group. Serum P decreased with age in control foals, but was stable in control mares.

Serum holo-Cp activity, total Cp and Cu were extremely low at 1 week after birth (serum Cp; 15.7mg/dl), then increased rapidly up to 1 month of age (serum Cp; 43.7mg/dl), and maintained this level until the 17th month. There were no remarkable changes in Cps and Cu in control mares during the perinatal period.

There was no obvious difference in copper metabolism or the various mineral concentrations in sera between the control and DOD groups. It was also indicated that the synthesis of Cp is extremely limited in all newborn foals, and that it rapidly increases during the neonatal period. These results suggest that the first one month after birth is the critical period in which physiological copper deficiency could occur.