The objective of this study is to determine serum levels of phosphorus, copper, cobalt and zinc in the liver of Water Buffalos raised in the Marajó Island, state of Pará, Brazil. 104 liver samples of approximately 100g were collected, as well as blood samples for serum in slaughterhouses and in animals from municipal districts within the Marajó Island. The blood samples were collected by jugular venepuncture, in sterile vacuurn tubes without anticoagulant. The samples were then centrifuged at 3000 rpm for five minutes and the serum obtained was stored in 2ml polyethylene tubes and frozen at -20°C. Blood serum inorganic phosphorus analysis was done utilizing Dole's® reagent kits in the Bioplus 2000. After weighed between 0.5 and 0.6g, liver samples were digested in a closed system, adding 7ml of HNO₃ 65% and 0.5 ml of H₂O₂ 30% and left at room temperature for 12 hours. The digestion process was complemented by heating using a MarsXpress - CEM Tecnology Inside microwave oven for 50 minutes. Determination of copper, cobalt and zinc values was conducted using a Optical Emission Spectrometry with Inductively Coupled Plasma (ICP OES), model Vista-MPX CCD simultaneous (Varian, Mulgrave, Australia). Inorganic phosphorus analysis revealed an average of 6.26±1.81 mg/dl. From the total studied animals, 12 presented values lower than 4 mg/dl, what may be considered as critical values, when compared to bovines. From the 104 liver samples analyzed, 21 in cobalt determination and 24 in copper evaluation had results below the methodology utilized detection limit. When analyzing cobalt levels, values of 0.02 to 1.22 ppm were verified, with average of 0.36±0.33 ppm. In copper levels determination, values between 0.62 to 50.61 ppm, with average of 5.57±7.60 ppm were obtained. All samples had levels of zinc detectable by the methodology, with values that varied from 12.06 to 76.11 ppm, with average of 27.04±13.12 ppm. Cobalt detected levels were considered to be normal, while copper and zinc levels were considered deficient when compared to reference levels in the bovine species, since there are no patterns in bubaline species. Levels of inorganic phosphorus in the blood serum may serve as a complementary factor in the phosphorus deficiency diagnosis. Detection of copper, cobalt and zinc in the animal liver represents a satisfactory diagnostic means in these elements' deficiencies.

Keywords: Phosphorus, cobalt, zinc, water buffalo, Pará.