
**STRESS LEVELS DURING CHEMICAL VS. MANUAL RESTRAINT IN WOOD BISON
(*Bison bison athabasca*) AS INDICATED BY BLOOD LACTATE AND GLUCOSE**

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Abstract

Blood lactate (mmol/L) and glucose (mg/dL) concentrations were measured in captive wood bison (*Bison bison athabasca*) restrained for disease testing and health, pending reintroduction into Alaska. The majority of the herd (n = 70) were restrained in a hydraulic squeeze chute, though the larger, more aggressive animals (n = 9) were chemically immobilized via darting using a combination of thiafentanil and xylazine. A General Linear Model was used to test for differences in blood [lactate] and [glucose] among eight categorical and three continuous variables related to demographics, restraint technique, handling times, and factors assumed to cause additive stress, where $\alpha = 0.05$ (SAS, PROC GLM). Additive stressors were documented during the handling and include things such as the use of an electric prod, an injury occurring during handling, and observed aggressive conspecific interactions. We also tested for a correlation between [lactate] and [glucose] (SAS, PROC CORR, Pearson).

Consistent with our expectations, a highly significant difference ($p < 0.0001$) was found in [lactate] among the three categories of restraint techniques; this relationship was not demonstrated for [glucose]. Darted animals exhibited the lowest [lactate] ($\bar{x} = 0.9$, SE = 0.15), while animals handled through the chute system had the highest [lactate] ($\bar{x} = 11.7$, SE = 0.53) and bison unsuccessfully moved through the chute system and subsequently darted fell in between ($\bar{x} = 4.2$, SE = 0.90). No correlation was observed between [lactate] and [glucose] ($R = 0.075$). For chute-handled bison, no significant differences were found for [lactate] or [glucose] with respect to the day of handling, gender, age, order through the chutes, or additive stressors. Animals with shorter handling times were shown to have significantly higher [lactate] ($p = 0.0347$). Restraint time, (the amount of time in the hydraulic squeeze), did not affect [lactate]. However, animals with shorter restraint times did have significantly higher [glucose] ($p = 0.0293$), such that each minute increase in handling time resulted in a ~1% decrease in the median [glucose]. The total handling time did not have a significant affect on [glucose]. While we expected that chemical restraint would be less stressful to the bison than other techniques, we did not anticipate that shorter handling times would yield higher [lactate]. We propose that wood bison, as herd animals, likely recover quickly from individual stressful events. However, swift processing through a chute system does not allow time for this lactate recovery, as there is little to no rest period between segments of the chute system. In brief handlings (<18 min), the point in time where we collected our blood sample allowed us to actually measure cumulative stress, whereas in the longer handlings (>38 min) our blood sample was more representative of an acute response to the most recent stressor(s).

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