MS Thesis
Department of Environmental Science and Policy
George Mason University

Candidate: Matthew D. Krcmarik
Defense Date and Time: Tuesday, July 30, 2019 at 11:00am
Defense Location: Exploratory Hall 3301, Fairfax Campus
Title: Effects Abnormal Prolactin Secretion Has on Metabolic Health of Acyclic Female African elephants (Loxodonta africana)

Thesis Director: Dr. Larry L. Rockwood
Committee Members: Dr. Lance A. Liotta and Dr. Natalia Prado

ABSTRACT

Reproductive success is an increasing concern for captive African elephants (*Loxodonta africana*) in North America. Chronic hyperprolactinemia (HPRL), elevated prolactin secretion, has been proven to have a strong association with ovarian dysfunction in African female elephants. Previous studies have identified metabolic effects correlated with acyclicity, such as higher concentrations of insulin and leptin and lower glucose-to- insulin (G: I) ratios. However, metabolic effects from chronic elevated prolactin have yet to be investigated in elephants. In humans, hyperprolactinemic women have shown to have increased risks for accelerated atherosclerosis, hyperandrogenemia, decreased metabolism, and insulin resistance. The aim for the study was to explore possible associations between abnormal prolactin secretion (high and low) and metabolic disorders in elephants.

One year of serum samples, collected biweekly, were obtained from African female elephants (n=36) with varying status of prolactin secretion (high= 12, normal= 12, low= 12). Biomarkers were assessed to compare thyroid function, glucose and lipid metabolism and cardiovascular health amongst the high, normal, and low prolactin state groups. Generalized linear mixed models (GLMs) were performed in R.

Results determined that high prolactin secretion is associated with abnormal TSH and thyroid hormone production, elevated cortisol and cholesterol, and reduced fructosamine. Low prolactin individuals were found to have heightened levels of testosterone. Taken together, this study highlights several areas in need of further study to further advance our understanding of African elephant physiology and the etiology of hyperprolactinemia in female elephants.