

Crocodile Specialist Group SSC -IUCN

Student Research Assistance Scheme (SRAS)

FINAL REPORT

Project title: Efectos maternos y su interacción con factores climáticos sobre huevos y progenie de *Caiman latirostris*.

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The present scholarship granted by the CSG allowed me to carry out the works related to my Phd studies that I currently finish. The results and scope of this research were presented at the 24th Working Meeting of the Crocodile Specialist Group in South Africa (2016) and 25th Working Meeting of the Crocodile Specialist Group in Santa Fe (2018). In addition, from this work two scientific publications were generated and a third one is in preparation:

1. LEIVA, PAMELA M.L.; M.S. SIMONCINI; T.C.G. PORTELINHA; A. LARRIERA; C.I. PIÑA 2018. Size of Nesting Female Broad-snouted Caimans (*Caiman latirostris*, Daudin 1802) BRAZILIAN JOURNAL OF BIOLOGY
2. LEIVA, PAMELA M.L.; LABAQUE M.C.; FERNANDEZ, M.E; PIÑA, C.I; SIMONCINI, M.S. 2018. Physical and chemical characteristics of fertile and infertile eggs of wild *Caiman latirostris* AQUACULTURE

Introduction

Previous studies on reptiles mention that female attributes and energy they investment in progeny, based on nutrition, are regulated by prey availability and/or quality in interaction with local and regional climatic factors. This phenomenon, understood as maternal effect, is defined as the influence of mother phenotype and/or the conditions of the environment on the phenotype of her offspring. A model used to understand the incidence of this phenomenon in oviparous species is the study of yolk fatty acid profile (FA) (principal energy reserve for embryonic development) of eggs produced by females, since FA respond to quality of the diet and certain climatic factors predominant in the maternal environment.

Objective

Evaluate the influence of corporal (body condition [SMI-Scaled Mass Index] and physiological attributes [plasma and muscle FA profiles]) of reproductive females and their

interaction with predominant climatic factors (rainfall in the headwaters of river and local, and temperatures during the months March-April and September-October) in the pre-breeding season on their reproductive performance (clutch size and hatching success) and eggs characteristics (morphometrics, percentage of constituents and FA composition) and progeny of *Caiman latirostris* in wild populations in Santa Fe, Argentina.

Materials and methods

This study was done in wild animals in Santa Fe province during 2013-2016 reproductive season. Wild nesting female were captured using steel ropes. After capture, individuals were immobilized mechanically, without the use of anesthetics (Verdade 1997). Biometric data were obtained with a tape (1 mm accuracy) by measuring the total length (TL), snout-vent length (SVL); and weighted with a scale of 0.01 kg precision. Also, blood and muscle samples and clutch of females were collected in the field.

Body condition was calculated by the Scaled Mass Index (SMI, Peig y Green, 2009), physiological condition was characterized by fatty acid profiles (FA) in plasma and muscle of reproductive female. We processed and analyzed fatty acids of five eggs of each nest by extraction of yolk lipids according to Labaque *et al.* (2010). The rest of the clutch was incubated to evaluate the hatching success.

Climatic variables (temperature, local rainfall, and rainfall in the headwaters of the rivers prior to oviposition) was obtained from the official website of the national meteorological service.

Results and Discussion

No relationship was found between female's body condition and climatic variables; this could indicate that only females that have managed to overcome the minimum required body condition can reproduce. Although for the moment it is unknown what are the causes that would allow a female to reproduce and it is possible that this threshold is flexible. A relationship was found between female body condition and hatching success of their nests, females with better body condition have greater hatching success. Is possible that there is a minimum energy threshold to reproduce, but once the threshold is overtaken, the excess energy could be invested to improve progeny quality. In addition, it was observed a negative association between clutch size and rainfall in the headwaters of rivers in March-April. According to the relationship between body size, clutch size and energy cost of reproduction, it is possible that in years with lower rainfall, only larger females would reproduce. Respect to the physiological condition, muscle FA showed that essential fatty acids such as linoleic (C18:2) has a strong association with minimum temperatures of September, which shows that temperatures of first warm months (spring), determines the availability of food items that are in relation to values of essential fatty acids (EFA). Also, muscle FA (C18:1, C18:2, C22:6 and total polyunsaturated) showed association with hatching success, which in turn are indirectly related to a higher body condition. In plasma EFA and total polyunsaturated was associated with rainfalls in headwaters of rivers in December, showing that precipitation would affect plasma FA through diet. Our results suggest that body condition allows to evaluate reproductive performance of the species; and females physiological condition is affected by precipitation and temperature.

Added to these results and considering that snout-vent length and weight of the female were positively related to certain physical characteristics of eggs and offspring, strengthens the idea of climatic variables would strongly condition population dynamics *C. latirostris*.

The body and physiological condition of females showed a relationship with FA profiles of their early eggs. In addition, certain FA in early eggs, such as C20:4 showed a positive relationship with hatching success, while C18:2 showed a negative relationship. It is worth mentioning that these fatty acids were associated with the climatic variables (temperature and rainfall) of the breeding season. This study suggests that years with abundant rainfall, where greater availability and/or quality of food resources and refuge would be generated, reproductive females of *C. latirostris* invest better quality resources in production eggs and, therefore, increase hatching success probability, influencing the reproductive performance of the population.