

MANAGEMENT OF *CROCODYLUS MORELETHI* IN CAPTIVITY CONDITIONS

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Introduction

Mexico is one of the 12 richest countries in biodiversity; reptiles occupy the 1st world place with 717 reported species²⁰. The morelet's crocodile is one of the 3 species found and raised in Mexico¹⁴. It is reproduced on the coast of the Gulf of Mexico from Tamaulipas to Yucatan, Belice and the north of Guatemala. In Mexico has been reported in many southwest states along rivers, streams and lagoons inside the forests and jungles²⁰. It is also called dark, pale or bog crocodile, *acuetzpalin* and *itzam canain* in Nahuatl and Mayan language respectively¹⁸. The morelet's crocodile has been exploited over 200 years⁸, has economic value², very durable, thick and resistant skin, which is very important for the Fur industry (shoes, wallets, purses, belts, boots, among others)¹⁰. Crocodile's weight at the hatching time is 35 g and 23-28 cm length, in natural conditions increases 2 to 2.5 cm/month (30cm/year) during the first years²⁰. The highest reported length has been 4.16 m¹⁶. In wildlife, younger crocodile's diet is composed by larvae and adults of aquatic, terrestrial and flying species of insects found over the water, small fishes, tadpoles and small frogs⁹. The crocodiles less of 50 cm eat insects mainly and they also use to eat reptiles, birds and mammals⁴. The environmental temperature is important on the feed intake (30-32 °C) and when it drops until 25 °C feed consumption decreases either and crocodiles stop eating when it reaches down 22 °C⁷. The insects are a source of macronutrients, good quality protein mainly. Grasshoppers are widely reproduced with high protein value¹⁹.

Material and methods

This study was carried out at The Phoenix crocodile's farm located in City of Carmen Campeche at 18°39'N, 91°50'W and 3hasl. Housing consists on an offspring room of 8x3.50 m and 2.10 height; it has a pen of 3x1.50 m and was divided in 9 penning of 60x1.50 m (90m²). Animals smaller than 60 cm were housed in breeding area, 104 hatching crocodiles were fed from Sept 2003 to Jan 2004 with different diets, 8 groups (13) were formed, 4 lots were fed on grasshoppers *Sphenarium histrio* E, *Sphenarium purpurascens* Ch and

Melanoplus mexicanus S (GD) and 4 with minced fish (FD), both were mixed with chicken liver as agglutinant at 5:1 proportion, complemented with calcium (adenac) and vitamins (ferminac). Macro and micronutrients were determined by AOAC methods and high-resolution liquid chromatography respectively^{1, 13, 17}. Food was given each two days between 2:00 to 4:00 pm at the highest day temperature at 5-8% BW proportion. Feeding conversion was made using the proteinic efficiency relation (PER)³. Identification⁵, growth, length, weight and survival were set every month.

Results

Nutritive value of grasshoppers is reported on table 1.

Table 1. Nutritive Value of Different Insects used in Crocodiles Diets.

Common name	Scientific name	Protein*	Ashes*	Lipids*	Fibre*	NFE**	Provit. A (mg/100ml)	Vit. E (mg/100ml)
grasshopper	<i>Sphenarium histrio</i> E	75.33	2.99	5.12	13.25	3.36	4.12	0.79
grasshopper	<i>Sphenarium purpurasens</i> Ch	72.45	2.40	5.92	8.55	10.60	4.03	0.73
grasshopper	<i>Melanoplus mexicanus</i> S	74.60	3.40	5.23	12.01	4.76	3.6	0.67

*gr/100 g dry base; **Nitrogen Free Extract

Survival was 77.7% (GD) and 55.5% (FD). The GD lots presented the highest growth and monthly weight gain with 2.4 cm and 27.7 g and FD lots with 1.4 cm and 14.2 g (table 2).

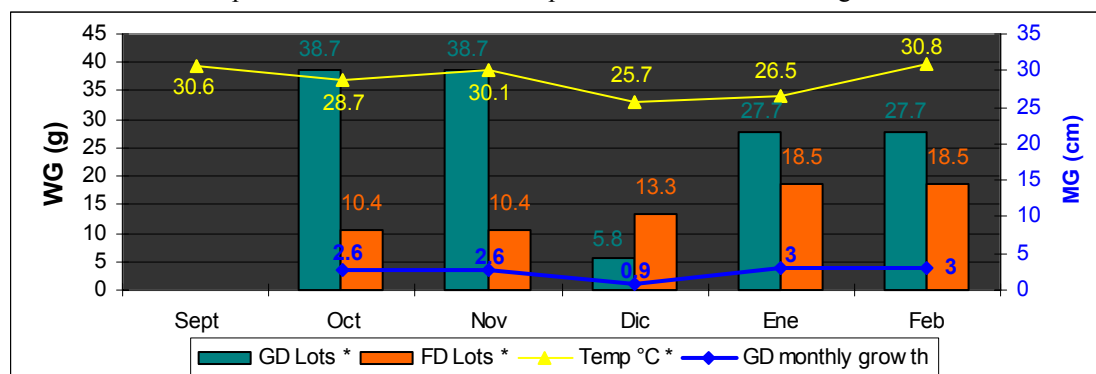
Table 2. Survival, Growth and Weight Gain in Morelet's Crocodiles fed with Insects.

Lots	IL cm*	FL cm*	MG cm*	IW g*	FW g*	MWG g*	MR %
GD	26.5	39.5	2.4	45.4	184.2	27.7	22.3
FD	26.1	34.5	1.4	45.4	130	14.2	44.5

*means, IL, FL initial and final length; MG monthly growth; IW, FW initial and final weight; MWG monthly weight gain; MR mortality rates.

Low environment temperature is related with decreased food consumption and monthly weight gain, higher growth and weight gain were during Jan-Feb (3 cm/month) with higher temperatures than other months, similarly smaller growth and weight gain were during Dec (0.9 cm) and with the lowest temperature registered this month for GD and FD, nevertheless the latter lot data are not shown (graphic 1). Main causes of mortality were fractures, abdominal swollen, eyes infection and salmonellosis.

Graphic 1. The Effect of the Temperature Variations on Weight Gain



Discussion

Survival was higher in grasshopper fed group (77.7%) than in pilot groups (55.5%), provitamin A and vitamin E content increases immunological resistance to infectious diseases, the mortality rates (22.3%GD 44.5%FD) are between the 30-50% reported by some authors, who mentioned temperature variations and lack of hygiene at the hatching place as main causes of death^{6, 7}, according to this, problems observed were eyes infection, abdominal swollen, salmonellosis, stress and anorexia. Young crocodiles need frequent change of water, infectious diseases increases with dirty and cold water⁶. Eyes infection is reported as common in youngs^{21,18}. Salmonella has been found in crocodile's flesh for human consumption at higher rates than beef¹⁵, 92 different serovars has been identified, most of them in farming Nile's crocodiles, but this microorganism is also present in African dwarf crocodiles and other reptiles like snakes, lizards and tortoises²².

Growth and weight gain was related with temperature, in lots fed with insects, which obtained the highest increases (27.7 cm and 38.7 g) at 30.6 and 28.7°C (Oct; Nov), when temperature drops until 25.7°C (Dec) resulting the lowest growth (graphic 1). Feed intake is also related directly with temperature, the highest feeding intake is present with the highest temperatures^{18, 11} and is related directly with body weight and growth¹¹ (table 2), alligators grow about 30cm/year for the first 6 years¹², this still happens in juvenile crocodiles which after 14 weeks increased their BW 18% at 30°C whereas lost 13% (30 and 25°C) and 66% (25°C), respectively¹¹. The stress is common in breeding, also cause decreased in feed intake, body weight and appears because of temperature fluctuations, during the colder month (Dec) body weight lost was reported after feed intake decreased, likewise happens in other reptiles which stop eating when temperatures drops below 16°C¹².

Conclusion

Survival rates were much higher in crocodiles fed with insects. Low environmental temperature decreased food consumption. The main causes of death were lack of hygiene during hatching, so the highest mortality was observed in the pilot group. Skin is thick, colour appearance are deeper and brighter. Insect breeding is cheaper and with better results in growing and immunological resistance. Most research is necessary, there is a lack of current data on morelet's crocodile.

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