COMPARISON OF SEMI-NATURAL WITH HATCHERY NESTS AT PUNTA RATÓN, HONDURAS

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Figure 1: Hatchery at Punta Ratón.

Punta Ratón is the main nesting beach for *Lepidochelys olivacea* in Honduras. The local community consumes the eggs during most of the year, but the 25 day "veda" enforced by the Central Government requires that eggs collected at this time be translocated to a hatchery (*Fig. 1*) and the neonates released after hatching. Outside of the "veda" period, when egg harvesters at Punta Ratón see female turtles emerging from the surf, they will often collect them from the intertidal area, carry them on their shoulders, and deposit them in artificial body pits on the upper part of the beach (*Fig. 2*). Surprisingly, many females will lay eggs after this process. The goal of our study was to compare hatching success, thermal regimes, body condition and performance of hatchlings from these semi-natural nests with nests within the hatchery.

Figure 2: Semi-natural nests at the upperpart of the beach at Punta Raton. Top left: Local fisherman carrying a female from the surf to the beach area

Hatching Success and Incubation Temperatures

Methods: We compared 4 nests from the hatchery with 4 semi-natural nests, deposited on the same or consecutive nights.

We deployed thermo-dataloggers in each nest at laying or burying, programmed to take temperature samples every 60 minutes. Control dataloggers were deployed in pseudo-nests at both locations.

After emergence, we recovered the thermo-dataloggers and calculated hatching success.

We graphed temperature profiles and calculated maximum temperatures, and number of days with temperatures above 35 °C.

Results: Hatching success was significantly higher for beach nests than for hatchery nests (86.2 % vs 24.1 %). (*Fig. 3*)

The maximum recorded temperatures at the hatchery were significantly higher than on the beach (38.08 ± 0.24 vs 36.54 ± 0.50, $t_{(6)} = -2.8$, $p = 0.033$). The maximum recorded temperature in a pseudo-nest was 35.5 °C. (*Fig. 4*)

Temperatures surpassed 35 °C an average of 15.5 ± 2.2 days in the hatchery and 6.3 ± 2.1 days in the beach. The number of consecutive days over 35 ranged between 1 and 7 for the hatchery and between 9 and 12 for the beach. (*Fig. 5*)

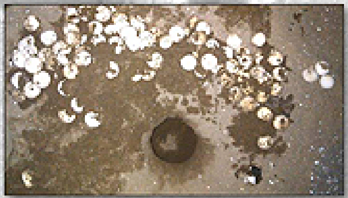

Figure 3: Excavation of hatchery nest number 93. Hatching success was very low: only three hatchlings survived out of 107 eggs.

Body Condition

Methods: We monitored four nests from the hatchery and four semi-natural nests, located on the beach.

After emergence, we randomly selected 15 hatchlings from each nest and measured SCL, SCW, CCL, CCW and weight. We compared SCL and weight for the two groups.

Results: We found hatchlings from the beach nests to be significantly larger both in weight ($t_{(82.8)} = 4.4$, $p < 0.001$) and SCL ($t_{(116)} = 6.1$, $p < 0.001$). Average weight was 16.0 ± 0.1 g for the beach and 15.0 ± 0.2 g for the hatchery. SCL was 39.8 ± 0.2 mm for the beach and 38.2 ± 0.2 mm for the hatchery.

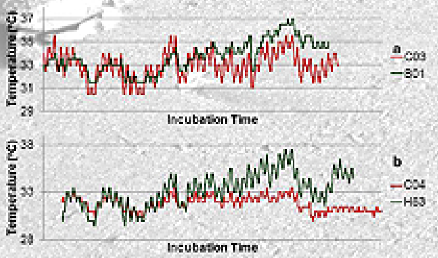

Figure 4: Temperature profiles from B01, a semi-natural nest at the beach (a) and H63, a hatchery nest (b). Red lines are temperature profiles from pseudo-nests at each location (C03 and C04).

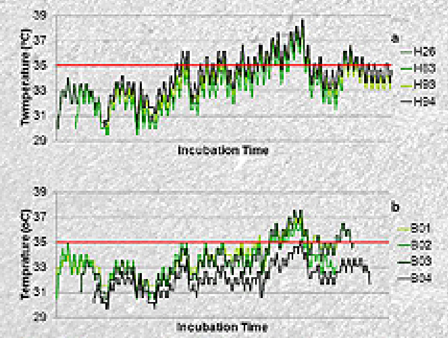

Figure 5: Temperature profiles of the four semi-natural nests located at the beach (a) and the four hatchery translocated nests located at the hatchery (b). Red lines indicate 35 °C. The datalogger of nest B04 (b, black line) was located on top of the eggs instead of among them, likely causing that nest to show lower temperatures.

Running Performance

Methods: We randomly selected 6 hatchlings from each nest and compared hatchlings from the hatchery with hatchlings from the semi-natural nests, located on the beach.

We used running speed to assess running performance.

We measured time required for each hatchling to walk a 1 m PVC gutter with a light at the end.

The gutter was located on the beach, following the natural inclination (*Fig. 6*).

We repeated the measurement three times per hatchling. All trials were performed at night.

Results: Although running speed was slightly higher for the hatchlings from the beach nests (1.4 vs 1.2 cm/s), the difference was not significant.

Figure 6: Set-up for the running speed trials. Hatchlings ran the length of a 1m PVC gutter with a dim light at the end, following the natural inclination of the beach.

Swimming Performance

Methods: We selected 6 hatchling from each nest, different from those used for the running performance experiments, and compared natural nests with semi-natural (beach) nests.

Hatchlings were video recorded for 10 minutes while swimming in an aquarium 52L x 32H x 27W cm, attached with a tether so they could not reach the walls (*Fig. 7*).

The number of power strokes and the time swimming dog-paddle style per minute were calculated.

Results: Hatchlings from the beach swam using a higher number of power strokes per minute than hatchlings from the hatchery (38.9 ± 5.5 vs 25.7 ± 3.1, $t_{(36.6)} = 2.095$, $p = 0.043$) and spent more time dog-paddling per minute (19.2 ± 1.6 s vs 14.3 ± 1.1 s, $t_{(39.6)} = 2.4$, $p = 0.02$).

Figure 7 : Set-up for the swimming style trials. Hatchlings were attached with a tether to the top of the aquarium. The length of the thread did not allow them to reach the walls.

DISCUSSION

During the 2013 season, hatching success at the Punta Ratón hatchery was 4 times lower than on the beach zone where the semi-natural nests were deposited. Hatchlings from the hatchery were significantly smaller and performed more poorly in the swimming trials. Although these differences could be due to several factors, it is known that incubation temperatures strongly influence hatching success as well as hatchling physical characteristics and behavior[1,2,3,4]. Temperatures above 34 °C for more than 3 consecutive days caused decreased emergence success in *L. olivacea* nests from East Java, Indonesia[5]. Pacific Olive Ridleys are known to show higher incubation and pivotal temperatures than those from the Indian Ocean[6]. Thus, we decided to use a threshold of 35 °C instead of 34 °C. Both groups of nests surpassed 35 °C during several days but the number of days and the maximum temperatures were significantly higher in the hatchery. The nests within the hatchery were very close to each other (30-40 cm away) (*Fig. 1*), potentially causing the metabolic heat from one nest to affect neighboring nests.

To improve number and quality of hatchlings released from the conservation project at Punta Ratón, we recommend:

1. the hatchery be built following expert recommendations, i.e. keeping at least 1 m between nests, build potential for shading, monitor nest temperatures, etc.
2. rather than translocating eggs to a hatchery, sections of the beach should be established and protected in which turtles are moved to lay eggs. At these locations, nests could be kept *in situ*.

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