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PRELIMINARY FEEDING STUDIES WITH CAPTIVE HAWKSBILL TURTLES (*ERETMOCHELYS IMBRICATA*)

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Introduction

Materials and Methods

Sixteen young Hawksbill turtles, averaging 16.4 grams when they were received at 24 days of age were distributed equally at random into four 85 liter sea water aquaria. These animals had previously been fed on chopped fish and razor clams (Penna), and during a subsequent 14 day acclimation period they received either smelt (_____), squid (Loligo sp.), shrimp (Penaens sp.) or combinations of two of these foods. Immediately preceding the start of the study the animals were distributed at random into their final experimental groupings. At this time, the groups averaged 22-24 gms, 50-51 mm in carapace length and 40.5-42.5 mm in carapace width.

The aquaria were located in an air-controlled laboratory in which fluorescent lights were regulated by a time clock to provide a uniform thirteen hour day. The air conditioner was turned on at feeding times, mainly for the comfort of the worker. During the rest of the daytime hours the fan only operated, while at night the air conditioner was turned off. Minimum and maximum temperature readings taken daily showed an average minimum of 21°C during the cooler months with a maximum temperature of 28°C. During the warmer months the minimum averaged 23°C and the maximum 32°C.

Table 1 shows the composition of the experimental diets used in this study. Group 1 received diet 305 mixed with 40 to 50% of frozen squid (305S). The two ingredients were passed through a meat chopper several times until an homogenous mixture was obtained. The resultant feed held together quite well in the water. Preliminary tests had shown that diet 305 mixed into a paste with water alone did not hold together very well when placed in water. Also, dried, hard food which would hold together was rejected by the young turtles. Therefore, the use of squid as both a binder and nutrient source seemed a reasonable method to introduce experimental feedstuffs.

Groups 2 and 4 were the control groups, and received chopped smelt and/or chopped squid throughout the experiment.

Group 3 received diet 303 mixed with squid in a similar manner to diet 305S. After three weeks on this diet, group 3 was switched to Oregon moist pellets, either plain or mixed with chicken eggs for another three weeks. Pellets coated with raw egg and briefly steamed exhibited good water stability. The final diet received by group 3 was diet 305 mixed with frozen chicken viscera as a binder (305V). All groups thus received their respective feeds until the end of the study.

Charcoal and wool were replaced as necessary in the external recirculating filters. Since the sea water had to be hauled to the laboratory, it became necessary to practice various conservation methods. At the outset it became obvious that feeding the experimental diets directly into the aquaria would rapidly exhaust the ability of the filter to keep the water clean. Therefore, feeding was carried out in plastic dishpans approximately twelve inches in diameter. Sufficient water was placed in the pans to float the turtles and the feed then added. When the water became fouled the animal would stop feeding. In such a case, the water was changed. This was repeated two or three times as needed during a feeding period.

The young turtles were initially fed in sea water. Attempts to filter and reuse the feeding water proved unsatisfactory. After the turtles were six weeks old the feeding water was gradually diluted with tap water, and after two weeks, tap water was used exclusively for feeding purposes.

During the early part of the experiment the turtles were fed three times a day. As they grew older the feedings were reduced to two times a day, one in the morning and the other in the evening. At four months of age, a single evening feeding was given.

Individual body weights were obtained weekly and straight line measurements of the carapace length and width were made at four-week intervals.

Results and Discussion

Weight Gain

The mean body weight gains and feed conversion values by three-week periods are shown in Table 2. The group receiving diet 305S grew at a greater rate than any of the other treatment groups. This was true for carapace length and width as well as for body weight gains. Figures 1, 2, and 3 show carapace length, carapace width, and mean body weight, respectively.

There was little difference in gains of group 3 fed diet 303S during the first period and Oregon moist pellets during the second period, and group 1 receiving diet 305S. There was also very little difference in rate of gain between groups 1 and 3 from the 3rd through the 6th periods when group 3 received diet 305V (305 + chicken viscera). After the 6th period, however, group 1 continued to increase their gains in each period while group 3 as well as the control groups tended to slow up in their rate of gain.

There was considerable variation between the two control groups. The turtles in control group 2 (treatment 4) grew so poorly during the first two periods that they were removed to the nursery where they received individual attention, a wider variety of food and an occasional trip to the beach. Under such ministrations they regained their appetites and were returned to the experiment.

Control group 1, on the other hand, made good gains the first 3 periods. The rate of gain fell off, however, during the 4th period but gradually increased thereafter. At the end of the eighth period when the rate of gain of the two control groups was approximately the same, control group 1 was changed over to a prepared food, diet 321 (Table 1). The rate of gain of this group for the 9th period was depressed somewhat as a result of the change in type of feed.

However, after the adjustment to the feed was made, the rate of gain increased during the 10th period.

Carapace Measurements

Figures 1 and 2 show the relative carapace lengths and widths of the experimental groups while Figure 3 compares the body weights over the same period. The ratio between the final carapace length and width was fairly constant for all groups averaging between 1.23 and 1.25. The percent increase in carapace length for the entire experimental period was very similar to the percent increase in carapace width. While both carapace length and carapace width were related to body weight, the percent increase in body weight for all treatment groups was much greater than the percent increase in carapace dimensions. This observation suggests that body weight gain is a more sensitive measure of treatment effects than are carapace measurements.

Feed Efficiency

The groups receiving the formulated diets were generally less efficient in their food utilization than were the groups receiving the control diets of fish and squid. The efficiency of feed utilization of group 1 was fairly uniform throughout the study averaging 1.1 grams of dry feed consumed per gram of gain in body weight. Group 3 which received diet 305 plus chicken viscera, was less efficient with an average feed conversion of 1.5. The feed conversion of the control groups averaged 1.0 and 0.9 grams fish and squid (dry weight) per gram of body weight gain for groups 2 and 4, respectively. The first period after control group 2 was switched to diet 321 the feed conversion was much poorer, although the efficiency of utilization greatly improved during the following period, suggesting an adaptation to the formulated feed. This also appeared to be true for groups 1 and 3 which had poorer feed conversion for the first period than during the subsequent periods.

Any attempt to compare the growth rate of these turtles with the few other growth studies with Hawksbill hatchlings is difficult because of the uncertain history of our turtles. Hatching weights of 12.3 g of Hawksbill turtles have been reported (McVey, 197). Witzell (1972) reported a 100-120% increase in weight during the first month when fed fresh chopped fish. It would appear, therefore, that 24-day old Hawksbills weighing only 16.4 g probably were stressed during the early weeks of life.