

GROWTH RESPONSE OF RIVER TERRAPIN (*Batagur baska*) HATCHLINGS FED WITH COMMERCIALY-AVAILABLE FEEDS AND COMBINATIONS WITH KANGKUNG

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ABSTRACT

A three-month feeding trial was undertaken to evaluate the growth response of river terrapin (*Batagur baska*) hatchlings fed with tilapia feed, a combination of tilapia feed and kangkung (*Ipomoea* sp.), frog feed, a combination of frog feed and kangkung and only kangkung. The feeding ration was 2% of body weight per day. Terrapins fed with tilapia and frog feeds showed greater growth compared to the other treatments both in terms of mean weight gain per individual (133.40g 142.77g respectively) and mean increase in carapace length per individual (2.18cm and 2.30cm straight carapace length respectively) over the experimental period. The growth response of terrapins fed with (a) tilapia feed and a combination of tilapia feed and kangkung and (b) frog feed and a combination of frog feed and kangkung were also statistically different. No significant difference in weight gain and increase in carapace length were detected between terrapins fed with tilapia and frog feeds; as well as a combination of tilapia feed and kangkung, and a combination of frog feed and kangkung. Kangkung, on the other hand, produced significantly poor growth response in comparison to the other treatments. From the results of this study, it can be concluded that the tilapia and frog feeds produced the best growth response compared to the other combinations of feeds, probably because the commercially-available feeds contain a high percentage of protein (34% in tilapia feed and 38% in frog feed). However, further studies on the digestibility of the feeds should be carried out to gauge the level of digestibility of each of the nutrients found in the feeds.

Keywords: river terrapin, feeding trial, growth

INTRODUCTION

Batagur baska (Gray, 1831) or commonly known as the river terrapin, is listed as one of the world's top 25 most endangered tortoises and turtles (Turtle Conservation Fund, 2003). *Batagur baska* once inhabited rivers and swamps from India east through Vietnam and south through Indonesia. But today viable wild populations are believed to remain only in Malaysia. The collection of adults, harvesting of eggs and destruction of habitat have led to a reduction of *Batagur baska* in Peninsular Malaysia by over 90% in the last century (Jenkins, 1995).

Moll (1978) described that the *B. baska* are predominantly herbivorous in the wild. Davenport *et al.* (1992) studied young river terrapins from a head-starting program in western Malaysia and reported that the species is omnivorous but predominantly herbivorous from the hatchling stage onwards. According to the authors, the terrapin's appetite on a plant diet (kangkung) was high. In a more recent study, Norkarmila (2001) conducted a study on the effects of various diets (fish, kangkung and pelleted feed) on the

early growth of the river terrapin hatchlings. Apart from that, there is no other information available on the feeding and growth of the river terrapins in captivity.

Hence, the aim of this study was to determine the growth response of river terrapin hatchlings fed with commercially-available feeds and combinations with kangkung.

MATERIALS AND METHODS

Thirty-five hatchlings were placed into five concrete tanks measuring 360cm (L) X 53cm (W) each, and each tank was assigned a different food or a combination of foods. Hatchlings in the first and second tanks were fed tilapia feed and tilapia feed and kangkung. Subsequently, hatchlings in the third, fourth and fifth tank were fed with frog feed, frog feed and kangkung and kangkung (*Ipomoea aquatica*) only (Table 1).

Table 1: Hatchlings in each tank were given a different food or a combination of foods

Tank	A	B	C	D	E
	Tilapia feed	Tilapia feed + kangkung	Frog feed	Frog feed + kangkung	Kangkung only

A fixed ration of 2% of their total body mass was given to the hatchlings daily, once in the morning and once in the afternoon throughout the three-month experimental period. In treatments where only pelleted feed were given, all terrapins were fed 100g in the morning, and the remaining in the afternoon. Whereas in treatments where a combination of pelleted feed and kangkung we fed, hatchlings were given 100g pellet in the morning, and the remaining weight of kangkung in the afternoon. Complete water renewal was done daily before the first feeding.

Kangkung was used because it is widely eaten as an inexpensive vegetable and therefore easily available in the markets. Besides, Davenport *et al.* (1992) revealed that kangkung maintains a constant weight when held in freshwater for hours, thus allowing accurate estimates of appetite.

Hatchlings were weighed and measured every fortnight. At the end of three months, the growth of the hatchlings was evaluated in terms of mean weight gain per individual as well as mean increase in carapace length per individual.

RESULTS AND DISCUSSION

Hatchlings fed with frog and tilapia feeds achieved a body weight gain of 142.77g and 133.40g per individual respectively at the end of the experimental period (Table 2). This is similar to that reported by Tuan Afifah (1989) who studied the effects on the growth of terrapins fed with different amount of fish and kangkung and reported that terrapins fed with fish attained better growth in terms of increase in carapace length and width. This confirms that a diet rich in protein is essential for the growth of the terrapins.

Table 2: Average body weight of hatchlings during the experimental period

Tank	A	B	C	D	E
Week					
2	174.31 ± 30.76	171.92 ± 34.66	175.86 ± 31.49	177.71 ± 33.49	171.14 ± 27.55
4	202.63 ± 34.33	196.75 ± 38.27	206.29 ± 33.87	210.74 ± 36.53	178.17 ± 28.69
6	228.66 ± 36.23	216.00 ± 40.87	232.69 ± 35.95	219.20 ± 36.88	177.69 ± 27.76
8	257.46 ± 39.07	237.50 ± 43.03	265.37 ± 39.24	237.29 ± 40.91	181.40 ± 28.69
10	279.60 ± 40.27	254.14 ± 44.66	293.43 ± 45.54	256.57 ± 44.99	183.14 ± 28.89
12	307.71 ± 45.24	264.61 ± 45.88	318.63 ± 49.37	265.74 ± 44.71	184.80 ± 28.86

Values are mean (g) ± SD

Growth in terms of average body weight gain was significantly different (ANOVA, $p < 0.01$) between hatchlings fed with (a) tilapia feed and a combination of tilapia feed and kangkung; and (b) frog feed and a combination of frog feed and kangkung. Growth of hatchlings fed with only kangkung was also statistically different compared to that of hatchlings in other treatments (ANOVA, $p < 0.01$).

On the other hand, hatchlings fed upon kangkung obtained an average body weight gain of only 13.66g per individual. This is inconsistent with the earlier findings of Halimah (1987) who experimented on the effects of various plant diets such as kangkung, bananas (*Musa paradisiaca*), paku rawan or yellow sawah lettuce (*Limnocharis flava*), water hyacinth (*Eichornia crassipes*) and a mixed diet on the growth of the terrapins. This could be due to the fact that the feeding ration given to the terrapins in this study were indeed less than the fixed ration of 2% body weight. Unlike the pelleted frog and tilapia feeds given to the terrapins which were measured on a dry weight basis, the kangkung that were fed were given on a wet weight basis.

Halimah concluded that the terrapins produced the best growth when fed with kangkung and paku rawan. Water hyacinth, on the other hand, gave the poorest growth. It is hypothesized that terrapins that were used in Halimah's study were not the fittest. The 15 eleven-month old terrapins that were used in the study had an average weight between 41.76g and 71.58g per individual whereas in the current study, a total of 135 six-month old terrapins with an average body weight between 171.14g and 177.71g per individual were used.

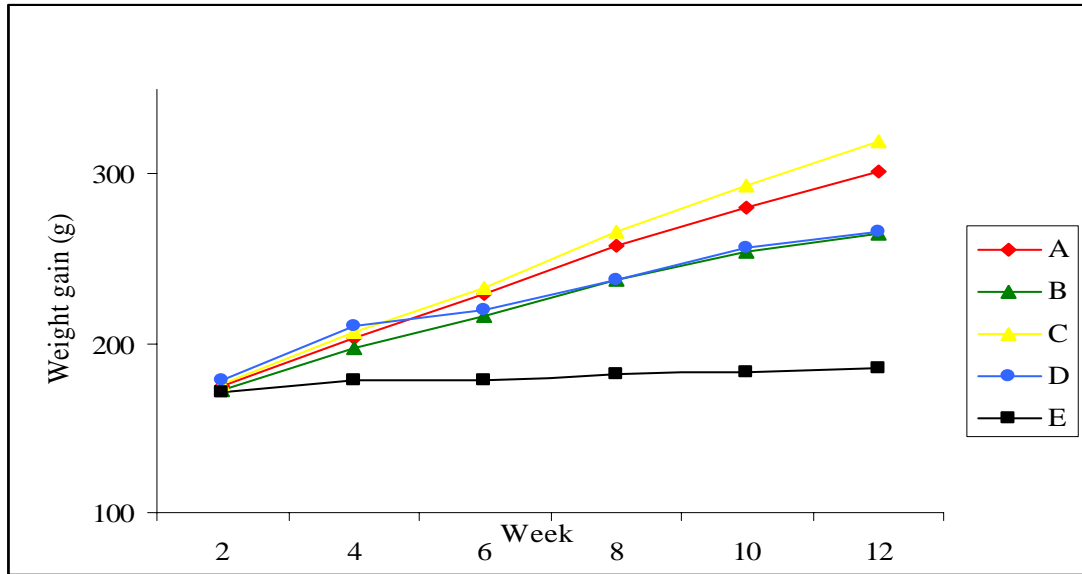


Figure 1: Growth of terrapins in terms of weight gain (g)

A same trend is observed in terms of mean increase in carapace length in hatchlings fed with different diet (Table 3). Hatchlings fed with frog and tilapia feed grew an average of 2.30cm and 2.18cm per individual respectively. Comparatively, hatchlings fed with kangkung only grew an average of only 0.47cm per individual at the end of the experimental period.

Table 3: Average carapace length of hatchlings during the experimental period

Tank	A	B	C	D	E
Week					
2	10.26 ± 0.73	10.20 ± 0.74	10.24 ± 0.65	10.22 ± 0.70	10.36 ± 0.66
4	10.80 ± 0.66	10.79 ± 0.73	10.87 ± 0.65	10.83 ± 0.69	10.57 ± 0.64
6	11.29 ± 0.70	11.18 ± 0.72	11.37 ± 0.61	11.17 ± 0.68	10.62 ± 0.64
8	11.75 ± 0.61	11.55 ± 0.71	11.87 ± 0.61	11.51 ± 0.70	10.73 ± 0.63
10	12.10 ± 0.61	11.80 ± 0.71	12.24 ± 0.64	11.74 ± 0.71	10.76 ± 0.63
12	12.44 ± 0.62	12.03 ± 0.72	12.55 ± 0.67	11.94 ± 0.71	10.82 ± 0.64

Values are mean (cm) ± SD

Similarly, significant difference was detected in terms of increase in carapace length between hatchlings fed with (a) tilapia feed and a combination tilapia feed and kangkung; and (b) frog feed and a combination of frog feed and kangkung (ANOVA, $p < 0.001$).

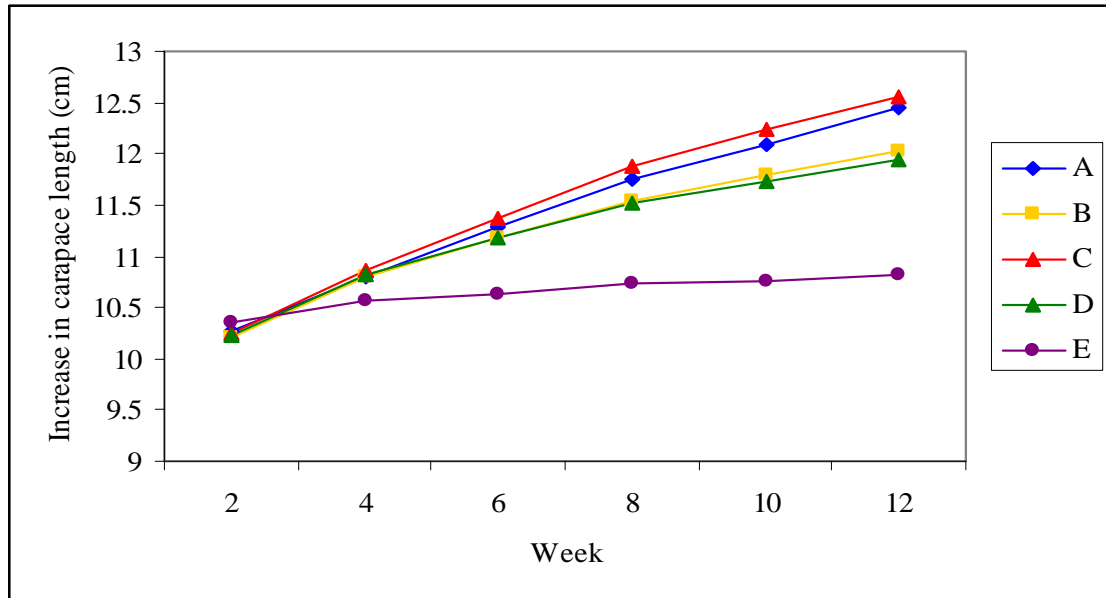


Figure 2: Growth of terrapins in terms of increase in carapace length (cm)

It is therefore concluded that frog feed is the best commercially-available feed that could produce the best growth response in river terrapin hatchlings reared in captivity. However, a supplement of kangkung in the diet of the terrapins is encouraged.

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