

WEIGHT MANAGEMENT AND THE USE OF A NOVEL GEL DIET WITH FLORIDA MANATEES (*TRICHECHUS MANATUS LATIROSTRIS*)

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Abstract

Disney's The Seas with Nemo and Friends® is home to two adult male Florida manatees (*Trichechus manatus latirostris*). Their typical diet consists almost entirely of free choice romaine lettuce split between both animals who share one habitat. From January 2015-July 2017 the animals went through a period of marked weight gain, from 694 kg for manatee A and 678 kg for manatee B to 784 and 794 kg, respectively (Figure 1). Over that same time period, average daily intake of lettuce averaged 105 heads per day for each manatee. The decision was made to institute a daily intake cap beginning at 100 heads per animal per day. After six months on the new diet, both animals lost an average of 18kg. However, at twelve months following the diet change, manatee A lost an additional 44 kg while manatee B gained 60 kg, weighing nearly 850 kg. We believe this was the result of behavior change with both manatees more completely consuming the lettuce available once lettuce was no longer available free choice. Because of this change in behavior, subsequent diet decreases were enacted and over the next year. Both manatees again lost weight, with manatee B maintaining his 100 kg weight advantage. By January 2019, manatee A had reached the bottom of his target body weight range, while manatee B remained 100 kg over his target range. Diet decreases were clearly impacted by social dynamics (Table 1), with each diet decrease affecting the more submissive manatee A. Because these two individuals share one habitat, individualized feeding sessions prove challenging. While total diet reduction into the habitat was adequate to reduce body weight for both over conditioned animals, we were eventually faced with the need to maintain the body weight of manatee A while continuing to encourage weight loss in manatee B.

To target feed manatee A, in order to provide the additional calories needed to maintain his weight, we formulated a new gel diet that included lettuce and pellets. The gel diet is a mix of chopped romaine lettuce, ground pellet (Mazuri Wild Herbivore 5Z0X), beet pulp, unflavored gelatin, and a vitamin E supplement. The product can be made in bulk and stored frozen, then thawed in the refrigerator overnight for use as needed. After an initial 2-week palatability trial was successful, steps were taken to increase the daily offering. Currently offered at 800 g/d, the new herbivore gel provides 530 additional kcals/day, the calorie equivalent of 3300 g of romaine. After introduction of the new product in March 2019, we were able to regularly increase the daily caloric intake of manatee A (Figure 2). The convenience of delivering a calorically dense supplemental diet item allowed our husbandry team flexibility in how they fed out the day's remaining diet. While both animals are not yet within their target weight range, the initial results should be valuable. Similarly, next steps in this project will test our ability to use this product in maintaining both animals within

their target weight range long-term. Feeding this new product represents the first time these animals are fed a complete nutrition product and could shed light on additional benefits of the formulation.

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Table 1. Four years of average daily lettuce consumption (2015 – 2019) for two Florida manatees (*Trichechus manatus latirostris*).

Animal	Avg Lettuce Intake	Avg Lettuce Head Weight	Consumed ¹
	hd/d	g	kg/d
<u>Manatee A</u>			
2015 ²	102	580	59
2016 ²	97	579	56
Jan – Jul 2017 ²	113	544	61
Aug – Dec 2017³	88	587	52
Jan – Aug 2018³	77	587	45
Sept 2018 – Jan 2019³	76	594	45
Feb – Apr 2019³	76	594	45
May – Jun 2019³	81	653	53
<u>Manatee B</u>			
2015 ²	89	580	52
2016 ²	95	579	55
Jan – Jul 2017 ²	116	544	63
Aug – Dec 2017³	93	587	54
Jan – Aug 2018³	85	582	49
Sept 2018 – Jan 2019³	81	594	48
Feb – Apr 2019³	74	594	44
May – Jun 2019³	67	653	44

¹Calculated: Consumed (kg/d) = (hd/d × hd wt (g)) ÷ 1000 g/kg

²*Italics for free choice diet period*

³**Bolded for capped diet period**

Manatee Body Weights

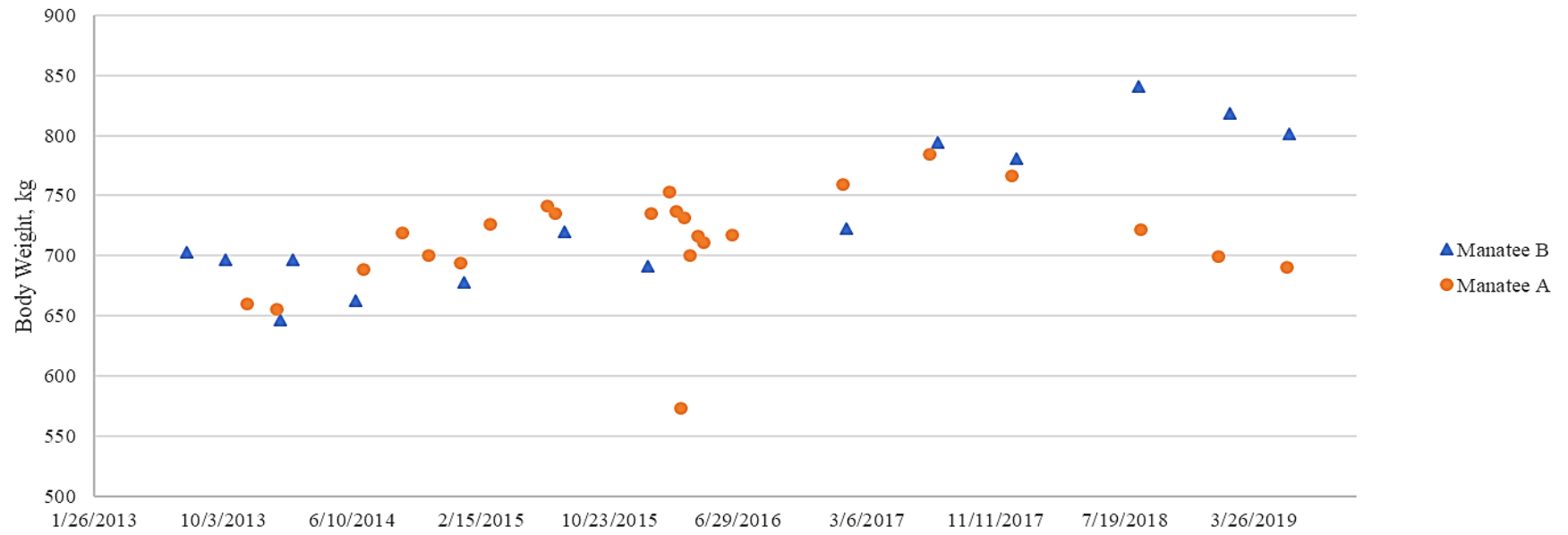


Figure 1. Body weights over time for two Florida manatees (*Trichechus manatus latirostris*).

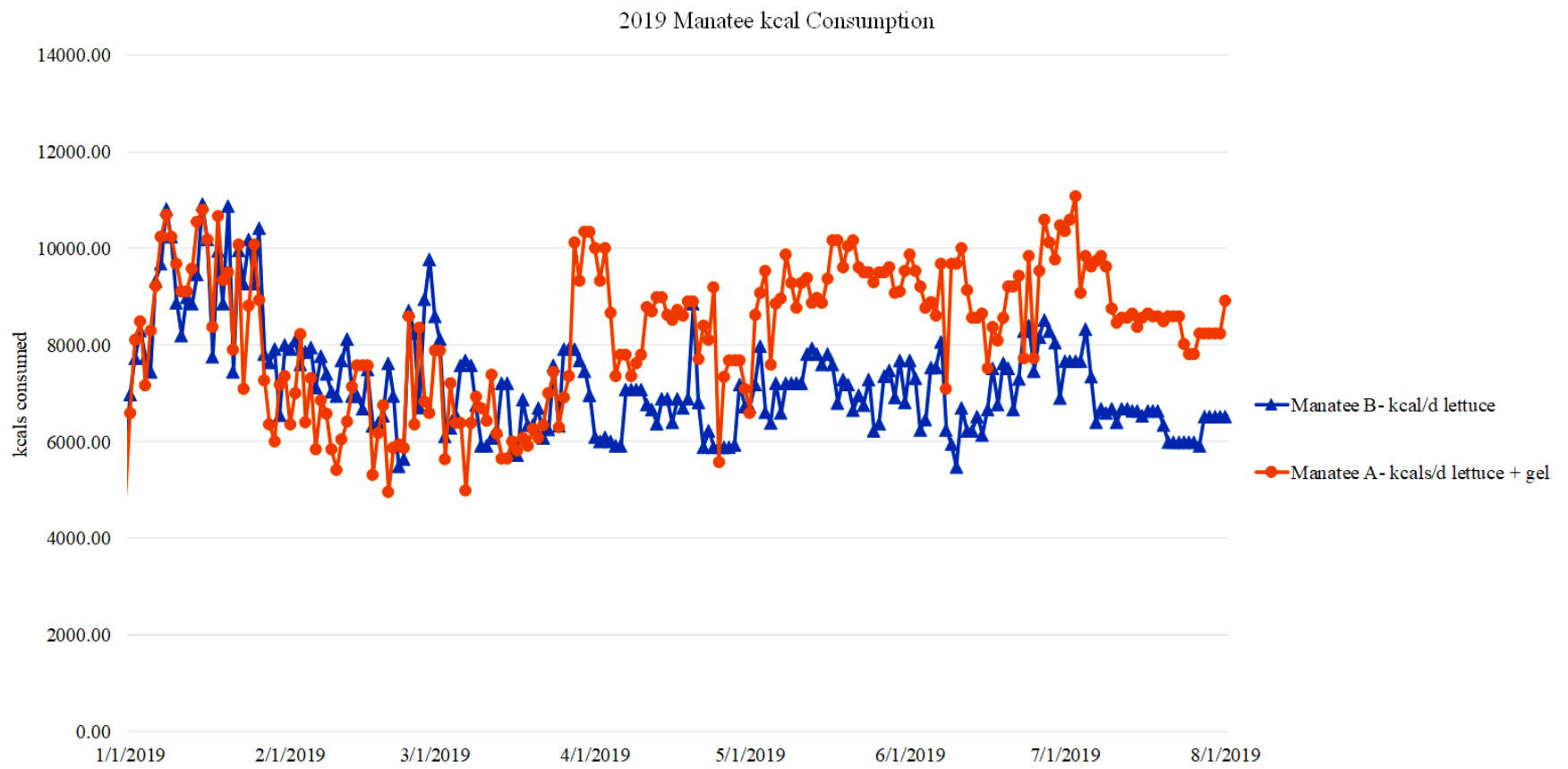


Figure 2. 2019 daily caloric consumption for two Florida manatees (*Trichechus manatus latirostris*).