Diet-related factors in the conservation of kiwi

(*Apteryx mantelli*)

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“An infinity of forest lies dormant in the dreams of one acorn.”

Wayne W. Dyer

ABSTRACT

Captive management is a valuable tool in the conservation of endangered species. The subtleties of a species' nutrient requirements are increasingly recognised as fundamental to their ability to thrive in captivity. This study focuses on the nutrient composition of diet and factors related to diet that can influence the conservation management of captive species. North Island brown kiwi (*Apteryx mantelli)* were used as a case study but the implications are applicable across species. A variety of techniques were used to determine the natural diet of kiwi. The fatty acid composition of gizzard fat was not a reliable predictor of dietary intake for kiwi. A synthetic diet was formulated to closely match the nutrient composition and apparent digestibility of a near-natural diet. Ingredients used in the synthetic diet were readily available worldwide, and the physical form of the diet was tailored specifically for kiwi, hence long, moist, 'worm-like' items were produced.

The unusual ecology of kiwi, coupled with a lack of data relating to digestibility values, led us to question whether the physiological processes of kiwi fit within known/common parameters for avian species. Thus, a common, domesticated, omnivorous species for which substantial digestibility and physiological data exist (roosters (*Gallus gallus*)) was also fed the kiwi near-natural and synthetic diets, and direct comparisons of apparent digestibilities were made with kiwi. Apparent digestibilities of macronutrients were higher in kiwi fed the synthetic than the near-natural diet. They were also higher in kiwi than roosters fed either diet. Inconsistencies in macronutrient digestibilities in both kiwi and roosters fed the near-natural versus the synthetic diets preclude using roosters to predict macronutrient digestibilities of a diet fed to kiwi. For both species the source of the macronutrients in the diet appears to have a marked influence on apparent digestibility.

Equally important to health as a nutritionally adequate diet is the community structure of enteral bacteria. Captive kiwi, brown teal (*Anas chlorotis*) and takahe (*Porphyrio* [Notornis] *mantelli*) had a greater diversity of intestinal bacteria than wild birds of the same species. The acquisition and colonisation of enteral bacteria in kiwi and chickens varied over the first three weeks of life. By three weeks of age the enteral bacteria of kiwi chicks was similar to that of adult birds. Acquisition and colonisation of intestinal bacteria in chickens was not influenced by bacteria adherent to their eggshells. Diet affected enteral bacterial diversity; as kiwi consumed a greater proportion of the

wild than the captive diet the number of dominant enteral bacterial genera decreased. Takahe fed both a captive and wild diet had enteral bacterial communities intermediate to that of birds eating either a solely captive or a solely wild diet.

The relevance of the work in this thesis to the captive management of other wildlife is discussed, and recommendations are presented on how to address a range of diet-related issues including palatability, neophobia, obesity, and preparation of captive-held animals for release into the wild.

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http://www.massey.ac.nz/massey/expertise/profile.cfm?stref=207130

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