

Abstract

Jürgen Hummel (2003):

Nutrition and feeding behaviour of okapis (*Okapia johnstoni*) in zoological gardens

For ruminants with feeding preferences for either browse or grass, considerable differences in the anatomy and morphology of the digestive tract have been described. Corresponding differences in digestive physiology like a faster rate of passage of food through the digestive tract are hypothesised in browsing species like the okapi. The okapi is generally considered to be a rather difficult animal to keep in zoos. The problem may also include a suboptimal feeding of the animals in captivity. Generally, okapis in zoos can not be provided with large amounts of their natural food item, browse, but are often fed higher amounts of concentrates with potentially negative effects on rumen environment and behaviour of the animals.

This study focused on aspects of energy nutrition of okapis. Diets including higher amounts of a potentially favourable concentrate (beet pulp) and of browse were compared to diets commonly fed to okapis. Diets were evaluated concerning their amount of roughage and the energy supplied to the animals. Besides that, the mean retention time (MRT) of food in the digestive tract was quantified to see whether the okapi fits the picture of a typical browsing ruminant in this important aspect of digestive physiology.

The study included 10 animals (including 8 non-reproductive adults) in 3 different zoos. Feed intake and digestion were quantified while all animals were on regular zoo diets and while some were fed diets including higher amounts of beet pulp (2 zoos) and beet pulp + browse (1 zoo). MRT of food in the digestive tract was measured, too (Markers: Co-EDTA and Cr-mordanted fibres). Data collection periods lasted for 8-12 days. 24 h feeding and ruminating activity of 7 animals was recorded. Feeds were analysed for their nutrient contents and for their fermentation characteristics using an in vitro gas production system ("Hohenheimer Futterwerttest").

Routine diets included mainly alfalfa hay, dried forage meal, grain-based pelleted compounds, pure grains, and produce. Browse was preferred over all other feedstuffs. The measured dry matter intakes of the non lactating/non pregnant animals on these diets ranged between 58 and about 75 g/(kg BW^{0.75}*d) and OM digestibility between 65 and 74 %. In several animals, roughage intake was < 50 % of DM-intake, while two of the study animals performed oral stereotypies. Feeding duration related to feed intake on a dry matter basis was 3.5 times longer for roughage than for concentrates. Diets including larger amounts of beet pulp resulted in no detectable changes in the energy supplied to the animals, while fibre digestibility was improved. In vitro gas production of fruits and vegetables was extremely high in the first 2 h of fermentation, while pure grains resulted in highest gas production in the interval of 2-6 h and beet pulp in the interval of 6-24 h. There were no obvious signs of scarce energy supply to zoo okapis estimated according to standard methods for domestic ruminants. The average MRT was 36 h for fluids and 47 h for particles, resulting in low coefficients $MRT_{\text{Particle}}/MRT_{\text{Fluid}}$ of 1.3 (1.2-1.5).

The results should encourage zoos to include beet pulp in the diets of okapis, since it seems to be energetically equivalent to grains or produce while having favourable fermentation characteristics. The in vitro data also indicate a more constant fermentation in beet pulp compared to produce or rolled oats. Browse should be regarded as a premium feedstuff for okapis, since the animals preferred it over all other feedstuffs. In general, the lack of obvious signs of energy undersupply may encourage careful attempts to increase the amount of roughage like alfalfa hay or browse in the diet. This seems to be advisable to guarantee a

rumen environment as stable as possible, and also from an ethological point of view. In domestic cattle, oral disturbances are often associated with low roughage intake. The low coefficient $MRT_{\text{Particle}}/MRT_{\text{Fluid}}$ is in correspondence with expectations for browsing ruminants, while for grazing cattle, values of 2.0-2.8 are given in literature.