

FEEDING STRATEGIES OF THE PLAINS ZEBRA Equus
quagga boehmi IN THE AMBOSELI ECOSYSTEM.

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A THESIS SUBMITTED FOR THE DEGREE OF DOCTOR
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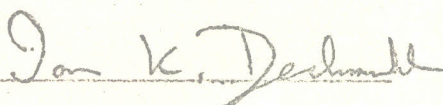
CHRISTOPHER GATAMA GAKAHU

1982

I Christopher Gatama Gakahu hereby declare that this thesis is my original work and has not been presented for a degree in any other University.

Signature 

This thesis has been submitted for examination with our approval as University supervisors.

DR. IAN DESHMUKH 

DR. DAVID WESTERN  23 SEP 1982

A B S T R A C T

This thesis consists of two parts, one establishing the efficiency of plains zebra and a similar sized ruminant in digesting various components of forage and comprising the efficiencies of the two ungulates; the second part concentrates on zebra and looks at how the established digestive characteristics affect the species use of phagic resources, and specifically how these characteristics influence and constrain the feeding strategies, behaviour and group dynamics of zebra.

In Part I results indicated that zebra is as efficient as the ruminant in the digestion of high quality forage, but as the quality of forage drops the ruminant is better off in digesting all forage components, except protein. The capacity of zebra to digest protein as well as the ruminant was apparent. Nitrogen recycling has, however, been used to explain the superiority of the ruminant to equines in protein assimilation. To date, little work has been done on this aspect on equines, and the little done indicates that equines may have the ability to recycle nitrogen. This calls for more knowledge on the physiology of equines protein digestion.

However, keeping the lack of this information aside, the larger intake of forage together with the rapid rate of passage of ingesta through a zebra's digestive tract, can allow the species to extract nutrients from forage

at an equivalent or higher rate than the ruminant, thus compensating for the observed lower digestion efficiencies.

In Part II the availability of forage (quantity and quality) during different seasons and in different habitats is presented. These resources were found to be spatially and temporary variable. With this information an attempt was made to establish how the plains zebra adjust feeding strategies to cope with the fluctuating resources by looking at activity regimes, feeding behaviour, group size/composition and the distribution and movement of the species.

The principal hypotheses used to investigate these aspects were; that Zebra will maximise benefits through maximising digestible intake per unit time and inter-individual distance, and that animal movement will follow the digestibility gradient in the habitat; that non-optimal foraging patterns can be explained by constraints such as predators, lack of utilizable standing water, etc.; that the efficiency of energy harvesting influences reproductive success by making reproductive adjustments to optimize energy harvesting; and finally that zebra increase harvesting at the expense of socialness.

Quantitative data on how zebra distribute time among various activities are presented. Grazing, moving

and standing are the main activities. Interseasonal differences among age/sex categories in the proportions of time allocated to various activities have been drawn out from the data and their adaptive significance considered. On the whole, foraging time was a major factor governing the zebra's time budgets and zebra make "decisions" about how much time to allocate to foraging, so as to maximize or get the required intake of forage.

The adaptive responses in group dynamics to maintain optimal utilization of resources were established with data on seasonal changes in number of individuals in a group together with changes in composition of the group. Changes in group size were mainly due to the birth of foals. Most births occurred during the wet season when food resources were abundant.

Data on spacing of individuals and rates of progression while foraging together with temporal and spatial distribution of zebra were collected with a view to establishing how resources influence foraging patterns. The data and their seasonal variability have been presented. Zebra were found to progress faster and space out more when forage availability was poor. They also selected habitats with high quality and quantity. Zebra also preferred areas with grass greenness of over 50% especially during the dry season.

These observations have finally been discussed as

processes for optimizing food intake. The factors which inhibit optimization were found to be availability of surface water and predator avoidance. The order of habitat preferences was found to correspond with the severity of these two factors.

The results of this study were found to be consistent with expectations based on the food selection model of optimization and support the validity of extending the model to habitat selection.