

AN OVERVIEW OF THE NUTRITION OF ZOO ANIMALS IN THE MIDDLE EAST (PART 2)

Industrial domestic animal feeds are generally made to stimulate animal growth or production performance in the short term and are usually fortified to “specific species performance requirement”. For example; the recommendation for Vit D3 in broiler diets is below the requirement (NRC, 1994) to make strong and long lasting bones, because it is not desired. Therefore houbara bustard (*Chlamydotis undulata*) or stone curlew (*Burhinus oedicnemus*) chicks cannot be fed successfully on broiler feeds. However, knowledge from domestic animal nutrition research can also be extrapolated to zoo animal diets. For example; the efficiency of absorption of a nutrient like Ca from a feed like alfalfa is approximately 3x times higher in domestic horses than in domestic cattle (*Bos taurus*), which is probably due to differences in their digestive physiology (NRC, 2001 and NRC 2006). Diet formulation for wild *Equidae* and *Rhinocerotidae* are supported by this nutrition research.

The hot climate of the Middle East region requires that extra electrolytes (mainly Na, K, and Cl) are offered to compensate for losses through sweating and increased kidney excretion, due to panting and evaporation induced alkalosis (Schmidt-Nielsen, 1990, Borges et al, 2007). Water is most important in a hot, dry climate and water quality is an important factor to consider when formulating diets. For example; water from wells in the region is often quite salty. Thus feeds commonly fortified with salt could cause the diet to become too alkaline (i.e. high in Na, K and Mg). In alkaline conditions a good feed to use additionally could be wheat bran which has low Na and K.

Animal managers should consider using new knowledge from nutrition science. For example; prebiotics like fructo-oligosaccharides (Vancaeneghem et al, 2002), mannan-oligosaccharides (Cotter et al, 2002) are replacing feed antibiotics and are considered immune stimulants. Plant secondary metabolites (PSM's) like condensed tannins derived from trees, shrubs and forages like aspen (*Populus tremula*), sula (*Hedysarum coronarium*) and sainfoin (*Onobrychis viciaefolia*), act as natural de-wormers (Mefod'ev, 1996, Niezen et al, 1998, Molan et al, 2002, Hoste et al, 2005.); tannins are effective against bacteria, fungi and viruses (Claus, 2003); certain barks from willows (*Salix* sp.) and aspen (*Populus tremula*) are known to provide natural anti-inflammatory properties (Von Kreudener et al 1996). Caution is required however, as most PSM's also have anti-nutritional effects (Athanasiadou, 2004). Naturally bound Se (i.e. Se similar to levels found naturally in seeds) has a major positive impact on productive animal's health (Lyons, 2002) and common levels of nutrients (iron and vitamin A) in industrial domestic animal feeds are implicated in iron storage disease in frugivorous and omnivorous animals (Claus, 2006, Huisman, 2006, McDonald, 2006). Finally the use of gluten free feeds for

gluten intolerant species, such as red-bellied tamarins (*Saguinus labiatus*) seems to work. (Berndt et al, 2006).

Generally a zoo animal display is the outcome of a compromise between the needs of the captive animal and the requirements and available resources of the zoological collection. Traditionally zoo animal keepers have studied and developed diets for zoo animals. Most zoo animals are nutritionally and behaviourally adaptive, allowing people to keep them in captivity with variable degrees of success. It is advisable to feed captive wild animals as naturally as possible, i.e. feed what the species would eat while in its original habitat, and to use knowledge of nutrition from wild and domestic species as a guide. Zoo animal nutrition is an important and complex subject and the advice of a zoo animal nutritionist can have far reaching benefits for a captive wild animal collection.

References

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Radiograph of a Bonelli's eagle chick with metabolic bone disease ©Tom Bailey.



Cheetah cub with bilateral hip abnormality showing poor stance caused by poor nutrition (©Florine de Haas van Dorsser).