Zoo animal nutrition, it is important! Newsletter of the EZNC

Edited by Sally Walker

From time to time we circulate the url of the newsletter of European Zoo Nutrition Centre to our various animal network people. The most recent posting caught my eye particularly because there was a small news item or short report about almost every animal group. The information was simplified but pithy for getting the most facts out of the most rapid reading. For the first time I read some of the information about EZNC and its newsletter and decided it was well worth an article in ZOOS' PRINT and another round of information to our networks.

The European Zoo Nutrition Centre was established in January 2002, at the initiative of Dr. Walter L. Jansen, Director of Jagran, and Joeke Nijboer BSc. nutritionist from Rotterdam Zoo. The Centre was located at the EAZA Executive Office in Amsterdam Zoo till 2002. Since then the office is in the historical canal house in Amsterdam operating as an independent non-profit foundation which stimulates European zoo nutrition.

A questionnaire among EAZA (European Association of Zoos and Aquaria) revealed that continuing health problems in zoo animals may be caused by inadequate diets and that additional research in the field of zoo animal nutrition is much required. The EZNC Newsletter and website www.eznc.org was founded in 2004. Editor Natasja Gianotten<n.gianotten@jagran.nl> manages the newsletter herself, collecting interesting material and rewriting it. The newsletter is published in Dutch every two weeks and the material that is interesting to a broader public than Netherlands is translated into English. The Editor always includes the original source of the articles. She provides photographs from the web. Natasha has permitted us to use their articles in ZOOS' PRINT magazine or taxon network newsletters with due credit to EZNC. The number of visitors to the website are just amazing. Natasha said since July of last year the number increased up to 6000 visitors per month. They like to know which countries visit their site - it is not only European countries but also Japan, Argentina, Canada and of course India. So 558.723 hot items were read and downloaded. Feeding, digestion and diets (nutrition of birds; digestibility traits of tapirs; types of feeds for giraffe in captivity; zoo formula for turtle diets) just to name a few of the most popular.

EZNC sent a questionnaire to research institutes and found that many of them are willing to cooperate with zoos and exchange data on zoo animal nutrition. Cooperation between zoo nutritionists, research institutes and animal food manufacturers is essential in order to improve zoo animal nutrition and mutually benefit all the institutions. Also recognizing and improving zoo animal nutrition is likely to result in considerable reduction in the cost of animal feed cost. There are more than 1000 zoos in Europe of which 285 belong to EAZA, the regional zoo association. They spend over 40 million euros a year on animal food. Results of collaborative research revealed that a minimum 10% reduction (4 million euros) can be reached by improving diets. Improved food hygiene, resulting in fewer food-related problems and perhaps even reduced labour costs can also result in reduction of costs overall. Most important, the benefits to the animals in our care will be improved longevity and reproduction.

About EZNC

Information on the EZNC can be found on their website in the menu under nutrition and feeding guidelines. It is part of a consultacy firm named Jagran (www.jagran.nl). Most of the text is in Dutch but part is translated as well. In Jagran the projects are always in a triangle of animal-human-environment. Animals can be kept either for food production (e.g., poultry), as pets (e.g., dog), for education (e.g., tiger), for nature management (e.g., moorland sheep) or for recreation (e.g., horse). at the EZNC part of Jagran we deal with non-production animals like (exotic) pets or zoo animals in order to provide information on proper keeping (housing, feeding, handling, legislation, etc.) of these categories of animals. In the Dutch part of the EZNC site there is much infomation per animal-type on these subjects. The owner of Jagran also founded the EZNC in 2002. Information on him and the site is in Dutch, however.

The Editor of EZNC, Natasja Gianotten was born in the Netherlands but spent much of her childhood in Africa, mostly Tanzania, between Watusi cattle and giraffes! Back in the Netherlands she attended Wageningen University to study Animal Science with main subject as Animal Husbandry but specializations in Immunology, Ethology and Endocrinology. Natasja started her career in a feed production firm, working in the R&D department on poultry, swine and ruminant feed conducting feed experiments. She now works part time for Jagran as a consultant and one day a week on the newsletter and rest of the time as a consultant on a variety of projects. A major project is to find out if it is possible to mass rear insects for the human food market in future.

Internal "TomTom",
Brain cells for Navigation, 16 June 2010 - Source: Noorderlicht, photo Torkel Hafting

Rats as well as people have special brain cells for navigation. Not so much for driving to some holiday destination, but for walking in familiar spaces. Without thinking you walk to the dining table to the kitchen and to the couch.

The distance between the couch and the coffee table is known and therefore you do not walk into the table all the time. Research in rats has shown that two types of brain cells are involved in this in rodents. The 'place cells' store information about where the objects in a familiar space are located. The distances within the space are observed by 'grid cells'. The grid cells form a highly regular diamond pattern. This grid is a virtual map of the environment. Every point on the grid matches an abstract coordination point in the environment. When the rat passes this point the brain cell in the grid sends out a signal. The distances between the brain cells in the grid correlate with actual distances. The scientists believe that these cells help the animals to navigate. Because the brain cells match abstract places in the environment the system also works in the dark. A researcher from London University has now discovered that humans also possess such grid cells. Subjects had to navigate through a virtual space while their brain activity was measured in an MRI scanner. Brain cells were found to be active in a specific pattern. Also these cells formed a diamond grid. So we are able to walk from our beds to the toilet, without bumping into everything. In theory, that is.

Cranes in England*, 16 June 2010 - Source: hln.be*

After a turbulent car drive eight crane birds hatched in the United Kingdom. The eggs were supposed to be flown in, but the Icelandic volcano threw a monkey wrench (or rather ashes) in the works. A 17 hour care drive delivered the eggs just in time.

Since 1600 there haven't been any cranes in the UK. Since 2007 the Wildfowl and Wetland Trust (WWT) runs a project to start a breeding population. A Crane School has been founded at WWT Slimbridge in Gloucestershire. A piece of swamp has been decorated specifically to raise crane chicks as naturally as possible. The chicks are raised by humans but the caretakers are always dressed in grey crane suits with hats. When the chicks are fed this occurs with machines that look like a crane's head. The caretakers have to learn the chicks how to survive in the wild, how to swim and to gather food.

They also have to learn to socialize and protect themselves from predators. Eventually, the birds will be released into the wild. Eight eggs would have been flown in from Germany, but due to the ash cloud flight embargo they had to be brought in by car. They were just in time, because only hours after their arrival the eggs hatched.

Handling-related tail loss in an endangered skink. *09 June 2010 - Source: Journal of Zoology, 2009, volume 277, issue 3*

Caudal autotomy (tail loss) during capture and handling is widely reported among several families of lizards. Autotomy causes elevated stress levels in lizards, and imposes a significant fitness cost on autotomized individuals. Despite these detrimental impacts, conservation and ethical issues associated with handling-related tail loss have received little attention. We assessed the incidence and correlates of tail autotomy during capture and handling in an endangered skink, the alpine she-oak skink *Cyclodomorphus praealtus*. A significant proportion (9.3%) of lizards autotomized their tails during capture and handling. Medium-sized lizards were more likely to lose their tails during handling, and this effect was exacerbated at intermediate body temperatures. Probability of autotomy had a complex relationship with cumulative observer experience, independent of other risk factors. Based on the modelled relationship of autotomy with body temperature, we propose that alpine she-oak skinks be cooled immediately after capture to reduce rates of autotomy during subsequent handling. Title: Handling-related tail loss in an endangered skink: incidence, correlates and a possible solution, Authors: M. P. Scroggie, N. Clemann

Flossing teeth *16 June 2010 - Source: nu.nl*
The dentist always urges us to floss our teeth. But there are also macaques that floss. This was discovered by Japanese scientists. One macaque started this and taught the trick to her group members. Researchers from Kyoto University conducted their study in the Iwatayama Monkey Park zoo. A macaque named Chompe seems to floss her teeth after every meal. She does this by chafing her teeth on the fur of the other monkeys or by pulling hairs from her own fur and using it as floss. The researchers think that this behavior was created accidentally. Macaque monkeys regularly lick each other's fur to remove parasites. A hair probably got stuck once between Chompe's teeth causing remnants of food to get stuck on it. She could then lick off food remnants from the hair. The reward of being able to lick food off the hairs probably caused her to repeat the behavior. Very slowly, during a period of four years, the flossing ritual was taken over by other group members. In macaques new finds spread via close relatives. Mothers transfer them to their offspring. The flossing behavior spread very slowly because Chompe only has two close relatives in the group, her mother and one child. The results of this research were published in the scientific journal Primates.

Books
Encyclopedia of Aviculture*, 16 June 2010*

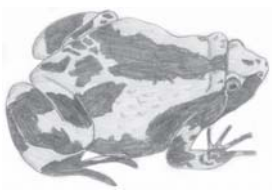
Aviculture is 'the practice of keeping and breeding birds and the culture that forms around it'. Often aviculture is not limited to this, but it is also concerned with the preservation of natural habitat and campaigns to raise public awareness (definition from Wikipedia). aviculture. Proven practical methods are presented to the aviculturalist, methods for the keeping and breeding of almost all bird families in the world. Birds that are discussed vary from the largest bird in the world, the ostrich, to the small

hummingbirds. Also several special bird species are discussed, such as kiwis, saddle-bird storks, bee-eaters, swallows and red siskins. The book contains information on diets, habitat requirements, compatibility with other species and the hand-raising of young birds. Today the aviculturist's challenge is to let birds breed in captivity and to obtain and keep a healthy population that is no longer dependent on animals caught in the wild. The authors of this book hope that the information provided in this encyclopedia will assist aviculturists in reaching this goal. Glen Holland, Encyclopedia of Aviculture, Hancock House Pub Ltd, 2007, ISBN-10: 0888394608, ISBN-13: 978-0888394606

Are frogs pussies? *16 June 2010 - Source: teleac.nl*

Frogs have long been known for their sensitivity to environmental pollution. However, a biologist of South Dakota University discovered that frogs are not necessarily more sensitive to chemicals than other animals. When a frog species disappears or becomes extinct somewhere this is often considered an indicator of the condition of the environment. But this view is incorrect according to biologist Kerby. Frogs are only 'slightly susceptible' to 'insusceptible' to most chemicals. Other animals can be equally susceptible or more susceptible to chemicals. It all depends on the chemical in question.

Kerby looked at 28.000 different toxicity studies that had been performed in the past. The toxicity of 107 different chemicals was investigated, including inorganic chemicals, pesticides and heavy metals. The chemicals were tested on 1279 different animal species, such as worms, fish, snails and insects. Kerby says that environmental researchers should be more careful with considering frog mortality as evidence for environmental pollution. If they nevertheless want to use frogs or other amphibians, they should first investigate what exactly the animals are susceptible to. The research was published in the scientific journal Ecology Letters.



ABSTRACTS. The newsletter also has Abstracts and Projects

Behaviour/Feeding ecology
Nutritional Management of Ungulates in Captivity - Natural Seasonality of Vegetation, *Matthias Lechner-Doll Dr., Institute for Zoo Biology and Wildlife Research, P.O. Box, 10315 Berlin, Germany*

The aim to ensure an adequate nutritional basis for wild herbivores in captivity is difficult to realize in many cases, mainly because of insufficient data on the particular needs of the species. The natural diet is usually impossible to offer, in particular for selective herbivores and for animal species away from their natural climatic zone. To adapt commercial dietary components designed for domestic livestock may be the only alternative in most cases. However, in temperate climatic zones and close to the polar regions, seasonal variations of the biomass available for consumption of wild ungulates varies several orders of magnitude, both in respect to quantity and to quality. This is mainly a result of the short vegetation period. Wild ungulates in the polar region (but also in temperate zones) consequently are strictly seasonal. Reproductive functions with the highest nutritional demand (late pregnancy and lactation in particular) must be synchronized with the vegetation period. However nutritional strategies are often very different between species. Examples for different ungulate species and feeding types will be discussed. Energy expenditure is greatly reduced in winter in many northern cervids, energy balance is negative in winter and body fat reserves may contribute substantially to winter energy expenditure. Voluntary feed intake and the extend to which body reserves are accumulated during the vegetation period are not only a matter of feed quality and quantity offered, but depend on day length and season. Seasonality of feeding behavior changes seem to be inherited and thus remain present in captivity, even if continuous feed supply is guarantied since many generations. As a consequence for practical management, northern cervids in particular may need to be fed below voluntary consumption in autumn to avoid the accumulation of body reserves, which are not utilized during winter in captivity. A second possible management strategy may use the natural seasonal rhythm. To simulate winter conditions animals may be fed below maintenance and may thereby reduce excess body reserves accumulated previously.

Regulation of Food Intake, *Thomas Lutz Dr., Institute of Veterinary Physiology, University of Zuerich, Winterthurerstrasse 260, 8057 Zuerich, Switzerland*

Adult individuals are usually characterized by a balance between energy intake and energy expenditure. Food intake is controlled by various feed back loops. Short-term and long-term regulatory systems can be differentiated. The feed back signals are integrated in the central nervous system (CNS) and translated into an appropriate feeding response. Short-term regulation of food intake mainly involves feed back signals originating in the gastrointestinal (GI) tract. They may be positive (e.g. from the oral cavity) or negative in nature. Distension of the stomach (or the forestomachs in ruminants) leads to the activation of vagal afferents projecting to the nucleus of the solitary tract (NTS) in the hindbrain being connected with the hypothalamus. The presence of nutrients in the small intestine (or rumen in ruminants) is sensed and the information transmitted via vagal afferents or via the release of GI hormones, e.g. cholecystokinin (CCK). Besides CCK, other hormones (e.g. gastrin-releasing peptide and the pancreatic hormones amylin, glucagon and insulin) also play an important role in the regulation of food intake. These satiety hormones act partly via receptors on vagal or splanchnic afferent nerves (CCK) whereas amylin and insulin appear to act directly in the CNS. Feed back signals from the hepatoportal area are postabsorptive in nature. The availability of glucose (propionate in ruminants), the oxidation of fatty acids and the energy status in

general appear to be sensed in the hepatoportal area with the signals being transmitted mainly via hepatic vagal afferents. The lipostatic theory of the long term regulation of food intake and body weight postulates the presence of humoral factors whose concentration depends on the size of the adipose tissue.

The most important signals are leptin and insulin whose plasma concentrations increase with the degree of obesity. Both constitute negative feed back signals acting directly on the brain, their main target organ being the hypothalamus, the main integrating center for the control of food intake. Within the CNS, a plethora of substances interact in a complex system to control food intake. Among them are the neurotransmitters serotonine, histamine, norepinephrine and dopamine and the neuropeptides corticotropin releasing factor (CRF)/ melanocortin (MC) and neuropeptide Y (NPY). The anorectic effects of leptin and insulin, e.g., also appear to be mediated via the NPY and CRF/ MC systems.

Variation in Energy Intake in Eurasian Otters (Lutra lutra)*:*
Alfred Melissen Dr.; Otterpark Aqualutra, De Groene Ster 2, 8926 XE Leeuwarden, The Netherlands

As Eurasian otters are kept in many countries in Europe, with very different climatological circumstances during the year, it is difficult to advise on food quantities that have to be given to an individual. In this report temperature related energy intake data are presented as a guideline. Otters are large consumers, daily food intake can mount up to 15% bodyweight in wintertime, or up to 20% bodyweight during lactation. In order to investigate variation in energy intake related to changing seasons and lactation the food intake of 4 otters kept at the Otter park Aqualutra was monitored. All animals were fed an identical diet, consisting on 2/3 of gross energy intake provided by mackerel and 1/3 of gross energy intake from one-day-old chickens. During the test period all animals appeared healthy and were behaving normally. Two adult, non-pregnant or lactating animals (1.1) of average bodyweight housed in the public accessible enclosures were followed during one year. The animals were fed three times daily ad lib to the point they would not appear from their nest boxes for their last feeding time, then the daily quantity of food given was reduced. When the animals became too aggressive to the keepers because of hunger, the quantity of food offered was increased. Together with this data on average temperature during the test period were collected, in order to be able to give more specific advise on gross energy intake related to average environment temperature.

Furthermore the effects of lactation on energy intake were studied in two females otters. They were housed in the breeding center and fed the same diet, the quantities of food offered being determined by the animals in the public enclosures. The animals were fed once daily at the end of the day, the amount was titrated by the aggressiveness of the animals during feeding time and the amount of food not eaten the next morning. Both females were housed under comparable conditions in adjacent enclosures, and were monitored over a period of six months. One of the females was mated, became pregnant and raised three cubs successfully. The other female, of approximately the same bodyweight, remained unmated and was used as reference animal to eliminate climatological effects. Results indicate that in winter the amount of food offered should be monitored carefully (weighing the amount given and the amount not-eaten daily!) and increased in our case up to almost 200% compared to the lowest summer averaged week intake. For lactating females the amount increases even more (up to almost 300%). Regarding the fact that an important component of otter diets (fish) is very perishable, husbandry measures are necessary in order to provide the animals a sufficient amount of proper food.

Review of Foraging Niches in Rodents and their Implications.
Mike Jordan, Animal Management Section, Sparsholt College Hampshire, Sparsholt, Hants SO21 4 NK, United Kingdom

Of all the Mammalian Orders, the Order Rodentia contains the largest number of mammal species. The Rodents comprise a total of 2021 species, which represents 43.7% of all mammals. They occupy all six zoogeographical regions of the world, and in each region different species have evolved to occupy a massive diversity of ecological niches. This ranges from commensal species such as the Western House Mouse (*Mus domesticus*) to tropical arboreal species such as Prevost's Squirrel (*Callosciurus prevosti*). In behaviour the rodents are again incredibly diverse and species exist that can provide examples of many different strategies across a wide range of habitats. Rodents show a wide variety of foraging specialisations, since by developing such specialist foraging behaviours each species fully exploits its habitat and reduces competition with other inhabitants of the same area. However, within a large number of zoological collections the diversity of rodents is poorly known and even more poorly displayed. Despite the large variety in natural diets and foraging ecology amongst rodents, most species are still fed in captivity with exactly the same diet and food presentation techniques irrespective of their wild ecology. For the majority of rodents this consists of a seed mixture fed in a static food bowl. Rodents have the potential to be more effectively displayed if their natural foraging behaviours are utilised, as well as enhancing the welfare of the individuals themselves through providing environmental enrichment. An example of this is the Fattailed Duprasi (*Pachyuromys duprasi*). In the wild this animal is a voracious hunter, and given a regular supply of live insects and molluscs can display active hunting behaviour. Zoos must therefore look to what happens in the wild in order to enhance their displays and improve welfare - and rodents should not be exempt from this rule.

There are many other useful features in the newsletter. Have a look on the website and write to us if you would like to get it via email.