EAZA NUTRITION GROUP

Programme Booklet

European Nutrition Conference 2021 Online

28 – 29 January 2021

Scientific and Organizing Committee

Anouk Fens - Apenheul Primate Park
Lauren Samet - Marwell Wildlife
Marcus Clauss - University of Zurich
Joeke Nijboer - Nijboer Consultancy
Nicola Bryson-Morrison - University of Kent
Sarah Depauw – Odisee University College

Photo credit front cover: Anouk Fens

Welcome

After a fantastic European Zoo Nutrition Conference at Marwell Zoo in January 2019, we couldn't wait to start planning another successful conference edition. Therefore, we were very happy when Vienna Zoo kindly offered to be the host of the 2021 edition. However, in the beginning of 2020, everything changed. Due to the coronavirus pandemic, zoos have had to fight for survival - having to shut facing huge financial difficulties, as well as having to come up with flexible solutions and draw on staff's incredible adaptability in unprecedented times. We have seen the zoo community as a whole, globally, come together and support one another in facing their challenges to do what is right and what is best for their animals. And rather than dwell on what has been such a challenging year we hope to now focus on what motivates us all to do our jobs, inspire our work and fuels our passion - the animals!

Although we will not be together in person this year to share our experiences and knowledge of zoo animal nutrition in 2020, we are very pleased to have been able to arrange another European Zoo Nutrition Conference - the first ever virtual meeting, which will proceed online in modified format. Due to this year's format and support from EAZA, we are pleased to have been able to offer this year's conference free of charge, which we hope is of benefit to our loyal community but also encourages some new faces with an interest in zoo animal nutrition to take part and get a taste of what our usual conferences are about.

This year the organising committee is very excited to present you with a wide range of talks and workshops from expert scientists in the field of bat, bear and bird nutrition, and the primate gut microbiome. Additionally, we have some fantastic talks and workshops with high practical value to zoo nutrition/nutritionist roles based around human behaviour change science, sustainability through diet change, and adaptations, problems and solutions due to Covid-19.

This programme provides an outline of the talks and workshop sessions. **Please note that all talks and sessions are scheduled in Central European Time (CET)**. There may be some additional details added as we approach the conference date so keep an eye out for new announcements and updates. We hope this programme finds you well and excited for the conference - **Registration is open to all**, please note that there are 5 different parts of the conference to register for (including workshops) and we encourage you to register for all 5 sessions early on to not miss out on any of the fun and to receive communications on what to prepare for workshops etc! There are some really unique opportunities to take part with.

Preparing a conference, even a virtual one, is a lot of investment in time, money, and effort. We are very grateful for the support of all our members of the organising committee, Marcus, Joeke, Nicola and Sarah, with many thanks also to the EAZA Executive office and especially Mirko Marseille and Lauren Florisson, for coordinating the virtual aspects of the conference, processing registrations, regularly updating the conference website and taking responsibility of announcements.

And finally, we are pleased to welcome all our participants both old and new! Thank you for attending our virtual European Zoo Nutrition Conference 2021. We hope you are looking forward to the programme as much as we are, and hope to meet you again at future conferences, next time in person.

On behalf of the organizing committee,

Anouk Fens and Lauren Samet, Chair and Co-Chair EAZA Nutrition Group


EAZA Nutrition Group

The EAZA Nutrition Group (ENG), reporting to the EAZA Research Committee, seeks to improve communication and coordination among all those engaged in research, education, or application of comparative (zoo) nutrition, and those requiring nutrition information. Our aims include:

- To have an advisory role in nutrition best practice for the EAZA community;
- To have a close working relationship with the TAGs, EEPs, ESBs and other EAZA working groups;
- To contribute to the developments in nutritional analysis and recording;
- To direct enquiring institutions towards relevant resources, training opportunities and specialists.

Members of the ENG fulfil various roles within the working group, including conference organisation, editing Nutrition News issues, managing social media, liasing with TAGs and providing and updating relevant resources. The members are made up of a range of zoo animal nutrition specialists from across Europe, working both in zoological collections and in academia, all of whom are actively involved in zoo animal nutrition.

In order to obtain information or relevant resources, please visit our ENG website (www.eaza.net/about-us/areas-of-activity/eaza-nutrition-group/). The website includes proceedings of past conferences, previous Nutrition News issues and other relevant publications on zoo animal nutrition. In addition, our ENG Facebook page (www.facebook.com/EAZAnutrition/) offers regular updates on nutrition related articles and links that might be of interest.

Nutrition Conferences

A large part of the ENG's responsibilities is the organisation of a biennial European Conference on Zoo Animal Nutrition, which are open to anyone interested in comparative and zoo animal nutrition. Nutrition is a vital element of animal care and gathering everyone involved or interested to exchange information and ideas helps fulfil our objectives. These conferences are usually attended by an average of 150 delegates from approximately 20 countries globally, representing zoo nutritionists, veterinarians, curators, animal keepers and students.

Join the ENG

The mission statement of the ENG is to promote and support nutrition in zoological institutions as an essential component of their conservation mission. Membership is open to all individuals who support the aims of the EAZA Nutrition Group or need to know how they can improve nutrition within their zoo. We welcome all serious applications and each one will be considered independently. Before applying, please consider what you can bring to the ENG; as a member you will be asked to get involved in a wide range of activities. Members therefore require a good working knowledge of zoo animal nutrition and need to be active in this field. Contact details can be found on the ENG website.

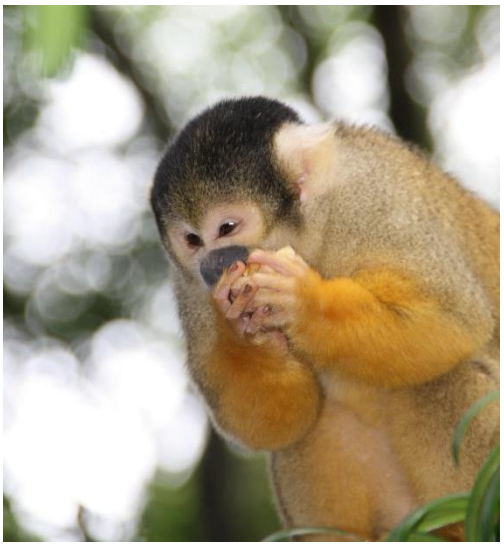
Conference programme

THURSDAY 28 JANUARY 2021

09.00	Welcome & Opening Remarks
09.15 – 10.15	**Dr Tamzin Furtado** – Helping the Leopard Change its Spots: How We Can Use Behaviour Change Science in the World of Zoo Animal Nutrition
10.30 – 11.30	**Dr Leonie Baier** – The Nutritional Husbandry of Bats
11.30 – 11.45	Break
11.45 – 12.30	**"Short Talks" Session:** Smart Solutions in Zoo Nutrition (including Q&A session afterwards)
12.30 – 13:30	Lunch Break
13.30 – 14.15	**"Short Talks" Session:** Diet Change and Behaviour (including Q&A session afterwards)
14.15 – 14.30	Break
14:30 – 16.00	**Workshop:** Behaviour Change Science in the World of Zoo Animal Nutrition – Tamzin Furtado
16.00 – 16.30	Break
16.30 – 18.00	**Workshop:** COVID-19 & Zoo Animal Nutrition – Lauren Samet & Anouk Fens
18.00	Concluding Remarks & Thanks by Geert Janssens

FRIDAY 29 JANUARY 2021

09.00	Welcome & Opening Remarks
09.15 – 10.15	**Dr Francis Cabana** – Sustainability of Zoo Animal Feed: Food for Thought
10.30 – 11.30	**Dr Ellen Dierenfeld** - Now That's a Seedy Character! Nutritional Considerations in Feeding Granivorous Species
11.30 – 11.45	Break
11.45 – 12.30	**"Short Talks" Session:** Underwater Nutrition / Mineral Deficiency (including Q&A session afterwards)
12.30 – 13:30	Lunch Break
13.30 – 14.30	**Dr Katherine Amato** - Diet and the Gut Microbiome: Lessons from Comparative Work with Primates
14.30 – 14:45	Break
14.45 – 15.30	**"Short Talks" Session:** Scoring and Measuring Animal Condition / Microbiome (including Q&A session afterwards)
15.30 – 16.00	Break
16.00 – 18.00	**Workshop:** Bear Nutrition – with Charles Robbins ("New insights into dietary management of polar bears and brown bears") and Marcus Clauss ("Feeding bears – physiological, behavioural and practical implications") and a discussion of feeding regimes communicated in advance by participants
18.00	Concluding Remarks & Thanks by Geert Janssens



Plenary lectures

Helping the Leopard Change its Spots: How we can use Behaviour Change Science in the World of Zoo Animal Nutrition

Tamzin Furtado, PhD.

There is one commonality to improving all captive and companion animal welfare issues: to improve the welfare of an animal, we have to first change the behaviour of people in some way. Whether we want to make a small change or a major one, or change one person or one million people, the principles of behaviour change science can be applied in order to help us effect change.

This talk will bring together aspects of psychology, sociology, animal welfare, nutrition, and the study of human-animal relationships to consider why people behave the way they do, and how we can help people to change. In particular, we will examine the complexity of human behaviours around food and feeding, and why changes in these areas can be harder to achieve.

Tamzin is a social scientist with a background in global health, and has a specific interest in the interconnections between human and animal health and wellbeing. She completed a PhD at the University of Liverpool studying how we can improve the management of obesity in horses, particularly focusing on horse-human relationships and human behaviour change. She now works on projects covering a wide range of aspects of understanding human behaviour in order to improve companion animal welfare, and in using social sciences to find out more about how we can help people to change. Although Tamzin is a self-confessed horse-nut, she hopes to work with animals across the board in future, and has previously been involved with charities ranging from South-East Asian wildlife to British domestic pets, and particularly loves goats (well, who doesn't).

The Nutritional Husbandry of Chiropterans (Bats!)

Leonie Baier, PhD.

Bats are a very successful clade of mammals. The unique combination of flight and echolocation made it possible for them to exploit the lush ecological niche that is the night's skies. With over 1400 species, they inhabit almost every corner of the world, and every imaginable food source: from mosquitoes to moths, beetles, spiders, over scorpions, birds, other mammals, frogs, and fish to blood, fruit, pollen and nectar. While almost every 5th mammal species on the planet is a bat, approximately 25% of bat species today are threatened with extinction. As part of recovery plans, bats have been brought into captivity, where their practical needs differ substantially from species to species. But because they are small in size and their metabolism must support prolonged episodes of flight, all bats have one thing in common: a large appetite.

Since she first encountered bats during her undergrad studies, Dr. Leonie Baier has worked with wild and captive bats of different species in many different places. Her research interests revolve around the questions 'How does the way that bats perceive their environment influence their behaviour?' and 'How did their behaviour shape their perception?'. After working in a bat sensory ecology lab at the Max PIanck Institute for Ornithology, Seewiesen, she obtained her PhD on bat echolocation from the Ludwig Maximilians University Munich and the International Max Planck Research School for Organismal Biology. She has since continued her scientific work on bat sensing and behaviour at the Technical University of Munich and will soon set out to the Panamanian jungle where she will study multisensory perception in the frog-eating bat as a research fellow of the Alexander von Humboldt Foundation. Her expertise lies with bat behaviour and bioacoustics, but over 15 years of experience with bat husbandry around the world have left their mark: Her favourite pastime is in fact watching bats feed.

Sustainability of Zoo Animal Feed: Food for Thought

Francis Cabana, PhD.

Zoos are known for providing meaningful guest experiences and playing an important role in species conservation. More recently, zoos have also taken on the role of reducing their environmental impact to promote sustainable best practices. One way of achieving this is by making “greener” choices and reducing an institutions total carbon footprint. In Wildlife Reserve Singapore (WRS), animal feed was recognised to be a major contributor to carbon emissions due to its large and consistent volume used to maintain the living collection. To measure carbon footprint, we used food items that has gone through Life Cycle Assessments (LCA) with available Global Warming Potentials (GWPs, represented as kg CO2-eq/kg produce), a recognised method of comparing and calculating the climate impact of any given item or produce. Each food item was first inventoried and categorised into food groups. Monthly averages of food purchased and total GWP figures for each food item were calculated. Fifty-three different food items were chosen by their consistent amount purchased and available GWPs figure found in literature between 2017 to 2019. The largest GWP contributor was by far meat followed by seafood, vegetables and fruits. By setting sustainable targets for animal feed one of which was to reduce the usage of ruminant meat (beef, veal, venison and goat) by 5% (approx. 132 kg/month), and increase proportion of chicken, kangaroo and horse meat, we were able to decrease 10.6% (200337 Kg CO2-eq) of the total carbon emissions between 2017 and 2019. By using validated methods for measuring environmental impacts such as GWPs and targeting areas with high potential of carbon emissions such as animal feed, more effective sustainable targets could be developed and achieved that would greatly help zoos and aquariums in their pursuit to be more sustainable without compromising on the nutritional status of the animals.

Working as the Wildlife Nutritionist within Wildlife Reserves Singapore, Francis has been in a never ending study to understand and satisfy the nutritional needs of wild animals under human care. With his PhD on the feeding ecology and nutrition of slow lorises, he learned their habits from the wild and crafted and validated diet recommendations based on that. While nutrition welfare will continue to be the focus of Francis’s career, ensuring the food we provide to our animals doesn’t come at an unacceptable ecological cost also needs to be studied. Francis started investigating the sustainability of the WRS Wildlife Nutrition Centre in 2017 and has worked on a number of sustainability initiatives throughout the life sciences department such as chipping horticulture waste to reuse as substrate (reducing the need for daily jetspraying), vermicomposting and black soldier fly rearing as well as a global warming potential analysis of the animal diets.

Now That's a Seedy Character! Nutritional Considerations in Feeding Granivorous Species

Ellen S. Dierenfeld, PhD.

Seeds, grains, and nuts (SGN) can all be considered embryonic packaging for plants. As such, and serving mainly a reproductive function, nutrients packaged within this food/feed category primarily provide energy in the form of stored carbohydrates or lipids, often encased in a hard, protective fibrous coating that is typically discarded by a consumer. Weight of these discarded, less digestible fractions may comprise up to 50% of as-fed portions; corrections for uneaten fractions must be taken into account when designing animal diets and can be used to advantage for targeted supplementation purposes. Few generalized nutritional principles of SGN apply across this huge and diverse group of potential ingredients; rather aspects of all major nutrient categories – proteins, fats, vitamins, and minerals, can be highlighted. Proteins: While most monocot seeds contain moderate (~10-20%, DMB) crude protein, oilseeds in particular may contain high levels (~25-50%). Thus SGN can provide a valuable source of dietary protein, but both protein levels as well as underlying amino acid profiles vary widely in this diverse category. These differences are well known in common livestock feeds, thus ingredients are routinely combined to create nutritionally balanced end-products. Fats: Regarding lipid fractions in SGN, both total amount and saturation profiles differ distinctly among ingredients. Total fat must be considered since high-fat seed-based diets may lead to obesity and/or energy satiety, potentially resulting in other nutritional deficiencies. While linoleic acid (LA) and α-linolenic acid (ALA) are considered nutritionally essential fatty acids (FA), and can be converted to eicosanoids for improved development and immune function, the vast majority of lipids in most SGN comprise polyunsaturated FAs (primarily LA >> ALA) far in excess of requirements, thus require dietary antioxidants to offset potential negative effects. Optimal dietary ratios of n3:n6 fatty acids have not been determined for most granivores; high n3 fatty acids found in select seeds may have protective activity against cardiovascular lesions reported in SGN-fed psitticines and rodents. Vitamins: In general, SNG can be considered good sources of B vitamins, but deficient in the fat-soluble vitamins, and both vitamin A and vitamin E deficiencies have been reported in granivorous species consuming seed-only diets. Nonetheless, some oilseeds accumulate carotenoid pigments that may be converted to active vitamin A, while others are considered excellent sources of vitamin E. Awareness of differences in vitamin profiles among SNG, and recognition of selection potential from blended seed mixes, is critical in assuring balanced nutrient presentation/consumption. Minerals: The highly digestible, nutrient-dense endosperm tissues of seeds, grains and nuts typically lack significant amounts of macrominerals calcium and sodium, while containing high (or variable) levels of magnesium, phosphorus and potassium. Without supplemental sources of calcium available, granivorous species are susceptible to calcium:phosphorus imbalances and associated metabolic diseases. While most SGN provide adequate levels of trace minerals, levels vary according to growing conditions, and some individual species can be toxic accumulators (e.g. Brazil nuts and selenium).

Typically, seed/grain/nut - based diets require supplementation with antioxidants, fat-soluble vitamins, possibly carotenoid pigments, and macrominerals calcium and sodium to provide diets would be considered nutritionally balanced for numerous animal species considered to be primarily granivorous. Certainly these nutrients can be supplied through other ingredients in mixed diets.

Ellen S. Dierenfeld, PhD, received her PhD and MS in Animal Science from Cornell University, and a BS in Animal Science from Iowa State University. She is a founding member of both the American Zoo and Aquarium Association's Nutrition Advisory Group and the Comparative Nutrition Society, where she currently serves as President, and is an Advisor to the online Handrearing Resource Center as well as Elephant Care International. She served >10 years a Nutrition Advisor to the AZA Elephant SSP, and is a member of the IUCS/SSC Asian Elephant Specialist Group, with over 30 years' professional experience in applied and basic animal nutrition research. Previous positions include: Director of Wildlife Nutrition (Wildlife Conservation Society/Bronx Zoo), Director of Nutrition and Research (Oxbow Animal Health), Staff Nutritionist (Saint Louis Zoo), and Manager of Africa R&D and Global Sustainability Programs (Novus International, Inc.). Present activity includes roles as Honorary Professor, School of Animal, Rural & Environmental Sciences at Nottingham Trent University in the UK, Editorial Boards for Zoo Biology and Dairy Science, Veterinary & Animal Husbandry and Animals scientific journals, as well as Consulting Nutritionist for several zoos, private facilities/individuals, and feed manufacturers. Ellen has conducted field work on six continents with a variety of both wildlife and livestock species, focusing on native/local feed ingredient composition and animal utilization. She has mentored >200 students/interns in aspects of comparative nutrition, and currently co-supervises graduate student activities in the UK and Australia, working with multiple species and nutrients. Ellen has published more than 250 peer-reviewed articles, co-authored the book, `Comparative Animal Nutrition and Metabolism', and developed Zootrition records keeping and nutritional analysis software.

Diet and the gut microbiome: Lessons from comparative work with primates

Katherine R. Amato, PhD.

It is widely assumed that host diet strongly influences the gut microbiome, and vice versa. However, many of the foundational studies indicating this pattern target humans exclusively or rely on largescale cross-host species comparisons. Here, I use primates as a model system to re-examine common assumptions about diet and the gut microbiome. I explore patterns within a single host species across time and space, as well as compare patterns across host species. I demonstrate that, while the gut microbiome and host diet clearly interact, the relationship is not the same for all host species. It varies depending on host ecology and evolution. Additionally, study scale and context matter. Therefore, while the microbiome appears to represent a critical piece of the puzzle when addressing questions of host nutrition, energetics, and health, our current understanding of its role is not as clear as it sometimes seems. Even in the relatively well-studied primate system, we must better integrate data from multiple studies to improve our understanding of general principles of host diet-microbiome relationships.

Amato is a biological anthropologist studying the influence of gut microbes on host ecology and evolution. Her research examines how changes in the gut microbiota impact host nutrition, energetics, and health. She uses non-human primates as models for studying host-gut microbe interactions in selective environments and for providing comparative insight into the evolution of the human gut microbiota. She is also interested in global variation in the human gut microbiome and its implications for local human adaptation. Amato earned her B.A. (Biology) at Dartmouth College and her Ph.D. (Ecology, Evolution, and Conservation Biology) at the University of Illinois at Urbana-Champaign. She is an assistant professor at Northwestern University. She is also a fellow in the CIFAR Humans and the Microbiome program and the president of the Midwest Primate Interest Group. She serves on the editorial board of *Microbiome* and *Folia Primatologica.*

Workshops

Workshop 1: Behaviour Change Science in the World of Zoo Animal Nutrition

Tamzin Furtado, PhD.

We've all been in situations where we've tried to get someone to change their behaviour, whether it's your boss, the public, your colleagues, or even (especially?!) your other half…. and we know it can be a frustrating and fruitless experience. We all spend a lot of time trying to understand our animals, but sometimes we neglect our poor conspecifics. However, understanding human psychology and how change happens enables us to see better ways to help bring about change, ultimately improving animal welfare.

This interactive workshop will bring participants together and use your real-life examples of times when you were able to influence change, and times when you were maybe not so successful! By examining those experiences as a group and in light of behaviour change principles, we will consider why certain campaigns and messages do work, and why others don't.

Participants will gain an understanding of the overall principles of behaviour change science and an understanding of how to apply those in practice, and hopefully have fun along the way! Please do join us if you have an interest in this area, and bring along any examples of times when you have or haven't been able to influence people you've wanted to change (OR, times when someone tried to influence your behaviour, and how you felt about it). We will look forward to seeing you there!

Workshop 2: The impact of Covid-19 on Zoo Animal Nutrition*

Lauren Samet, PhD & Anouk Fens, MSc

This year has been a year like no other in modern history. This workshop aims to acknowledge that, and exactly how it has impacted zoo nutrition globally, by exploring how Covid-19 in relation to zoo nutrition and zoo animal feeding.

Covid-19 has impacted the zoo community globally with lockdowns and temporary zoo closures restricting tourism and zoo visitor numbers. This has affected zoo finances around the world, threatening their work and the care provision they can afford. Common headlines around the problem cite the expense of "feeding of animals" as one of the major issues with lack of funds, but has this really been the case?

Keepers pride themselves in taking tremendous care of their animals; many have suggested that the additional time in their day from not having to carry out public displays has been time well spent instead making feeding enrichment for animals, while other collections have been able to grant animals access to different grazing and browse territories thanks to greater freedom from the necessity of public viewing. Food supply chains have been affected across the world and acquisition of certain produce has been difficult. Meanwhile in the initial stages of outbreak it was discussed whether and how food should be disinfected or quarantined for a period before feeding.

Join us in this workshop to discuss these matters and more, to share your experiences, knowledge, adaptability and problem solving in the hope that we can learn from each other in how to improve our current situations and hopefully assist troubleshooting for similar situations in the future.

Anouk Fens is the Chair of the European Nutrition Group. She currently works as zoo nutritionist in two Dutch zoos, being Apenheul Primate Park and Rotterdam Zoo. Along her study in Animal Nutrition at Wageningen University, she focussed and specialised in wildlife and zoo nutrition.

Lauren Samet is the recently appointed Co-Chair of the ENG. She helps manage the European Zoo Nutrition FaceBook page and works as a consultant nutritionist for Marwell Wildlife in her spare time. She has a background in both zoo and companion animal nutrition and a PhD based in the latter.

*Photos taken before the 2020 Covid outbreak. Please be advised that by registering for this workshop you agree that the themes discussed within this workshop may be written up for wider sharing. Collections and individuals will not be named and any identifying factors will be removed.

Workshop 3: Bear Nutrition

Charles Robbins, Prof. & Marcus Clauss, Prof.

Dr. Robbins is a professor at Washington State University who has studied the nutrition of wild animals for 51 years and founded and directed a captive and wild brown bear research program for 35 years. He will introduce you to their studies that have led to a basic understanding of the diets of wild brown bears and polar bears which now form the basis of a new applied concept for creating healthy diets for the managed care of polar bears and brown bears.

Bears are well-known for their propensity to adapt to human proximity, for example their foraging in garbage dumps. Sometimes, one can get the impression that bear feeding regimes replicate the anthropogenic garbage niche. The label as 'omnivore' also might sometimes induce indiscriminate feeding regimes. And because they look cuddly, one might be tempted to spoil them. However, bears are special: Several bear species are seasonal herbivores. Bears show incredible adaptations to seasonality and hibernation, including the extreme altriciality of their neonates - even in those species that do not populate temperate habitats. Bears change their nutritional focus with seasons, and suggestions will be presented how zoo feeding regimes can mimick conditions in natural habitats of bears.

Marcus Clauss is the head of research at the Clinic for Zoo Animals, Exotic Pets and Wildlife of the Vetsuisse Faculty of the University of Zurich. He has been an active member of the European Zoo Nutrition Group for more than a decade, always with a tendency towards more scholarly knowledge and less practical nutritional experience, which may make it easy for him to state how things could be rather than take responsibility for how they are.

Short talk sessions

Short talk sessions

Short Talks Session 1 - Smart Solutions in Zoo Nutrition

Vegan fish feed project and 3D printed feeding racks

Sander van Lopik[1]
[1]*Diergaarde Blijdorp Rotterdam Zoo, The Netherlands*

ENG nutrition workshop in Kaliningrad

Tjalling Huisman[1], Joeke Nijboer[2]
[1]*Van Hall Larenstein University of Applied Sciences, The Netherlands*
[2]*Nijboer Consultancy, The Netherlands*

The sourcing of feeder animals for snakes by UK zoos

K. Jones[1], G. Cooke[2], Wanda McCormick[1]
[1]*Department of Animal and Agriculture, Hartpury University, UK*
[2]*Anglia Ruskin University, UK*

Breeding your food rats: a productive alternative to lab-style cage systems

A. Wigger[1], D. Singh[1], J. Leu[1], Marcus Clauss[2]
[1]*Wildnis park Zurich, Switzerland*
[2]*Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Switzerland*

Stimulation natural foraging behaviour in primates through new exhibit design for local biodiversity

Anouk Fens[1,2]
[1]*Apenheul Primate Park, The Netherlands*
[2]*Diergaarde Blijdorp Rotterdam Zoo, The Netherlands*

Short Talks Session 2 - Diet change and behaviour

Pecking and plucking - How nutrition can influence behaviour in ostriches

Angela Gimmel[1], S. Silinski-Mehr[2], O.F. Loffler[3], A. Liesegang[1]
[1]*Institute of Animal Nutrition, Vetsuisse faculty, University of Zurich, Switzerland*
[2]*Geflügelgesundheitsdienst, Tiergesundheitsdienst Bayern e.V., Grub, Germany*
[3]*Artestruz, Mallorca, Spain*

Effect of adding silage leaves to the feed ration on the nutritional behaviour of black howler (*Alouatta caraya*) and Angola colobus (*Colobus angolensis*)

Marcin Przybyło[1], O. Lasek[1], K. Kasprzak[2], M. Zając-Ossowska[2], N. Kędra[1], I. Wajsman[1], P. Górka[1]
[1]*Department of Animal Nutrition and Biotechnology, and Fisheries, University of Agriculture, Krakow, Poland*
[2]*Wroclaw ZOO, Wroclow, Poland*

Effect of quantity of low-starch pellet in the diet and a use of straw as a bedding on feed intake, eating and rumination behaviour of bongo antelope (*Tragelaphus eurycerus*)

Samanta Świerk[1], M. Przybylo[1], K. Hasior[1], M. Gluch[1], A. Waliczek[1], Ł. Różański[2], J. Kański[1], P. Górka[1]
[1]Department of Animal Nutrition and Biotechnology, and Fisheries, University of Agriculture, Krakow, Poland
[2]Warsaw Zoological Garden, Warsaw, Poland

Transitioning to a fruit free diet with all four great ape species

Lorraine Miller[1]
[1]Greatapeconsultancy, UK

Effect of decreasing fruits on the behaviour of ring-tailed lemur (*Lemur catta*)

Garus-Piętak[1], M. Przybylo[1], W. Bielatowicz[2], P. Górka[1]
[1]Department of Animal Nutrition and Biotechnology, and Fisheries, University of Agriculture, Krakow, Poland
[2]Warsaw Zoological Garden, Warsaw, Poland

How does feeding with whole rabbit versus lean beef affect the behaviour of captive jaguars (Panthera onca)

Line Enmark[1], M. Clauss[2], L. Lagerström[3], H. L. Halkjær Rhode[1]
[1]University of Copenhagen, Department of Veterinary and animal Sciences, Section for Animal Welfare and Disease control, Denmark
[2] Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Switzerland
[3]Parken Zoo, Eskilstuna, Sweden

Short Talks Session 3 - Under water nutrition / mineral deficiency

Case Report: copper deficiency in four cheetah cubs

Tina Rish[1]
[1]Zoopark Erfurt, Germany

Mineral status in captive animals: a non-invasive method: first results

An Cools[1], L. Forier[1], F. Molenaar[2], A. Deschoemaeker[1], L. Van Sonsbeek[3], D. Vanhauteghem[1], G.P.J. Janssens[1]
[1]Laboratory of Animal Nutrition, Faculty of Veterinary Medicine, Ghent University, Belgium
[2]ZSL Whipsnade Zoo, UK
[3]Diergaarde Blijdorp Rotterdam Zoo, The Netherlands

Maize green forage in the diet of West Indian manatee *(Trichechus manatus*)

Karolina Kasprzak[1], G. Krajda[2], A. Urbańczyk[1], J. Kanski[2], M. Przybyło[2]
[1]Wroclaw ZOO, Wroclow, Poland
[2]Department of Animal Nutrition and Biotechnology, and Fisheries, University of Agriculture, Krakow, Poland

Sea turtle diets

Anouk Fens[1,2]
[1]Apenheul Primate Park, The Netherlands
[2]Diergaarde Blijdorp Rotterdam Zoo, The Netherlands

Feeding habits of two native Andean killifish of Lake Titicaca, a contribution to their ex-situ conservation

Erick Loayza[1], A. Muñoz-Saravia[1], M. De Troch[2], G.P.J. Janssens[1]
[1]Laboratory of Animal Nutrition, Faculty of Veterinary Medicine, Ghent University, Belgium
[2]Marine Biology, Ghent University, Belgium

Advances in amphibian nutrient metabolism study

Andrea Brenes Soto[1], E. Dierenfeld[2], G. Bosch[3], W. Hendriks[3], G.P.J. Janssens[4]
[1]Animal Science Department University of Costa Rica, Costa Rica
[2]Nottingham Trent University, UK
[3]Animal Nutrition Group, Department of Animal Sciences, Wageningen University, Wageningen, the Netherlands

[4]*Laboratory of Animal Nutrition, Faculty of Veterinary Medicine, Ghent University, Belgium*

Short Talks Session 4 - Scoring and measuring animal condition / microbiome

A comparison of gut microbiota between wolves (*Canis lupus*) and cheetah (*Acinonyx jubatus*)

Jia Xu[1], G.P.J. Janssens[2]
[1]*Department of Veterinary Medicine Jinhua Polytechnic University, China*
[2]*Laboratory of Animal Nutrition, Faculty of Veterinary Medicine, Ghent University, Belgium*

Giraffe body condition scoring

Irina Clavadetscher[1], Monica Bond[2], Christian Schiffmann[1], Jean –Michel Hatt[1], Marcus Clauss[1]
[1]*Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Switzerland*
[2]*Department of Evolutionary Biology and Environmental Studies, University of Zurich, Switzerland*

Growth curve and body mass prediction of Red-Footed Tortoises (*Chelonoidis carbonaria*) in captivity

Pierina Mendoza[1]
[1]*School of Veterinary Medicine and Animal Science of Sao Paulo State University, Brazil*

Diet effects on fecal consistency of brown bears

Annelies De Cuyper[1], M. Clauss[2], L. Lens[1], D. Strubbe[3], A. Zedrosser[4], S. Steyaert[5], A. Muñoz-Saravia[1], G.P.J Janssens[1]
[1]*Laboratory of Animal Nutrition, Faculty of Veterinary Medicine, Ghent University, Belgium*
[2]*Clinic for Zoo Animals, Exotic Pets and Wildlife, Vetsuisse Faculty, University of Zurich, Switzerland*
[3]*Terrestrial Ecology Unit, Department of Biology, Ghent University, Belgium*
[4]*Norwegian University of Life Sciences, Department of Ecology and Natural Resources, Norway*
[5]*Faculty of Biosciences and Aquaculture, Nord University, Norway*