

## Editorial

# JZAR Nutrition Special Issue

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Welcome to the 2nd JZAR Nutrition Special Issue collating selected papers based on research presented at the 2025 European Zoo Nutrition Conference (EZNC2025), held at Apenheul Primate Park in The Netherlands, and coinciding with the 25th Anniversary of the European Zoo Nutrition Group's establishment.

While JZAR regularly includes papers on zoo animal diets, feeding behaviours and health related nutrition topics, the overall representation of zoo nutrition research globally can often still feel limited when there remain so many questions unanswered. What to feed the 100,000+ species kept globally in zoos and aquariums, with diets as diverse as the species kept, is part of the limitless nature of this topic and a reflection on the wondrousness of the animal kingdom; species' abilities to adapt, survive, exploit niches, and thrive in the toughest of environments of the natural world.

Where do we begin with what to feed? Being an anniversary year, EZNC2025 included talks by historians and original members of the European Zoo Nutrition Group to reflect and review the distance we've come across time. While historians reflected on Victorian London trying to feed herbivorous species meat, and later in the 20th Century human style diets to primates, 25 years ago we were still getting a handle on preventing premature deaths in browser species due to vitamin E deficiency, skeletal deformities due to lack of vitamin D, and welfare failures due to inappropriate feeding routines.

With the work and collaboration of so many across the zoo and aquarium community, avoidable nutrition-based animal

deaths have now become less common, but it does not mean there is not still a way to go. One thing these reflections highlighted was the cyclical nature of dietary issues over generations: A diet-related health issue identifies the need for research and knowledge generation. This knowledge is then developed, shared through conferences, scientific publications, and best-practice guidelines, and ultimately applied to inform practices in zoos and aquariums. However, over time, practice without an understanding of the knowledge (or forgetting the rationale behind the founding principles of species-specific dietary design) can lead to drift in the dietary composition. This can lead back to the original diet-related health issue in a population, before diets are re-evaluated and the issue addressed again.

The question then becomes how to keep progressing into the future whilst keeping one eye on learnings from the past. We still don't have the exact answers but need to consider: (1) Ensuring knowledge, scientific evidence and plausibility underpin rationale for dietary changes, not a feeling or sheer tradition - zoos must invest in expertise or learning to help deliver this. (2) Having open minds – not just to discover the new but to respect the past where it is appropriate. We can only improve by admitting we do not know everything already and maybe some of our practices need updating. (3) Critical thinking - challenging our sources of information and continuously compare rationale to species' natural histories and the current context of the world around us. Agriculture, marketing, and our own subconscious biases can all limit the

quality of diet we feed. Diets will never be a “one and done” topic because ingredients, knowledge, best practice guidelines, and supply chains are constantly changing.

The presentations, workshops and discussions featured at EZNC2025, demonstrate that nutrition remains a crucial aspect of animal management in zoos and aquariums, and zoo nutrition research helps us to generate new insights and knowledge. This special issue of JZAR is part of our efforts to share some of the scientific evidence and knowledge generated by the zoo and aquarium community, looking forward into the future, and building on the past

A recurring theme across the papers presented at EZNC2025, and in this issue is the reliance of zoos and aquariums on previously published data and monitoring tools, often derived from domestic species, aquaculture industry or observations from the wild, rather than species-specific evidence from zoo and aquarium environments. Hunt et al. address this challenge directly through a multi-institutional analysis of diets fed to common octopus in European aquariums. While octopus are popular and charismatic, their nutritional requirements remain poorly defined. The nutritional analyses of whole diets in this study provides a comprehensive overview of octopus feeding practices. The findings reveal substantial variation in diets provided to common octopus and underscore the need for targeted research linking dietary composition with growth, health and longevity outcomes.

The importance of objective assessment tools to evaluate dietary health impacts, is highlighted by Sauspeter et al. in their examination of body condition scoring (BCS) in rhinos across European zoos. The authors present a refined BCS protocol and demonstrate that commonly held assumptions linking black rhino health issues to obesity may be unfounded. Instead, their results point towards species-specific ageing patterns, dental health and long-term management factors as more relevant considerations. This work reinforces the need for evidence-based evaluation tools to guide nutritional and husbandry decisions, rather than reliance on anecdotal associations.

Nutritional management challenges are further explored by Beltrán Urrego et al. who combined diet surveys across zoological institutions with faecal consistency scoring to investigate links between dietary composition and gastrointestinal health in cotton-top tamarins. The positive association between higher fruit inclusion and looser faecal consistency provides practical,

actionable insights for diet formulation, while the development of a standardized faecal scoring system offers a valuable monitoring tool for routine health assessments.

Complementing these findings, Walsh et al. present nutritional analyses of diets fed to Linnaeus’s two-toed sloths across UK and Irish zoos. Their work highlights considerable variation in diet composition and food quantities between institutions. Notably, dietary fibre levels were consistently lower than published recommendations, reflecting the limited provision of browse in some diets. Given the prevalence of digestive and metabolic disorders in captive sloths, this study reinforces the importance of aligning husbandry practices with nutritional guidelines and expanding the evidence base for specialist folivores.

While several studies in this issue focus on the link between nutrient composition and physiological condition, the role of feeding regimes in shaping behaviour and welfare is addressed by Brunner et al. This study examines how different food items and fasting schedules influence feeding behaviour and activity budgets in zoo-housed jaguars. By comparing processed meat, poultry and whole carcasses under intermittent feeding regimes, the authors demonstrate that whole carcasses substantially prolong feeding time and promote a wider range of natural behaviours. Although overall activity budgets and stereotypic behaviours remained largely unchanged, the behavioural richness elicited by carcass feeding highlights its value as a form of behavioural enrichment. These findings emphasise that welfare benefits may arise not only from what animals are fed, but from how food is presented and distributed over time.

What is so special about the biennial European Zoo Nutrition Conferences that have been occurring over the past 25 years is that they bring together a diverse array of open minds from zoos and aquariums globally to share new scientific evidence and knowledge that can inform updates to animal husbandry practices or challenge the norms of current practice to keep us moving forward and improving animal care within collections. This JZAR Nutrition Special Issue features some of the research presented on just that: a variety of studies on dietary composition, feeding routines, behaviour, and health impacts that we hope will help inspire the next 25 years of zoo animal nutrition research throughout the EAZA community and beyond.

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