

mol are available to date. According to our knowledge from the current literature, thymol metabolites, mostly thymol sulphate and glucuronide, were detected in the plasma and urine of humans and in the plasma, intestinal content, faeces and tissues in rats, pigs, chickens, horses and rabbits. To precisely understand the metabolic processes and biological activity of thymol and its metabolites within organisms, more clinical studies are necessary, with pre-clinical comprehensive research on animal models.

Funding VEGA 2/0009/20

CSL-VET-01 Contributed Short Lecture “*In vivo* efficacy assessment of an essential oils-based solution on controlling red mites and egg residues in laying hens”

Authors [Hoa Bui](#), [Sorphon Suor-Cherer](#), [Mohammed el Amine Benarbia](#)

Institute 1 [Nor-feed, Angers, France](#)

DOI [10.1055/s-0043-1773824](#)

Red mite (PRM) is the tricky issue in poultry welfare and performance. Besides, the excess use of synthetic compounds to control PRM causes risk of resistance and bioaccumulation that alerts public health concern. Hence, sustainable alternatives are in demand. Natural essential oils (EOs) are the promising solution thanks to their documented repellent effect. The objectives of this study were to evaluate a standardised essential oil mixture (STEOs), named Nor-Mite, in controlling PRM and its possible residues in eggs.

Nine hens were divided into 2 groups: STEOs group fed ($n = 4$) with standard feed supplemented with STEOs; CT group ($n = 5$) received an un-supplemented standard feed. The repellency of hens to PRM was determined by letting 50 starving female PRMs freely choose hens for blood meals through a Y-shaped olfactometer route. Residues were analysed using an adapted GC-EI-MS method on eggs laid by STEOs-supplemented hens during 10 months compared to eggs from un-supplemented hens. Two major compounds, geraniol and eugenol were targeted.

In vivo study showed that up to 78% of tested PRM was recorded feeding on CT hens while only 14% of PRM choose STEOs hens. These results showed significant repellent effect against PRM of STEOs hens compared to CT hens ($P < 0.001$). By detection limit, no aromatic compound was detected from all eggs of both groups.

STEOs demonstrated the via-feed-supplement repellent effect. Residual accumulation in eggs laid by hens supplemented with STEOs in feed for 10 months was absent. Thus, indicating that dietary STEOs is the efficient, residue-free solution to prevent PRM.

KL-VET-02 Keynote Lecture “Ethnoveterinary research in Benin – an overview”

Author [Hospice Dassou](#)¹

Institute 1 [University Of Abomey-calavi, Abomey-Calavi, Bénin](#)

DOI [10.1055/s-0043-1773825](#)

Across Benin, local people typically rely on plant-based veterinary knowledge readily available to manage common animal health problems. Despite the ancient origin of these practices, formal ethnoveterinary research is still an emerging field in the country with most studies to date focusing on documenting plants used. The most comprehensive checklist includes 241 plant species (c. 9% of total flora of Benin) to treat 45 animals' signs and diseases. Despite this rich diversity, ethnoveterinary flora has received little attention from chemists and pharmacologists. This is related to the inadequate funding for research and poor equipment in scientific laboratories. Therefore, the major challenge is to initiate a joint vibrant and robust research and development program on ethnoveterinary plants, notably those traditionally used to tackle emerging diseases like zoonosis, in order to find out their effectiveness but also to strengthen the human and technical capacities.

Conflict of Interest There author declares no conflict of interest.

ISL-VET-02 Invited Short Lecture “Contribution of the observation of animal self-medication behaviours to ethno-veterinary medicine: Mahout-Elephant interactions in Thongmyxay district – Laos”

Author [Jean Marc Dubost](#)¹

Institute 1 [Museum National d'Histoire Naturelle, Paris, France](#)

DOI [10.1055/s-0043-1773826](#)

Until recently, based on convergent uses of traditional remedies in human and veterinary medicine, it was somehow assumed that the ethnoveterinary pharmacopoeia was a subset of the human pharmacopoeia extended to animal care. However, studies conducted over the last two decades comparing the plant species locally used in these two domains show that a significant proportion of species are dedicated to animal treatments, raising the question of the origin of these practices, while the multiplication of studies on animal self-medication is giving ground to the idea, found in many folk accounts, of an animal origin of part of the human pharmacopoeia.

Relying on the close relationship that mahouts maintain with their elephants in Laos, we have studied these interactions between animal observation and traditional medicine.

We have highlighted different processes by which observed elephant behaviours interpreted as self-medication can lead to the emergence of various ethnoveterinary practices, ranging from facilitating access for sick elephants to the plants they seek in such cases, to the integration of these items with elements from the local pharmacopoeia into elaborate ethnoveterinary preparations. Furthermore, mahouts uses of some plant items in their own households appear to be more consistent with their observation of elephants' self-medication behaviour than with the use of these items by local healers, supporting the hypothesis of medicinal knowledge transfer from animals to humans.

These data show that traditional human medicine and ethnoveterinary medicine are mutually enriching and that the observation of animals contributes to the development of practices in both areas.

CSL-VET-02 Contributed Short Lecture “Ethnoveterinary use of herbal mixtures in the treatment of livestock – a survey in Bavaria”

Authors [Theresa Schlittenlacher](#)¹, [Gabriela Knubben-Schweizer](#)², [Ariane Maeschli](#)¹, [Michael Walkenhorst](#)¹

Institutes 1 [Research Institute of Organic Agriculture FiBL, Frick, Switzerland](#);

2 [Clinic for Ruminants with Ambulatory and Herd Health Services, Ludwig-Maximilians-University Munich LMU, Oberschleißheim, Germany](#)

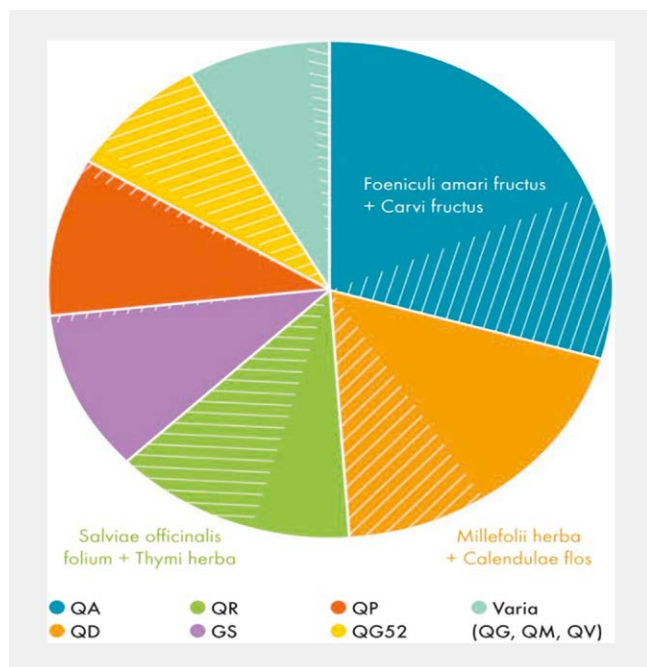
DOI [10.1055/s-0043-1773827](#)

While mixtures are common in traditional Chinese veterinary medicine, they seem to be rare in Western veterinary phytotherapy. From 2018 till 2021, we conducted an ethno-veterinary study on Bavarian farms to evaluate how frequently medicinal plant mixtures are used in practice.

A total of 77 interviews were carried out with 101 farmers. Altogether 884 use reports (UR) were recorded, comprising detailed information about plant species, plant part and further natural substances used, the manufacturing process for the end product, dosing, administration and therapeutic intention. Among them, 159 UR described the use of mixtures (each contained between two and 19 ingredients (mean: 4)) corresponding to 155 different plant species and 17 different natural substances (e.g. salt, sugar, propolis).

The most frequently mentioned plant species in mixtures were: *Calendula officinalis* L. (27 UR), *Salvia officinalis* L. (24 UR) and *Cinnamomum verum* J.Presl (24 UR).

The most frequently reported UR were for “Alimentary tract and metabolism” (QA) followed by dermatological indications (QD) and respiratory tract diseases (QR). Purchased products were used for 36% of the UR (► **Fig. 1**). Popular purchased products among the farmers were ColoSan SaluVet with 10 UR for digestive disorders and “Schwedenbittertrunk” for use in skin diseases or mastitis (8 UR). Overall, the farmers surveyed preferred single preparations (448 UR compared to 159 UR of mixtures used).



► **Fig. 1** Classification of the 159 mixture UR (out of a total of 884 UR) according to ATC-Vet codes incl. representation of the share of purchased mixtures (shaded area) – and with the two most frequently reported drugs, respectively.

Conflict of Interest The authors declare no conflict of interest.

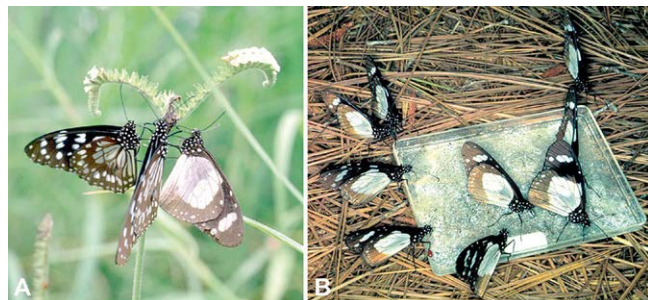
KL-VET-03 Keynote Lecture “Pyrrolizidine alkaloids – medicine for insects?”

Author Michael Boppré¹

Institute 1 Albert-Ludwigs-Universität, D-79085 Freiburg, Germany

DOI 10.1055/s-0043-1773828

Since toxicity is not a character but an effect of a chemical on a certain organism, it not only depends on the dose but also on the receiver. 1,2-dehydropyrrolizidine ester alkaloids (PAs), although harmful secondary plant chemicals for vertebrate animals including humans, do have beneficial effects for particular, adapted insects. Some actively gather PAs from dead or injured plant tissues by a peculiar behaviour performed independently of, and in addition to feeding: PA-pharmacophagy (► **Fig. 1**).



► **Fig. 1** Self-medicating milkweed butterflies. Males of *Tirumala petiverana* and *Amauris ochlea* (Lepidoptera: Nymphalidae: Danainae) taking up pyrrolizidine alkaloids from a wound at an inflorescence of *Heliotropium indicum* (a) and from a dish containing pure PAs (b) to potentially increase their chances of survival and biological fitness.

This talk will discuss examples of PA-pharmacophagy and their peculiarities. PA-pharmacophagy is not necessary for maintaining life but serves (potentially) to increase chances of survival and/or biological fitness, sometimes also providing such a benefit for sex partners and/or offspring. It is not an insect-plant relationship in the common sense, but an insect-chemical relationship, often shown by one sex only and never continuously engaged, only temporarily. Similar behaviours for taking advantage of natural products not essential for life are also known from other insects (animals).

Are we dealing with self-medication? This term is used for taking chemicals capable of curing an acute pathological situation, preventing a disease, or boosting general well-being. When insects are in focus, insufficient understanding about their state of health, sentience and welfare makes any definition of self-medication challenging. However, behavioural activities that relate to specific chemicals not essential for living and gathered from peculiar sources, are distinct from general activities of the species and performed only temporarily, and serve to enhance chances of survival and/or biological fitness, can surely be regarded as self-medication, too.

KL-VET-04 Keynote Lecture “Porcupines, plants and pathogens: an overview of the multi-disciplinary evidence for self-medication in the crested porcupine and other rodent species”

Authors Michael A Huffman¹, Emiliano Mori², Andrea Viviano²

Institutes 1 Wildlife Research Center, Kyoto University, Inuyama, Japan;

2 Consiglio Nazionale Delle Ricerche, Istituto Di Ricerca Sugli Ecosistemi Terrestri, Sesto Fiorentino, Italy

DOI 10.1055/s-0043-1773829

Dietary selection is an important process for the maintenance of health homeostasis. From the potential plants available in one’s environment, choices are made to assure a proper balance of nutrients for energy, growth, maintenance, reproduction, and sometimes even their nesting material. Animals also select such plants for their medicinal properties. This rapidly growing field of research is known as animal self-medication. An overview of the ethnomedicinal, behavioural and ecological evidence suggests that rodents in the wild are no exception. We review our research on the dietary habits of populations of crested porcupine (*Hystrix cristata*). In Central Italy we identified the seasonal ingestion of medicinal food species with antiparasitic properties. The seasonal ingestion of certain plant items coincides with peaks in parasite infection levels. In East Africa, self-medicating porcupine have been the inspiration for the discovery of a now widely used ethno-antibiotic treatment. It is also suggested that wood rats (*Neotoma fuscipes*) in North America and harvest mice in Japan place aromatic leaves (*Umbellularia californica*, *Artemisia princeps*) in their nests for the fumigation of nest-borne ectoparasites, supporting the growing body of evidence for the use of plants with antiparasitic benefits in wildlife species. The study of self-medicative behaviour and the plants used by animals in the wild is a promising bio-rational for expanding and advancing the use of phytotherapy in a veterinary setting.

Egon-Stahl-Award in Gold

Monday 3rd July 2023

ESA-GOLD “Natural Products: a Key to Open the Door to the Future”

Author Giovanni Appendino¹

Institute 1 Università del Piemonte Orientale, Dipartimento di Scienze del Farmaco, 28100 Novara, Italy

DOI 10.1055/s-0043-1773830

Combining tradition and innovation is probably the best recipe for success in natural products (NPs) research. When you have a history, tradition is unavoidable.