

Research Strategy 2019-2024

Institute of Animal Welfare Science

(Institut für Tierschutzwissenschaften und Tierhaltung)

Department for Farm Animals and Veterinary Public Health

University of Veterinary Medicine, Vienna (Austria)

Summary

The Institute of Animal Welfare Science (Institut für Tierschutzwissenschaften und Tierhaltung, 'ITT') focuses on the welfare of animals kept by humans, primarily farm and companion animals. The ITT aims to safeguard and improve animal welfare by creating and disseminating scientific knowledge. Our research spans from basic research with novel ideas to applied research with science-based improvements in practice. The group has strong research expertise in ethology (the scientific study of animal behaviour), veterinary health, physiology and neuroscience.

The 4 research program areas, always in regards to their implications for animal welfare, are:

- Positive social behaviour
- Positive human-animal relationship
- Novel approaches to animal welfare: PLF and neuroimaging
- Management and housing practices

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Aim of the Research Strategy

This research strategy sets the current and future directions for research activities at the Institute of Animal Welfare Science (Institut für Tierschutzwissenschaften und Tierhaltung, 'ITT') over the next 5 years: 2019-2024. This document serves as a roadmap for ITT scientists and as an information point for stakeholders, by highlighting the ITT main scientific strengths and priorities. The goal is to strategically organise focus, efficiency and communication in research activities.

Scope of the Research Strategy

This document concerns research led by ITT staff, conducted within the ITT or through collaboration. It defines ITT research activities in terms of common goals, main areas of expertise, capacity and objectives.

Definition of 'animal welfare'

Conceptually, animal welfare refers to an internal state of the animal, specifically the way an animal experiences its environment and feels as a result. Animal welfare includes both psychological and physical health and it is a multi-dimensional concept characterised by transient states and assessed at the individual level. Operationally, animal welfare can be assessed through indicators from various scientific disciplines, including ethology (animal behaviour), physiology, health and neuroscience. Good welfare goes beyond the absence of suffering and encompasses positive experiences and states.

The ITT mission

Our mission is to safeguard and improve animal welfare by creating and disseminating scientific knowledge to encourage implementation and improvement in practice. We have a dual focus on basic and applied research, from novel ideas to science-based improvements in practice. The scope is the welfare of domestic animals, primarily farm and companion animals, and other animals kept by humans.

The ITT vision

Research in animal welfare science provides the basis to improve animal welfare in practice while addressing societal concerns. This ensures relevant and impactful research leading to change, for the benefits of animals. These goals are achieved through consultation with stakeholders, use of interdisciplinary research approaches, and dissemination of the research outcomes to the scientific community, policy makers, targeted users and society at large through effective communication.

The ITT raison d'être

Scientific information provides one of the components that can assist in promoting animal welfare, alongside education and animal protection legislation, in order to fulfil the ethical responsibility of humans toward animals under their care. The ITT is a service provider operating for the common good, helping to protect the interests of animals through scientific research, dissemination of scientific knowledge and teaching. With this purpose in mind, work at the ITT is driven by commonly shared intentions for integrity, objectivity and scientifically rigorous research of the highest quality.

The ITT team

The ITT is composed of 6 permanent scientists who conduct research, teaching and extension activities, and a staff of approximately 20 persons in total. An organigram listing current ITT staff is available at:

<https://www.vetmeduni.ac.at/en/animal-welfare-science/about-us/>

Research program areas

ITT research activities operate in 4 main research areas, across domestic species and always in regards to their implications for animal welfare. Each scientist works in several of these areas. To fund research projects costs, the ITT depends on grant funding and student projects.

1. Positive social behaviour

Social behaviour organises many of the affective and stress-coping processes that domestic animals employ in their daily lives. We focus on elucidating the benefits of socio-positive behaviour, as factors that promote positive well-being. The aim is to identify improvements in animal management that take advantage of the benefits of social behaviour in practice.

Topics include:

- Positive social interactions, characterising the types of behaviour: affiliation, social nosing, micro-behaviours.
- Characterising the quality of social relationships and its implications for welfare: emotional regulation, neurobiological functioning, animal health outcomes.
- Prosocial behaviour, by elucidating its implications for the welfare of other individuals, and possibly the donor.
- Social support, by increasing stress-coping abilities.
- Socio-behavioural development in young animals: cow-calf rearing, loose-housed sows, socialisation with unfamiliar conspecifics.
- The neurophysiological basis of social behaviour: oxytocin, etc.

2. Positive human-animal relationship

Humans hold an important place in the life of domestic animals, despite increasing herd size and automation. This research focuses on the concept of a positive human-animal relationship, for farm and companion animals, including:

- The animal's perception of different gentle interactions with humans and the features of these interactions in terms of control, reciprocity, or within the context of animal-assisted interventions.
- Evidence of positive emotions during interactions with humans.
- Enabling stress-reduction during unavoidable aversive procedures, such as handling, (vet) examination, transport, or through training to minimise distress and ensure safety.
- Long-term beneficial effects on animal health, psychological well-being, and productivity.

We also use reports by caretakers acquired by surveys about human attitudes toward animals to explore their associations with human behaviour and decision-making and its impact on animal behaviour and welfare.

3. Novel approaches to animal welfare: PLF and neuroimaging

Assessment of animal welfare is commonly done through behavioural observation, but it can be laborious. Continuing advances in terms of bioanalytical and technical approaches offer new tools to assess animal welfare.

Automated technological approaches allow continuous monitoring of animal welfare, life-long assessment, and potentially early detection of problems through sensor-based data collection ('Precision Livestock Farming', PLF). At present, our approach is based on images (video and algorithm) and ear tag sensors. We combine expertise in animal behaviour, health and welfare with processing and bio-mathematical modelling of big data sets, together with complementary research partners. Our focus is on PLF for its use in animal welfare relevant situations: image-based automatic detection of sow farrowing, ear tag movement in sows and growers to identify activity-based welfare indicators, automatic recognition and recording of social behaviour in pigs. This program will be applied to the detection of illness, pain (e.g. lameness) or other practically relevant welfare indicators in farm and companion animals.

Some behavioural states are ambiguous with regard to affective valence. To this end we are developing non-invasive approaches to measure neurobiological functions, including neuroimaging and wireless underneath the skull EEG, that allow studying animals in real-life paradigms and with longitudinal designs. Our current neuroimaging efforts centre on collecting three complementary types of data: volume-based morphometry (VBM) to assess macrostructural changes, diffusion-weighted MRI (dwMRI) to assess microstructural changes, and manganese-enhanced MRI (MEMRI) to assess calcium-dependent neural activation changes. These changes are utilised in the context of studying whether and how animal rearing and husbandry practices might induce changes to the brain's macrostructure, microstructure, and function and result in differential animal welfare outcomes.

4. Management and housing practices

The species-specific biological needs (behaviour, hygiene, feeding, etc.) should be fulfilled in the development and improvement of housing and management conditions. These constitute prophylactic measures as part of a preventive veterinary medicine approach. Through epidemiological research or controlled experiments, we evaluate the effect of housing environment and management practices on animal behaviour, health and other welfare aspects. The aim is to provide the basis for improvement strategies by identifying effective applications and educate owners in regards to their animals' needs.

Topics include:

- Welfare assessment and risk factors analysis: e.g. loose housing and nesting behaviour in sows, horned cattle and goats, poultry husbandry welfare monitoring, dog bite prevention, husbandry of cats and small companion animals (ferrets, rabbits, etc.).
- Feeding and activity enrichment, as ways to prevent behavioural problems: destructive behaviours in companion animals, human-directed aggression in cats, feather pecking in poultry, tail biting in pigs.
- Improving the quality of life in shelter environments for dogs and cats.
- Euthanasia: decision process and methods to euthanise animals.

Research expertise

Animal welfare is a multi-disciplinary field. At present, we have the following combination of expertise:

- Ethology (animal behaviour)
- Physiology
- Veterinary health (especially epidemiology)
- Neuroscience
- Psychology (surveys)
- Computer algorithms and programming
- Animal law

Research collaboration

Animal welfare is a multi-disciplinary topic, and is relevant to most topics that involve animals. As such, ITT scientists collaborate with other research groups with complementary expertise within Vetmeduni (Department 3 Farm Animals and Veterinary Public Health, Messerli Research Institute, other Vetmeduni units), and within our disciplines nationally (BOKU Division of Livestock Sciences) and internationally.

Research capacity

Specific ITT research equipment:

- Video cameras and recording systems: CCTV systems, camcorders, wildlife infrared cameras, 3-D video cameras
- Thermographic camera
- Fixed video and PLF equipment on VetFarm Medau pig farm
- Heart rate (variability) monitors
- Physiological laboratory equipment: portable centrifuge, pipettes, nitrogen dryer, -20°C and -80°C freezers
- Weather station, shared with Abteilung für Physiologie und Biophysik
- Electronic data storage

Research facilities available:

- VetFarm Medau: farrow-to-finish pig farm (80 sows), sheep barn (70 ewes) and a multi-species housing facility
- VetFarm Kremesberg and Rehgras: dairy cow farm (90 cows) and dairy heifer farm (40 heifers)
- Private farms or animal-holding facilities: long-term collaboration with farms for laying hens, broiler chickens, dairy cows, dairy goats, companion animal shelters, etc.