

Collaboration between academia and industry with focus on improvement of the welfare of both animals and humans in laboratory animal facilities

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Abstract

Centre for Applied Laboratory Animal Research (CALAR), *www.calar.dk*, is a research group established in 1999 consisting of scientists from Danish universities and private research institutions.

It is the vision of CALAR that animals as well as humans in a modern laboratory animal facility will perceive it as a positive experience to be a laboratory animal or a laboratory animal experimenter, respectively.

There are many examples of collaborations between Academia and Industry with a focus on animal welfare, however, the CALAR collaboration is unique in having a dual focus on both animal welfare and health and safety issues for animal care professionals, veterinarians and scientists.

In order to pursue the CALAR vision, many research projects have been performed with focus on improved housing conditions (e.g., non-enriched versus environmentally enriched housing and single housing versus social housing), experimental procedures (e.g., optimal blood sampling and improved welfare for rats housed in standard metabolic cages), physiological changes in relation to different housing conditions (e.g., cardiovascular parameters, diabetes development, haematology and clinical chemistry) and allergen protection (e.g., efficacy and optimal use of airshowers).

Keywords: animal welfare, collaboration, health and safety, allergy

Introduction

Centre for Applied Laboratory Animal Research (CALAR), *www.calar.dk*, is a Danish research group consisting of scientists from universities and private research institutions with the main focus on improvement of the welfare of animals and humans in laboratory animal facilities.

The centre was founded in 1999 by researchers from the laboratory animal units from the Royal Veterinary and Agricultural University (now University of Copenhagen, Faculty of Life Sciences), Novo Nordisk A/S and Scanbur A/S. Later the laboratory animal units from LEO Pharma, University of Copenhagen (Faculty of Health Sciences) and Lundbeck A/S joined the collaboration.

CALAR is, as the name implies, directed towards applied laboratory animal research with focus on Refinement and Reduction and thus supplementing Replacement activities, which is traditionally

receiving greater attention and funding from the EU and animal protection organisations, outside the centre.

It is the vision of CALAR that animals as well as humans in a modern laboratory animal facility will perceive it as a positive experience to be either a laboratory animal or an animal experimenting scientist, respectively.

CALAR's mission is, through research performed at the highest scientific level within the field, to improve the welfare of animals and humans in modern laboratory animal facilities. This is accomplished by defining a number of specified research projects each based on testing a hypothesis and with the aim of being published in an international peer reviewed journal. CALAR also compiles and prepares reviews of specific topics covered by the mission in order to publish these in international peer reviewed journals and presents results at international congresses as

well as at the annual Danish symposium.

Other collaborations have focused on animal welfare only, however the CALAR collaboration is unique in having a dual focus on both animal welfare and health and safety issues for employees working with the animals. Especially the demand for larger cage sizes and new housing systems in Europe (e.g., pen housing of rabbits) has emphasized the need for focus on occupational health and safety especially in relation to ergonomics and laboratory animal allergy.

The scientific methods used in CALAR include:

- 1) Radio-telemetry technique to measure heart rate, blood pressure, temperature of conscious, freely moving rats and mice (Krohn et al, 2003a). Changes in these physiological parameters can be used to evaluate the impact of different housing conditions or various procedures on the animals.
- 2) Preference tests for mice and rats in which the animals are given a choice between two cages. The cages are placed on a digital weight and the weight of each individual cage is automatically recorded, so it can be calculated where the animal is staying (Krohn et al, 2001). In this way the impact of different housing conditions on the animals' choice can be tested.
- 3) Behavioural tests, e.g., Open Field test, Elevated Plus Maze and Morris Water Maze (Krohn et al, 2002b). The tests can be supplemented with EthoVision (Noldus Information Technology, The Netherlands) and LABORAS (Metris B.V., The Netherlands) for automatic analysis of the data in the different tests.
- 4) Allergen samples are analyzed by means of a standardized ELISA-test quantifying the specific antigens Mus m1 and Rat n1. Equipment and methods for collecting allergens from the air in animal facilities, under different housing conditions or under different procedures are available (Krohn et al, 2004, 2006a).

Research areas within CALAR

CALAR has done several studies focusing on development of methods for evaluating animal welfare and the preference of the animals (Krohn et al., 2001, 2003a; Stub et al., 2004; Sørensen et al., 2005a).

As the use of Individually Ventilated Cage systems increased, the impact of these kind of housing systems was studied, to evaluate how the animals are affected by ventilation and different levels of CO₂ (Krohn et al., 2002, 2003b, 2003c).

Different scientific methods have been evaluated to reveal the impact on the welfare e.g. the impact of gavaging (Alban et al., 2001; Bonnichsen et al., 2005) and the impact of tail tip amputation and ink tattoo in mice (Sørensen et al., 2007), as well as the effects of different blood sampling methods (Toft et al., 2006).

Regarding occupational health issues focus has been on allergens with evaluation of different new equipments to reduce the spread of allergens from cages and animal facilities (Krohn et al., 2004a, 2006, 2007).

Several reviews have been made, e.g., "The effects of individual housing on mice and rats" (Krohn et al., 2006), "The consequences of enhancing environmental complexity for laboratory rodents" (Sørensen et al., 2004) and "The housing requirements of golden hamsters, Mongolian gerbils and fat sand rats in the laboratory" (Sørensen et al., 2005b).

At present CALAR is focusing on the effects of enrichment for rats. It is important to reveal whether new enriched cages have any consequences on the animal models that are used in biomedical research. Furthermore the effects of single housing of rodents and the use of radio entertainment in the animal facility are studied at the moment.

CALAR is based on collaboration and within CALARs mission we aim to extend and expand this collaboration with other research groups in order to pursue the ambitious vision that animals as well as humans in a modern laboratory animal facility will perceive it as a positive experience to be either a laboratory animal or an animal experimenting scientist, respectively.

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