NOVEL INDIVIDUALIZED, HOMOGENEOUS AND ADJUSTABLE LIGHTING SYSTEM FOR ANIMALS

DATOS DE CONTACTO:

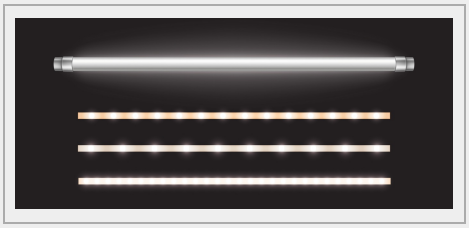
Research Results Transfer Office-OTRI
University of Alicante
Tel.: +34 96 590 99 59
Email: areaempresas@ua.es
http://innoua.ua.es

RESUMEN

The Neurobiology of the Visual System and Therapy of Neurodegenerative Diseases (NEUROVIS) research group at the University of Alicante has developed a comprehensive lighting system for housed animals that can be self-regulated in an individualized and automated way, depending on the specific lighting conditions of the space or module in which each animal is located.

The system consists of a programmable controller, illuminance sensors, dimmable power supplies and LED strips. It is suitable for different installations, being especially interesting in animal experimentation units, particularly in vision and blindness studies.

Companies interested in the commercial exploitation of this technology are sought.



INTRODUCCIÓN

Some of the most modern lighting systems used in the care and management of animals in enclosed enclosures (animal housing) allow individualized lighting for each animal, ensuring that all animals receive the same illumination. However, none of these are dimmable.

In other cases, the room or lairage has adjustable lighting, but this lighting is not individualized for each animal or group of animals, so the lighting conditions will vary depending on the location of each individual or group of individuals within the room. For example, if the light source is overhead, individuals will receive more or less illumination depending on whether they are housed more or less close to the spotlight.

Ambient light is a key factor in animal husbandry and maintenance, with demonstrated effects on stress level, visual function, circadian rhythms, and other key factors for health and aging. This variable is especially important in animals used in experimentation and, particularly, if the studies are related to vision and blindness.

In addition, ambient light intensity significantly affects the onset and development of eye diseases. The higher the light intensity, the greater the degeneration and loss of vision, with effects on inflammation and oxidative stress.

For all these reasons, there is a need to develop lighting systems that provide individual and adjustable light for each space where the animal is located, adapting to its specific needs.

DESCRIPCIÓN TÉCNICA

The **Neurobiology of the Visual System and Therapy of Neurodegenerative Diseases (NEUROVIS)** research group at the University of Alicante has developed an individual adjustable lighting system for stabled animals that solves the technical

problems mentioned above.

This **integral lighting system** provides each animal or group of animals with a **homogeneous and regulated light source**, which can be modified depending on the experimental or production requirements, providing adequate lighting conditions for each need and avoiding lighting differences between individuals.

This consists of a modular **system** made up of **four** fundamental **elements** (*Figure 1*):

1. Programmable logic controller for the control of the modules, which is common to all the modules where the animals are housed.

2. Illuminance measuring device (luxmeter), which allows real-time monitoring of the illumination received by the animals.

3. Dimmable led power supply.

4. LED lighting, which will provide the programmed lighting, modifying its intensity based on the electrical power determined by the programmable automaton through the dimmable power supply.

The PLC consists of a monitoring system, a control system and an operational part. It will be able to register and regulate the lighting of different rooms or modules, each with a different lighting pattern if necessary.

The number of lux meters, power supplies and LED strips will depend on the number of modules or units to be illuminated.

The elements that make up the system are arranged in such a way that they generate a closed feedback loop, in which the automaton regulates the LED lighting according to the signal perceived by the sensors.

From this structuring we obtain a lighting system that can be individually regulated, depending on the specific needs of each animal, in order to optimize the process of breeding and maintenance of animals, minimizing the level of stress, and optimizing visual function, circadian rhythms, and other key factors for the health and aging of the animals.

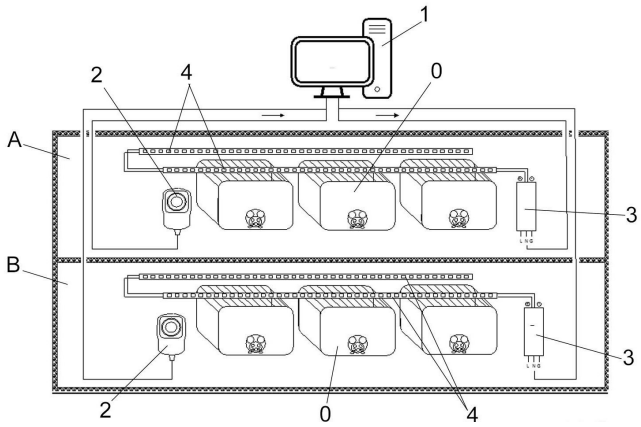


Figure 1. Schematic representation of an animal housing facility, involving two modules (A) and (B), for rearing animals with different lighting needs. (0) Rodent cages; (1) programmable logic controller; (2) photocell or luxmeter; (3) dimmable led power supply; and (4) LED strips.

VENTAJAS Y ASPECTOS INNOVADORES

ADVANTAGES OF TECHNOLOGY

The main advantages of the developed lighting system are the following:

- It provides **homogeneous, individualized and adjustable** lighting, allowing to adjust the intensity or type of light to the needs of each species, strain, individual or circumstance.
- The **illumination**, being distributed homogeneously in each cage or cabin, **does not depend on the location of each individual**, since they will all be at the same distance from the light source.
- It provides **adequate lighting conditions** for every need and avoids **lighting differences between individuals**.
- Its use allows **optimizing the process of breeding and maintenance of animals**, minimizing the level of stress, and optimizing visual function, circadian rhythms, and other key factors for the health and aging of the animals.

INNOVATIVE ASPECTS OF THE TECHNOLOGY

The main innovative aspect of this technology lies in the fact that the novel and original connection and arrangement of elements already available gives the lighting system properties that do not exist in current lighting systems, which represent a qualitative improvement in the lighting of housed animals, responding to needs that have not been met to date.

ESTADO ACTUAL

The research group has a prototype demonstrator.

With this system it has been possible to efficiently and easily adapt the lighting conditions to each group of animals depending on their needs.

The research group has published a study demonstrating the effects of illumination on the progression of a degenerative eye disease (Kutsyr et al., IOVS: 61, 1, 2020; doi:https://doi.org/10.1167/iovs.61.10.1)

APLICACIONES DE LA OFERTA

This lighting system has been specially designed to be installed in animal houses, stables, farms or similar facilities.

It is suitable for different facilities, rooms or animal housing equipment, but it is especially interesting in **animal experimentation units** and, particularly, if they carry out studies related to **vision and blindness**.

COLABORACIÓN BUSCADA

Types of agreements sought for **commercial exploitation**:

- Patent license agreements.
- R&D projects of the technology to adapt it to the customer's needs.
- Consulting services.
- Etc.

Type of companies sought:

- Manufacturers of equipment for animal facilities.
- Manufacturers of animal research equipment.
- Manufacturers of luminaires, mainly oriented to animal research.
- Manufacturers of tools for the veterinary, biotechnology and biomedical sectors.

DERECHOS DE PROPIEDAD INTELECTUAL

This technology is protected by a **patent application**.

- *Patent title: "Lighting system for stabled animals".*
- *Application number: P202430476.*
- *Application date: June 11, 2024.*

SECTORES DE APLICACIÓN (2)

Molecular Biology and Biotechnology
Pharmacology, Cosmetics and Ophthalmology