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European Journal of Zoological Research, 2021, 9 (3): 14-15
(http://scholarsresearchlibrary.com)

Scholars Research Library
ISSN: 2278–7356

Transgenic Animal: An Introduction

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EDITORIAL

It is not a new procedure to carefully choose and reproduce animals with new gene combinations. New gene combinations, on the other hand, are only found in the same or similar species in nature. Transgenic or genetically modified animals are the outcome of scientists carefully manipulating and implementing unique gene combinations. Because DNA is the universal genetic code for all living species, it may be easily altered and transferred between two completely unrelated organisms to develop a combination of features that would not be feasible otherwise. A genetically modified or "transgenic" animal carries a known recombinant DNA sequence in its cells and passes it on to its progeny. The term "transgenic" was expanded in the late 1980s to include gene-targeting experiments and the development of chimeric or "knockout" mice in which a specific gene was selectively eliminated from the host genome. Recombinant DNA is a term used to describe DNA sequence fragments that have been linked together in a molecular biology lab. When recombinant DNA is put into the nucleus of a potential transgenic animal to express a desired protein, it is created in such a way that it can express the functional protein. The gene encoded in the resulting DNA construct can produce the same type of protein regardless of whether animal, microorganism, or even plant produces it. However, along with the gene of interest, the nucleotides coding for the signal peptide that causes the protein to be released at a certain position are inserted. Unless certain alterations are required to make the protein physiologically active or identical in behaviour and appearance, most recombinant proteins are perfect copies of their natural counterparts. Transgenic animals have been used to manufacture a variety of recombinant proteins, primarily for therapeutic purposes.

Disease models, xenotransplanters, transpharmers, food sources, and scientific study models are among the several types of transgenic animals. Various illness models have been constructed using genetic engineering to mimic human disease symptoms. The onco mouse (a mouse model for cancer research), the AIDS mouse, the Alzheimer's mouse, and the HLA-A2.1/DTR mouse to study the presentation of antigens that are ordinarily not presented by mouse antigen-presenting cells, and the Parkinson's fly are examples of such models. Transpharmers are animals that have been genetically modified to express a particular protein in their milk. This technology has been used to genetically modify mice, sheep, goats, and cows. There are also animals that have been genetically modified to produce histocompatible organs that can be put in humans without worry of rejection. Although this method has been utilised to produce pigs for xenotransplantation, the use of those organs has not yet been approved.

Transgenic animal models for scientific research are often created by inserting a transgene into their DNA to investigate the effects of overexpression of a certain gene on the physiological systems of the animal. The gene under inquiry is sometimes knocked out to see how it affects normal body metabolism. And the transgenic monkey; clever mouse; young mouse; super mouse; and influenza-resistant mouse are all well-known scientific research models. The development of transgenic animals raises a slew of ethical concerns. Is it ethical to create transgenic creatures, first and foremost? It appears obvious that modifying an animal's DNA for artistic purposes (e.g., green fluorescent rabbits) is superfluous and cannot be encouraged. If the production of an animal can advance scientific knowledge and maybe aid in the understanding of a disease condition, then genome editing will be widely accepted. Although some animals die in most transgenic research, the number of human lives saved may be far larger than the animals'

suffering, though it is advised that transgenic animals' suffering be minimised as much as possible. Although we cannot justify the production of all transgenic animals, each experimental situation should be evaluated on its own merits.

Another concern is that transgenic animals will escape and outbreed their wild-type natural kin; however, with rigorous security measures in place, transgenic animals can be maintained and employed. Scientific research is monitored by established regulatory authorities such as universities' Institutional Animal Care and Use Committees (IACUC), which require research scientists to justify the use of animals in each experiment. Many religious groups, as well as some volunteer and nongovernmental organisations, are opposed to the production of transgenic animals because they believe it interferes with nature. Most people, on the other hand, have no objections if the animals' pain is minimal and the experiment is scientifically significant.