

Genetic modification and genome editing rely on active roles for researchers and industry

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How society regards the use of genetic modification and genome editing can have a significant influence on how these technologies are regulated by authorities and on the pace of technological advancement. In a review published in the *Journal of Dairy Science* authors from the Swedish University of Agricultural Sciences discuss potential applications of genetic modification and genome editing of cattle for food production, considering both the breeding program and its ethical aspects. The authors concluded that an active role by all those involved is necessary to support scientific developments.

"It is important that clear and honest information about different methods and their potential use and consequences be provided by researchers. Discussion of ethical dimensions with stakeholders and awareness of possible controversies may decrease the risk of miscommunication," lead author Susanne Eriksson, PhD, said. "To leave the ethical discussions and decisions about genetic modification or [genome editing](#) to those with less insight in genetics and animal breeding would be an unfortunate scenario."

In their study, three geneticists and one ethicist focused on two potential applications within cattle; namely, genome editing to create [dairy cows](#) without horns ("polled" dairy cows) and genetic modification to improve udder health. Both approaches could be seen as beneficial for animal welfare, but in the former case, a genetic variant already present within the species is introduced, whereas in the latter case, a gene not found in cattle is inserted into the [bovine genome](#).

"It is no longer a question of whether [gene editing](#) and genetic modification of farm animals can be done, but, rather, should it be done and who decides what is acceptable. There is the need for international cooperation because dairy genetics are distributed throughout the world in the form of frozen semen used for artificial insemination," commented Matt Lucy, editor-in-chief of the *Journal of Dairy Science*.

Potential drawbacks include unexpected abnormalities in embryos or calves that arise from the use of advanced reproduction techniques in the gene editing and genetic modification procedures. Ethical questions also exist regarding the "naturalness" of either method, maintenance of the bovine genome, and respect for the cow's life and well-being. Addressing these issues will help shape public perceptions and advance the science of genetic modification and genome editing.

"As pointed out by Professor Henner Simianer (University of Göttingen, Germany), to become quickly adopted and implemented, novel technologies must be suitable for daily use, benefit the [breeding program](#), and be cost efficient, but they also have to be accepted by society," Professor Eriksson said. "However, it is an open question when or if general societal acceptance of food items produced by [genetic modification](#) will be achieved."

More information: S. Eriksson et al, Invited review: Breeding and ethical perspectives on genetically modified and genome edited cattle, *Journal of Dairy Science* (2017). [DOI: 10.3168/jds.2017-12962](https://doi.org/10.3168/jds.2017-12962)

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