

NEW GENOMIC TECHNIQUES (NGTS) - BENEFITS AND CHALLENGES

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Intro

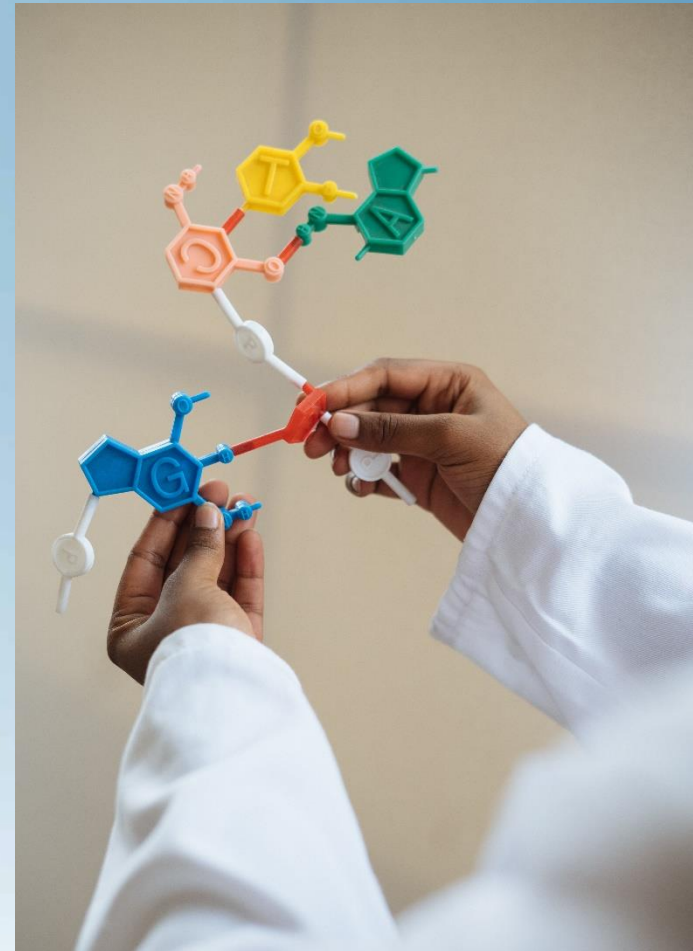
- New genomic techniques (NGTs) and their products have developed rapidly over the past 20 years in many parts of the world.
- In the coming years, more applications are expected in various sectors, with the majority of them being developed outside the EU.
- Under the current EU regulatory system, there are implementation and enforcement challenges, particularly related to the detection and differentiation of NGT products that do not contain foreign genetic material.
- Benefits and concerns associated with NGT products and their current and future applications. NGT products have the potential to contribute to sustainable agri-food systems. In the pharmaceutical sector, these techniques would enable faster and more affordable drug development and have the potential to address currently unmet medical needs. The main concerns are related to their possible safety and impact on the environment, including biodiversity, coexistence with organic and non-GMO agriculture, and labelling and consumers' right to information and freedom of choice.

terms and definitions

- The term **conventional GMOs** will be used throughout this report to refer to GM plants obtained by recombinant DNA technology, i.e. using established genomic techniques, which are characterised by the presence of randomly introduced DNA sequences from sexually non-crossable species, i.e. foreign DNA.
- **Established Genomic Techniques (EGTs)** - genomic techniques developed prior to 2001, when the existing GMO legislation was adopted (EC, 2021).
- **New Genomic Techniques (NGTs)** - an umbrella term used to describe a variety of techniques that can alter the genetic material of an organism and that have emerged or have been developed since 2001, when the existing GMO legislation was adopted (EC, 2021).
- **Targeted mutagenesis** - an umbrella term used to describe newer techniques of mutagenesis that induce mutation(s) in selected target locations of the genome without insertion of genetic material. The process usually results in a 'knock-out', i.e. the disruption of the functioning of a gene responsible for an unwanted effect, or in modifications of the expressed protein or of regulatory elements of a gene (EC, 2021).

(NGTs):

- **since 2001;**
- **Mutagenesis** - Changes without insertion of genetic material;
- **Cisgenesis/Intragenesis** - Rearrangement of genetic material of the same organism/insertion of genetic material from organisms that could also occur in conventional breeding;
- **Transgenesis** - Insertion of genetic material from other organisms that are sexually incompatible;
- **Epigenomic changes** - Genetic material is altered without changing the nucleic acid sequence.



Potential benefits of NGT:

- Plants resistant to climate change;
- Reduced content of harmful substances such as toxins and allergens;
- Plants resistant to pests and diseases, needing less pesticides;
- Vegetables with improved nutritional content;
- Animals resistant to certain diseases;
- Production of useful substances from microorganisms, with applications in cosmetics, biofuels, food ingredients and pharmacy;
- In the pharmaceutical sector for the development of vaccines and therapies for hereditary diseases.

Possible concerns:

- Possible risk to the environment;
- Applications of NGT in the agricultural sector should not undermine other aspects of sustainable food production, e.g. in relation to organic farming;
- Labelling and the consumer's right to information.

EFSA opinions on targeted mutagenesis and cisgenesis in plants:

- There are no new dangers compared to both conventional breeding and established genomic techniques;
- Random changes in the genome occur regardless of technique;
- Non-target mutations potentially induced by site-directed mutagenesis techniques are of the same type and fewer than those mutations in conventional breeding;
- Therefore, in certain cases, site-directed mutagenesis and cisgenesis carry the same level of risk as conventional breeding techniques.

Labeling:

- Consumer understanding and awareness enables them to make informed choices;
- The effectiveness of this labeling in informing consumers.



GABA tomato:

- 2021 г. - Japan "Sicilian Rouge" cherry tomatoes with increased content of gamma-aminobutyric acid (GABA) - improves nerve transmission and lowers blood pressure



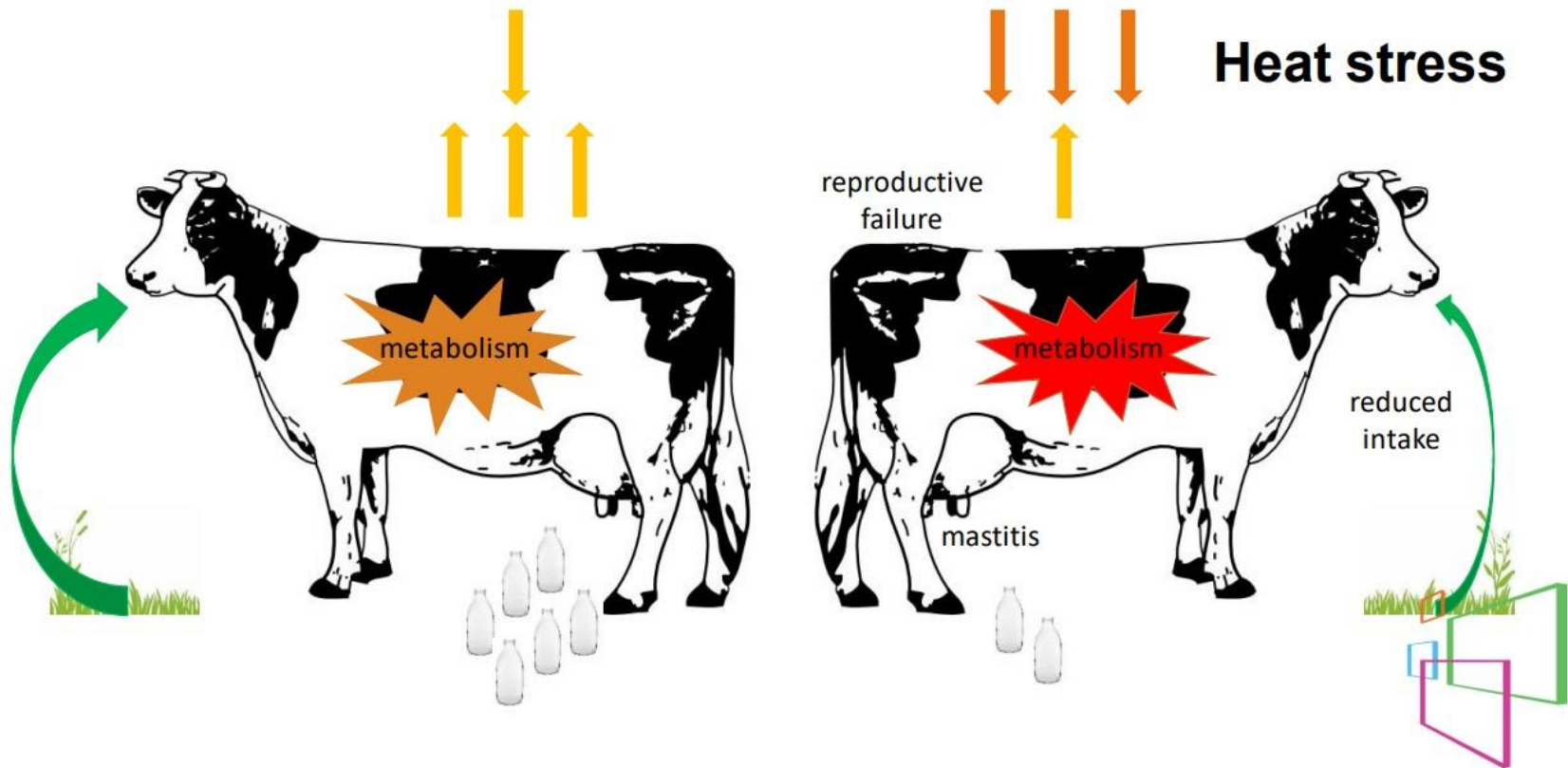


Livestock genome editing:

The distinguishing characteristics of mammals:

- the secretion of milk;
- the development of fur;
- the homeothermic regulation of body temperature.

Environmental Resilience / Heat stress (in cattle)



Dr Christine Tait-Burkard

Environmental resistance/heat stress (in cattle):

WT

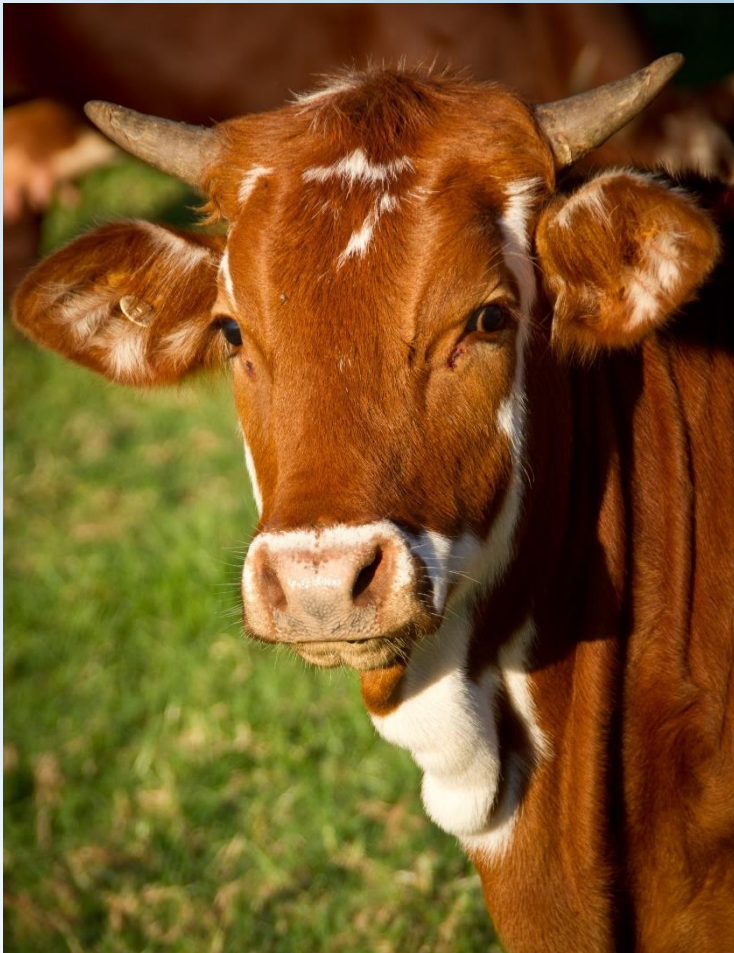


edited



Littlejohn et al., 2014

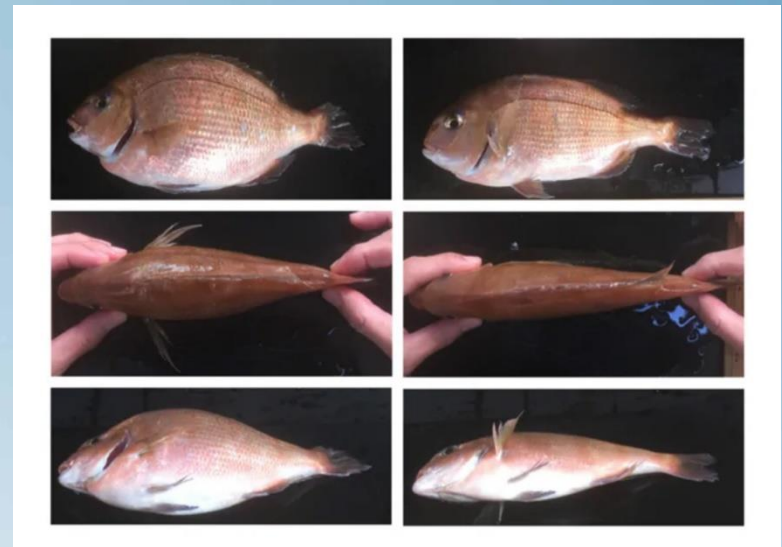
Animal welfare/Dehorning in cattle:



<https://www.vegansouls.com/cattle-dehorning>

Better Production/Improving Muscle Mass:

- sea bream - a popular sushi ingredient - effectively sustainable food;
- Approved in Japan.



<https://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=19061>

That's next ???

- Consultations continue
- ENGL working group WG NMT – JRC Technical Report - in progress
- Research & Analytical Methods & Artificial intelligence

European Commission | Funding & tender opportunities
Single Electronic Data Interchange Area (SEDIA)

SEARCH FUNDING & TENDERS | HOW TO PARTICIPATE | PROJECTS & RESULTS | WORK AS AN EXPERT | SUPPORT

Due to technical maintenance, Sealing and signature of documents may not be available Tuesday 16/05/2023 between 17:00 and 17:30 (CET). We apologize for any inconvenience this may cause.

New detection methods on products derived from new genomic techniques for traceability, transparency and innovation in the food system
TOPIC ID: HORIZON-CL6-2023-FARM2FORK-01-11

Grant

General information	General information	
Topic description	Programme Horizon Europe Framework Programme (HORIZON)	
Destination	Call Fair, healthy and environmentally-friendly food systems from primary production to consumption (HORIZON-CL6-2023-FARM2FORK-01)	
Conditions and documents	Type of action HORIZON-RIA HORIZON Research and Innovation Actions	
Submission service	Type of MGA HORIZON Action Grant Budget-Based [HORIZON-AG]	
Topic related FAQ	Deadline model single-stage	
Get support	Opening date 22 December 2022	
Call updates	Deadline date 12 April 2023 17:00:00 Brussels time	

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See budget overview

Closed

Благодаря за вниманието!



<http://www.ncpha.government.bg>

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