

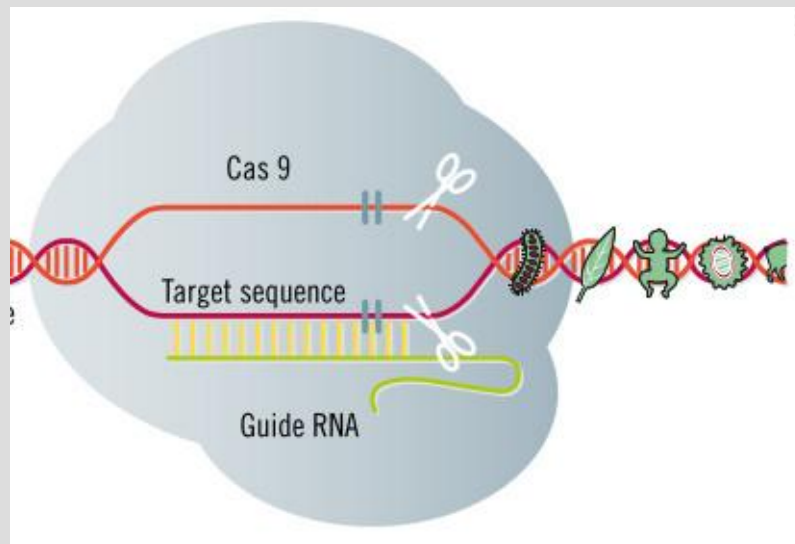
Neue Gentechnik:

Negative sozioökonomische Auswirkungen für

Landwirtschaft, Handel und Züchtung

TEST
BIOTECH

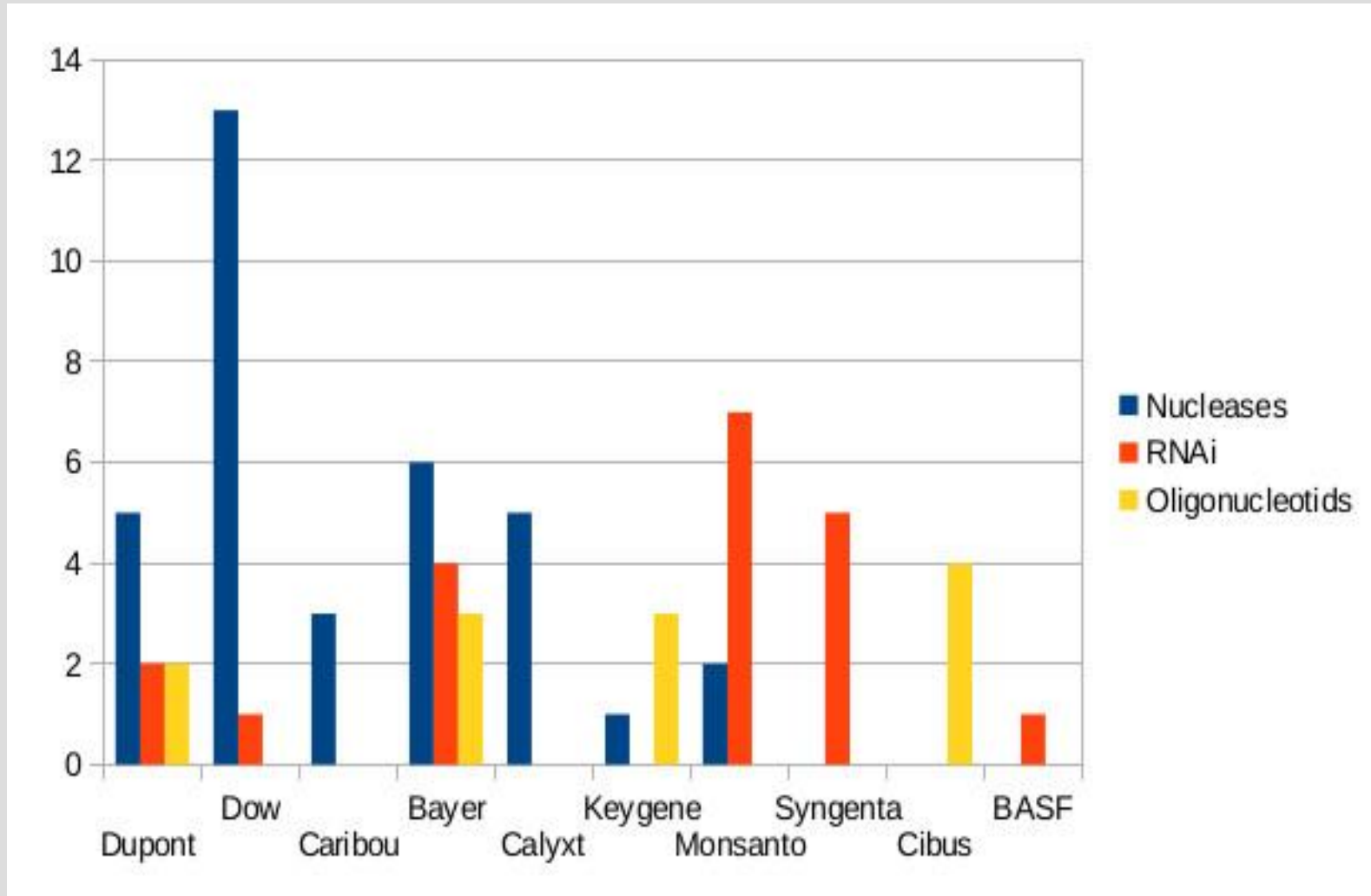
Testbiotech e. V.
Institut für unabhängige
Folgenabschätzung in
der Biotechnologie



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Patentanträge auf neue Züchtungsverfahren



Number of WO patent applications registered at the World Intellectual Property Organisation (WIPO) between 2010 and 2015

USA: Zulassung ohne Prüfung und Kennzeichnung

CROPPING OUT REGULATION

Since 2010, the US Department of Agriculture has told at least 10 groups that their genetically modified (GM) crops would not be regulated because a plant pest was not used to do the engineering.

SOURCE: APHIS

| Crop | Trait | Developer | Technique |
|-------------------|-------------------------------|---|--------------------------------------|
| Switchgrass | Easier conversion to biofuels | Ceres | Gene gun |
| Grapes | Red colour | University of Florida | Gene gun |
| Turfgrasses | Herbicide tolerant | Scotts Miracle-Gro | Gene gun |
| Maize (corn) | Improved nutrition | Dow AgroSciences | Zinc-finger nucleas |
| Plums | Faster breeding | Appalachian Fruit Research Station | Non-transgenic off of GM parents |
| Tobacco | Faster breeding | North Carolina State University | Non-transgenic off of GM parents |
| Sorghum grass | Higheryields | University of Nebraska-Lincoln | Epigenetics |
| Not disclosed | Faster breeding | New Zealand Institute for Plant and Food Research | Non-transgenic off of GM parents |
| Ornamental plants | Not disclosed | BioGlow | Not disclosed |
| Not disclosed | Not disclosed | Collectis | Meganuclease-targeted gene deletions |

CRISPR-edited crops free to enter market, skip regulation

Emily Waltz

Nature Biotechnology 34, 582 (2016) | doi:10.1038/nbt0616-582
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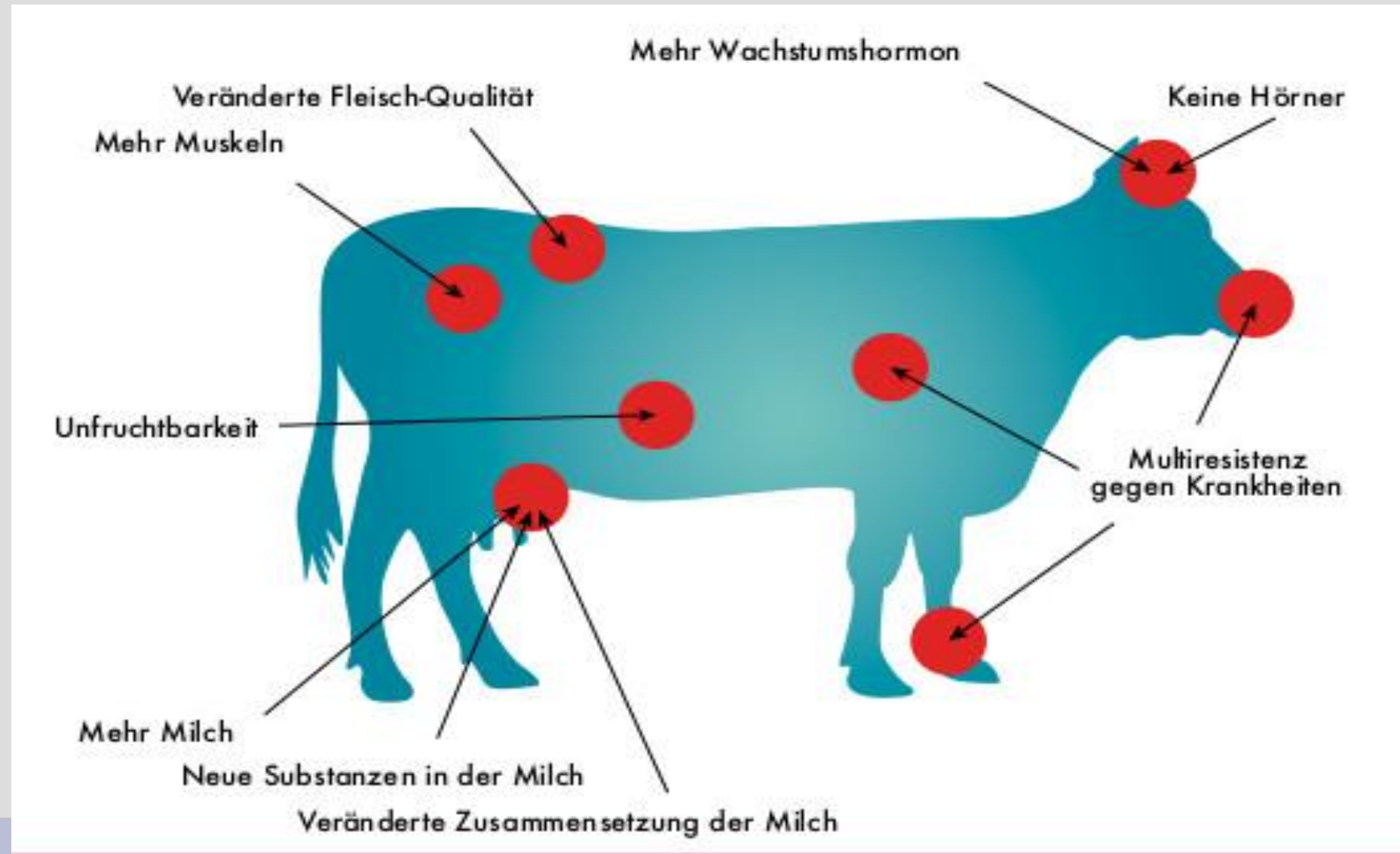


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DuPont Pioneer's high amylopectin corn is the first CRISPR-edited plant likely to bypass USDA oversight.

Table 4: Crops derived from genetic engineering and Synthetic Genome Technologies that did not undergo control in the US (source: Ledford, 2013)

Wieder im Fokus: Neue Gentechnik-Tiere



Fallstudie: Afrikanische Schweinepest

Per Gen-Editing wird eine genetische Veranlagung vom Wildschwein in Mastschweine übertragen, um diese gegen der Erreger der afrikanischen Schweinepest resistent zu machen. Würden diese Tiere für die Mast zugelassen, hätte das erhebliche Folgen: Die Tiere können ähnlich wie Wildschweine zu einem Virusüberträger werden, die Seuche könnte sich schneller ausbreiten. Der Einsatz gentechnisch veränderter Tiere würde zur einzigen Option. Gentechnikfreie Schweinehaltung müsste verboten werden, stattdessen müssten alle Schweinemäster die patentierten Gentechnik-Tiere kaufen.

Gentechnik-Tiere:
Risiko für Mensch und Umwelt
Eine kritische Bewertung, Testbiotech 2016

Patentanträge auf Tiere

| Application | Claims |
|--------------|--|
| WO2012116274 | Usage of nuclease TALEN to increase muscles in cows and pigs |
| WO2013192316 | Usage of nuclease TALEN to increase muscles in cows and pigs and produce cows without horns |
| WO2014070887 | Usage of nuclease TALEN, zinc finger or CRIPSPR to prevent animals from reaching sexual maturation, these animals cannot be used for further breeding. |
| WO2014110552 | Hornless cows by application of methods for gene editing. |
| WO2014193583 | Usage of nucleases to block genes for production of sperm cells. |
| WO2015168125 | Usage of nucleases to create animals with multiple genetic changes. |

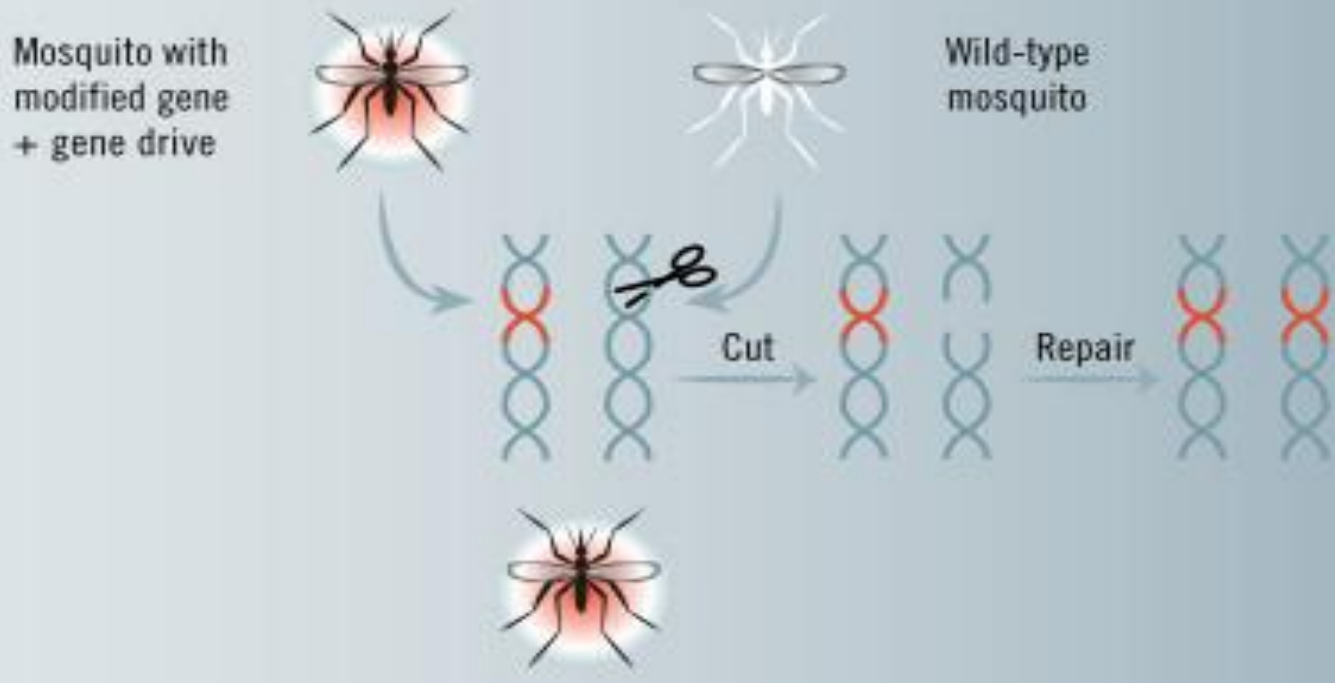
Synthetic gene technologies used in plants and animals for food production, Testbiotech, 2016

Patente betreffen Tierhalter direkt

- Der Bereich der landwirtschaftlichen Tierzucht ist anders als die Pflanzenzucht von Patenten bisher weitgehend verschont geblieben.
- Landwirte dürften in Zukunft beispielsweise ihre Kühe noch melken, aber ohne Zustimmung der Patentinhaber nicht mehr zur Zucht verkaufen.

Neues Risiko unkontrollierter Ausbreitung: Gene drives

GENE-DRIVE INHERITANCE



CRISPR, THE DISRUPTOR

BY HEIDI LEDFORD

A powerful gene-editing technology is the biggest game changer to hit biology since PCR. But with its huge potential come pressing concerns.

Three years ago, Francis Crick's name came across a method that made him change the course of his life. Crick, a scientist at the Gladstone Institutes in San Francisco, California, had been trying to work out how variations in DNA affect various human diseases, but his tools were cumbersome. When he worked with cells from patients, it was hard to know which sequences were important for disease and which were just background noise. And engineering a mutation into cells was expensive and laborious work. "It was a student's entire thesis to change one gene," he says.

Then, in 2012, he read about a newly published technique called CRISPR that would allow researchers to quickly change the DNA of nearly any organism — including humans. Soon after, Crick abandoned his previous approach to modifying disease and adopted this new one. He had

is now frequently altering genes associated with various heart conditions. "CRISPR is turning everything on its head," he says.

The sentiment is widely shared. CRISPR is causing a major upheaval in biomedical research. Unlike other gene-editing methods, it is cheap, quick and easy to use, and it has swept through labs around the world like a storm. Researchers hope to use it to adjust human genes to eliminate diseases, create healthier plants, improve piglets and much more besides. "I've seen two huge developments since I've been in a science. CRISPR and PCR," says John Schalko, a geneticist at Cornell University in Ithaca, New York. Like PCR, the gene-amplification method that revolutionized genetic engineering after its invention in 1983, "CRISPR is impacting the life sciences in so many ways," he says.

But although CRISPR has much to offer, some scientists are worried

ILLUSTRATION BY ANDREW HAYES

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Ledford, 2015; adoption: Testbiotech

Vielen Dank für Ihre Aufmerksamkeit!

- Transparenz, Rückverfolgbarkeit, Schutz der gentechnikfreien Produktion und das Vorsorgeprinzip sind beim Umgang mit den neuen Gentechnikverfahren unverzichtbar.