



Gene Editing: Providing Benefits to Animal Agriculture

February 21, 2019

World Leading Animal Genetics



50,000+
Customers

70+
countries

>2700+
employees

Genetics Evolution

Domestication

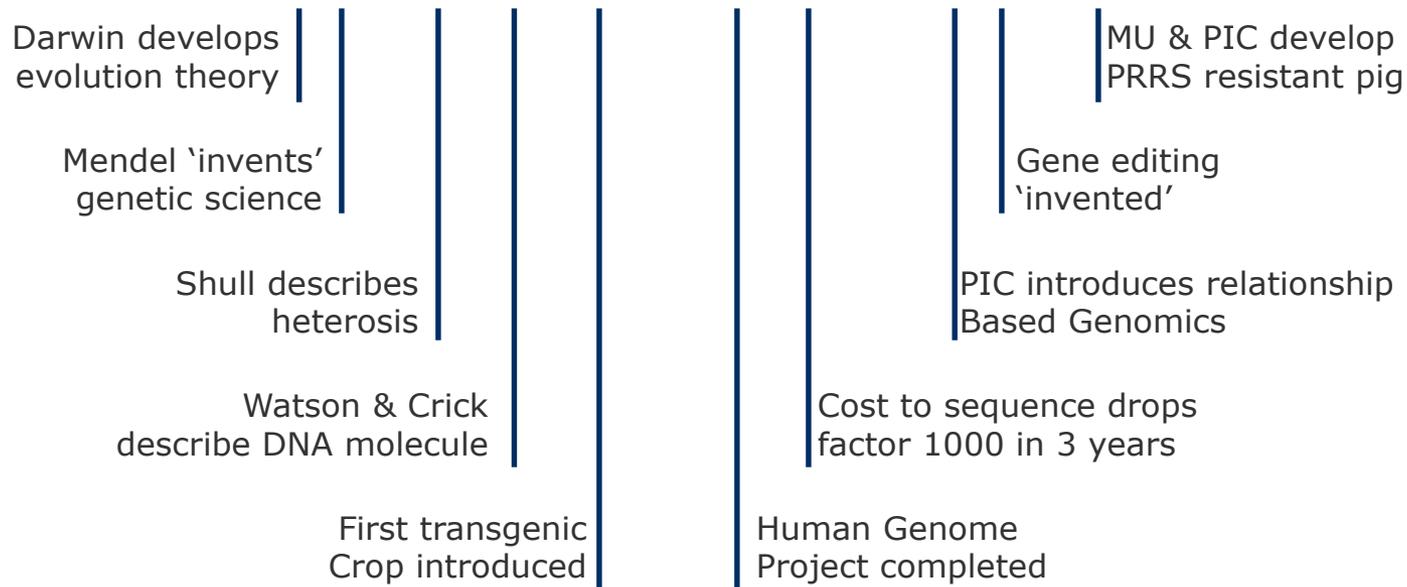
Selective breeding

Directed recombination?



Efficiency & sustainability
 prolificacy, feed efficiency, health & robustness

Meat quality
 taste, leanness, yield



Selective Breeding Works

	1960s	2010s	
 <p>Prolificacy</p>	14 pigs Per year	28 pigs Per year	+100%
 <p>Feed conversion</p>	900 lbs of feed each pig	550 lbs of feed each pig	-40%
 <p>Meat quality</p>	75 lbs of lean each pig	120 lbs of lean each pig	+60%

Manure per lbs of lean meat reduced by more than 60%

PRRSv causes losses along the pig life cycle

Sow farm



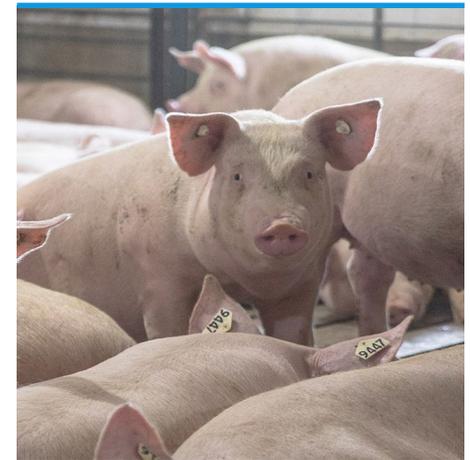
- Sow mortality
- Abortions
- Stillborns
- Pre-wean mortality

Nursery



- Low weaning weight
- Morbidity
- Mortality

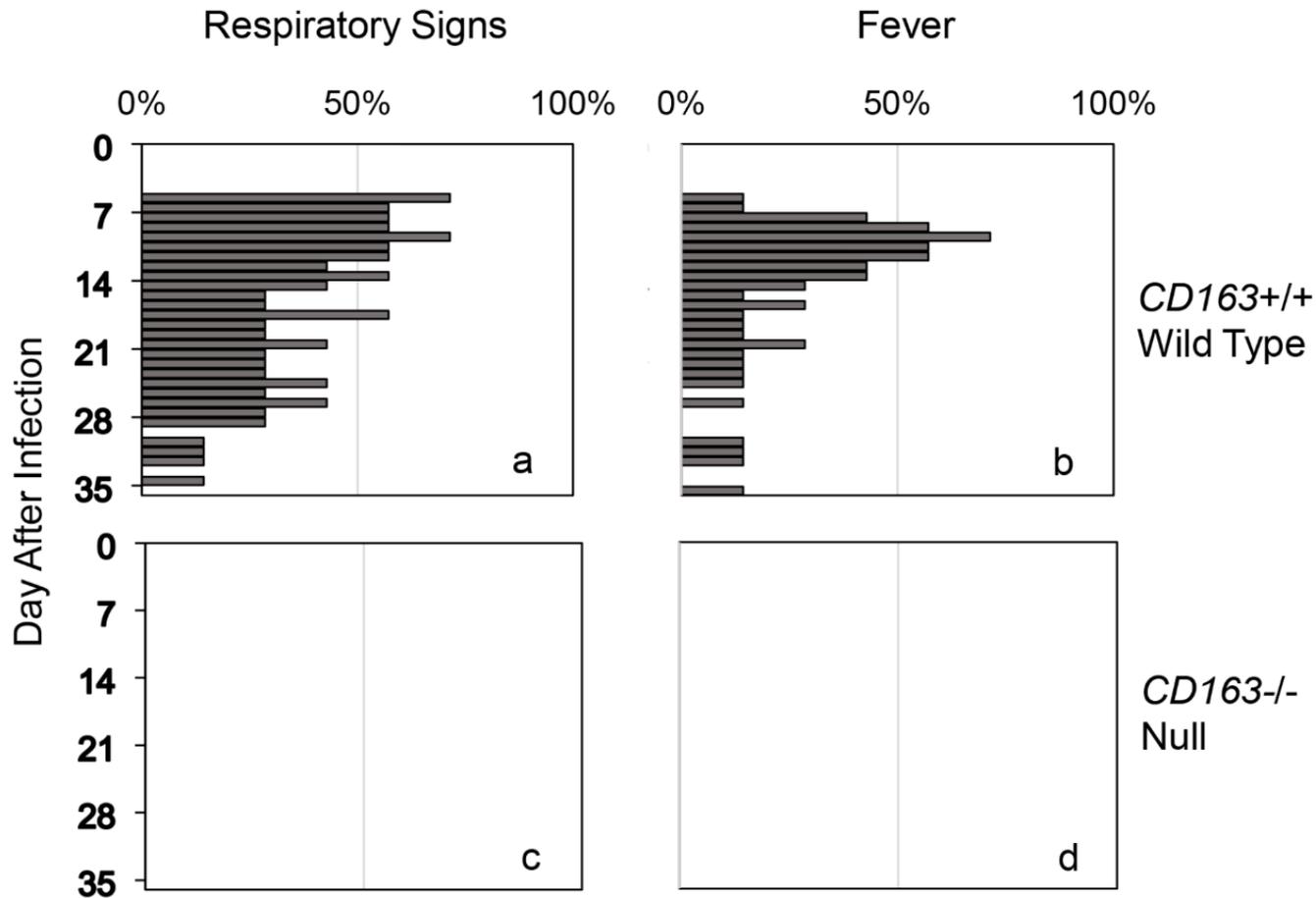
Finishing



- Morbidity
- Mortality
- Slow growth
- Poor feed efficiency

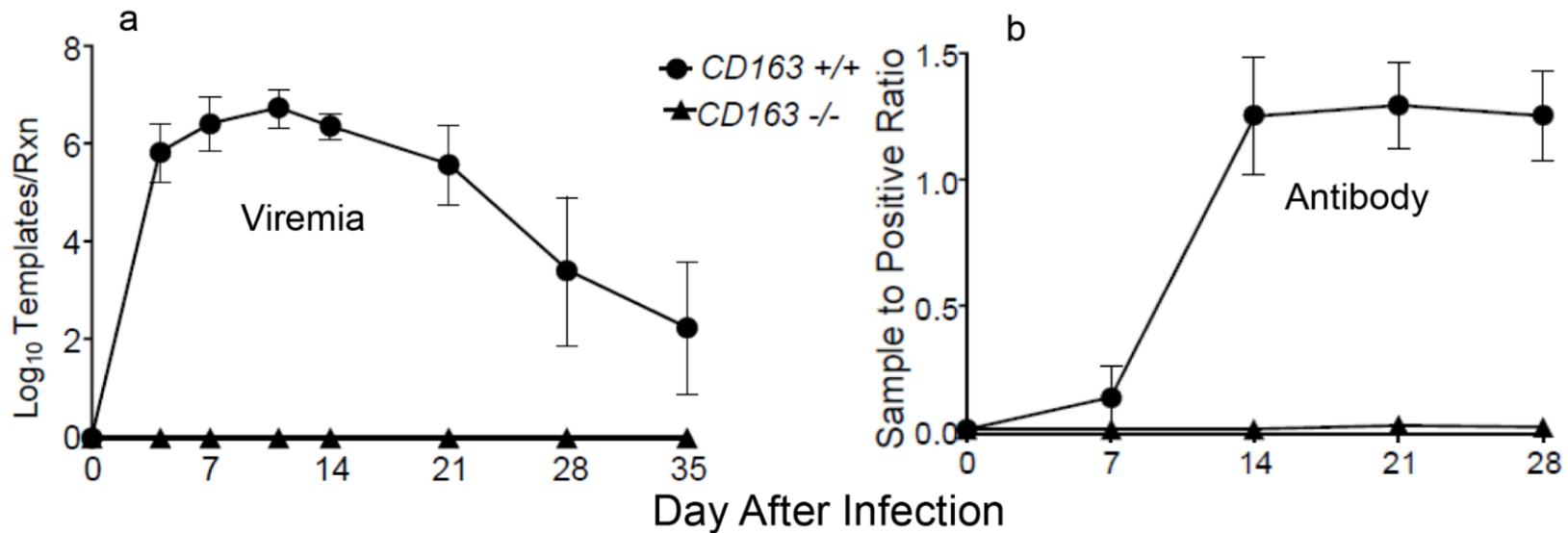
– animal suffering – increased use of antibiotics –
– lower farm productivity – larger environmental footprint –

The Promise of Gene Editing



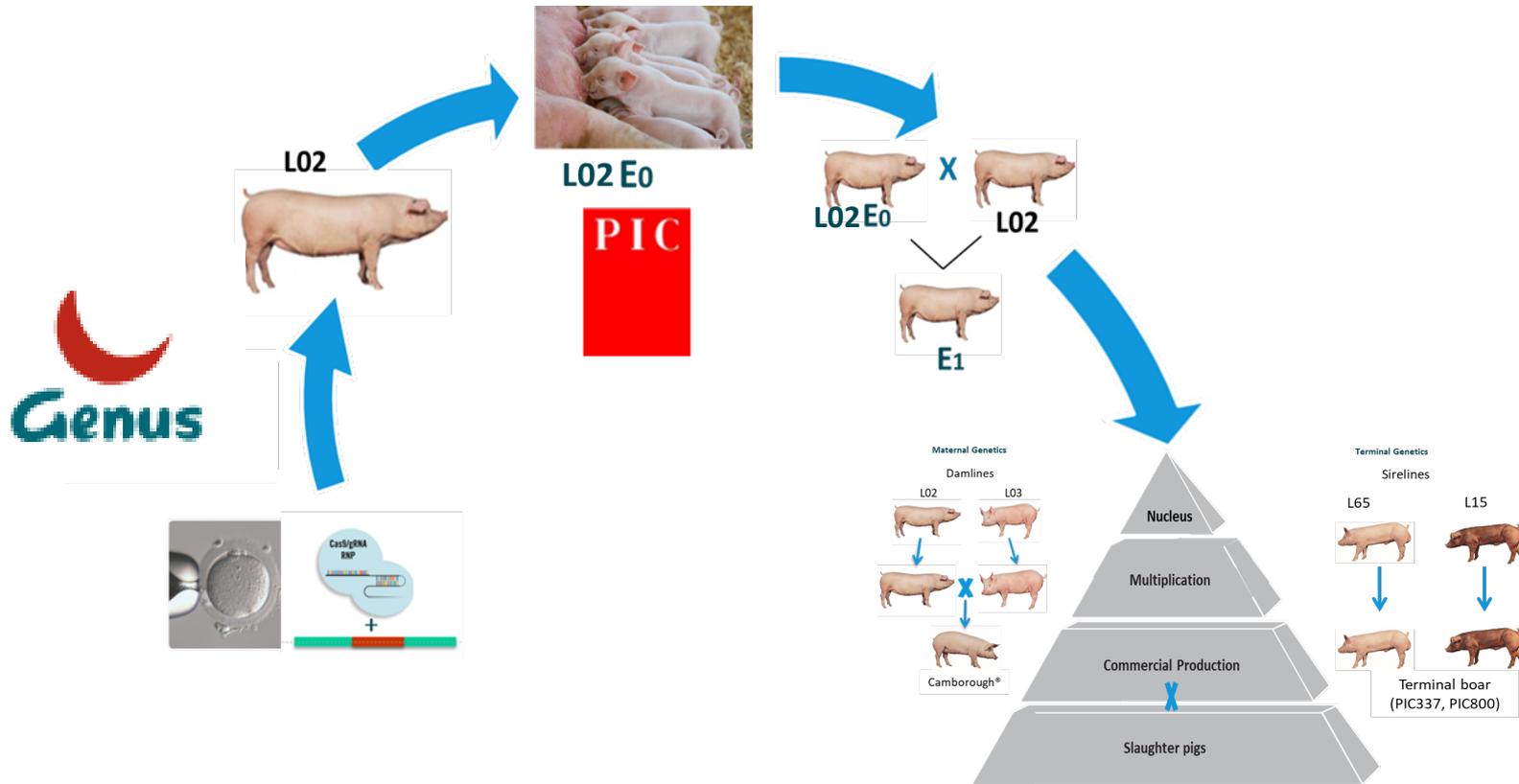
Source: University of Missouri, "Gene-edited pigs are protected from porcine reproductive and respiratory syndrome virus" Published 2015 in Nature Biotechnology by Prather et. Al.

The Promise of Gene Editing



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Genus Edited Animal Generation & Commercial Pyramid



The Genus Journey to Commercialization



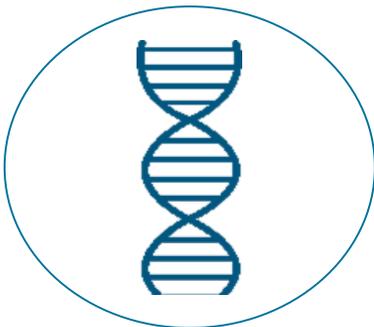
Market acceptance

- Industry willing to produce
- Consumers willing to eat



Regulatory

- Approval in key markets
- International harmonization



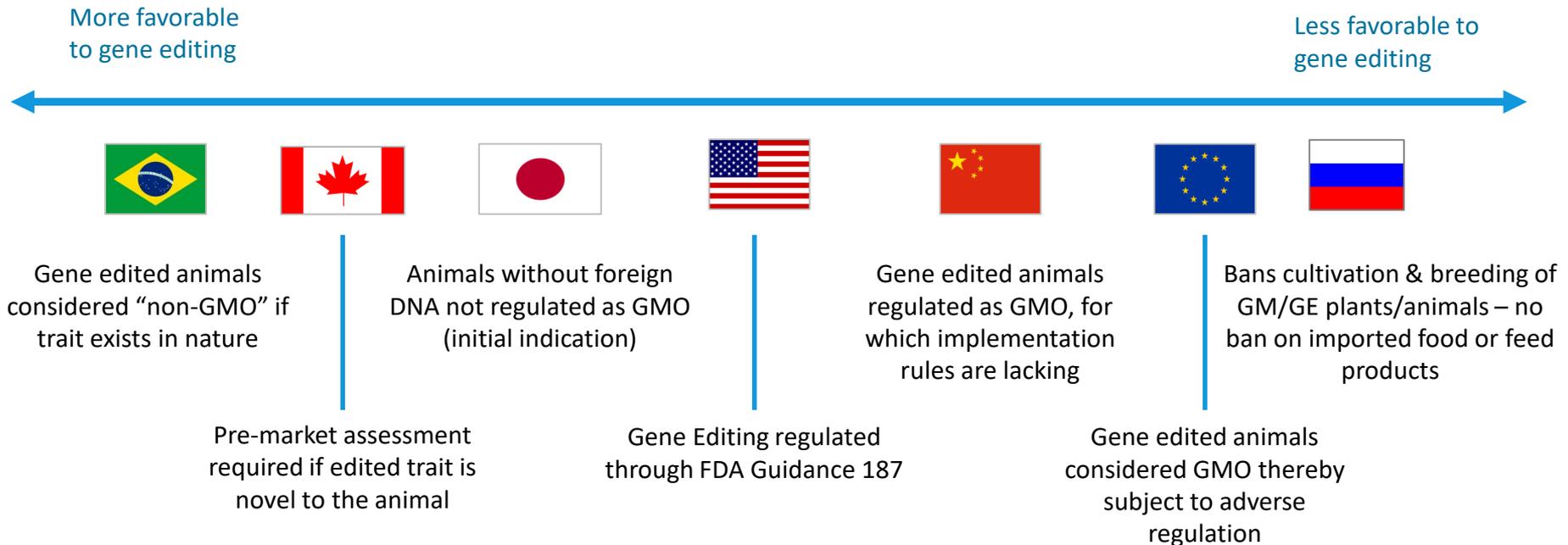
Technology

- Validation of technology
- No unintended consequences

Genus Position on Regulatory for PRRSv Technology

- **Strongly supports the appropriate regulation of gene editing technologies.**
- **Needed: common sense, science-based and structured regulatory pathway for such technologies that meets three main criteria:**
 - (1) Be focused on food safety;
 - (2) Be practical and science-based so as not to stifle innovation; and
 - (3) Provide clarity on the scope of regulatory jurisdiction across agencies.
- **We believe these specific criteria would create a common-sense regulatory environment that would stimulate innovation and discussion around technology, ensure food safety and further build transparency and trust in modern agriculture.**

International Regulatory Opinions on Gene Editing Vary

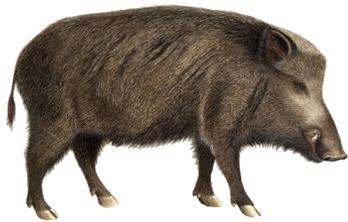


It's all about Responsibility

- We are committed to the responsible use of gene editing technology.
 - We understand that there are risks.
 - We're engaging the best and brightest.
 - We know that many consumers will have questions.
 - We want to engage in a robust dialogue with customers and consumers about how this technology can benefit them.
 - We want to build trust.
 - We're engaged in several coalitions dedicated to building consumer engagement and improving understanding of gene editing.
 - We're gathering research that unequivocally demonstrates the benefit of this technology to animal health and wellbeing.

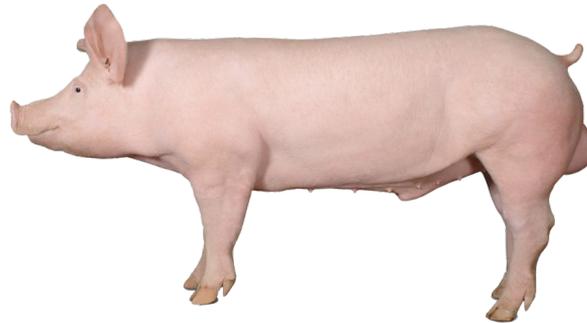
Genetics Evolution, Not Revolution.

13,000 BC

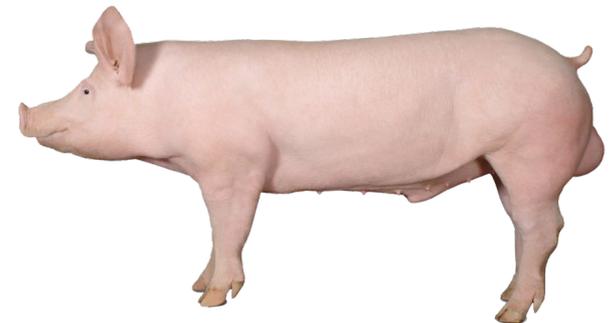


Evolution

2016



2020



Revolution?

Genus Vision: Pioneering animal genetic improvement to help nourish the world.