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In Search of a Better Pig

Hog farmers want to edit pigs' genes to create disease-resistant herds. But some say regulatory scrutiny could stall the technology in the U.S.

Young pigs stand in a pen in a barn at Paustian Enterprises in Walcott, Iowa. PHOTO: DANIEL ACKER FOR THE WALL STREET JOURNAL

By Jacob Bunge
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Hog farmers want to genetically engineer a better pig.

Cutting-edge gene-editing techniques such as Crispr-Cas9 will enable scientists to make precise genetic changes to pig physiology, they say, leading to animals impervious to common maladies such as porcine reproductive and respiratory syndrome, a virus that costs the U.S. pork industry hundreds of millions of dollars a year.

"It has the potential for being a great tool," says Gordon Spronk, a veterinarian and chairman of Pipestone Holdings LLC, a Minnesota hog-breeding company. Producing pigs that aren't susceptible to common ailments would be a big advantage, he says.

Gene-edited livestock is a new frontier for the U.S. meat industry. Unlike genetically modified corn, soybeans and cotton, which have been on the market for more than 20 years, genetically engineered livestock have yet to be commercialized. While gene-edited hogs are at the forefront

of livestock producers' efforts to develop healthier animals, scientists also are using gene editing to develop dairy cows without horns and cattle resistant to respiratory disease.

The technology is likely years from placing modified pigs in U.S. barnyards, but companies such as Genus GNS -0.54% ▼ PLC of the U.K. are moving forward with gene-edited pigs overseas. Pork producers worry that the U.S. regulatory environment could slow the technology's path to U.S. farms, while rivals in China and South America harness it to boost their own pork industries.

"It is having a chilling effect on research and development here in the U.S.," says Dan Kovich, director of science and technology for the National Pork Producers Council, which represents about 60,000 U.S. hog farmers.

Regulatory concerns

Crispr-Cas9 and related techniques allow scientists to make targeted changes to an organism's DNA. As manipulated cells repair themselves, their DNA sequence is changed. With pigs, this could include removing genes that increase susceptibility to disease

While genetically modified organisms such as "Roundup Ready" crops incorporate genes from other plant or animal species to create new varieties, the gene-editing techniques being used on livestock don't require outside genes to achieve genetic changes.

That is one reason why the NPPC and others in the pork industry say the federal government should ease regulations on the use of gene editing in livestock. They say the Food and Drug Administration, which oversees the technology, plans to require approval for each line of hogs modified with gene-editing technology. The industry argues that once a proposed gene modification is approved, it should be cleared for use in various hog lines.

The pork group is pushing for regulatory oversight to be moved from the FDA to the U.S. Department of Agriculture, which oversees meatpacking plants and promotes U.S. farm goods on the world market. The USDA could regulate gene editing under its authority over livestock health, which is how other nations are doing it, says Mr. Kovich.

An FDA spokeswoman says the agency's regulations will ensure that genetic changes made to animals are safe for both animals and consumers, and help consumers get comfortable with the technology. "We want U.S. developers of animal biotech products to be successful in bringing safe and effective products to market," she says.

Michael Hansen, senior staff scientist for Consumer Reports, says questions over gene editing's potential to make unintended changes to DNA sequences show the need for strict regulation. Some gene-edited animals developed by researchers in China and other countries have been born with unexpected deformities, and others died early.

Dr. Hansen predicts that wide adoption of gene-editing technology would likely drive interest in organic and non-GMO pork products, similar to recent growth in sales of food made from nonmodified crops.

"Consumers and food companies are saying, we want transparency," Dr. Hansen says.

Virus resistant

Genus, a U.K.-based specialist in hog and cattle breeding, already has used Crispr-Cas9 to produce a pig resistant to the PRRS virus, which slows hogs' growth and kills some. PRRS costs the U.S. pork industry about $664 million annually, according to Iowa State University researchers.

Genus is pursuing the research in China, in partnership with a Chinese company, which has stoked fears among U.S. producers that the world's biggest pork-consuming country could gain an edge on the U.S. The U.S. is the world's third-biggest hog producer, after China and the European Union.

Bill Christianson, chief operating officer for Genus's pig division, says the company aims to introduce gene-edited hogs in the U.S., as well. But because the U.S. exports about one-third of its pork, he says the technology needs to be approved in China and other markets that are big buyers of U.S. hams and pig's feet.

"It's critical for launch in the U.S. to have acceptance in China," Mr. Christianson says.

Genus and other hog scientists also have been exploring whether gene editing can be used to combat African swine fever, which has led to the deaths of hundreds of millions of hogs in China and other Asian countries this year. The results have been mixed so far, industry officials say.

Smithfield Foods, the biggest U.S. pork processor, said in a statement that it is monitoring gene-editing research for now. Tyson Foods Inc. hasn't taken a position on the technology, a spokesman says.

Bradley Wolter, president of Illinois-based hog producer Maschhoffs LLC, said on a conference call in June that the pork industry could win over consumers by explaining benefits of gene editing, like keeping pigs healthy, and its distinctions from other forms of genetic engineering.

"We feel obligated to provide for the best that resources and technology allow us to," Dr. Wolter said.

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