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Bioengineering a heart-healthy steak

Scientists aim to design animals rich in omega-3

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Scientists have pulled off a feat of gene engineering that could lead, in theory at least, to juicy steaks and fluffy omelets that are good for your heart.

The scientists inserted a worm gene into mice and made the rodents produce significant amounts of omega-3 fatty acids, a heart-friendly substance normally found in salmon and other oily fish.

The researchers at Boston's Massachusetts General Hospital now are trying to breed gene-engineered chickens that would lay omega-3 eggs. And they said the obvious follow-up would be transferring the gene to livestock to see if they can produce meat and milk rich in omega-3.

Details of the mouse experiments appear in Thursday's issue of the journal Nature.

"It would be little bit more difficult in a cow or pig," said the study's senior author, Jing X. Kang. "Overall, it would be quite similar and I think the outcome would be the same."

Omega-3 fatty acids are thought to prevent heart disease by helping to reduce the inflammation involved in hardening of artery walls. They also may reduce blood pressure and chemically regulate the electrical impulses of the heart's rhythm. Omega-3s also are important to brain development and may reduce the risk of Alzheimer's disease.

The American Heart Association recommends two or more weekly servings of fish, particularly fatty fish like trout and salmon, which are naturally high in omega-3s.

Regulatory hurdles

But researchers who did not participate in the experiments cautioned that meat and dairy products rich in omega-3s will probably not be sold in supermarkets anytime soon, even if livestock experiments are successful.

Gene-engineered herds would face significant regulatory and consumer hurdles, they warned.

The Food and Drug Administration treats transgenic animals as medicine and requires extensive testing. So far, the agency has not approved any gene-engineered animals for human consumption.

Transgenic meat would also probably lead to demands for labeling and generate protests over its potential sale alongside conventional meat. After years of fierce protests, the European Union now requires stringent labeling of foods made with genetically modified organisms.

"It's an interesting idea, a tremendous idea," said Bob Roberts, a food researcher at Penn State University. But he added: "My sense is that consumers would have issues with it. They have issues with transgenic tomatoes."

Different flavors and textures

Some experiments have succeeded in manipulating animals' fat content but never made it out of the lab.

At the University of California at Davis, cattle and sheep were fed diets in which fats were made less digestible. The animals' meat was lower in saturated fat. But the flavors were less rich. Butter and cheese made from the animals' milk had different textures, too.

Contributors to those experiments said they served as a reminder of the complex role that fat plays in food —

and in consumer satisfaction.

“The lamb tasted differently — less lamby,” recalled Christine Bruhn, director of the university’s Center for Consumer Research. “I would expect if the transgenic animal was producing omega-3s, there would be a different flavor in the meat.”

In the Boston experiments, Kang’s team extracted the fat-1 gene from the microscopic soil roundworm C. elegans. They loaded the gene onto a harmless virus that spread throughout the cells of the test animals. Then the transgenic animals and ordinary mice were fed a diet low in omega-3s.

Tissue from the gene-engineered mice was found to be high in omega-3s. And when the mice were bred, their offspring produced high levels of omega-3s for three generations.