San Francisco Chronicle

Scientists alter mice to produce omega-3 acids Process could someday be used in livestock, researchers say

David Perlman, Chronicle Science Editor
Thursday, February 5, 2004

Printable Version
Email This Article

Crucial in everyone's diet are the specialized fats abundant in fish and fish oils but that don't exist in cattle, pigs, most poultry and many other common foods. The missing fats are known as omega-3 fatty acids, and nutritionists and heart specialists recommend that everyone get plenty of them.

Now four Harvard Medical School researchers report that they have taken the gene for the missing fatty acids from a lowly laboratory worm called C. elegans and have genetically engineered mice to produce the fats abundantly for generation after generation.

The same engineering trick also should endow animals that produce steaks, pork chops, omelets and other much-beloved foods with the same missing essential ingredient, the scientists suggest in a report being published today in the scientific journal Nature.

"Isn't that amazing," said Cynthia Kenyon, the famed molecular biologist at UCSF who has long studied the same worm's genes for its clues to human longevity. "It's so cool! Now you can just change the nutrition in your beef and make it even better for you."

The Harvard researchers -- Jing Kang, Jingdong Wang, Lin Wu and Zhao Kang -- proposed that their discovery could yield a new strategy for producing all kinds of foods that would be rich in omega-3s and that doing so would be "a cost-effective and sustainable" way of meeting the increasing demand for such foods without constantly exhorting hearty meat-eaters to make stringent dietary changes.

Commonly found in fish

The American Heart Association and cardiologists throughout the country have long urged people to consume more omega-3 fatty acids -- primarily in fish -- as a way of preventing heart disease.

Kang told the Associated Press that his team is trying to create a

breed of chickens that would lay omega-3 eggs. The researchers also want to engineer the gene into farmed salmon as a way to make their conversion of fish food into omega-3s more efficient, according to the Washington Post.

The microscopic worm, formally named Caenorhabditis elegansis, is much beloved by genetics researchers because it can be so easily manipulated. It is also able to make its own omega-3 fatty acids from less healthful omega-6 fatty acids, the type of fat that is prevalent in today's human diet.

The Harvard scientists took a gene from C. elegans and injected it into mouse embryos, which then were placed into surrogate mothers. The mice developed an unprecedented capacity to convert the omega-6 fatty acids in their diet into omega-3s, and this capacity was passed on to their offspring.

Scientific reservations

Kenyon said she had one reservation about the Harvard researchers' report: Although they followed four generations of the mice endowed with the omega-3 gene and found that all the generations "appeared to be normal and healthy," Kenyon suggested that more study is needed to be certain that the mice had not undergone some unnoticed ill effects from the genetic manipulation -- changes that could also show up in meat and poultry treated the same way.

Another reservation was voiced by Marion Nestle, a former UCSF molecular biologist and nutritionist now at New York University, whose first comment on reading the Nature article was, "Well, it's a good thing we don't have to eat mice."

In a telephone interview Nestle, the author of the best-selling book "Food Politics," praised the technology used by the Harvard researchers as "awesome and beautiful science." But she added: "Yes, but to what end?"

"There are plenty of sources for omega-3 fatty acids in nature; they're in green vegetables, in legumes, in nuts and herbs and spices, and other oils like canola besides fish oils. It's just that people don't eat enough of them, because if they did, we wouldn't need genetic engineering to change our diets."

Any effort to breed cattle or other livestock containing the omega-3 acids through genetic engineering would face regulatory hurdles from the U.S. Food and Drug Administration and would be likely to meet the same consumer resistance that other genetically altered foods have encountered in the past.

The Associated Press and the Washington Post contributed to this report.E-mail David Perlman at dperlman@sfchronicle.com.