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The Times March 27, 2006

Why the the fat from this little piggy could be good for us

BY MARK HENDERSON, SCIENCE CORRESPONDENT

A HEALTHY form of bacon, ham and even pork scratchings could soon be available after the cloning of pigs genetically modified to produce beneficial fats.

The piglets have been enhanced with a gene from a nematode worm to give their meat up to five times the normal level of omega 3 fatty acids. A diet rich in these fats, usually found in fish and vegetable oils, has been linked to improved brain function and a lower risk of heart disease and stroke, suggesting that the pigs' meat could be sold as a healthier option.

The pigs — three of which were named Salmon, Tuna and Trout after fish high in omega 3 fats — are the first cloned livestock that can make the beneficial compounds. The success, by a research team in the US, paves the way for a new era of animal breeding in which animals are genetically engineered to make their meat healthier.

While GM and cloned meat is not approved for human consumption in the US or Britain, scientists are working on chicken, beef and fish with enhanced omega 3 fat content. Jing Kang, of Harvard University, said: "I think we will be eating transgenic animals in the near future. Livestock with a healthy ratio of omega 3 to omega 6 fatty acids may be a promising way to rebalance the diet without relying on diminishing fish supplies or supplements."

Meat is generally low in omega 3 fatty acids and high in omega 6 fatty acids, which do not have the same healthy properties. Fish such as salmon and tuna are omega 3 rich, but some scientists are concerned about people eating a lot of such fish because they contain toxic heavy metals such as mercury, and because of the pressure on collapsing fish stocks.

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While the beneficial effects of omega 3 fats were challenged in a study published last week, the Food Standards Agency recommends that people eat at least a portion of oily fish and a portion of white fish every week.

The new research, which will be published in the journal *Nature Biotechnology,* suggests that GM pork could be another option. “While fish is one of the best food sources of omega 3 fatty acids, we have been warned to limit consumption because of high mercury levels,” said Yifan Dai of the University of Pittsburgh, the study’s lead author. “These animals could represent an alternative source.”

In the study, a group led by Dr Dai, Dr Kang and Professor Randall Prather of the University of Minnesota genetically modified pig cells to express a gene called fat-1, which is normally found in the nematode worm *Caenorhabditis elegans,* and which converts omega 6 fats into omega 3.

They then cloned embryos from the transgenic pig cells, producing ten male piglets. Of these, six tested positive for the fat-1 gene, and three — Salmon, Tuna and Trout — also had between four and five times the normal level of omega 3 fatty acids in their bodies.

Though two of these three had to be put down because of a heart abnormality — probably a side-effect of the cloning process — a further litter of eight was later cloned from Salmon, the pig with the best omega 3 profile. All of these pigs were healthy, and had the enhanced omega 3 content.

Dr Kang said that in the longer run it would not be necessary to clone pigs. Once a founder population had been established, these could be used to breed in the normal way.

As well as their potential for producing healthier meat, the GM animals have value as laboratory models for investigating the effects of omega 3 fatty acids on heart function.

“Pigs and human beings have a similar physiology,” Professor Prather said. “We could use these animals as a model to see what happens to heart health if we increase the omega 3 levels in the body. It could allow us to see how that helps the heart.

“If these animals are put into the food chain, there could be other benefits. First, the pigs could have better cardiovascular function and therefore live longer, which would limit livestock loss for farmers. Second, they could be healthier for human consumption.”


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