

# **A long-term toxicology study on pigs fed a mixed GM diet. Adverse effects of GM crops found.**

**By Adjunct Associate Professor Judy Carman**

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This is a briefing about the contents of a new, peer-reviewed scientific paper titled: A long-term toxicology study on pigs fed a combined genetically modified (GM) soy and GM corn maize diet, by Dr Judy Carman, Howard Vlieger, Dr Larry Ver Steeg, Veryl Sneller, Dr Garth Robinson, Dr Kate Clinch-Jones, Dr Julie Haynes and Dr John Edwards. The study was published in the Journal of Organic Systems, Volume 8, No. 1.

At a commercial piggery in the US, we took 168 just-weaned pigs and fed them a typical diet for the piggery, containing soy and corn, for 22.7 weeks (over 5 months) until the pigs were slaughtered at their usual slaughter age. Half of the pigs were fed widely-used varieties of GM soy and GM corn (the GM-fed group) for this whole period and the other half of the pigs were fed an equivalent non-GM diet (the control group). The GM diet contained three GM genes and therefore three GM proteins. One protein made the plant resistant to a herbicide and two proteins were insecticides. We chose a mixed diet instead of a single crop because this is usually what pigs and people eat. Regulators do not require animal feeding studies on mixtures of GM genes and their proteins, regardless of whether the genes are all “stacked” into the one plant or spread across several plants that are eaten in the same meal. We chose pigs because they have a similar digestive system to humans, and because some of the investigators had been observing reproductive and digestive problems in pigs fed GM crops. We took blood from the pigs a few days before they were slaughtered to do standard biochemistry tests. Autopsies were done by qualified veterinarians who didn't know if a given pig was fed the GM diet or not, so their observations were completely unbiased.

Some of the investigators had previously seen a reduced ability to conceive and higher rates of miscarriage in piggeries where sows were fed a GM diet, and a reduction in the number of piglets born if boars were used for conception rather than artificial insemination. Artificial insemination guarantees the presence of a certain number of viable sperm. Because male pigs were neutered at 3 days of age in order to provide meat free of boar-taint, we were only able to look at the female reproductive system in these pigs. We found that, on average, the weight of the uterus of pigs fed the GM diet, as a proportion of the weight of the pig, was 25% higher than the control pigs. We found that this biologically significant finding was also statistically significant. We list some of the pathologies that could be occurring in these uteri in the paper.

Some of the investigators had also previously seen higher rates of intestinal problems in pigs fed a GM diet, including inflammation of the stomach and small intestine, stomach ulcers, a thinning of intestinal walls and an increase in haemorrhagic bowel disease, where a pig can rapidly “bleed-out” and die from a torn or perforated bowel. We weren't able to look inside the intestines, due to the amount of food in them, but we were able to look inside the stomach. We found that the level of severe inflammation in stomachs was markedly higher in pigs fed the GM diet. Pigs on the GM diet were 2.6 times more likely to suffer severe stomach inflammation than control pigs. While 22% of male pigs and 42% of female pigs on the GM diet had severe stomach inflammation, when these pigs were compared to pigs on the control diet, it was found that male pigs were actually more strongly affected. While female pigs were 2.2 times more likely to have severe stomach inflammation when on the GM diet, males were 4 times more likely. These findings are both biologically significant and statistically significant.

We found that these key findings were not reflected in the standard biochemistry tests that are done in GM feeding studies, probably because standard biochemistry tests provide a poor measure of inflammation and matters associated with uterus size. We did however find a marginally significant change on a measure of liver health in the blood of GM-fed pigs.