



StarLink Corn

Genetically modified (GM) StarLink™ corn hit world headlines in 2000, when it was found in USA supermarket products, after only being approved for use in the country as an animal feed. Despite no evidence of harm to human health, what followed was a multi-million dollar food recall, loss of export markets, and a corn buyback scheme across the nation. Since 2000, a number of regulatory changes have been made to avoid such an event occurring again.

What is StarLink corn?

StarLink corn was genetically modified to resist major corn pests. It contained a soil bacteria gene from the *Bacillus thuringiensis* (Bt) family, which allowed it to produce an insecticide protein (Cry9C) which controls major corn pests such as the European corn borer and the Southwestern corn borer.

StarLink corn seed was registered for use as a domestic animal feed and for non-food, industrial use in the USA in 1998, 1999 and 2000. Non-food industrial uses for corn include the production of ethanol fuel.

StarLink in the USA food chain

StarLink corn was not approved for use in the human food chain. StarLink was registered and annually renewed for domestic animal feed and non-food industrial use in the USA. The USA Environmental Protection Agency (EPA) required further data on whether the newly introduced protein (Cry9C) was allergenic to humans, before approval was given for food use.

In 2000, a coalition of environmental groups commissioned the testing of corn products from supermarkets for traces of StarLink corn, and they found its genetic material in taco shells.

A recall of hundreds of corn products resulted, including more than 70 types of corn chips and more than 80 types of taco shells. This led to major disruptions in domestic and export markets.

The USA grain handling industry, in coordination with the government and Aventis, the technology developer, worked to channel the StarLink corn into approved uses such as animal feed.

Aventis reached a deal with the USA Department of Agriculture to launch a buy back program. They offered producers a 25 cents-per-bushel premium above the normal price to ensure that as much of the StarLink as possible remaining on farms was fed to the farmers' own animals, sold to feed outlets, or sold to the Commodity Credit Corporation (CCC) with the expenses reimbursed by Aventis.

Approximately 60 per cent of corn in the USA is used for animal feed, while industrial use such as alcohol fuel accounts for about two per cent.



Evidence of harm?

Following the discovery of StarLink in human food products, a nationwide investigation was undertaken to ascertain if the StarLink corn had resulted in any negative impacts on human health. Of the 28 people who came forward claiming an adverse reaction after eating corn products, none were found to have suffered an allergic response.

On 13 June, 2001 the Center for Disease Control and Prevention released its report to the USA Food and Drug Administration (FDA) which concluded, 'These findings do not provide any evidence that the reactions that the affected people experienced were associated with hypersensitivity to the Cry9C protein.'

Feed studies involving StarLink corn, undertaken by researchers at the University of Guelph and the University of Missouri involving chickens, cattle and dairy cows found:

- StarLink corn was as wholesome to livestock as conventional corn.
- In cattle, no differences were observed in feed intake, weight gain, hot carcass weight, quality and yield grade, or gain efficiencies.
- In dairy cows, no Cry9C protein was detectable in milk, and no difference in milk quality was found between cows fed StarLink and conventional corn.
- None of the new protein (Cry9C) was detected in meat samples (liver, kidney, fat or muscle) from the animals fed StarLink corn.

Segregation

In the USA, almost all corn including GM corn, is comingled after harvest. There is no routine segregation for GM and non-GM corn crops through the system, but market demands for specialty/niche varieties could see such segregations occurring. However, StarLink corn should not have entered the human food chain.

StarLink today

StarLink corn seed is no longer available for sale, and seed companies have destroyed their stocks of the seed. The registration for growing StarLink corn was withdrawn by Aventis in October 2000. However, the use of StarLink corn in livestock feed and industrial, non-food uses remains fully approved by the EPA.

It was expected that it would take up to four years for the corn to be completely removed from the system.

The StarLink corn technology has not been developed or commercialised in any country outside of the USA.

Lessons learned

Following the StarLink incident, a number of regulatory agencies, including those in Canada and the USA, and Australia's food regulatory agency FSANZ implemented a strategy which avoids what are known as 'split use' approvals — where a GM plant receives approval for use in animal feed but not for human food.

According to FSANZ, 'it is now common practice for GM plants intended primarily for feed use to also undergo food safety assessment and approval for human food use. This minimises the risk of unassessed and unapproved products entering the food supply', for example, as a result of accidental mixing during transport or storage.

Examples of GM crops that have been developed primarily for animal feed but which have also been granted approval as human foods in Australia and New Zealand include high lysine corn, and herbicide-tolerant lucerne.



Further information

- www.cdc.gov/media/pressrel/r010613a.htm
- www.epa.gov/oppo0001/biopesticides/pips/starlink_corn.htm
- www.foodstandards.gov.au/consumerinformation/gmfoods/frequentlyaskedquestionsongeneticallymodifiedfoods/part4otherquestions.cfm

