10 facts about genetically modified (GM) crops

1 Genetic modification is the most precise form of plant breeding in agriculture

Genetic modification is the most precise form of plant breeding in agriculture ever. 'Traditional' breeding involves the transfer of many genes from one plant to another, which means a lot of trial and error as gene transfer cannot be exactly predicted. Alternatively, genetic modification involves precisely selecting specific known genes for transfer. Genetic modification technologies don't necessarily involve the introduction of any new genes from another species at all. Some techniques simply involve maximising beneficial genes or reducing negative genetic traits for better crop outcomes.

2 GM crops are as safe as conventional crops and highly regulated in Australia

Genetic modification is the most tested agricultural and food technology in history. There have been no reports of negative health impacts as a result of the genetic modification of food crops. GM Crop technology allows farmers to supply consumers with safe, affordable food. Australia has one of the most stringent and sophisticated systems of gene technology regulation in the world. The Office of the Gene Technology Regulator (OGTR), within the Australian Government Department of Health, has specific responsibility to protect the health and safety of people and to protect the environment by identifying risk posed by or as a result of gene technology, and by managing those risks through regulating certain dealings with genetically modified organisms. The OGTR carries out risk analysis to identify and manage any risks posed by new GM crops before allowing field trials and before seeds can be commercially produced and sold to farmers.

3 GM crops are beneficial to the environment

The adoption of GM crops has resulted in enormous environmental benefits, including a significant reduction of greenhouse gas emissions from agricultural practices. This results from less fuel use and additional soil carbon storage from reduced tillage and zero tillage practices with GM crops. In 2013, this was equivalent to removing 28 billion kg of carbon dioxide from the atmosphere or equal to removing 12.4 million cars from the road for one year.

4 GM crops have raised on-farm incomes in Australia and overseas

From 1996-2013, Australian GM cotton and canola farmers have realised farm income benefits of more than US$885 million. Over the same period the global farm income gain from GM crops has been US$133.5 billion. Half of this gain has been by farmers in developing countries. On average, farmers in developed countries received US$3.88 for every dollar invested in GM crop seeds, while farmers in developing countries received US$4.22.

5 Genetic modification improves existing crop plants to meet farmer and consumer needs

Genetic modification produces defined and precise improvements to existing crop plants that meet a recognised need, such as food quality, increased yield, herbicide tolerance or pest resistance. Strong regulatory systems ensure that GM crops meet stringent safety standards. GM crops present promising cost-effective solutions for reducing health problems associated with nutritional deficiencies. For example, Golden Rice could more than halve the disease burden of Vitamin A deficiency in developing countries and nutritionally enhanced wheat could halve bowel cancer rates in Australia.

6 Genetic modification techniques are being researched and developed across the public, private and not-for-profit sectors

GM crop research is undertaken and funded by public institutions, such as the CSIRO, not-for-profit humanitarian organisations, such as the Bill & Melinda Gates Foundation, and the private sector. The commercialisation of GM crops is very expensive due to the extensive testing and regulation requirements of bringing a product to market, so new varieties often involve collaboration between sectors. A new GM trait takes 10 years and US$136million to bring to market.

7 GM stockfeed is safe and nutritious

The most extensive GM feed study ever undertaken showed that GM stockfeed is safe and nutritious. In 2014, University of California-Davis Department of Animal Science geneticist Dr Alison Van Eenennaam reviewed 29 years of livestock productivity and health data and published her findings in the peer reviewed *Journal of Animal Science*. The data analysed represented 100 billion animals in the United States from before 1996, when all feed was 100% GM-free and after 1996, when the use of GM feed quickly rose to over 90%.

The study represented the animal consumptions of trillions of GM meals and concluded that GM feed is safe and nutritionally equivalent to non-GM feed.

GM feed does not translate to GM meat. As animals digest the feed, genetically modified DNA and proteins are entirely broken down. This means the meat, milk and eggs from animals which have eaten GM feed do not contain any genetically modified DNA or proteins. As a result, there are currently no requirements in any country to label products from aniamls that have eaten GM feed.

8 GM crops are a trusted technology of farmers

The unprecedented adoption rates of GM crops are testimony to trust and confidence by millions of famers worldwide. A 100-fold increase in the acreage of GM crops planted since 1996 makes GM crops the fastest adopted crop technology in the world. In 2014, biotech crops were grown by 18 million farmers on 170 million hectares in 28 countries.

9 All GM food products and ingredients must be labelled in Australia

All GM foods, ingredients, additives, or processing aids that contain novel DNA or protein must be labelled with the words 'genetically modified' under Australian law. Labelling of GM food has nothing to do with the health or safety of the food. All approved GM foods sold in Australia have been rigorously assessed and found to be safe by the responsible regulator, Food Standards Australia New Zealand.

10 Genetic modification is one of many innovations in agriculture that leads to more productive and efficient farming

In addition to genetic modification, traditional breeding, agronomy, improved land management and sustainability research will all contribute to food security.

The future will see many genetic traits, including improved performance in dry environments, grain yield, tolerance to high temperatures and improved nutrition, incorporated into many food, feed and fibre crops. It is likely that some of these new traits will be realised using genetic modification, some using traditional breeding techniques and some using new innovations.