

## ***Background***

Between 9,000 to 11,000 years ago human societies began the process of improving wild plants and animals through the selection and breeding of desirable characteristics, by artificial selection, the intentional breeding of certain traits, or combinations of traits, over others. This breeding has resulted in the domesticated plants and animals that are commonly used in crop and livestock agriculture. Traits are passed from one generation to the next through genes, which are made of DNA<sup>1</sup>. All living things—including the fruits, vegetables and meat that we eat—contain genes that tell cells how to function.

## ***What is agricultural biotechnology?***

Based on an understanding of DNA, scientists have developed solutions to increase agricultural productivity. Agricultural biotechnology is a collection of scientific techniques used to improve plants, animals and microorganisms and includes: classical plant breeding, marker assisted selection, and genetic modification.

## ***Classical Plant Breeding***

Classical plant breeding uses deliberate interbreeding of closely or distantly related individuals to produce plants or animals with desirable agricultural properties.

## ***Marker Assisted Breeding***

Sometimes traits may be under the control of many different genes. The use of tools such as molecular markers or DNA fingerprinting can map thousands of genes. This allows breeders to screen large populations for those that possess the trait of interest.

## ***Genetic Modification***

Genetic modification enables improvements that are not possible with traditional crossing of related species alone. Genetic modification is achieved by adding a specific gene or genes to a plant or animal, or by removing the effects of a gene to produce desirable agricultural characteristics.

## ***What are the Benefits of Biotechnology?***

Modern Biotechnology provides benefits to both farmers and consumers. Important improvements help farmers protect their crops from pests and diseases and provide consumers with increased yields which help to ensure a plentiful and low cost supply of food. New innovations include drought tolerance, which is a key technology for Australia given our chronic water supply problems. Agricultural Biotechnology innovations ensure that Australian farmers can supply both our domestic and international markets while reducing the environmental food print of agriculture through reduced use of pesticides and other environmental contaminants. Australia also benefits from active research in biotechnology creating high paid technical jobs in Australian Universities and research institutions which enhance employment opportunities throughout the nation.

## ***How does Australia manage the risks of Biotechnology?***

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<sup>1</sup> Deoxyribonucleic acid, a cellular component that contains the [genetic](#) instructions used in the [development](#) and functioning of all known [living organisms](#).

# AusBiotech Agricultural Biotechnology Brief



The *Gene Technology Act 2000* (the Act) came into force on 21 June 2001 as the Commonwealth component of a national biosafety regulatory scheme. The object of the Gene Technology Act 2000 is to protect the health and safety of people, and to protect the environment, by identifying risks posed by or as a result of gene technology, and by managing those risks through regulating certain dealings with genetically modified organisms (GMOs). The OGTR assess, mitigates and manages risks through its comprehensive risk management strategy.

## ***References:***

- OGTR. 2005. Risk Analysis Framework. Office of the Gene Technology Regulator. Canberra, Australia.
- NRC (National Research Council). 2002. *Environmental effects of transgenic plants: The scope and adequacy of regulation*. Washington, D.C.: National Academy Press.
- Cartagena Protocol on Biosafety. <http://www.cbd.int/biosafety/protocol.shtml>