History of Agricultural Revolutions

**Neolithic Revolution** – birth of agriculture over the past 10,000 years along plentiful river systems around the world from a warm stable climate since the ice age.

**The Age of Exploration** (1400-1600) - led to the movement of crops across the globe. Many of the crops grown today such as corn, beans, squash, potatoes, tomatoes, chocolate, peanuts and more originated from the Americas.

**Industrial Revolution** (1750-1900) – advances in crop rotation, farm enclosures, selective breeding and the triangular plough led to increased production that supported the movement of people to cities to work in factories.

**Green Revolution** (1960s) – the use of chemical fertilizers, increased mechanization and higher-yield crop varieties increased global food production by two and a half times
The Ag2030 Challenge: Sustainable Intensification

Delivering Ag2030
The Australian Government is setting the foundations for Australia’s world-class farmers, fishers and foresters to rebound from COVID-19 and build toward the agricultural sectors’ vision for a $100 billion industry by 2030.

October 2020

The Delivering Ag2030 plan sets 7 themes for action: trade and exports, biosecurity, stewardship, supply chains, water and infrastructure, innovation and research, and human capital.
This challenge is not one challenge - it is many

- Climate Change
- Water conservation
- Protecting the Natural Environment
- Biosecurity
- New Emerging Markets
- Efficiency
Climate Change

[Map of Australia showing major classification groups: Equatorial, Desert, Tropical, Grassland, Subtropical, Temperate.]

Image courtesy of the Bureau of Meteorology
Doomsday seed vault, Svalbard, Norway (photo courtesy of Global Crop Trust). [Svalbard Global Seed Vault - Crop Trust](http://www.croppedcrop.org/

Water Conservation

Explained: Water allocations and cotton - YouTube

Measuring evapotranspiration with satellites

More efficient water systems for agriculture, the environment and the community
**Water Conservation**

**Controlled Environment Agriculture (CEA)**

Green Camel AgTech works by maximising the efficiency of product per litre of water and square metre used, the facility is compact and highly productive.

Vertical farming allows for small crops such as high-value lettuce and herbs to be grown inside within urban and peri-urban environments reducing the transport costs and risks of pest infestation.


The Agriculture Stewardship Package is working to develop market arrangements and kick start private investment in farm biodiversity and other sustainability opportunities.


Supporting farmers to protect biodiversity
Protecting the Natural Environment

Regenerative Agriculture

https://soilsforlife.org.au
Soils for Life supports Australian farmers in regenerating soil and landscapes, to build natural and social capital, and transform food and fibre systems.

https://regenfarmers.com.au
Regenerative Australian Farmers assists Australian farmers to adopt regenerative agriculture practices and access benefits from the Australian Government’s Emission Reduction Fund.
Biosecurity

New Technologies to monitor and control pests

https://imapests.com.au
Monitoring airborne pests and diseases to aid on-farm pest management

Sustainable Crop Protection Hub
RNA-based bio-pesticides result in reduced chemical inputs, increased crop productivity, green credentials, sustainability, market access and capacity building, all of which will contribute to a more profitable and competitive food and agribusiness sector.

Drones and aircraft can help farmers check the health of crops and monitor for plant diseases.
New Technologies for biosecurity at the border

  - eDNA is being used to track high priority plant pests

  - 3-D X-rays and advanced algorithms are being developed to automatically detect biosecurity risk material at airports

  - High Throughput Sequencing will allow dozens of genetic tests to be performed at a time improving detection of plant diseases so they are not allowed into the country.

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**Biosecurity**
New Emerging Markets

The potential of Wild Harvest Agriculture

Kakadu Plum is a growing wild harvest industry in Aboriginal communities

Can Australian native rice be wild harvested economically?
Alternative building materials

Hempcrete, the combination of lime, water and hemp is being used to create eco-friendly homes.
Meat Alternatives: Plant-based meat & Cellular Agriculture

Animal-free meat alternatives are finding new economic markets

Cellular agriculture allows meat to be grown in a lab to build a more resilient food system
Virtual fencing allows greater freedom for animals and greater control for farmers.

Sheep grazing and solar farming (photo: University of Qld) Australian-guide-to-agrisolar-for-large-scale-solar.pdf (cleanenergycouncil.org.au)
The latest fully electric and autonomous tractor could prove revolutionary for the agricultural industry.

https://interestingengineering.com/worlds-first-fully-electric-tractor-could-outclass-all-rivals

The latest fully electric and autonomous tractor could prove revolutionary for the agricultural industry.
Blockchain and Internet of Things (IoT) technologies

Blockchain as a method of securely controlling and tracking data has many potential applications in agriculture. Internet of Things (IoT) technology allows devices such as pumps, sensors, and tractors to be connected to a network to provide information in real-time.


Reducing food waste

DAWE's National Food Waste Strategy includes examples of innovative Australian food waste solutions.

Here's just one example:

Queensland producers Natural Evolution Foods are transforming misshapen, oversized, spotted, unsaleable bananas into gluten-free banana flour and resistant starch dietary fibre.

So how will farms look in the future?

How will we find the balance between intensification and sustainability?
There is not one solution, there are many

- **Climate Change**: plant genetic resources for poor growing conditions
- **Water conservation**: more efficient water systems
- **Protecting the Natural Environment**: regenerative agriculture practices and supporting farmers to protect biodiversity
- **Biosecurity**: new technologies to monitor for pests and treat pests directly
- **New Emerging Markets**: wild harvest agriculture, alternative building materials and alternative meat industries
- **Efficiency**: novel animal grazing, automation of machinery, new information technologies, waste reduction
The challenge is for us to increase our farmgate production across Australia to $100 billion dollars a year by 2030 sustainably and consistently.

This challenge requires a new agricultural revolution.

We need your ideas...

Develop a pitch
Propose a new method
Create an innovative idea

Questions ????