Australia's innovation catalyst

CSIRO Overview, agriculture & food, and global connections

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CSIRO AGRICULTURE AND FOOD
www.csiro.au

Australia's national science agency

CSIRO – Commonwealth Scientific and Industrial Research Organisation

5400+
talented staff

$1billion+
budget

Working with over
2800+
industry partners
370 +
multinationals

55
sites across Australia

Top 1%
of global research agencies

Each year
6 CSIRO technologies
contribute
$5 billion to the economy

Big ideas start here

Fast WIFI

PLASTIC BANKNOTES

AEROGARD

BARLEYmax™

RELENZA FLU TREATMENT

TOTAL WELLBEING DIET

HENDRA VACCINE

EXTENDED WEAR CONTACTS

SOFTLY WASHING LIQUID

SELF TWISTING YARN

RAFT POLYMERISATION

NOVACQ™ PRAWN FEED

CSIRO's Structure

- Agriculture & Food
- Energy
- Manufacturing
- Mineral Resources
- Land & Water
- Oceans & Atmosphere
- Health & Biosecurity
- Data61

National Facilities and Collections	
Global	Facilitate collaboration globally
CSIRO Services	BD&C, Communication, Diversity & Inclusion

One-CSIRO support services

Enterprise Infrastructure

CSIRO Agriculture and Food

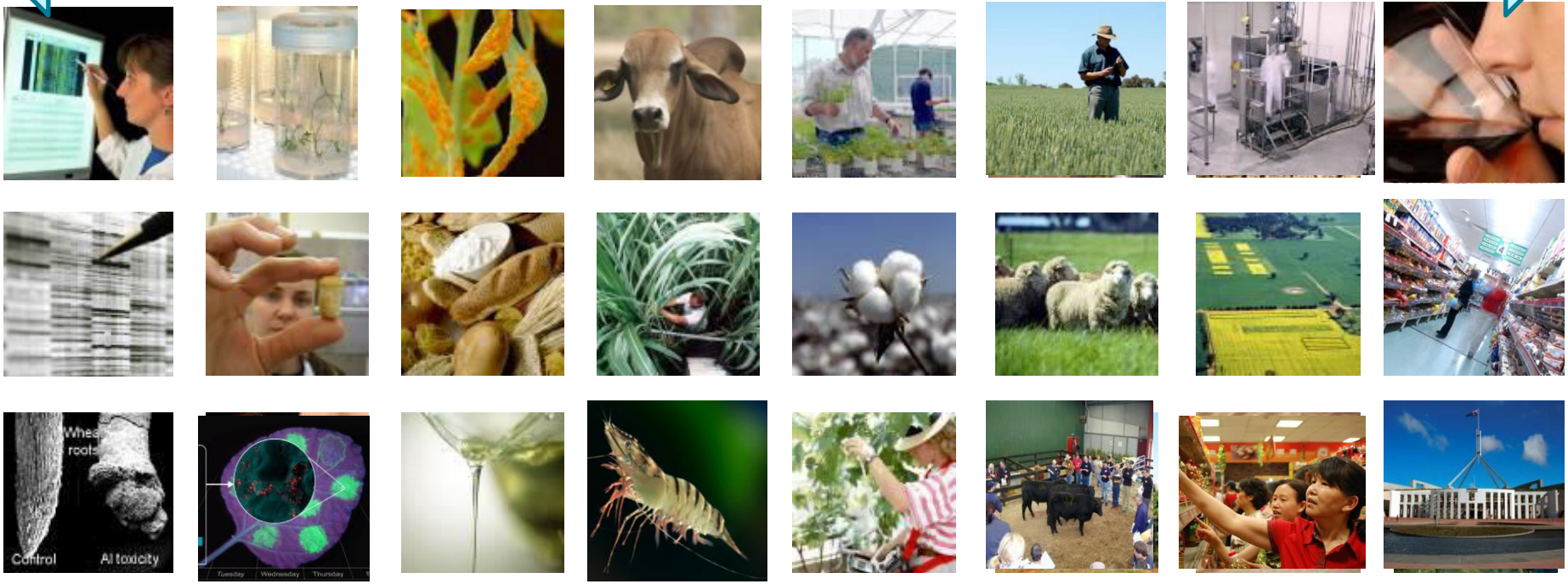
John Manners, Director, CSIRO Agriculture and Food

CSIRO Agriculture and Food

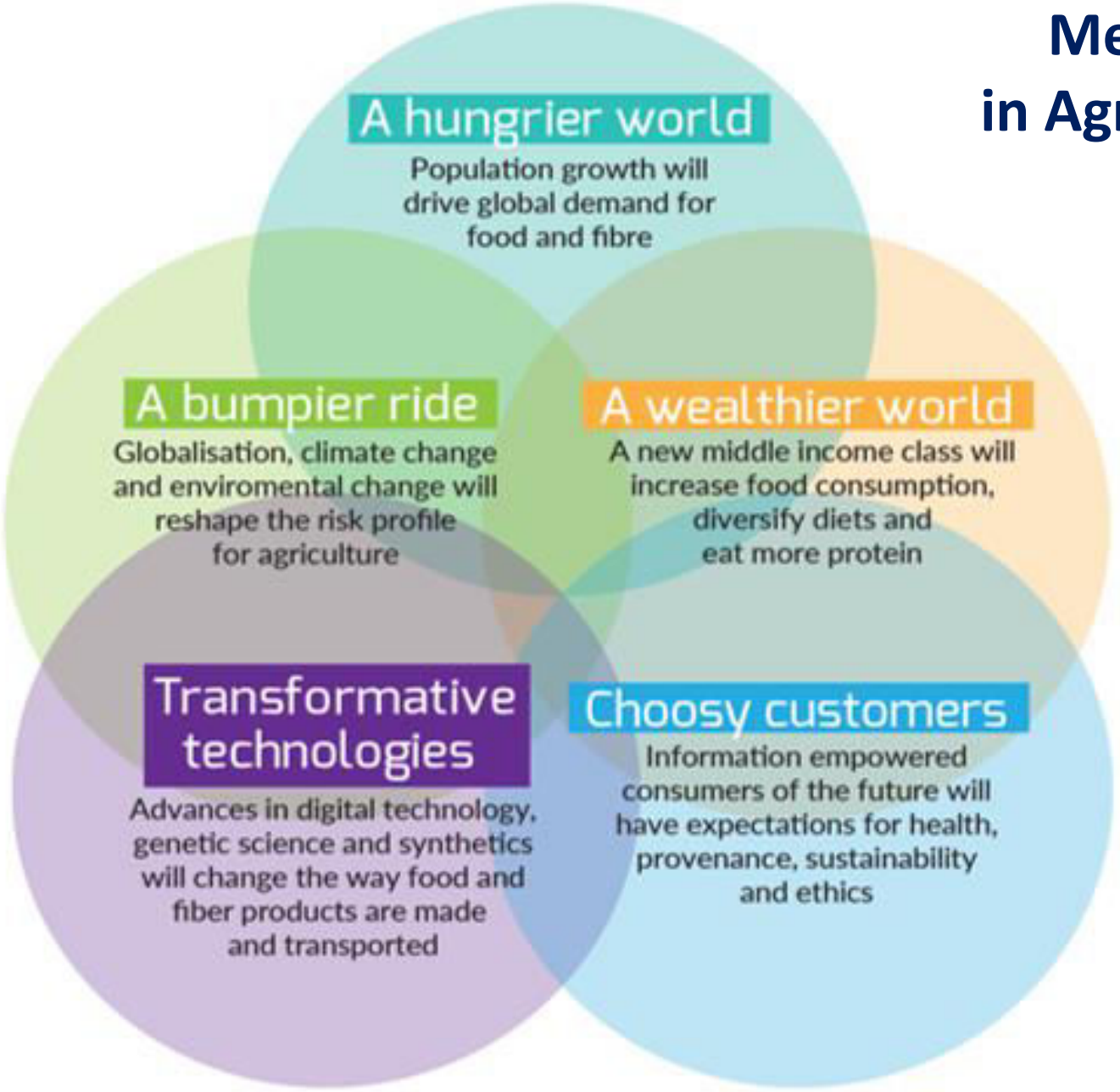
1. **Australia's leading Ag & Food R&D organisation (top 10 globally)**
2. **>1000 staff, national footprint (27 locations) & key Ag & Food facilities**
3. **Links CSIRO's capabilities into agri-food**
4. **Market facing with >75% R&D funds from outside CSIRO**

Integrated research across the value chain

Genome Phenome Breeding Farms Landscapes Foods Markets Consumers Environment Society



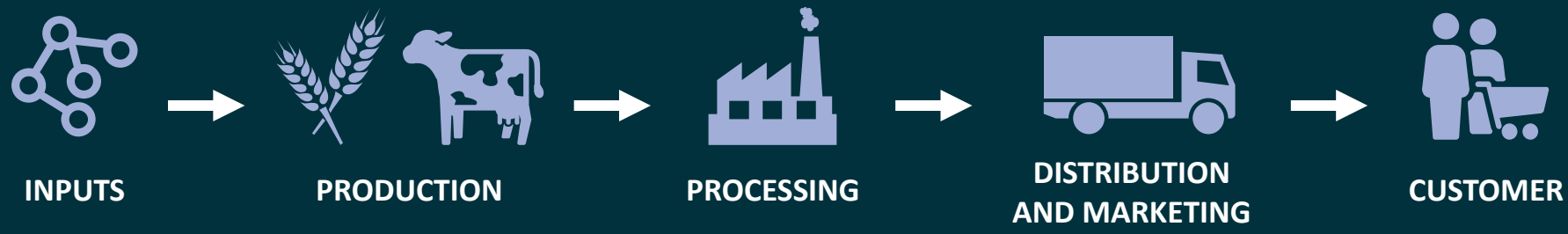
Mega-trends in Agriculture and Food



Stefan Hajkowicz and Sandra Eady CSIRO

RURAL INDUSTRIES
Research & Development Corporation

Research focus areas – 9 programmes



CSIRO is at the forefront of innovation, providing solutions for cropping, livestock production, aquaculture, horticulture and the food industry.

1. Breakthrough genetic technologies
2. Breeding higher value food crops
3. Crop improvement for novel plant products
4. Productive and adaptive livestock systems
5. Integrated agricultural systems
6. Sustainable aquaculture production
7. Sustaining agricultural soil and landscape
8. Agriculture and global change
9. Food manufacturing and processing

CSIRO Agriculture & Food – core capabilities

1. ***Plant and animal breeding***
   - *(e.g. Cotton varieties)*
2. ***Efficient farming systems***
   – *(e.g. Yield Prophet app)*
3. ***Aquaculture***
   – *(e.g. Novacq bioactive)*
4. ***Global agriculture***
   – *(e.g. ARISA project outcomes)*
5. ***Food science***
   – *(e.g. BARLEYmax™, High pressure*

CASE STUDY

Transforming the cotton industry

Today all Australian cotton, half the dryland cotton in the United States and about one-third of the cotton in Brazil, Turkey and Greece benefits from CSIRO-bred varieties.

THE CHALLENGE

Australian farmers need pest and disease resistant cotton varieties bred for Australian conditions.

HOW CSIRO WORKED WITH CLIENT

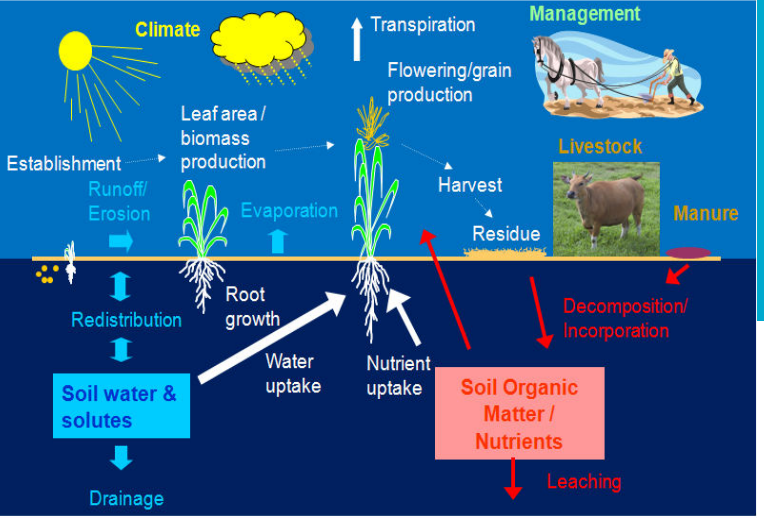
CSIRO worked with Monsanto using its expertise in molecular biology and plant breeding to introduce insect resistant traits into our cotton varieties.

SOLUTION

This research revolutionised disease and pest resistance, yield and fibre quality. The result was top quality cotton that is highly sought after in the global market.

CASE STUDY

Yield Prophet® to match crop inputs to attainable yields



Today more and more farmers in all states of Australia are using Yield Prophet® to assist decision-making on their farms, benefiting from CSIRO's modelling-based approach.

Yield Prophet® is funded by the BCG (the Birchip Cropping Group), with added support from CSIRO, the Grains Research & Development Corporation and the national Managing Climate Variability program.

THE CHALLENGE

Australian farmers need to make decision to sow crop and match inputs to attainable yields under highly variable climate conditions.

HOW CSIRO WORKED WITH CLIENT

CSIRO worked with farming groups using its expertise in farming systems modelling and climate forecasts to help on-farm decision making.

THE RESULTS

This research revolutionised farm management decision making, leading to increased benefits and reduced risk, with a net benefit up to A$20,000 per farm per year.

CASE STUDY

Novacq™ prawn feed – increasing productivity

THE CHALLENGE

Prawn farmers needed a solution to increase productivity while reducing reliance on wild fish stocks.

CSIRO RESPONSE

CSIRO developed an entirely natural food source produced by marine microbes.

THE RESULTS

Prawns fed with Novacq™ grow on average 20-30 per cent faster and are healthier. The production of Novacq™ commenced under licence in Australia, China and Vietnam, and since early 2017 – the rest of the world.

CSIRO's prawn breeding and prawn breed research is expected to deliver net benefits, in terms of increased productivity of prawn production, equal to $882.8 million over the period 2004/5 to 2023/24.

CASE STUDY

BARLEYmax™

THE CHALLENGE

Increased wholegrain intake, including barley, has been shown to reduce the risk of certain cancers, heart disease, diabetes, stroke and even help with weight control.

CSIRO RESPONSE

CSIRO developed BARLEYmax™, a wholegrain with superior health benefits that help combat cardiovascular disease, Type 2 diabetes and colorectal cancer.

THE RESULTS

A joint venture with Australian Capital Ventures Ltd saw CSIRO breed the new BARLEYmax™ grain and work with food manufacturers to create products containing it, including breakfast cereals, food wraps, rice mixes and bread. Consumers have enjoyed the benefits of BARLEYmax™ since August 2009. BARLEYmax™ is now licensed to a CSIRO spin-off company, The Healthy Grain.

CSIRO's capabilities

CSIRO Agriculture research is cited in the

top 1%

of publications

CSIRO makes a significant contribution to Australian research, and its research is of a high standard internationally.

CSIRO produces

19%

of Australia's output in agricultural sciences

500+ partners and collaborators including:

BAYER

MONSANTO

BILL & MELINDA GATES foundation

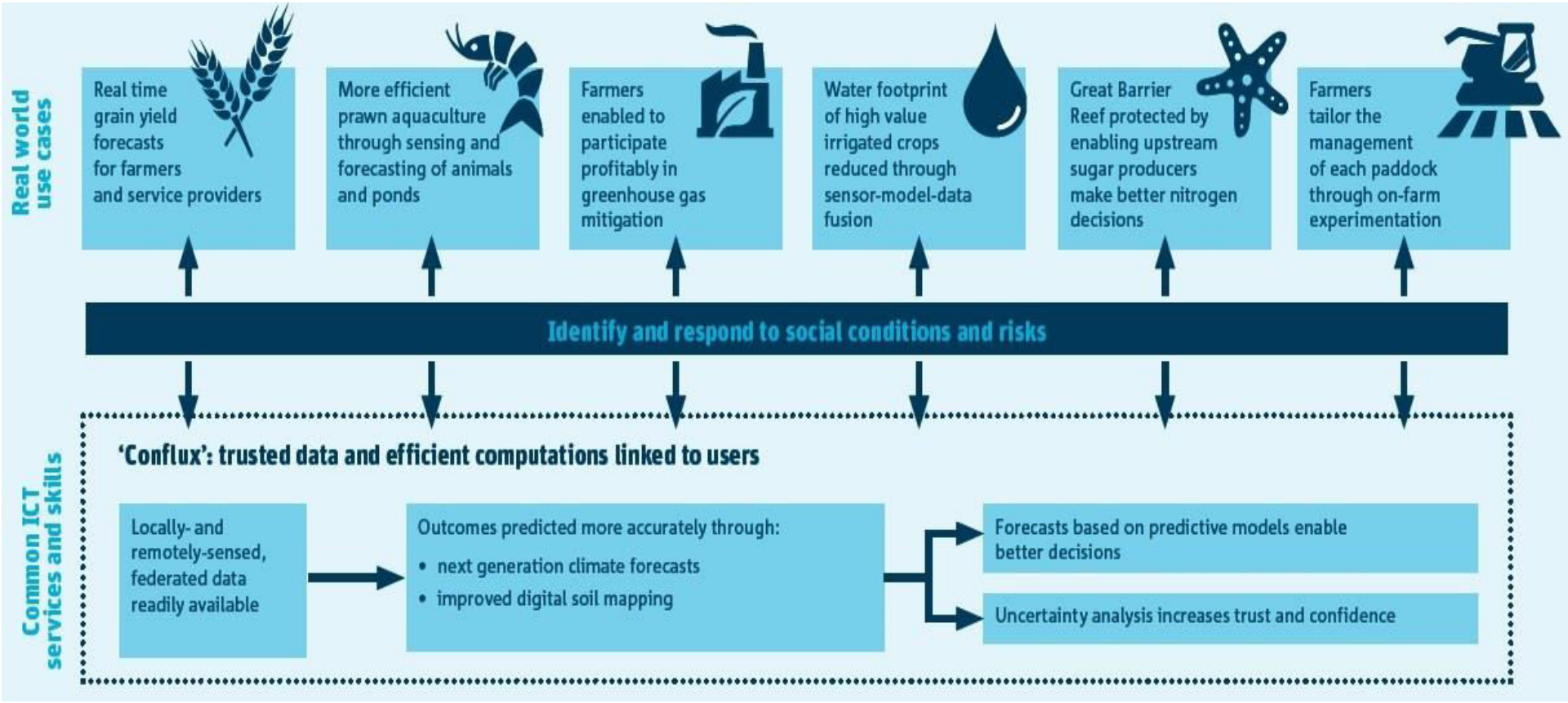
RIDLEY

Limagrain Céréales Ingrédients

CSIRO

Digiscape Future Science Platform

Harnessing the digital revolution for Australian farmers and land managers



CSIRO and China

- **532** CSIRO staff speak Chinese
- **484** CSIRO staff were born in China
- **3736** papers co-authored by CSIRO and Chinese co-authors 1970-2014
- **>15** Chinese research organisations/companies are collaborating with CSIRO

CAS-CSIRO priority areas for strategic collaboration (2010-):

- Sustainable agriculture and crop breeding
- Climate science impacts
- Nanotechnology, and new materials
- Health science and technology

CAAS-CSIRO strategic collaboration projects (2016-):

- Scientific benchmarks for sustainable agricultural intensification (**IARRP**)
- Metabolic differences and trade-offs between high and low oil canola (**OCRI**)

CSIRO International Collaboration Map (13 countries)

AGRICULTURE AND FOOD
www.csiro.au

CSIRO

Growing the future

CSIRO Agriculture and Food

Thank you

100 years of scientific excellence

1,000+ staff across 25 sites

500+ partners and collaborators

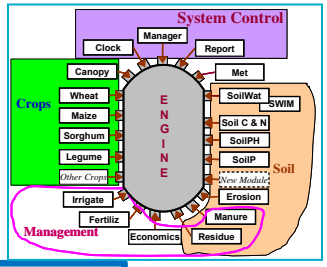
Expertise from the gene to the plate

Building on YieldProphet - Better yield forecasting & decision support

DECISION MAKING:

1. Sow a crop or fallow / wait for next opportunity?
2. Crop choice
3. Sowing time and variety
4. Resource management (N fertiliser)

APSIM farming systems model



N application rate

Soil
1. on-site characterization
2. continuous monitoring

Crop growth
Remote Sensing
Proximal Sensing

Climate
forecast

100 years of climate data

Weather
monitoring

Crop Sown

Model-data Assimilation

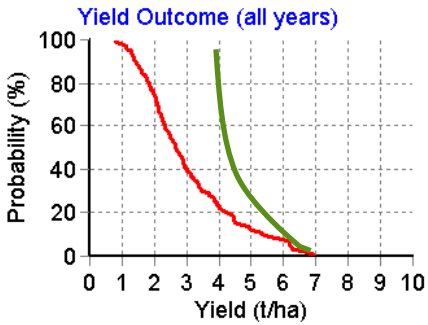
Yield forecast

Simulated yields (t/ha)

1983 → 1.3
1916 → 2.0
1937 → 2.8
1993 → 3.5
1972 → 4.7
1947 → 5.2

Today

APSIM simulation
(water and nitrogen balance, crop growth)



Mar. Apr. May. June. July. Aug. Sept. Oct. Nov.

Opportunities for Australian Agri-food

DRIVING MEGATRENDS	THEME	OPPORTUNITIES
• Health on the mind • Choosy customers	 **Products for health and wellbeing**	• Free-from and natural foods • Supplements • Fortified and functional • Personalised nutrition
• A less predictable planet • Smarter food chains • Choosy customers	 **Sustainable solutions**	• Waste conversion • Alternative protein sources • Sustainable packaging • Green and ethical value chains
• Choosy customers • One world • Smarter food chains	 **Premium / high end products**	• Convenience without compromise • Luxury products and gifts • Experiences and tourism • Novel tastes, smells, textures