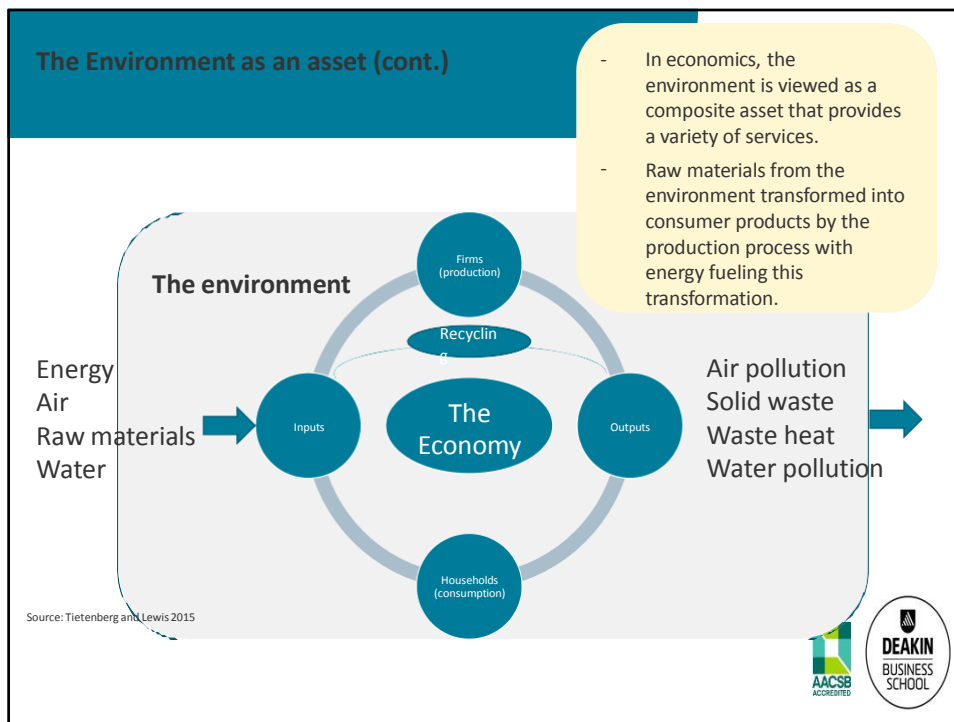


Session 2: Agricultural resource management: managing risks and achieving sustainability



- Sustainability frameworks and best practices
- Farm management
- Agricultural risks



Why sustainability matters?

- Environment is an asset, thus its importance
- Agriculture needs environment (raw materials, energy, etc)
- This comes with responsibility and expectations
- A question on “social license to operate (SLO)”
 - SLO as a means to earn accountability, credibility, flexibility and capacity for both stakeholders and industry (Nelsen 2006)
 - Initially more of a ‘mining industry’ topic, but increasingly discussed within the context of the agriculture – “Right to Farm”
 - Trust is key and determined by opinions of others, competence, and confidence. Transparency and continuous improvement are required to maintain (

Read further: Lush 2018 http://www.farminstitute.org.au/news-and-events/FPJ_Summer2018_JRC_Winner2.pdf

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DEAKIN BUSINESS SCHOOL

Agriculture and use of natural resources

Concerns over modern agriculture on natural resources

- Population growth (1 billion increase every 12 years; 9 billion by 2050 (UNEP 2007)) → expanding demand for agricultural products → increased pressure on land and water resources
- Spiertz (2009): **High input + low efficiency = environmental problems**
 - o Soil degradation
 - o Eutrophication
 - o Pollution of groundwater
 - o Emission of ammonia and greenhouse gases

→ Challenges:

*Profitable, but ecologically safe and socially acceptable agricultural systems.
Sustainable practices that provide healthy and nutritious food, ecosystem services and climate-change resilience.*



The importance of demonstrating 'sustainable agriculture'

“**Sustainability** rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs.



While conventional agriculture is driven almost solely by productivity and profit, **sustainable agriculture** integrates biological, chemical, physical, ecological, economic and social sciences in a comprehensive way to develop new farming practices that are safe and do not degrade our environment.”

(Lichtfouse et al 2009)




shifting
ve farming
sustainable
practices” (FAO Director-General Jose Graziano da
Silva, 2018)

Source: https://www.business-standard.com/article/news-ians/cut-use-of-chemicals-diversify-crops-fao-chief-118100200366_1.html

The Whole Farm Business System



The main components of the **farm business** system are:

- Human elements (goals, labour, management, attitudes to risk and uncertainty)
- Technical elements
- Economic, financial, growth and investment aspects
- Risks and uncertainties of the farm system

The main components of the economic system **beyond the farm gate** that impact on-farm business systems are:

- The behaviour of people and firms in competing businesses
- Suppliers and customers
- Non-agricultural economic sectors
- Institutional, political and social forces

Farm management analysis



- In essence, farm management analysis is the **farm benefit-cost analysis**.
- Typically, the focus is on enhancing the farm's ability to **reorganise in the face of change** (both planned (eg introduction of technologies and innovative business models); or as a result of exogenous factors (eg drought, crop disease, competition, etc)).

Farm management analysis (cont.)



- Farm management analysis is an **interdisciplinary** analysis
 - ✓ The **human element** is included and is the starting point;
 - ✓ The technical basis of **agricultural economic analysis** has to be sound;
 - ✓ **Economics is the integrating and core discipline;**
 - ✓ The business has to be **financially feasible**;
 - ✓ **Risk** and control in the face of uncertainty and volatility permeates all activity;
 - ✓ The role and influence of economic, institutional, political and social forces **beyond the farm** have to be recognised fully.
 - ✓ Knowledge from, and an emphasis on, **all these facets** of agriculture culminates in the ability of **managers** to reorganise farm resources and to succeed.

Why is economics important?

Everything has an opportunity cost!

Tractor or hire a worker or other farm equipments/inputs



PX SERIES

- 95/105hp Perkins diesel engine
- Power fwd/rev shuttle (Cab only)
- 32x32 transmission (Cab only)
- 4-wheel drive with Diff Lock
- Power Steering
- Radial tyres (Cab only)
- Hydraulic push button Hi/Lo (Cab only)

PX1052 CAB - LOADER 4IN1
\$76,995
INC GST

PX9520 ROPS - LOADER 4IN1
\$60,995
INC GST

PX9520 CAB - LOADER 4IN1
\$73,995
INC GST



RON & JOYCE READ from ELAINE

"After 70 years of driving tractors with no cabins, driving the PX1052HP CAB KIOTI is just luxury! The staff at Geelong Rural have really looked after us and we know we are in good hands when it comes to service and support."

Key concepts in farming business



- Total gross margin
- Profit/loss
- Return on capital
- Equity
- Assets
- Net cash flow

Agricultural technical systems

- Animal production systems
- Cropping systems

Read: Pages 18-29 - Malcolm, Makeham et al. (2005)



Technical systems #1: Animal production systems

- **Feed and pasture management** – Key focus is on the feed conversion-- to convert feed into saleable product and income (eg animals, hay, pellets).
- **Animal husbandry** e.g. use of medications and chemicals, veterinary services, harvesting methods (milk, wool, eggs, etc), time and interval of parturition (calving, lambing and farrowing)
 - Animal husbandry to minimise animal stress, maximise animal welfare, pay attention to occupational health and safety.
- **Use of genetics** – AI, cross breeding, etc



...e
...ctioners
...can the
concept of sustainability be effectively applied?



SAFA – Sustainability Assessment of Food and Agricultural Systems Guidelines
(FAO 2014; Version 3.0)

Animal health and welfare

SAFA Smallholder App –
Example questions



Source: <http://www.fao.org/nr/sustainability/sustainability-assessments-safa/en/>



Australian Animal Welfare Standards and Guidelines

- Collaboration between livestock industries, government and researchers
- To replace the traditional Model Codes of Practice for the Welfare of Animals.
- The Australian Standards and Guidelines for the Welfare of Animals – Land Transport of Livestock was the first of these new Standards and Guidelines to be completed, and was endorsed by the Primary Industries Ministerial Council in May 2009.
- The Australian Standards and Guidelines for the Welfare of **Cattle and Sheep** completed in 2015 and endorsed by the Agriculture Ministers' Forum (AGMIN) in 2016. **Poultry** yet to be developed.

SA - the first state to introduce regulation on 15th April 2017 and other States and Territories are progressively following suit.

Adherence to good animal husbandry principles is essential to meet the welfare requirements of animals. Good husbandry principles that also meet the basic physiological and behavioural needs of cattle include:

- a level of nutrition adequate to sustain good health and welfare
- access to sufficient water of suitable quality to meet physiological needs
- social contact with other cattle
- sufficient space to stand, lie and stretch their limbs and perform normal patterns of behaviour
- handling facilities, equipment and procedures that minimise stress to the cattle
- procedures to minimise the risk of pain, injury or disease
- provision of appropriate treatment including humane killing if necessary
- minimising the risk of predation
- provision of reasonable precautions against extremes of weather and the effects of natural disasters
- selection and breeding of cattle appropriate for the environment and the level of planned herd management to be provided
- assessment of the need to undertake any husbandry procedures that may result in significant short-term pain against alternative strategies for the long-term welfare of the cattle
- undertaking any husbandry procedures required for planned herd management in a manner that reduces the impact of these procedures and minimises risks to cattle welfare

Source: <http://www.animalwelfarestandards.net.au/>



RP1



Example: Australian Beef Sustainability Framework

Source: <https://www.sustainableaustralianbeef.com.au/what-is-the-framework1>



Drought – management options to consider

- **Agistment** (normally involving payment; check security (fencing, supervision to minimise theft), consider risks (eg disease), feed and water quality; whether a contract needed; explore other options; movement between properties to recorded on the NLIS database)
- **Feeding** according to nutritional requirements. Segregate. Usually more efficient to maintain (at fat score 3 or better) than feed to increase their weight and fat score.
- **Sell stock** (best to sell less-productive animals so at the end of the drought still have a herd with high-producing animals. Generally, the best cattle to retain are young good quality breeders ie 2-5 years (difficult and expensive to replace, basis to revive the herd).
 - o Pregnancy test; sell empty, late-calving, low-producing cows
 - o Sell inferior bulls
 - o Sell aged cows, aged bulls and lightweight heifers
 - o Sell non-breeding cattle (weaners, yearling steers and bullocks)
 - o Wean calves over 3 months of age and sell or feed separately
 - o Re-assess, sell poorest performing cows and heifers.



Managing horticulture: water

- The best crop is the one that maximises returns per unit of water used
- Check the property’s water supply and water licence (eg whether transferable)
- Water quality – lab test to check salinity, tolerance to total salts in irrigation water
- While much information available, expect farm-specific characteristics (and changes) may limit applicability of such general information.

Conductivity/salinity	Salt-tolerant plants
0 to 90mS/m = 0 to 500mg/L salts = 0 to 500ppm salts.	Fruits — persimmon, passionfruit, strawberry, raspberry, loquat, avocado, almond, stone fruit, citrus, apple, pear Vegetables — green bean, parsnip, radish, celery, squash, pea, onion, carrot Flowers — rose, azalea, fuchsia, magnolia
90 to 270mS/m = 500 to 1500mg/L salts = 500 to 1500ppm salts.	Fruits — mulberry, grape Vegetables — cucumber, capsicum, lettuce, sweetcorn, rockmelon, potato, cauliflower, cabbage, watermelon, broccoli, pumpkin, tomato Flowers — gladiolus, hibiscus, geranium
270 to 635mS/m = 1500 to 3500mg/L salts = 1500 to 3500ppm salts.	Fruits — olive, fig, pomegranate Vegetables — spinach, asparagus, beet, kale, garden beet Flowers — chrysanthemum, carnation, rosemary

1000ppm = 77 grains per gallon.

Source:
<https://www.agric.wa.gov.au/sites/gateway/files/The%20horticulture%20handbook.pdf>



Best practices

- According to the FAO, **good agricultural practices** are practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products.
 - The four pillars of GAP: economic viability, environmental sustainability, social acceptability, food safety and quality
- **Region-specific** e.g. ASEAN GAP – covering four modules, namely food safety; environmental management; worker health, safety and welfare; and produce quality
- **GAP certification** scheme by the private sector: GlobalGAP



Life is a risky business ... Some are risk-averse

Taken from: <https://lummy.com/wp-content/uploads/2015/12/Risk-Taking-Cartoon.jpg>

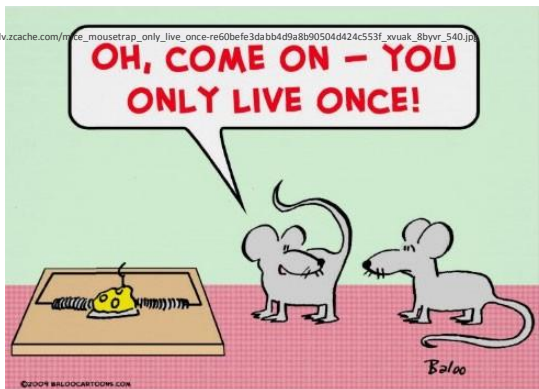


“Let’s try it without the parachute.”



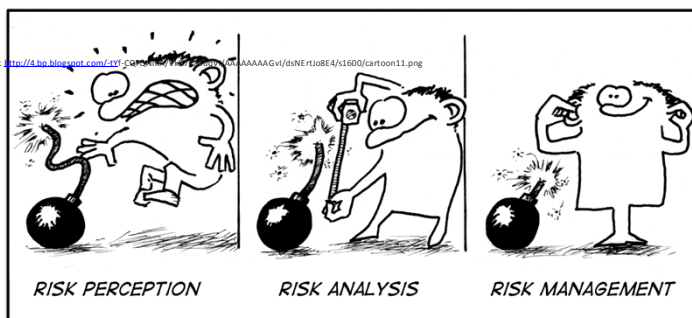
Some other are willing to take risks

Taken from: https://tv.zcache.com/mice_mousetrap_only_live_once-re60befe3da1b4d9a8b90504424c553f_xvuak_8byvr_540.jp



But, we all need to manage risks

Taken from: http://4.bp.blogspot.com/_t1f-5Qp3m00/AAAAAAAAAGw/dsNErU0E4/s1600/cartoon11.png



Risks in agriculture

Farm operator guilty over contractor's death during dingo chase on remote NSW property

A farm operator in remote north-west New South Wales has been found guilty of failing to provide a safe work environment after a court determined that chasing after dingoes was a legitimate part of mustering work.

Ethan Staker, 20, died in September 2014 after he fell from his motorbike while mustering sheep at Lake Stewart Station, 100 kilometres west of Tibooburra.

He was **not wearing a helmet**.

SafeWork NSW took the farm operator, KD & JT Westbrook Pty Ltd, to court, claiming that it had exposed Mr Staker to risk of death or serious injury by **not making him wear a helmet**.

Source: <http://mobile.abc.net.au/news/2018-09-21/farm-operator-guilty-over-motorbike-death-on-remote-nsw-property/10287564?pfmredirism>

Farm operator guilty over contractor's death during dingo chase on remote NSW property



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By ABC News

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Types of risks in agriculture

- **Business risks** – the risk any business faces regardless of how it is financed; coming from production and price risk, uncertainty and variability.
 - *Production and technical risks* – weather, pests and disease; equipment/technology
 - *Price risks* – influenced by dynamics in supply, demand and costs of production; lack of market information
 - *Consumer-related risks* – e.g. food safety, inaccurate labelling, other consumer appeal



Types of risks in agriculture (cont.)

- **Financial risk** – derives from the proportion of the lender's money used in the business, relation to that of the owner-operator capital ie the ratio of debt (D) to equity (E) $\left(\frac{D}{E}\right)$
 - Financial risk exacerbates business risk.
 - Financially rational enterprises will target financial outcomes that are consistent with the owner's attitude to risk, and efforts to manage risks and volatility e.g. insurance or futures
 - Individual risk-taking abilities are determined by their financial obligations, among others. Some key indicators are gross margin, cash flow or cash cushion,



Types of risks in agriculture (cont.)

- **Institutional risk** – change in services from supporting institutions e.g. banks, cooperatives, input dealers, governments. E.g. change in subsidies, regulations
- **Human and personal risk** – e.g. safety risks, illness, death
- **Pure risks** – a group of risks common to life and business in general (i.e. not agriculture-specific). E.g. physical risks of nature (e.g. wind storms, floods, droughts, earthquakes, volcanic eruptions); social and political risks (e.g. theft, fraud, riot, war); and liability (due to legal actions against the business)



Risks in agriculture

Farm operator guilty over contractor's death during dingo chase on remote NSW property

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He was **not wearing a helmet**.

Human/safety risks

SafeWork NSW took the farm operator, KD & JT Westbrook Pty Ltd, to court, claiming that it had exposed Mr Staker to risk of death or serious injury by **not making him wear a helmet**.

Related to regulations, contracts between the farm and services supplier

Source: <http://mobile.abc.net.au/news/2018-09-21/farm-operator-guilty-over-motorbike-death-on-remote-nsw-property/10287564?pfmredir=sm>

Farm operator guilty over contractor's death during dingo chase on remote NSW property



ABC 11 Ethan Staker was not wearing a helmet when he suffered a fatal motorbike fall during a dingo chase.

A farm operator in remote north-west New South Wales has been found guilty of failing to provide a safe work environment after a court determined that chasing after dingoes was a legitimate part of mustering work.

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Analysing risks

- Sensitivity analysis – a small number of scenarios to test the impacts of a change in one of the variables. “what-if approach”. Important to consider interactions between variables.
- Simulation – consider different possible combinations of variables, rather than a few scenarios. Unnecessary for simple problems.
- Decision trees – a graphic representation of the different possible outcomes of a decision and probability analysis to calculate the overall expected value of the project. Usually for projects that have costs or benefits in several time periods, and where sequential steps or decisions may be required.



Managing risks

- **Decisions to deal with risks:**

- Commercial decisions.

- Made through financial comparison of the anticipated return on investment with the cost of any risk if it occurs. If the risks and uncertainty of doing business are too great, and the investment is not made.

- Mitigation and control decisions

- The decisions specific for each risk: to be reduced or eliminated altogether. If the risk is only to be reduced, then it is important to decide to what acceptable level, and at what cost.

- Financing decisions.

- The decisions which deal with ways of financing the risk (for example, by insurance), and their acceptability.



Managing risks (cont.)

- Simple farm management budgets to identify what not to do (taking into account macroeconomic factors such as interest rates, inflation rates, expected yields, etc over the planning period)
- Diversification to spread the nature of the risks. But it can make income variability greater if various activities affected by similar seasonal and market forces, hence prices and yields moving in the same direction at the same time.
- Specialisation can be a form of risk management. Greater efficiency, better and more reliable products providing some 'protection or insurance' against some of the price and climate risks.
- Generating income from off-farm activities
- Risk-minimising inputs and technologies eg drought-resistant seeds
- Engaging in the same enterprise in different locations (not always feasible)
- Input reserves
- Contingencies – deliberate overestimation of costs to account possible increase in input prices
- Insurance – may lead to moral hazard, and not applicable to all types of risks



Managing risks – marketing risks

- Spreading sales – particularly for commodities that can be stored eg apples, potatoes, onions.
- Direct sales (to final consumers)
- Contractual agreements to sell produce and buy inputs
- Forward pricing – agree on a price in advance of delivery. To reduce the risk that the price they receive for their outputs might not cover production costs
- Building trust
- Tracking price information



Apps: From chemical hazards, noise, heat to ladder safety



Sources: <https://downloads.cmsguide.gov.au/2018/08/01/3301-45722-1-18.pdf> (in sources)



Recap

- Environment is an asset; element of social responsibility
- The concept of sustainability goes beyond the environmental aspects; also captures socio-economic, governance, cultural and ethical dimensions.
- The wide and increasingly challenging range of issues related to resource management means that seeking advice from the experts is a wise way to overcome issues. A good manager and policy maker, however, must have some basic understanding of various factors that may influence their business and policy decision making, respectively.
- Abundant information on 'best practices', but the key is our ability to acknowledge that risks, issues and their solutions are often context/region/farm-specific.
- *A scientist farmer* -- Trialling (with good planning and well-calculated risks), and continuous evaluations are critical.
- Policy discussion around resource management and risk management is very important. To be discussed in Session 3.



Practice questions