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Simulation modelling of grazing crops in mixed farming enterprises in southern Australia

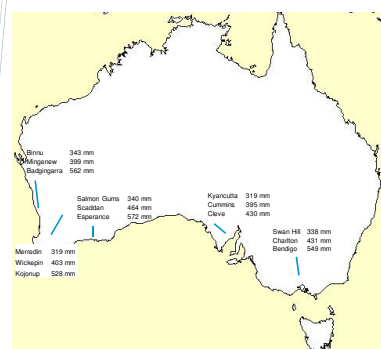
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Grain and Graze 2 - transect study



- 5 regions x 3 locations (high, medium, low rainfall)
- 3000 ha farm - mixed wheat and Merino sheep growing
- Stocking rate varied with annual rainfall
- Feedbase analysis with and without grazing dual-purpose crops

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Aims

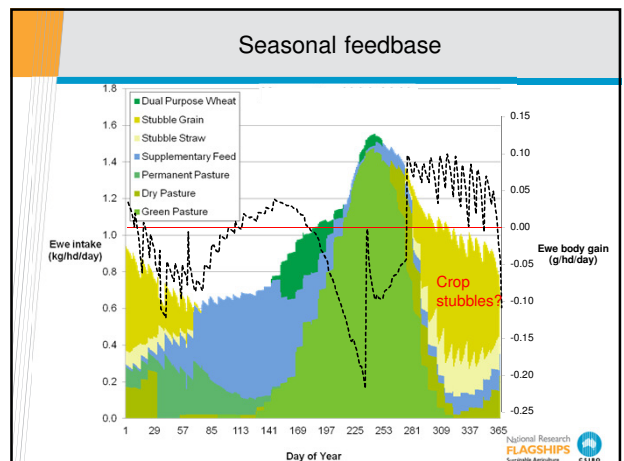
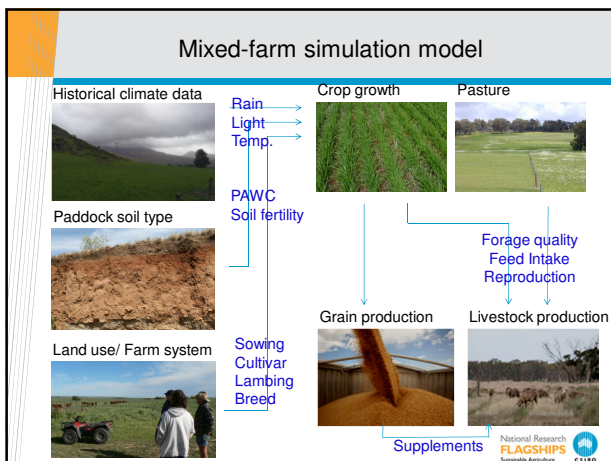
- Develop a whole farm simulation model that includes grazing wheat as a part of the feedbase
- Model the seasonal grazing value of a spring wheat crop across southern Australia
- Assess the interactions between grazing wheat and the utilisation of other feedbase components at different locations

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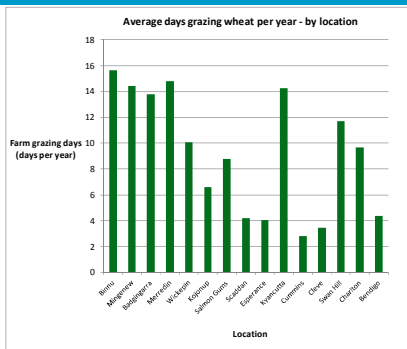
Base model summary

- 3000 ha farm
 - 2100 ha cropped
 - 700 ha annual pasture (in rotation with crops)
 - 200 ha permanent pasture
- Mixed self-replacing Merino and wheat farm, early July lambing
- Crop variety: spring wheat cv. Wyalcatchem
- Wheat grazing: grazed to avoid a yield penalty (soon after establishment and prior to stem elongation)
- Wheat is no longer grazed after annual pastures reach 800 kg/ha
- Feedbase rules to rotate animals between feedbase components

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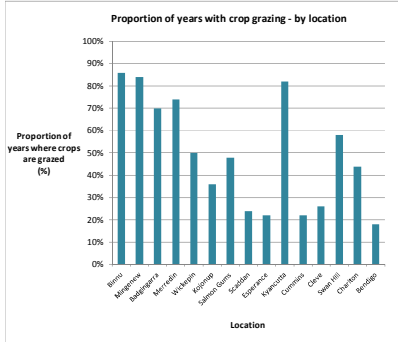


Does the amount of spring wheat grazed differ between locations?



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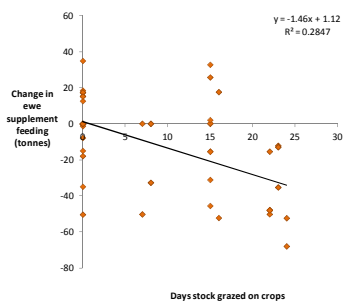
How often are conditions for grazing crops met?



- Crop > 150 kg/ha
- Crop GS < 30
- Pasture < 800 kg/ha
- Spring wheat cv. (sown after April 25)

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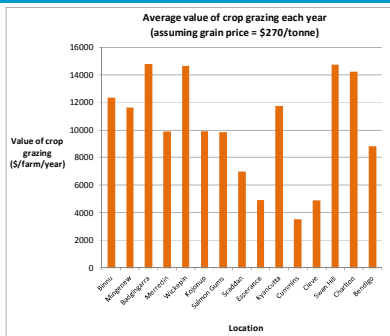
How much is supplementary feeding reduced for each additional day of grazing?



(data from Merredin simulation)

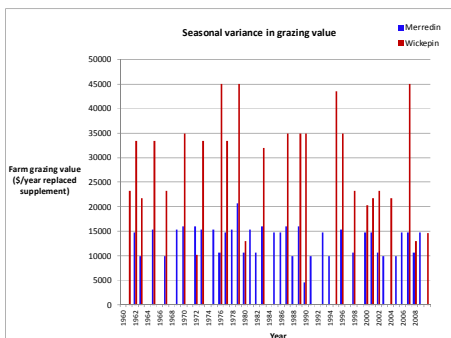
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How much is crop grazing worth?



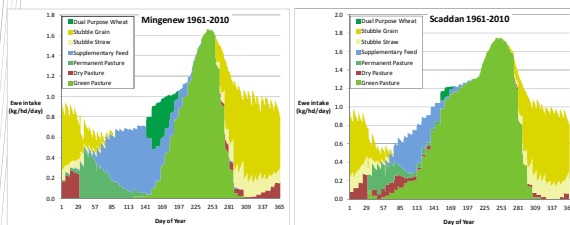
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How much does the value of grazing wheat vary between seasons and locations?

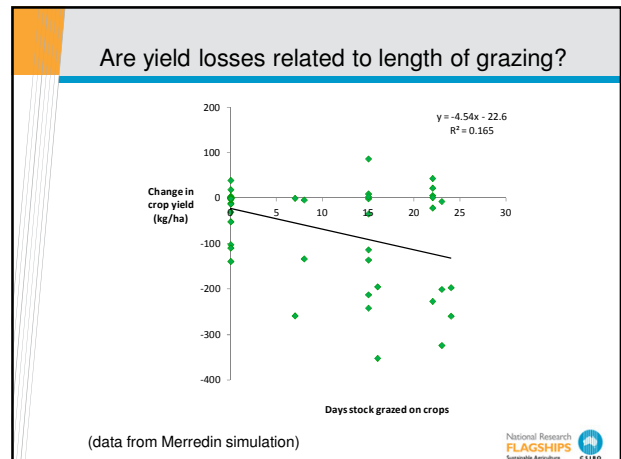
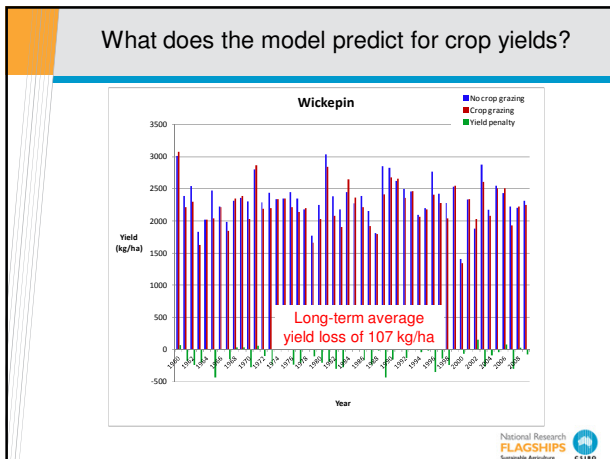


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Location differences in feedbase use



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Conclusions

- Opportunities to graze spring wheat exist in most years in the northern ag region and central wheatbelt, even when annual pastures are in reasonable shape. Canola, barley or winter wheats will likely provide better opportunities for grazing on the south-coast or higher rainfall areas.
- Grazing spring wheat is both more likely and more useful in seasons with medium-late start.
- Grazing crops are likely to be of even greater value if annual pastures are poor (i.e. low P, low plant density, poor species composition)

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Land allocation, rotations, management

Land allocation

- Crop/pasture rotation (4 x 400 ha and 4 x 200 ha paddocks). The same soil type (fertile sand) was used for all paddocks.
- Permanent pasture (2 x 300 ha paddocks). A less fertile sand was used for these paddocks.
- Feedlot (2 x 5 ha paddocks). Used for holding and feeding animals when insufficient standing forage is available.

Rotations

- The 4 x 400 ha paddocks in a pasture, wheat, wheat, wheat rotation
- The 4 x 200 ha paddocks in a pasture, dpwheat, dpwheat, dpwheat rotation

Sowing rules

- Wheat is sown after 25 April, when there has been cumulative rainfall > 10 mm over 5 days.

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Feedbase management

General

- The suitability of feedbase components for grazing is re-evaluated weekly, and animals are moved to a new paddock if required.
- Adult ewes must maintain condition score > 1.7 at all times

Dual purpose wheat

- Third priority feedbase component (after crop stubbles and annual pasture)
- Grazed only by adult ewes, although they may have lambs at foot
- The dp-wheat crops can be grazed when they reach 150 kg/ha biomass
- The dp-wheat can be grazed until zadok stage 30
- Each dp-wheat paddock can only be grazed for a maximum of 2 weeks. This is kept relatively low, because of the high grazing pressure used in the model and because the ewes are managed in a single flock and need to be rotated among the 3 d-p crop paddocks available.

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Permanent perennial pasture

- **Fourth priority feedbase component**
- The minimum animal-available dry matter for ewes grazing permanent pastures is 800 kg/ha
- Perennial pastures are only available for grazing only from 1 January to 1 May each year (targeting the autumn feed gap)

Feedlot

- Ewes and lambs are moved to a feedlot, and fed wheat and lupins (80:20) when farm standing forage options are not able to provide adequate feed.
- Ewes moved to feedlot are offered 1.5 kg DM/hd/day if their condition score < 2, otherwise they are offered 0.8 kg DM/hd/day of the supplementary feed.
- Lambs moved to feedlot are offered 1.5 kg DM/hd/day if their condition score < 3, otherwise they are offered 0.8 kg DM/hd/day of the supplementary feed.

