Implementing dual-purpose cropping and grazing in the high rainfall zone of southern Western Australia

Mixed farming enterprises of cropping and livestock are the predominant method of agriculture in southern Australia. Key to ensuring a farming enterprise's profitability and sustainability is the provision of a diversified feedbase that lowers costs for grazing during seasonal variability and filling any potential feed gaps (Moore et al, 2009). Dual-purpose cropping has the benefit of increasing livestock production, filling deficiencies in feed during low feed times of the year, while also increasing income and decreasing risk (Sharn et al, 2021).

Dual-purpose grazing is not new to the agricultural industry. Producers around the world have been trialing and applying this method for decades (Bell et al, 2015). However, it is only now that farmers in Western Australia are seeing a suitable fit for their production systems and finding a way to incorporate dual-purpose cropping. A dual-purpose crop can provide livestock with highly digestible forage in the time of year that pasture growth rates are low, while also ensuring the crop can recover to produce a crop that is of similar yield to an ungrazed crop (Bell et al, 2015).

The benefits of implementing dual-purpose cropping and grazing into a producer's rotation are numerous. Reasons to support dual-purpose cropping and grazing are that it increases the farmer's profitability and productivity while also decreasing costs for supplementary feeding. It increases flexibility within management options for the property as well as increasing stocking rates during the autumn feed gap. The feed available is typically higher quality and it also provides producers with more flexibility with marketing options for their livestock, something that is showing to be more valuable now than ever before.

Trial and commercial yield data have demonstrated early sown winter wheat can yield in the 6–8 ton/ha range and can miss frost events when sown in late March to mid-April. A further advantage of bringing winter wheat into rotation is they allow seeding equipment to be utilised over a wider sowing period and improving the overall utilisation of growers plant and equipment.

Southern Dirt Members is made up of 80% mixed farming enterprises. Average flock size for these enterprises is 2,000–5,500 breeding ewes, with a few larger enterprises with approximately 7,000 breeding ewes. Implementing dual-purpose cropping to the Kojonup HRZ would have long-term financial and sustainability benefits for a vast number of local growers.

The benefits of Red Wheat for dual-purpose cropping

As a winter type, producers have a longer grazing window during a time that is typically low on available food for livestock. Red Wheat can be sown early, even before canola if it suits the grower. Due to the sowing opportunity, the grower also can graze the plant until growth stage 31, when the growing point starts to extend. This means that it needs to be at the correct stage to grow initially and needs recovery

time between grazes. The extended growing season for Red Wheat also gives the plant the potential for an extra 28cm of rooting depth, which equates to an extra 1.2 tonnes of yield potential.

Red Wheat varieties can be selected for higher tiller density, which makes it more suitable as a forage crop. Red wheat also has a longer growing season, which gives growers the opportunity to take advantage of Kojonup's location and frost avoidance.

Winter wheats have grown in prominence in the lower Great Southern region of Western Australia in recent years as producers look to push yields (potential) beyond those of the spring wheats by taking advantage of early breaks without completely exposing the crops to frost risks. Winter type wheats are easier to graze than spring wheats because they remain vegetative for much longer. This means they can be grazed for longer periods of time compared to spring type wheat, with less risk of yield loss.

The disease resistance profile for Red Wheat is generally very good, as is their standability, which decreases lodging at harvest time. Grazing also reduces crop height.

Growth regulators are usually applied to spring crops (such as moddus evo) to reduce the final plant height to prevent lodging. With the use of livestock feeding, standability and the associated height of the crop being impacted, would suggest that potential growers would not need to apply growth regulators.

When planning to add dual-purpose crops into your farming system, accommodating the needs for nutrients and its package. N, P and K will all need to be at adequate levels to suit both the crop as well as the health of the livestock.

Methodology

During 2023, two producers in the Kojonup region hosted dual-purpose cropping trials. One paddock demonstration had a paddock in pasture and a paddock sown to a dual-purpose crop.

Site one – was sown to Red Wheat (Accroc).

Site two – was planted to a dry sown pasture mix of rye grass and clover.

The sheep were condition scored going into and out of the dual-purpose crops and pasture treatments and removed from the dual-purpose crops before GS30 stage to avoid and minimise yield losses.

Site one: Ben and Emily Webb

The Red Wheat at Ben and Emily Webbs' property has been put into a deep loamy soil, with good rooting depth potential, in the bottom of the landscape, increasing the frost risk. By planting a winter crop that early, the grower can avoid the frost risk as well as feed off the winter growth to provide for their livestock.

A total of 536 ewes were put into three separate paddocks which were seeded into the Red Wheat variety –accroc. The ewes were placed in each paddock at different stocking rates on 15 June and taken out on 14 August. Ben used three paddocks as variables where he decided to have different stocking

rates in each paddock and one control paddock which he left completely ungrazed to see what the yield comparisons of grazed and ungrazed would be.

DSE grazed vs Harvest yield total (t/ha)				
Paddock	**1 (ungrazed)**	**2**	**3**	**4**
DSE	0	11.2	15.3	25.2
Harvest yield total t/ha	2.43t/ha	3.45t/ha	2.95t/ha	1.89t/ha

Condition scores				
Paddock	**1 (ungrazed)**	**2**	**3**	**4**
DSE	0	11.2	15.3	25.2
Condition scores IN	0	3	3	3
Condition scores OUT	0	3.3	3.2	3.1

While the livestock were on the Red Wheat crop, Ben was able to recognize the need to increase the ewe's calcium both before and during their time in the crop since Red Wheat is known to be low on calcium. For future trials or on-farm applications, Ben has suggested incorporating some sub-clovers or vetches into the crop to ensure a myriad of nutritional requirements would be met for any grazing livestock.

The producer was very happy with the condition scores of the livestock coming off the Red Wheat as well as the final yields of each paddock.

Figure 1: Post-graze at Ben and Emily Webbs' property.

Site two: Nathan and Diana Leitch

At Nathan and Diana Leitches, 12 kilometers west of Kojonup, 92 merino wethers were put into a dry sown pasture mix, with the intent of removing the livestock in October. By putting a pasture into a paddock previously sown to a cereal stubble at the end of a cropping rotation, the grower has minimised losses (including poor carrying capacity and lower nutritional value from previous crop volunteers) by incorporating a pasture into their cropping rotation.

Rye grass is the dominant weed in our cropping sequence. It is vigorous, dominant and competitive. These attributes as a weed have led to it being a good pasture species due to its hardiness and suitability to a variety of different soil types. It tolerates grazing well and, with a range of varieties, farmers can tailor the maturity to suit their local climate. Newer varieties (such as what Leitches have planted) such as Atomic or Manta have a longer growing season which suits the longer Kojonup growing season and the areas long, cool finish. Older varieties, such as Wimmera, would have already matured and not suit the end of the local growing season.

Clover has an old adage – 'clover grows grass'. Due to the incorporation of a mixed sward, as the clover fixes nitrogen for itself, it also provides nitrogen for the surrounding grasses. This ensures a higher producing pasture with lower synthetic nitrogen applied to it. Nitrogen that is fixed by the clover leaks out of the rhizobia and plant roots, which then invertedly directly benefits surrounding pasture species. Clover also has higher protein levels, giving a better balance of energy for livestock. Increasing megajoules of metabolisable energy per kilogram of dry matter increase livestock growth rates and decreases their net feed requirements. A ewe on a good pasture with a good protein level has the ability to support multiple lambs.

Incorporating pastures into dual cropping and grazing

Many property owners within the Kojonup area have non-arable areas along creek lines, high-risk waterlogging areas, rocky outcrops and more to contend with. Generally, producers with these limiting factors consider incorporating mixed farming into their properties to ensure they get full utilisation out of their land. Dual-purpose cropping in the Kojonup area and resowing pasture phases are allowing farmers to increase their land use efficiency by increasing the feed availability associated with the autumn feed gap.

By using a dual-purpose cropping method, the producer can also ensure their cash crops do not have to compete with pastures and their timings since sowing dates are different, as are applications of fertilisers and pesticides.

Locally, it is suggested by agronomists that producers can increase their stocking rate up by 20–25% during seasons with tight autumn and winters in those resown areas. This will also give growers the opportunity to get critical feed on offer up to a threshold up to 2,000kg per hectare before grazing in deferred paddocks.

Conclusions

Evidence within our project over the four seasons measured will encourage other growers within the region to implement dual-purpose cropping and grazing to their current farm management plans. While the economic evidence is still in the process of being collated, the suggestion that growers in the HRZ can bridge their autumn and winter feed gap, while not being heavily impacted with yield losses at harvest time, is strongly supported through demonstration sites and the positive feedback from growers.

Applying dual-purpose crops and pastures to a mixed enterprise is proving to pay dividends. These primarily are due to the covering of the food gap during autumn and winter, but the process has also shown that there is financial reward to be had from grazing crops.

It is expected that growers in the Kojonup region will recognise and implement this process after the project is completed in 2024, with members of Southern Dirt already expressing interest in the results from all sites. The benefits of integrating dual-purpose crops into mixed farming systems are numerous while supporting the mixed farming enterprise model that so many farmers use.

References

Bell, L., Harrison, M. & Kirkegaard, J. (2015). Dual-purpose cropping – capitalising on potential grain crop grazing to enhance mixed-farming profitability. *Crop and Pasture Science*, *66*(4), i–iv. https://doi.org/10.1071/CPv66n4_FO

Dove, H. & Kirkegaard, J. (2014) *Using dual-purpose crops in sheep-grazing systems: Dual-purpose crops for sheep grazing*. Journal of the science of food and agriculture, 2014, Vol.94 (7), p.1276-1283

McGrath, S. Thomas, D. & Greer, A. (2021). Dual-purpose cropping: The opportunity for a step change in production in the temperate region of Australia. *Animal Production Science*, *61*(11), i–iv. https://doi.org/10.1071/ANv61n11_FO

Moore A., Bell L. & Revell D. (2009) Feed gaps in mixed-farming systems: insights from the Grain and Graze program. *Animal Production Science* **49**, 736–748.

Acknowledgement

This Producer Demonstration Site is funded by Meat & Livestock Australia

For further information: Sheridan Kowald, Southern Dirt Inc **M** 0455581729 **E** eo@southerndirt.com.au