AGRICULTURE

Sheep Notes



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Welcome to the spring edition of SheepNotes.

An extremely wet season for most of the state and we hope that you have all managed to stay safe and not suffered production loss. We have included some references to past articles in SheepNotes (see page 5) that may be useful over the coming months as issues like flies, worms and feed may challenge sheep farming. Thank you to all our readers who responded to our survey on how you like to get and read this newsletter and we are continuing some work in this area to look at how we can best continue to deliver. We always welcome your feedback.

Jane Court and Jeff Cave, Agriculture Victoria

Contact: Jane.court@agriculture.vic.gov.au or jeff.cave@agriculture.vic.gov.au

Specialist forages for lamb finishing

This article has been adapted by Jane Court, from an information sheet produced by Viv Burnett and Dr Eric Ponnampalam (Agriculture Victoria)

A variety of forage options are available, which can be useful options in a pasture renovation program and/or for providing quality feed for growing out or finishing stock. The main benefits of using forage crop options for finishing lambs is the provision of some high-quality feed at a time when pastures may be limiting. This article looks at some of the more specialist forages to optimise lamb growth and production.

Chicory (Chicorium intybus)

Chicory is a perennial herb highly suited to lamb finishing. It requires a minimum annual rainfall of 600 mm and will tolerate low soil pH. It has high nutritive value, with Crude Protein (CP) of 14–24 per cent, 70–80 per cent digestibility and Metabolisable Energy (ME) of 10.3–12.1 MJ/kg DM in the leaves. Chicory is usually sown in autumn



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and has its main growth period in spring and summer. It is a shortlived perennial and should persist for three to four years, although this can be extended with managed reseeding. It has a high mineral content and is generally sown in a mix, although this reduces chemical weed control options as broadleaf herbicides cannot be used (EverGraze). Soil moisture data from EverGraze indicates it dries the soil to three metres, which is comparable to lucerne. Chicory responds well to summer rain events.

Table 1 shows the range in pasture growth rates, production, and feed quality (as digestibility) for lucerne and chicory pastures at the EverGraze Hamilton Proof Site between 2007–2010 in summer and autumn.

Lambs grazing chicory can have growth rates of 190–370 g/day compared with ryegrass at 160–230 g/day or lucerne at 170–300 g/ day (Chicory factsheet, NSW DPI 2011). This may be important in areas where summer rainfall is unreliable and faster turn-off of lambs is required. In a lamb finishing experiment in NSW, lambs were finished on either lucerne based pasture or on chicory swards. Lambs grazing chicory grew faster than lambs grazing lucerne in three out of five groups, with average growth rates of between 172–312 g/day (Holst et al 1998). In the Central Tablelands region of NSW, chicory produced lamb growth rates of 125 g/day during finishing, allowing greater opportunities for producers in an environment where summer rainfall is unreliable (Holst *et al* 2006).

Plantain (*Plantago lanceolata*)

Plantain is a perennial herb requiring 550–650 mm annual rainfall. It is adapted to a wide pH range (pH CaCl2 4.2-7.8) and will tolerate low fertility soils and drought. Plantain can have a nutritive value of 13.8 per cent CP in the vegetative stage, ME of 10 MJ/kg DM with dry matter digestibility of 72 per cent (leaf) and 59 per cent (stems). It has lower palatability compared with other forage species. Plantain has its main growing season in winter and spring, with some opportunistic growth in summer. It has a relatively high concentration of magnesium (Mg) and calcium (Ca) which may assist in reducing the risk of grass tetany in mixed pastures. Plantain can be included in pasture mixes containing grasses and legumes but needs careful management to ensure it isn't smothered by other species.

Lamb performance on pure plantain has generally been poorer than on chicory and brassicas but better than perennial ryegrass in the summer/autumn.

Forage brassicas and summer canola

Forage brassicas (particularly forage rape species) are a popular option for providing quality feed in summer/autumn. They are suited to a range of soil types of varying fertility and have the capacity to produce a good quantity of feed with high nutritive value over an extended period, when winter active



Figure 2. Plantain



Figure 3. Forage rape

grass-based pastures are generally declining in quantity and quality. They can support good growth rates for lambs; however, it can take 2–3 weeks for animals to adapt before feed consumption and growth rates increase. Some results of lamb performance with other forages are provided below.

Spring sown canola

Spring sowing of winter-type canola varieties can be used as replacement for the spring sowing of a brassica/ forage rape crop for sheep production and produce similar

Table 1. Production from summer active perennials on EverGraze Hamilton Proof Site

Species	Lucerne		Chicory			
	Pasture Growth kg/ha/day	Quality Digestibility	Total dry matter Produced tonnes DM/ha	Pasture Growth kg/ha/day	Quality Digestibility	Total dry matter Produced tonnes DM/ha
Summer*	16–34 (18)	58-80%	1–2.5	6-32 (12)	60-75%	0.5–1.3
Autumn**	12–25 (23)	70–75%	0.5–2	5–31 (18)	65-80%	0.5–1.7

Figures in brackets are the average growth rates over (2007–2010) for the season.

* Summer includes Jan, Feb and March

**Autumn includes April, May

Specialist forages... continued from page 2

levels of dry matter to traditional brassica forages. They can produce three to four tonnes of DM/ha of feed with high nutritive value (approximately 12 MJ /kg DM and 14 per cent CP) over summer and autumn and into winter. If adequate growth occurs the crop can be grazed a number of times until the following winter, when it can then be locked up for seed/oil production. This system should be considered in regions with longer growing seasons suitable for spring sowing and where there is a reasonable incidence of summer rainfall events. Studies at Agriculture Victoria Hamilton have shown lamb growth rates ranged from 100 to 240 g/day once the lambs adapted to canola.

All winter-type canola varieties can be used for spring sowing as they have a vernalisation requirement and a later flowering date. Springtype canola varieties are not suitable for spring sowing, as they will try to flower early and reach maturity too soon.

Forage comparisons

Field experiments at Hamilton Victoria, in 2014 and 2016 tested seven forage treatments – canola (two different cultivars), forage brassica, lucerne, chicory, plantain and perennial ryegrass. Herbage mass and nutritive characteristics of the canola varieties were similar to forage brassica. Herbage mass in March 2014 was 3.35-3.64 t DM/ ha for brassicas; 1.05–1.37 t DM/ ha for perennial ryegrass, plantain and chicory; and 2.94 t DM/ha for lucerne. In March 2016, herbage mass was 1.86–2.05 t DM/ha for brassicas and 2.14–2.49 for the other forage treatments. Brassicas had higher ME concentrations and lower neutral detergent fibre (NDF) concentrations on most sampling dates compared to chicory, plantain, lucerne and perennial ryegrass. The crude protein concentration of the brassica treatments was not different from that of the other forage treatments.

Ewe lamb growth rates and conception rates were assessed for an autumn mating in 2014 and 2016. The grazing canolas and brassica produced similar live weight gains (in the mating and pre-mating period) of 140 g/head/ day compared to 60 g/hd/day on perennial ryegrass. Note that sheep grazing perennial ryegrass

Table 2. Reproduction rate (as fetuses scanned) on different forages with an autumn mating in 2014 (Hamilton)

	Canola	Forage brassica	Lucerne	Chicory	Plantain	Perennial ryegrass
Reproduction rate (%)	145	130	150	140	130	100

were fed additional supplement in order achieve positive growth rates. Table 2 shows the reproduction rates (as fetuses scanned) for the forages, with the highest rates for the lucerne, canola and chicory respectively. In the 2016 experiment, there were no difference in reproductive rate between the forage options grazed.

References and further information

EverGraze website: evergraze.com.au

Holst PJ, Kemp D R, Goodacre M, Hall D G (1998) Summer lamb production from puna chicory (*Cichorium intybus*) and lucerne (*Medicago sativa*). Animal Production in Australia. In 'Proceedings of the Australian Society of Animal Production' 22, 145-148.

New South Wales Department of Primary Industries (2011), *Chicory Agfact* P.2.5.40

A webinar on summer forage opportunities for lambs was held in September, with speakers Dr Ralph Behrendt (Agriculture Victoria) and Rebecca Stutz (CSIRO). If you would like to listen to the recording, contact Jane Court <u>jane.court@</u> <u>agriculture.vic.gov.au</u>

Flood information

For any urgent animal welfare needs please contact the VicEmergency Hotline on 1800 226 226

For more information about managing during and after a flood visit <u>agriculture.vic.gov.au/floods</u>



Practical biosecurity steps on your farm

The recent incursion of foot and mouth disease into Indonesia has heightened everybody's interest in biosecurity.

Strong biosecurity practices on your property are crucial to protecting your animals, as well as the safety of our food and agricultural industries, from pests and diseases.

Take these steps on-farm for high standard biosecurity:

- Ensure your <u>Property Identification Code</u> (PIC) details are up-to-date, and timely uploads of livestock movements on the <u>National Livestock Identification</u> <u>Scheme</u> (NLIS) database. PICs are free and easy to get or update on the Agriculture Victoria website.
- Do not permit visitors onto your farm if they have been in a foot-and-mouth disease (FMD) infected country within seven days.
- Have a biosecurity plan. A biosecurity plan should as a minimum promote good hygiene practices and control the movement of livestock, people and equipment onto your property.
- Make sure you document all vehicle movements onto your property, such as fodder deliveries and milk pickups, agricultural contractors and, most importantly, if you see anything unusual report it.
- Limit the access visitors or contractors have to your livestock or livestock holding areas and ensure everyone arrives with clean footwear and clothing.
- Use biosecurity signage at farm entry and exit points with clear instructions. This may include prompting sign-in processes or restricting access to certain parts of your property. Check out <u>Farm Biosecurity</u> for example gate signs (see box below).
- Have facilities and equipment in place for washing and disinfecting shoes and clothing and any other equipment and vehicles that enter your property.
- If you are working on a property and are in contact with sick animals, change your clothing and wash footwear after contact to avoid infecting other healthy animals.
- Keep up-to-date and timely records of your livestock movements on and off your property.
- When new livestock arrive on your property, isolate them and monitor them closely for any signs of sickness for up to two weeks (minimum seven days) before allowing them on to the rest of your property. Remember, diseases such as footrot and OJD, as well

Giving a biosecurity kit a run through at a recent Farm Biosecurity workshop

as lice, may take longer to become apparent so keep introduced stock separate from your main flock until you are satisfied that those diseases and parasites have not been introduced. Always continually monitor the health of your herd or flock.

- Do not feed or supply pigs with meat, meat products or any food that has been served on the same plate or has come into contact with meat. This is <u>prohibited pig</u> <u>feed</u>.
- Understand the signs of disease in different types of livestock. At first suspicion of sickness or a disease that concerns you, contact your local vet or notify Agriculture Victoria on the Emergency Animal Disease Watch Hotline phone number <u>1800 675 888</u>
- FMD is a notifiable exotic disease and any suspected cases must be reported to Agriculture Victoria immediately.
- Continually update your biosecurity plan. For more information on creating a biosecurity plan for your farm, including a plan template, visit <u>Animal Health</u> <u>Australia</u>
- To learn more about foot-and-mouth disease, and any changes to this advice, please visit the <u>Foot-and-</u> <u>mouth disease</u> page.



https://www.farmbiosecurity.com.au/ toolkit/gate-signs/



Seasonal reminders and resources

Below is a reference to some past articles that may be useful over the coming months, particularly given the wet season. These are available either as previous SheepNotes articles on the Agriculture Victoria website (agriculture. vic.gov.au and search for 'Sheep Notes') or on the FeedingLivestock website (see Figure 4 below).

Торіс	Content	Where is it
Inspect your dam to avoid failure	A detailed inspection of dams is recommended following significant storm or rain events which can impact structural integrity of dams.	SheepNotes Autumn 2022
Imprint feeding of lambs	Even after a good spring, weaned lambs may require supplements to keep them growing over summer, so to ensure they take to it quickly, train before you wean.	FeedingLivestock website- under all news articles
Tips for preventing flystrike	Blowfly strike is a scourge of the sheep industry, and sheep owners should use multiple methods to reduce.	SheepNotes Spring 2015
Summer drenches Best Practice first summer drenching strategies and Wormboss drench decision guide	First summer drench – due November/ December. In this article David Rendell discusses why and when.	SheepNotes Spring 2020
Ryegrass (and phalaris) staggers	Perennial ryegrass staggers may occur after a good spring and with summer rains.	SheepNotes Autumn 2021
Toxic summer weeds	Heliotrope and hairy panic	SheepNotes Autumn 2022 and Spring 2021
Second summer drench	Your sheep need two summer drenches?	SheepNotes Autumn 2020
To feed or not to feed	When stock prices are good, there may be interest to feed lambs on grain for earlier turn off. This article provides some guides on how to work through the rations etc	SheepNotes S <i>pring 2021</i> (or FeedingLivestock website in All News Items)
Resources for assessing feed and animal requirements over summer – and Underperforming animals in a paddock full of feed	As pastures eventually dry off over summer, it can be quite difficult (and misleading) to assess the value to stock.	SheepNotes Autumn 2021

Feedinglivestock.vic.gov.au



Figure 4. FeedingLivestock screenshot (feedinglivestock.vic.gov.au)

Feed supplements to reduce methane emissions?

Ainslie Macdonald – Research Fellow at the PICCC (Primary Industries Climate Challenges Centre), The University of Melbourne

Methane is the main greenhouse gas produced in grazing systems. Ruminant livestock (cattle, sheep and goats) have microbes in their rumen called methanogens. These microbes produce methane (from the fermentation of feed) that is then belched out. Feed with lower digestibility produces more methane than higher quality feeds. Belched methane represents energy lost from your production system that might otherwise be converted to the milk, meat or fibre that generates income. Methane is a major inefficiency in animal production systems with 2–12 per cent of the gross energy intake lost as methane. This energy loss has been calculated as the equivalent of up to 55 to 60 days of grazing intake for ewes and steers and 40 days for dairy cows. Emissions from methane need to be reduced in the move to carbon-neutral agriculture and new feed additives that inhibit methane production may assist in achieving a carbon-neutral future.

Bovaer® and Asparagopsis are two different feed additives that are currently available for commercial use in Australian cattle feedlots to inhibit methanogens from producing methane.

Bovaer[®], also known as 3-NOP, is manufactured by DSM Nutrition and replaces an enzyme required during the last stage of methane production, preventing methane from being produced. Bovaer[®] is metabolised within a few hours of consumption into compounds already found in livestock and is safely excreted with no negative effect on animals or environments. The introduction of 3-NOP during the last stage of methane production prevents the supplement from affecting any other aspect of digestion that may reduce productivity.

DSM recommends about 1 g a day for cattle to reduce methane emissions by 30 per cent, well below the maximum dosage recommended by the European Union EFSA Panel (88–100 mg 3-NOP/ kg of DMI). However, the potential for abatement could be higher in Australian diets. The only Australian study published on *Bovaer®* shows that a wheat-based diet high in oil can, in conjunction with *Bovaer®* reduce methane emissions by an average of 78 per cent in cattle. Currently, DSM is building a factory in Scotland to meet future global demand and trialling delivery methods for grazing animals including lick blocks and pellets, with the aim to roll out *Bovaer®* to ruminants in grazing systems to meet 2030 emission reduction targets. Some work has also begun on early life programming which aims to change



Figure 5. Methane is created by methanogenic microorganisms in the rumen during the fermentation of carbohydrates to dispose of by-products of digestion (H2 and CO2 gas).

the microbes in the rumen during ruminants' early life. Calves fed 3 mg of 3-NOP/kg BW mixed in water for their first 14 weeks of life sustained reductions in methane emissions for a year post-weaning. The production and transportation of *Bovaer*[®] will approximately emit 34–52 kg of CO₂ for every kg of *Bovaer*[®] produced but will prevent 138.6 kg of methane, which has a global warming potential 82 times higher than CO₂ (over a 20-year period) from being emitted.

Asparagopsis amarta and Asparagopsis taxiformis, are two red macroalgae species native to Australia's temperate and tropical coastline respectively. FutureFeed licenses companies to produce and distribute Asparagopsis as a feed additive. Asparagopsis naturally stores halogenated compounds capable of inhibiting methane production in its glands as a defence mechanism. The primary active compound in Asparagopsis is bromoform, which reacts with vitamin B12 to interfere with the enzyme required during the last stage of methane production.

The inclusion of *Asparagopsis* at 0.2 per cent of organic matter has been shown to nearly eliminate methane emissions in cattle in one study. However, post-mortem examinations on 10 sheep showed degeneration of the rumen surface from the inclusion of *Asparagopsis* at 0.5 percent of organic matter and above, suggesting that *Asparagopsis* may damage the digestive system of ruminants and doses should ensure to balance animal health and methane reductions. *Asparagopsis* can be produced in both open-ocean or land farming systems,

> but the large-scale production of *Asparagopsis* may reduce the biodiversity of marine ecosystems and increase ozone depletion by 0.18–0.48 per cent. Asparagopsis must also be harvested, processed, and stored in a specific way to prevent the loss of bromoform. Currently, the best way to process the



Figure 6. Infographic produced by DSM Nutrition to summarise the effectiveness of Bovaer®.



Figure 7. Asparagopsis armata (above) in Granada, (Southern Spain) at 5-m depth

macroalgae is in an emulsion of Asparagopsis in oil. Not only does this preserve the most important ingredient, but through a different process, the oil is able to further inhibit methane production, reducing methane with less bromoform.

There has been only one study on feedlot sheep for both Bovaer® and Asparagopsis. The first study on sheep observed that nine Segureña sheep (a Spanish breed) had an average 17.38 per cent reduction in methane emissions when fed 100 mg of Bovaer® daily. The second study on 28 Merino-cross wethers fed dried Asparagopsis at 0.5; 1; 2; and 3 per cent of organic matter on average had 15, 52, 62 and 81 per cent reductions in methane emissions respectively. Initially, there was hope that supplements would convert the energy normally consumed by methane production to increases in animal productivity, with the expectation that supplements could offset their costs through increases in meat or milk production. To date, there is no consistent evidence

that either Bovaer® or Asparagopsis will increase the productivity of animals. To be competitive and viable, supplements must be cheaper than the cost of continuing to emit greenhouse gas emissions. If Australian farmers can successfully use either product to significantly reduce emissions, this would be easier and cheaper than offsetting methane emissions in the long term. This could result in farmers accessing premium markets for products both domestically and internationally.

This article has summarised the current knowledge on these two products. It is important to note that there is significant research occurring around the world and in Australia to validate findings and address the need for practical methods to administer these products in grazing systems.

Further reading

Hegarty RS, Cortez Passetti RA, Dittmer KM, Wang Y, Shelton S, Emmet-Booth J, Wollenberg E, McAllister T, Leahy S, Beauchemin K, Gurwick N. 2021. An evaluation of emerging feed additives to reduce methane emissions from livestock. Edition 1. A report coordinated by Climate Change, Agriculture and Food Security (CCAFS) and the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) initiative of the Global Research Alliance (GRA).

The feed additive reducing methane emissions by up to 90% MLA Corporate. Published August 23, 2021. https:// www.mla.com.au/news-and-events/industry-news/ the-feed-additive-reducing-methane-emissions-by-upto-90/

Almeida, A.K., Hegarty, R.S. and Cowie, A., 2021. Metaanalysis quantifying the potential of dietary additives and rumen modifiers for methane mitigation in ruminant production systems. Animal Nutrition, 7(4), pp.1219–1230.



Be aware of the preventions for hydatids

Dr Jeff Cave, Senior Veterinary Officer, Agriculture Victoria

A peer-reviewed study has found hydatid cysts in eight per cent of cattle carcasses at a major abattoir in eastern Australia. This is consistent with data from a major Victorian abattoir, which means hydatids are a significant cause of condemnation of offal. More importantly, hydatids remain a threat to human health. In the past, hydatids were a significant cause of illness in Australian rural communities. This was largely due to the practice of feeding the offal of sheep to farm dogs, the absence of treatment of tapeworm in farm dogs, and the close physical connection between farmers and their dogs. Over time, the incidence of hydatids has decreased to the point that Tasmania and New Zealand are now provisionally free of hydatids. An understanding of the hydatid life cycle may help explain why this is difficult to achieve in mainland Australia.

The hydatid lifecycle involves two stages. The adult hydatid tapeworm lives in the intestine of dogs and dingos (and foxes to a lesser extent). The adult tapeworm produces eggs that are passed in the dog or dingo's droppings. When sheep, kangaroos and cattle ingest contaminated dog or dingo droppings, they become infected. The hydatids then develop into their immature stage as watery cysts in the soft tissues such as the liver of those animals. When a dog or dingo ingests raw offal or dead stock that contains the immature cysts,



Figure 8. Hydatid life cycle

they become infected completing the lifecycle.

Unfortunately, humans can become infected in the same way as sheep, cows, or kangaroos if they are in close contact with infected dogs. Children are at particular risk due to their close contact with dogs and their tendency to transfer eggs to their mouths. When a person becomes infected, cysts may develop in the liver, lungs, or brain. The consequences of this may be fatal. The only treatment in humans is a radical surgery to remove the cysts.



Tasmania, was able to eradicate hydatids because they didn't have wild dogs, dingos and foxes, and there was no involvement of wildlife. Its eradication program was based on treating infected dogs with praziquantel and denying dogs access to the offal of sheep, cattle, goats and pigs.

You can readily prevent hydatid disease in the same way by:

- worming your dogs regularly with an all wormer that is effective against the hydatid tapeworm
- never feeding raw offal to dogs
- promptly disposing of all dead stock
- keeping dogs kennelled or chained when not working to prevent them from finding offal or dead stock
- restricting your dog's access to household vegetable gardens and washing all vegetables thoroughly
- ALWAYS washing your hands after handling dogs and before eating, etc.

Sheep abortions

Kate Rowe, District Veterinary Officer, Agriculture Victoria

There have been several reported sheep abortion cases across North-East Victoria detected through the Victorian Significant Disease Investigation (SDI) Program. The two key infectious diseases identified have been Campylobacteriosis and Listeriosis. Ewes are usually infected through ingestion of the bacteria. Abortions are typically seen in late pregnancy.

Listeria

Listeriosis is a bacteria which can be found in the gut of healthy sheep. In the environment, it can be found in faecal material, soil, water, effluent, and spoiled feed. This bacterium is very hardy and can live in a wide range of temperatures and acidity (pH). The two forms of clinical listeriosis seen in sheep are the abortion and neurological form. The feeding of silage which hasn't fermented sufficiently and has a pH >5.5 can be a known risk factor for infected animals. However, the most recent cases of listeria related abortions observed locally have been linked to listeria growth in wet, rotting pasture and vegetation as we have seen during the favourable seasonal conditions of the past 12 months.

Treatment and prevention

Unfortunately, listeriosis is not readily treatable since the clinical signs are seen at the end stage of the disease. If faced with an outbreak of listeriosis it is best to identify and remove the source of the outbreak, and in the face of an abortion storm, to move the other pregnant ewes to another paddock. Your veterinarian may consider using antibiotics to minimise losses in the event of an abortion storm. Avoid feeding or access to poor quality silage. Feeding out on fresh, drier areas and minimising excessive wet muddy containment areas is best. Unfortunately, there is no vaccination available to prevent listeria related abortions.

Should I be worried about listeriosis?

Listeriosis is potentially a zoonotic disease so it may be transmitted to humans. At particular risk are pregnant



Figure 10. Aborted fetus



Figure 9. Many paddocks have been wet over lambing

women and people who are immunocompromised. Good hygiene should be used, particularly when handling aborted lambs.

Campylobacter

Campylobacteriosis (or Vibriosis) in sheep is another bacterial disease which causes abortion in ewes. It is one of the major causes of abortion in sheep in Australia. It is most seen in the cool and wetter months of the year. The bacteria can enter your property via healthy animals or can be spread by wild animals such as crows and foxes. After ingesting the infected material, the bacteria spreads to the uterus of pregnant sheep, which causes a placentitis (inflammation of the after birth) and subsequent abortion.

When it is first introduced into a flock it may cause lamb losses of up to 40 per cent. And once it is established in a flock it may continue to cause lamb losses of around 10 per cent, particularly in maiden ewes. Comparing scanning rates with lamb marking percentages can provide an indication as to whether the disease is an issue in a flock.

Treatment and prevention

Like Listeriosis, unfortunately there is no treatment once abortions have started. However, antibiotics may be prescribed by your veterinarian to treat uterine infection in the ewes. In the event of an outbreak, isolating the infected ewes from the main flock and disposing of contaminated aborted materials can help minimise the spread. Always remember to wear appropriate PPE as Campylobacter is a zoonotic disease, causing gastroenteritis in humans. A vaccine is now available for sheep, which costs around \$1.60 per dose, requiring two doses at three weeks apart to give initial protection, followed by an annual booster prior to joining.

Rapid investigation is vital in any case of suspect sheep abortion cases. The sooner a diagnosis can be achieved by your veterinarian, the faster treatment or other management practices can be implemented to help minimise the risk of spread in the remaining flock. Ongoing management practices such as vaccination in case of diseases like Campylobacter can be applied to minimise the risk of future outbreaks.

The value of dung beetles

Bindi Hunter (Agriculture Victoria) and Kate Joseph (Project Officer SWPLG)

Dung beetles have been the focus of on-farm demonstrations with the South West Prime Lamb Group (SWPLG). Despite a wealth of cattle related research, there is little completed on dung beetles in sheep production systems.



Figure 11. Native three-horned beetle

What's out there

Cashmore Park was one of eight farms to undertake monthly trappings, with an aim of identifying what beetles are active on sheep dung at different times of the year.

Nine species were found on Cashmore Park, including six introduced and three native species. A further two species were found on other group members' properties. *Onthophagus taurus* was the most commonly trapped beetle, found from late spring to autumn in large numbers. *O. taurus* is a small, introduced beetle, but in the large numbers observed at Cashmore Park,



Figure 13. **Dung Only, Dung+Beetle** and **Control** Olsen Phosphorus June 2021 – 1 year after burial



Figure 14. **Dung Only, Dung+Beetle** and **Control** Colwell Potassium June 2021 – 1 year after burial



Figure 12. Plant roots and an earthworm travelling through the dung tunnels

they're capable of shredding dung pats within a day, making them valuable for cleaning pastures and cycling nutrients.

The three-horned dung beetle, *Onthophagus mnisznechi* (Fig. 11), was also found in good numbers throughout the year. This native species evolved to feed on the coarse, pellet-like droppings of marsupials and was previously dismissed as a non-dung burier. However, it has proven to be adapting to livestock dung with dung-filled tunnels observed to a depth of 20cm.

Most of the species trapped at Cashmore Park are active over the warmer months, with a noticeable gap in winter and early spring. To help bridge that gap, the Keillers has selected three winter-active species (*Onthophagus vacca*, *Bubas bison* and *Copris hispanis*) and have established on-farm dung beetle nurseries to breed up populations for release.

Benefits for soil fertility

The Keillers also hosted dung burial trials to demonstrate and measure changes in soil fertility from the action of the winter-active species *Bubas bison* on three different soil types. *Bubas bison* is one of the four deep tunnelling dung beetles found in Australia and is known to bury dung to 60 cm. The trial compared 50x50 cm plots of *Dung+Beetles, Dung Only* and *Control* (no dung or beetles). Five kilograms of sheep dung was added over ten weeks to the Dung+Beetle and Dung Only plots, and 15 pairs of B. bison were added to the Dung+Beetle plots. Spare plots were excavated in spring to observe the action of dung beetles, and soil testing was undertaken across treatments the following winter at 0–10, 10–30 and 30–60 cm. Dung tunnels approximately 40 cm long and around 2.5 cm across were found beneath the beetle plots, with egg chambers at the base. Large numbers of earthworms were found under the plots and wrapped around the dung tunnels and plant roots had clearly travelled down the soil profile through dung tunnels.

Soil testing showed that the burial action of dung beetles had increased phosphorus (Olsen P) and potassium (Colwell K) to depth (Figs. 13 and 14). *Dung Only* plots had the highest surface phosphorus and potassium levels, however dung beetles had mobilised nutrients moving them down the soil profile into the 10–30 and 30–60 cm.

We would expect that the tunnelling activity from dung beetles and the increased nutrient levels at depth drives plant roots further down the soil profile, allowing them to access moisture from deeper down. This action could potentially increase the growing season, with removal of dung from the surface also reducing pasture fouling and the potential for nutrient runoff.

Next steps

While these demonstrations have finished, the SWPLG are continuing research with dung beetles and recently began a project investigating the effects of drenches and the development of drench tolerance within dung beetle populations. The Keillers have set aside a dung beetle refuge area in cattle paddocks that will remain free of recently drenched animals and insecticides while dung beetle populations are bred and released.

This project was an Enhanced Producer Demonstration Site (EPDS), co-funded by Agriculture Victoria and Meat & Livestock Australia (MLA) and support through the Dung Beetle Ecosystem Engineers (DBEE) project. Identification sheet for the dung beetles found on SWPLG farms can be found at: <u>www.agriculture.vic.gov.</u> <u>au/on-farm-demos</u> >Demonstrating the benefits of dung beetles to prime lamb producers.

Anthrax diagnosis – ICT kit for sheep project

Anthrax is an infectious bacterial disease of animals, caused by the spore-forming bacteria *Bacillus anthracis*. It can affect humans and a wide range of animals. Although most recent cases have been seen in the northern parts of Victoria, in the past Anthrax has been seen in all regions.

Anthrax exclusion testing should be carried out on all sudden, unexplained deaths of cattle, sheep and other susceptible livestock before the carcass is moved. Prompt reporting of suspected cases may potentially reduce the size of the outbreak and the level of contamination of your farm. For cattle and sheep, rapid anthrax exclusion testing can be done in the field using an (immunochromatographic test) ICT kit. The Victorian sheep and goat industries have provided funding to determine the accuracy of the ICT for diagnosis of anthrax in sheep.

The test kit has been validated for use in cattle. However, further field samples are required to finalise the validation of the ICT kits in sheep. Within the ICT project, your private veterinarian will be subsidised \$300 (+GST) per property for anthrax exclusion testing in sheep with unexplained sudden deaths. Up to 10 sheep that have experienced sudden death can be sampled from the same property. Only carcasses that are less than 48 hours old can be sampled. If anthrax was positively diagnosed and the first case associated with an outbreak you would be eligible for a one-off industryfunded incentive payment \$500. Following the positive diagnosis of anthrax an affected property is auarantined, potentially exposed stock are vaccinated, dead animals are safely disposed of usually by burning, and contaminated sites are disinfected.



If livestock die suddenly and without an obvious cause, please report the incident immediately to your private vet or Agriculture Victoria Animal Health and Welfare staff or call the all-hours Emergency Animal Disease Watch Hotline on 1800 675 888 and arrange to have the carcass tested for anthrax. The ICT validation project will continue until 31 March 2023.

Grappling with soil carbon

Soil carbon can be complex given the challenges around storing, measuring and monitoring it on livestock farms. In October, Agriculture Victoria's Beef and Sheep Networks ran a webinar on grappling with soil carbon to help explain some of the science behind these issues, to better equip farmers for making decisions on entering carbon markets.

The key speaker was Robert White, Emeritus Professor of Soil Science at the University of Melbourne. Professor White has extensive experience in soil science nationally and internationally, having worked in CSIRO, universities, and private industry. He has been actively questioning and writing on soil carbon farming for landowners and the science around soil sequestration.



In this webinar he covered:

- what is the potential to store carbon on my land and how can this be estimated?
- what changes in management might I have to make to increase and/or maintain soil carbon
- what are the possible benefits from increasing soil carbon in terms of the productivity of my business?
- what are the possible co-benefits and potential challenges for maintaining soil carbon?

Graeme Anderson, Climate specialist with Agriculture Victoria, stepped through some of the information resources available to farmers and chaired the Q&A session which covered a range of topics.

If you are interested in listening to this video (or just the transcript for reading) contact Jane Court: **jane.court@agrculture.vic.gov.au**.



Foot abscess or footrot?

Dr Jeff Cave, Senior Veterinary Officer, Agriculture Victoria

One of the main animal health issues for producers a good spring may bring is foot problems in sheep. A question often asked is *"is it foot abscess or footrot?"*

A sheep with foot abscess will usually be very lame in just one foot. This is an important difference from footrot where more than one foot will invariably be affected. Although foot abscess is associated with the bacterium *Fusobacterium necrophorum* it is not contagious. In contrast, footrot, caused by the bacterium *Dichelobacter nodosus*, spreads readily in warm, moist conditions.

The foot of a sheep with foot abscess will appear hot, swollen and painful. The abscess can be present in either the toe or the heel of the foot. A foot abscess contains pus. It can be treated by hoof paring to provide drainage for the pus. Antibiotics prescribed by your veterinarian will also help. In a spring with abundant feed sheep become unusually heavy and this coupled with standing on wet pasture or muddy ground for an extended period leaves them susceptible to developing foot abscess.

The severity of the effects of footrot, which are inflammation between the toes and underrunning of the hoof, will depend upon whether the strain of bacteria is benign (mild) or virulent (severe). Footrot can be controlled through foot bathing. Virulent footrot can be eradicated but a long, hot, dry summer is needed. For further advice please contact your local veterinarian or Agriculture Victoria veterinary or animal health officer.



Foot inspection

Maremmas to protect stock from wild dog attack?

Kim Woods, National Wild Dog Action Plan Communications Coordinator

Victorian wool growers who have used livestock guardian dogs long-term, believe that they are not a panacea to controlling dingoes and wild dogs. According to growers, livestock guardian dogs require an investment in training, handling and care and must be protected by electric predator fencing. They should also be used in conjunction with a wild dog management program.

East Gippsland wool growers Philip and Patrizia Neven fight "fire with fire" using five desexed male Maremmas to protect their sheep flock from wild dog predation. The Maremmas work in conjunction with electric predator fencing on their Tubbut property, together with a coordinated regional baiting program and a professional wild dog controller. Members of the Bonang-Bendoc Wild Dog Management Group, the couple now have fewer foxes and rabbits on their property due to the Maremmas and believe the local coordinated 1080 baiting programs have resulted in increased numbers of bandicoots, ring tailed possums, goannas and lyrebirds.

Philip and Patrizia were running 1000 Merino sheep in the 1990s and were losing 200 a year to wild dog predation. When 400 lambs, hoggets and ewes were attacked in a two-year period on an absentee block 20 kilometres away at Bonang in 1999/2000 they decided to trial livestock guardian dogs. Mr Neven said Maremmas were not for everyone and must be handled correctly, trained, and used in conjunction with electric fencing to prevent roaming. To protect the flock from wild dog packs, he suggests using two to three Maremmas, with young dogs taking one to two years to settle into the job. He said one usually stays with the mob while the other two act as scouts.

"Put the pups in with hoggets rather than lambing ewes – it takes three to six months for them to really bond with the sheep and hopefully they will stay on your property. Older trained dogs tend to roam. Electric fencing trains them to stay within your property as you don't want them causing hassles with your neighbours. We have all desexed males as we can't afford to have them mixing with the wild dogs. Even though our fences are electrified, they may still find a hole in the fence and go roaming. The professional wild dog controller is trapping along our boundary and lays baits at a distance."

Mr Neven said lambing percentages had improved from 70–80 per cent pre-Maremmas to 100–110 per cent today. But, he said, the benefits of guardian dogs were not always appreciated by neighbours or farm staff. "You've got to be the right person to own a Maremma – it's a bit like owning a horse when you don't like riding them. We usually pay from \$500–\$1000 for a pup and it costs us \$200 a year per dog for food." Mr Neven said Maremmas would be ideal for guarding livestock in peri-urban areas but must be kept within electrified boundary fencing. He said it was important to continue wild dog management with baiting and trapping on a regional scale.

Mac and Jo Fraser have used Maremmas to guard their sheep for almost 15 years on their property at Tallangatta



East Gippsland wool grower Philip Neven uses Maremmas to guard his sheep flock from predation. Image credit Neven family.

Valley in northeast Victoria. They have had up to eight Maremmas in the past but have reduced to two working in conjunction with electric predator fencing. Mr Fraser said any incursions of wild dogs were chased out by the Maremmas and lambing percentages had increased from 50 to 110 per cent. "We were having so much trouble with wild dogs, we tried everything including baiting, trapping and shooting, and the Maremmas are another tool."

Mr Fraser said professional wild dog controllers working locally in tandem with aerial baiting programs had reduced wild dog activity in his area. "When there are dogs about, there is no one thing that will fix it – since the aerial baiting has occurred it has made a big difference to the wild dog numbers to relieve the pressure."

National Wild Dog Management Coordinator Greg Mifsud said producers should regard livestock guardian dogs as one of an integrated suite of management tools for controlling wild dogs. Mr Mifsud said there was a level of commitment required for training and management to make them work effectively as part of your business just as is the case with any working dog. "In the US, guardian animals are effective, but they are in the presence of a full-time herder – they are not left out in the paddocks by themselves as we do. They have people living with them 24 hours a day and the dogs work as an alarm system rather than a direct security system. The Americans employ people from countries with historical herding cultures. If the Maremmas are not in the presence of humans, there is a risk things can go pear shaped."

Mr Mifsud was a contributor to the Guardian Dogs: Best Practice Manual for the use of Livestock Guardian Dogs by Linda van Bommel and published by the Invasive Animals Cooperative Research Centre. He said the manual provided guidelines for producers on how to manage their livestock guardian dogs to prevent incursions on neighbouring properties.

Helpful links:

www.wilddogplan.org.au

New mapping tool will help predict the impact of future climate variability

Agriculture Victoria scientists are working with farmers, industry experts, other government agencies, and partners to develop a predictive tool that will help farmers and industry advisors make informed decisions about potential climate change impacts in their region.

The Agriculture Climate Spatial Tool (ACST) will use advanced biophysical models to integrate land use information, industry information, and climate change projections for the years 2030, 2050, 2070, and 2090 for the two greenhouse gas Representative Concentration Pathways (RCPs) of 4.5 (moderate emission scenario) and 8.5 (high emission scenario).

The tool, which will be invaluable to farmers, industry advisors, and agriculture students will generate highresolution information, maps, and analytics on climate thresholds (for example days above 40 degrees). It will also detail the potential impacts on agricultural productivity including changes in yield, phenology, irrigated water demand, and water availability. Growers and industry experts will have a strong involvement in developing the farming scenarios and testing the products.

Users will be able to examine maps and charts of grazing, cropping, horticulture, and forestry commodities at a range of scales from the farm up to statewide. The tool will also provide analysis for local government areas, Catchment Management Authorities, and industry regions.

The models will provide information to help farmers understand, adapt and make informed decisions about planting, water needs and future climate risks to production. Sheep farmers and their advisers across the state will be able to investigate the potential future climate change impacts on their pastures, both by examining the predicted frequency and changes in the relevant climate thresholds and through the modelled impact on pasture productivity. Modelled productivity impacts for pastures (perennial ryegrass, cocksfoot, phalaris) include seasonal live and dead dry matter, digestibility, and seasonal growth rates. Sheep farmers who also crop will also be able to get this information for crops (wheat, canola) including yield, growing season duration, growing season rainfall, and soil water at planting. Users will also be able to see predicted impacts on the water balance including runoff, recharge, evapotranspiration (ET), and top and subsoil moisture.

Prototype testing will commence in late 2022, and the tool will be available through an interactive online spatial viewer in 2023.

Learn more about how Agriculture Victoria is helping the agriculture sector respond to climate change and reduce emissions through its Agriculture Sector Pledge program of work that includes undertaking research trials to test methane inhibiting feed additives, delivering an innovative pilot involving 250 farm businesses in a free on-farm emissions assessment and delivering the tools and services to help farmers reduce emissions while maintaining productivity and profitability.

For more information about the ACST contact Dr Dugal Wallace, Research Leader, Landscape and Water Sciences, <u>dugal.wallace@agriculture.vic.gov.au</u>



Figure 15. Annual Growing Degree Days – Annual sum of daily average temperature above 10oC in 2050 under RCP 8.5

Digital tips



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Trouble with sound when joining Zoom meetings or webinars?

Zoom is great technology for having meetings or hearing presentations without travelling. Sometimes I notice people have trouble getting the audio to work – and I have had problems when using other computers. Here are some simple tips to getting the audio to work.

First make sure that the sound is turned up on your computer by checking the volume icon on the bottom right of your screen (**a**).

If that's doesn't work, try clicking on the Zoom audio settings on your screen, usually down on the bottom left as the microphone. Click on the arrow beside this to see the microphone and speaker options (**b**).

Click 'test speaker' and it will play sound and ask you if working. If you don't hear sound, you might have the option here to change sources and test another speaker on your computer (**c**).

If still not working – you can click the 'switch to phone audio' (underneath the test speaker option) and phone options will appear for you to call in from your mobile phone. You can keep the Zoom meeting or webinar open on your computer to see the presentation.

A tip for when you're not that digital (or clear as to where you are!)





Got a digital tip to share? Send to: jane.court@agriculture.vic.gov.au

Agriculture Victoria animal health and sheep industry contacts

Although our offices are currently closed, the office numbers provided below are diverted to staff who can assist you. Alternatively, you can contact Agriculture Victoria on 136 186.

		Meat and Wool Services		
	off as Contract	Livestock Industry	Land Management	
Location	Office Contact	Development Officers	Omcers*	Animal nealth
South-west region			/	
Ararat	136 186	v		
Ballarat	5336 6856	<i></i>	\checkmark	✓
Colac	5233 5504			✓
Geelong	5226 4878		<i>√</i>	✓
Hamilton	5573 0900	1		\checkmark
Horsham	0343 443 111			\checkmark
Queenscliff	5258 0229			
Warrnambool	5561 9946	✓		\checkmark
South-East region				
Attwood	9217 4200			\checkmark
Bairnsdale	136186	✓	\checkmark	\checkmark
Cranbourne	136 186		\checkmark	\checkmark
Ellinbank	5624 2222	✓	\checkmark	\checkmark
Leongatha	5662 9900		\checkmark	\checkmark
Maffra	5147 0800	✓		\checkmark
Swifts Creek	5159 5134	✓	\checkmark	
Northern region				
Alexandra	5772 0200		\checkmark	
Benalla	5761 1611	✓	\checkmark	\checkmark
Bendigo	5430 4444	✓	\checkmark	\checkmark
Echuca	5482 1922			\checkmark
Rutherglen	02 6030 4500	✓		
Seymour	5735 4300			✓
Swan Hill	5036 4800		\checkmark	✓
Tatura	5833 5222		\checkmark	\checkmark
Wangaratta	5723 8600			\checkmark
Wodonga	02 6043 7900		\checkmark	\checkmark

*Farm planning, soil health advice, soil conservation advice, dryland farm water planning

 \circledcirc The State of Victoria Department of Jobs, Precincts and Regions, 2022

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ISSN 1326-4559

ISSN 1836-4756 (Online)

Accessibility

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