

Pasture and crop: Increase your productivity

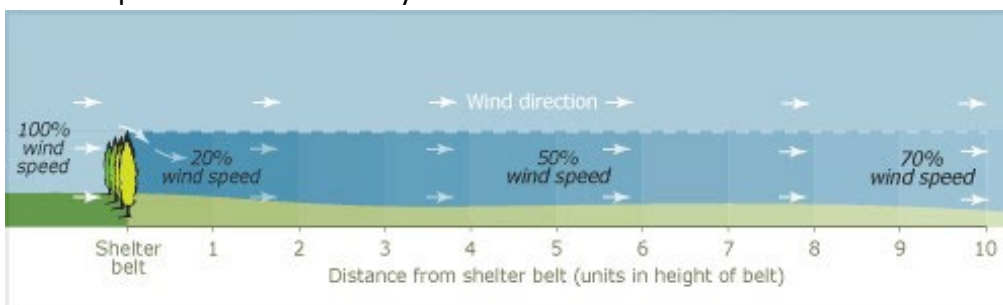
How? Shelter! Shelter! Shelter!

Strategically placed shelterbelts have many farm productivity benefits:

- helping prevent soil erosion, nutrient loss and salinity
- conserving soil moisture, which extends the pasture growing season
- providing firewood, posts, timber, fodder, honey and homes for insect eating birds
- acting as a firebreak
- increasing medium to long-term land values

Shelterbelts can be:

- A filter to reduce wind force while allowing some air movement. The height of the shelterbelt determines the size of the sheltered area; taller trees protect a greater area.
- Grassed shelters that can reduce wind chill.
- North-south facing hedges offering the best protection.
- A tree only shelterbelt which provides shade on hot days and will reduce some wind chill but is not as effective as trees and shrubs.
- A single tree in a paddock which can create adequate shade on hot days but will not reduce wind chill.



The best shelter belt is moderately permeable, so some wind flows through as well as over the trees. Effective shelter will be provided on the lee side for about 10 times the height of the shelter belt.



Shelter benefits:

- ✓ Planted shelter belts slow down the wind. This reduces moisture loss from soil and plants in summer and autumn and helps delay the effects of drought. It limits buffeting of fruit, shoots and flowers by strong wind, and makes it easier for insects to pollinate plants.
- ✓ Depending on crop type, soil moisture levels, rainfall and wind speed, sheltered crops may produce 5–15% more than those without shelter.
- ✓ Shelter belts around orchards help reduce drift of horticultural sprays to about 12% of that from unsheltered areas.
- ✓ As well as enhancing productivity, shelterbelts can improve the sustainability of a farm through reducing erosion and the impact of salinity.
- ✓ Shelterbelts can improve the aesthetic and capital value of a property as well as providing an improved working environment.
- ✓ Through reducing the level of exposure of pastures to harsh conditions, shelterbelts can improve the productivity levels of a livestock enterprise.



For information about potential incentives to plant trees and shrubs for shelterbelts contact the Goulburn Broken CMA on 5822 7700 or via our website www.gbcma.vic.gov.au

References:

- Economic Development, Jobs, Transport and Resources website <http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/erosion/shelterbeltsfor-control-of-wind-erosion>
- Shelterbelts for Livestock Productivity* Note number: LC0138, October 2009 Agriculture Victoria <http://agriculture.vic.gov.au/agriculture/livestock/sheep/victorias-sheep-meat-and-wool-industry/sheephealth-and-welfare/shelterbelts-for-livestock-productivity>
- Gillingham, Allan 'Shelter on Farms - Benefits of *shelter*', Te Ara – The encyclopedia of New Zealand, <http://www.teara.govt.nz/en/shelter-on-farms/page-2>
- The Economic benefits of native shelter belts* report by Basalt to Bay Network issue 3/2015 [The Economic Benefits of Native Shelter Belts Report — Victoria n Landcare Gateway](#)





Stock (cattle & horses): Increase your productivity

How? Shelter! Shelter! Shelter!

Strategically placed shelterbelts have many farm productivity benefits:

- protecting livestock from cold winds, rain, frost or heat stress in summer
- helping prevent soil erosion, nutrient loss and salinity
- conserving soil moisture, which extends the pasture growing season
- reducing bio-security hazards to stock from neighbouring land
- providing firewood, posts, timber, fodder, honey and homes for insect eating birds
- acting as a firebreak
- increasing medium to long-term land values

Shelterbelts can be:

- A filter to reduce wind force while allowing some air movement. The height of the shelterbelt determines the size of the sheltered area; taller trees protect a greater area.
- Grassed shelters that can reduce wind chill.
- North-south facing hedges offering the best protection.
- A tree only shelterbelt which provides shade on hot days and will reduce some wind chill but is not as effective as trees and shrubs.
- A single tree in a paddock which can create adequate shade on hot days but will not reduce wind chill.



Shelter benefits:

- ✓ Through reducing the level of exposure of stock and pastures to harsh conditions, shelterbelts can improve the productivity levels of a livestock enterprise. One of the most important roles a shelterbelt can play is the prevention of the death of livestock due to exposure during harsh weather conditions.
- ✓ Shelterbelts do this by providing shelter and reducing the effects of 'wind chill'. Wind chill is the combined effect of low temperatures and wind. The wind increases the loss of body heat from the livestock. During wet conditions the impacts of wind chill combined with wet stock can be lethal.



Shelter benefits:

- ✓ The provision of shelter can reduce the effects of hot, cold and windy conditions. The energy stock would normally expend on maintaining their body temperature can then be utilised for increased wool, meat and milk production.
- ✓ Higher rates of pasture productivity and lower amounts of energy expended on body temperature maintenance by stock can lead to higher levels of condition, higher birthing rates, higher stocking rates and/or lower requirements for supplementary feeding.
- ✓ The provision of shade research has found that cattle within sheltered paddocks have an average 2% higher calving rate and that the amount of feed required to maintain body temperature is substantially reduced.
- ✓ In serious droughts, the foliage from shelter belts (lucerne trees and salt bush plants) can be harvested and used to feed stock. Use of appropriate tree species may encourage bees, especially in early spring, and predators or parasites of crop pests. Shelter belts also provide habitats for birds, and native trees may attract native birds.



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References:

Linden (2015) *Profitable biodiversity assets – making \$ from the shade and shelter on your property.*

The Economic benefits of native shelter belts report by Basalt to Bay Network issue 3/2015

Economic Development, Jobs, Transport and Resources website <http://agriculture.vic.gov.au/agriculture/farmmanagement/soil-and-water/erosion/shelterbelts-for-control-of-wind-erosion>

Shelterbelts for Livestock Productivity Note number: LC0138, October 2009 Agriculture Victoria

<http://agriculture.vic.gov.au/agriculture/livestock/sheep/victorias-sheep-meat-and-wool-industry/sheep-health-andwelfare/shelterbelts-for-livestock-productivity>

Gillingham, Allan *'Shelter on Farms - Benefits of shelter'*, Te Ara – The encyclopedia of New Zealand,

<http://www.teara.govt.nz/en/shelter-on-farms/page-2>



Increase your profits

Shelterbelt designs

A well-considered property plan ensures objectives including landscape integrity, biodiversity, and agriculture are considered. Many cost-effective digital mapping programs can be downloaded from the internet and used with appropriate data to complete a farm map as the basis for development of whole farm plan.

The location of a shelterbelt is influenced by considering all site features such as: property infrastructure, prevailing seasonal winds, soil type, problem areas of erosion and salinity, remnant vegetation, use of nonarable areas and other on-site specific features. It is therefore important to specifically design the shelterbelt to suit the required purposes / benefits.

Below: Grassed shelter



Below: Permeable shelterbelts of trees and shrubs



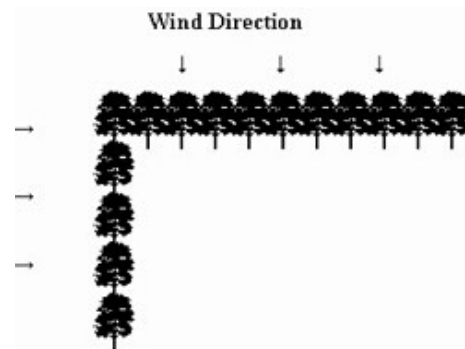
In the Goulburn Broken catchment, plant shelterbelts and windbreaks running north-south.

Right angled windbreaks provide protection from a range of wind directions.

During summer, shelterbelts protect crops and pastures from severe evapotranspiration, wind, and soil erosion; such situations benefit from a grid of shelterbelts using north-south and east-west orientations.

An “L” shaped permeable shelter belt with trees and shrubs provides shade for stock at various times of day and protection from winds from all directions and prevents permanent shading of pasture, exposing all areas to sun at different times of the day.

Generally, the protected area equals the length of the belt x height of shelterbelt x 10. Minimum length should be ten times the height (tallest tree). Therefore, a 25m high tree should create a shelterbelt 250m long.



Effective locations are high in the landscape (ridgeline) producing the greatest area of protection.

Planting on contour lines should be avoided as localised frosts can result.

References:

Linden (2015) Profitable biodiversity assets – making \$ from the shade and shelter on your property.

Whole Farm Planning courses are available on request from DEDJTR Benalla offices.

EverGraze Shelter Investment Tool www.evergraze.com.au/library-content/shelter-investment-tool/

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Sheep farmers: Increase your productivity

How? Shelter! Shelter! Shelter!

The value of shelterbelts in raising agricultural productivity have been demonstrated in Australia potentially increasing profit of grazing sheep by at least 15%

(Source: Linden (2015) *Profitable biodiversity assets*)

Strategically placed shelterbelts have many farm productivity benefits:

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- reducing bio-security hazards to stock from neighbouring land
- providing firewood, posts, timber, fodder, honey and homes for insect eating birds
- acting as a firebreak
- increasing medium to long-term land values

Shelterbelts can be:

- Trees and shrubs: filter and reduce wind force while allowing some air movement. The height of the shelterbelt determines the size of the sheltered area; taller trees protect a greater area.
- Grassed shelters: (see figure 2) reduce wind chill.
- Hedge shelters: north-south facing hedges offer the best protection.
- A tree only shelterbelt provides shade on hot days and will reduce some wind chill but is not as effective as trees and shrubs.
- A single tree in a paddock creates adequate shade on hot days but will not reduce wind chill.

Shelter benefits:

- Ewes exposed to 32+°C after joining have a 40.7% fertilisation success
- Heat stress reduces conception rates in sheep. Refer to figures shown below

Breed	Sheltered (marked per ewe lambd)	Unsheltered (marked per ewe lambd)	Difference Extra Lambs/100 ewes
Merino	126%	102%	24
Coopworth	157%	139%	18





- ✓ Sheltered sheep showed a 31% increase in wool production and a 21% increase in live weight in a five-year trial.
- ✓ In shorn sheep, shelter that reduced wind speed by 50% reduced energy losses by 20% and increased live weight by 30%.
- ✓ For sheep and lambs, the greatest benefits of shade are for days over 32°C and high wind-chill days.
- ✓ Shelter increases pasture growth by 10% and sheep require 10% less pasture to maintain body heat in cold conditions when shelter is available. The combined effect of these benefits is expected to generate on average an extra \$0.93/DSE per year.
- ✓ Heat load reduction on ewes at joining and lambing results in lambs with faster growth rates and more wool during their first 16 months of life. Heat stress reduces wool growth by reducing feed intake.
- ✓ Cold stress reduces live-weight gain by 6kg in sheep and depresses wool growth by 25%, while heat stress reduces wool growth by reducing feed intake.
- ✓ Sheltered off-shear wethers require only 1/3 the supplementary feed as unsheltered stock.
- ✓ Heat stress is detrimental to ram fertility, ovulation rate and conception in ewes and foetal development.



Figure 2 www.gbcma.vic.gov.au

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References:

Linden (2015) *Profitable biodiversity assets – making \$ from the shade and shelter on your property.*

Thwaites (1967) *Embryo mortality in the heat stressed ewe I. The influence of breed* J Reprod Fertil August 1, 1967, **14** 5-14

Dutt (1964) *Detrimental effects of high ambient temperature on fertility and early embryo survival in sheep.* Int. J Biometeorology

The Economic benefits of native shelter belts report by Basalt to Bay Network issue 3/2015

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website <http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/erosion/shelterbelts-for-control-of-wind-erosion>

