



How to design shelter belts also know as living barns

Hen Curtis is trialling shelter belts on her farm

Hen has been an organic livestock farmer for 30 years. She needed a design which was compatible with her grazing plan, but which brought in the benefits from the trees in terms of shade, shelter and nutrition.

[Hen is part of a 12 year farmer-led research project into silvopasture. Click here to follow how it's progressing.](#)

How shelter belts fit into the farm business

Her main priorities for design were ensuring her animals had shade, shelter from cold wind and from rain, and access to minerals which are lacking on her farm such as selenium and iodine. She was also keen to ensure direct access for livestock to feed on trees for self-medication and nutrition, to give animals rubbing posts for skin and coat health and to have a supply of tree fodder, either fed fresh or preserved.

Environmentally Hen is also keen on increasing soil carbon through sequestration and creating more biodiversity on the farm.

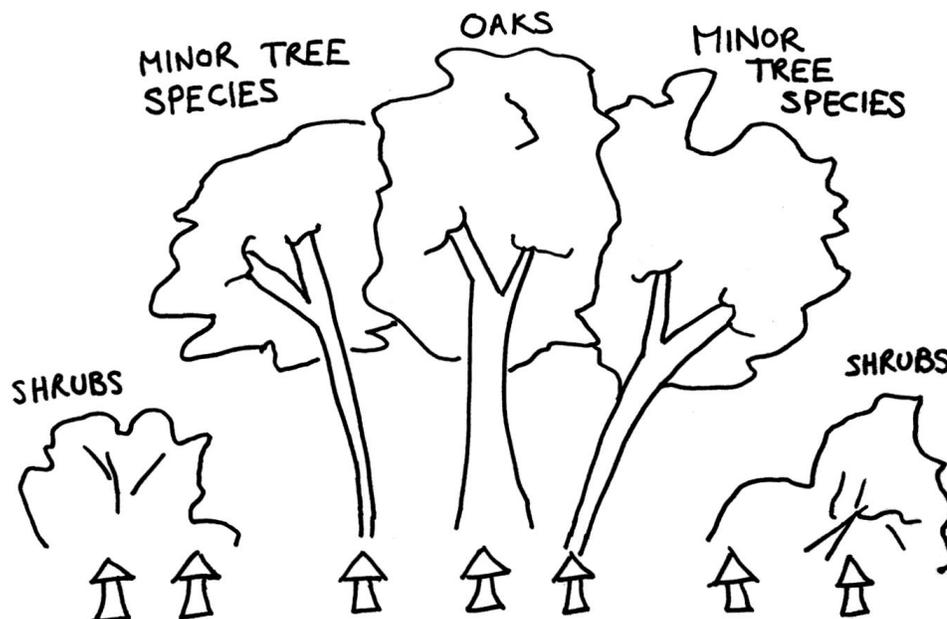
The concept of living barns is to create zones of tree shelter that livestock can choose to access directly on the field. The taller trees in these 'barns' naturally reduce exposure to sun, rain and wind and the lower trees and shrubs offer a source of nourishment and nutrition.



The silvopasture design for shelter belts

Hen has chosen a 4 ha field to introduce shelter belts. Because of its position on a hill, the field is exposed to strong winds and her animals are currently without shade and shelter.

Each belt of trees has been planted 12 metres wide in strips across the field. They are oriented north-south to ensure they block the prevailing westerly winds. In the middle of each belt, Hen has planted larger trees like oak, scots pine and aspen. These are planted 3.2 metres apart. At either side of these trees in the belt she has planted faster growing trees like common alder and downy birch. On the outside of the belts she has planted clusters of shrubs including willow, hazel, spindle and elder. Finally, she has planted a mantle of three hawthorn shrubs around each 'standard' tree. She expects these thorns to be outcompeted as the trees mature. Overall Hen has planted 20% of the field with a density of 200 trees per hectare



Why chose the shelter belt agroforestry planting design?

- As the trees mature over the coming decades, the belts will change form as the 'major broadleaves' such as oak, scots pine and aspen outcompete the 'minor broadleaves' such as alder, cherry and birch. For this reason, the major broadleaves are planted in the centre of the belts where they will be sheltered by the shrubs and minor broadleaves as they grow, before rising and eventually outcompeting the neighbouring trees.
- The hawthorn around each tree will provide a protection for the larger trees, ensuring that the livestock do not damage the trees in early development by rubbing. This should mean the field is taken away from Hen's grazing system for less time as the livestock can return to graze once the hawthorn is established but the trees are still delicate. This diminishes one of the biggest concerns some farms can have around taking their pasture out of the rotation for so long.
- By grouping the shrubs together there is a higher chance of some surviving if and when they get grazed off by deer and livestock. These clusters also end up as easy access fodder strips for livestock to feed on when they are comfortable in the shade.



The benefits of silvopasture shelter belts

Whilst the farmer loses access to 20% of their pasture through the establishment period, and grass growth will be reduced in the belts over the long term, there are considerable benefits to this system:

- The shelter belts can extend the grazing season as the animals do not have to leave the field for the barn to get the shelter they need in winter. The shelter from the trees also provides a helpful microclimate for the pasture, increasing temperatures early in spring and extending the grazing season by boosting productivity.
- If the field is used for lambing, research shows that shelter belts can substantially reduce lamb mortality as the sheep will be able to use the trees as a living barns reducing their exposure to wind, sun and rain as they lamb.
- The shrubs and smaller trees have varied nutritional benefits for the livestock giving them access to minerals, protein and condensed tannins for self-medication.
- The trees increase biodiversity (with knock on benefits with various ecosystem services), soil health and carbon sequestration on the farm.

Drawbacks of shelter belt design

- As grazing is excluded through the establishment period, BPS payments may be lost in the shelter belt areas.
- Grass growth will be restricted in the shelterbelts.
- There is a potential risk of increased blow fly presence in the belts (although some research suggests this is more than counteracted by the corresponding increase in predators such as bats and birds).



How many trees and shrubs in the shelter belt silvopasture design

Standard Trees (% total)	No.	Shrubs (% total)	No.
Downy birch (10%)	86	Elder (5%)	33
Field maple (5%)	34	Elm (10%)	86
Oak (20%)	171	Hazel (10%)	86
Scots Pine (5%)	33	Holly (5%)	34
Alder (5%)	33	Spindle (5%)	34
Aspen (5%)	34	Willow (15%)	113
		Hawthorn (separate)	1269

How much does the shelter belt silvopasture design cost?

Item	Unit
Total area of field (ha.)	4.23
Area of belts (ha.)	0.85
Number of trees	846
Number of thorns	1269
Fence (meters)	1163
Cost of trees	£2597.22
Cost of thorns	£761.40
Cost of fence	£5815.00
Total	£8,412.22



Find out more about farmer led research

Follow how the [12 year silvopasture field lab](#) progresses. Or [get in touch](#) to discuss your own ideas.