Devon silvopasture network – Trial design

The field lab will work with multiple partners to conduct research across a range of topics, looking at environmental and animal behavioural metrics as well as certain practical management considerations. The methodology for each of the research topics is still be developed, so the below will give an overview only.

Biodiversity

This trial will research the impact that introducing trees in three different silvopasture designs (shelterbelts, regular spacing and 'cluster' planting) has on several biodiversity metrics, looking particularly at those that have implications for livestock health and performance. Biodiversity metrics recorded will included flies (head counts), birds, dung beetles and bats.

FWAG SW will coordinate volunteers from wildlife groups including BTO, The Devonshire Association and Devon Bat Group to monitor bird, invert and bat populations.

Methodology:

- Historic data will be collated for birds and bats for each trial area from BTO and the Devon Biodiversity Records Centre. Transects will be developed for each site and base line surveys will then be carried out for each of the biodiversity metrics mentioned above in spring and summer 2021, shortly after the trees have been planted.
- Monitoring will be carried out on each site every other year for the first 5 years of the trial, with monitoring after 10 years being funding dependent.
- Data will be collated by FWAG SW at the end of each survey year.
- Controls will be taken from each farm in areas of open grassland and, where possible, closed canopy woodland.

Ground vegetation:

The trial will research the impact of silvopasture on the botanical composition, yield and nutritional properties of ground vegetation, as an indicator of both productivity and biodiversity.

Surveys will be carried out across a cross section of silvopasture designs at regular intervals to assess the correlation between canopy closure and changes to swards at different stages of tree maturity. Botanical surveys will be carried out by FWAG SW adviser, yield will be plate metered by the farmers after grazing/cutting to assess regrowth rate, and nutrition will be measured through grass analysis.

Baseline measurements for all three metrics will be taken in spring 2021; botany will be surveyed at 3 yearly intervals, yield and nutrition will be measured at baseline, then again after 5 years then every 3 years thereafter.

Soils

This element of the trial will be led by Rothamsted Research. Research topics can include

- The effect that introducing trees into grazing systems has on soil organic carbon, and the potential for increasing SOC through the soil profile down to 1m above levels found in permanent pasture and closed canopy woodland.
- The impact of silvopasture on drainage and water retention, and the potential for trees to improve productivity while reducing leaching and emissions on pastures with poor drainage.
- The effect of silvopasture on soil microbiology, potentially including mycorrhiza networks, (dependent on funding)

Methodology:

- The methodology for the soil research is being developed by Rothamsted Research

Animal Behaviour

The animal behaviour element of the trial will be led by Lindsay Whistance at the Organic Research Centre. The metrics that will be researched have been chosen to match the priorities of the farmers. They include:

- Shade, and its influence on animal performance and disease incidence
- Shelter, and its influence on mothering ability of ewes and cows, mortality of lambs, disease incidence and performance
- Body Maintenance – the influence of access to trees for rubbing on skin condition and external parasite control
- Minerals – influence of trees on the mobilization of macro and micro minerals, how this manifests in the soil, sward and leaf browse, and the impact on associated health and performance indicators
- Trees as fodder – nutritional value of different tree species and behaviour of animals in relation to different tree species available as browse. Impact of different tree species on internal parasite management.

Methodology:

- The methodology for the animal behaviour research will be developed by the Organic Research Centre

Establishment Considerations

The trial will also gather information on more practical considerations around establishment including:

- Tree protection, looking at the efficacy and financial viability of the different approaches to fencing, e.g. single strand electric, ring fence electric, permanent sheep netting. Also how far electric fence needs be placed from the trees at different stages of establishment
- The use of 'sacrificial willow' and decoy rubbing posts to protect trees from damage by browsing and scratching when livestock are introduced and thus allow for earlier reintroduction of livestock to planting areas.
- The use of limited sheep grazing to control scrub encroachment during establishment
- The impact of livestock grazing on shrubs such as willow, hazel and hawthorn through the establishment period
- Establishment speed at different planting densities within different designs – e.g. cluster planting at 400 trees/ha, regular spacing at 200 trees/ha, shelter belts at 1600 trees/ha

Methodology:

The establishment aspect of the research will be developed with support from the Organic Research Centre and will rely on a mixture of farmer records and monitoring from FWAG SW.

- Fencing – a range of different approaches to fencing are being trialled across the trial participants. Farmers will record details of their fencing, associated costs, and incidents of livestock and deer intrusion.

- Decoy rubbing posts – farmers will trial the use of various of types of rubbing post to distract animals from rubbing on trees before they are large enough to withstand it. Various designs of post and strategic positioning will be trialled and, using a check list issued by FWAG, farmers will make records on the rubbing behaviour of stock when presented with both posts and young trees.

- Sheep grazing to control scrub: a number of farmers will introduce sheep to planting areas through the establishment period to help retain sward condition. The farmers will observe the behaviour of the sheep and make records against a checklist issued by FWAG to show how the sheep interact with the trees, if they attempt to graze above the tree guards and if so how long it takes before they do so.

- Farmers will trial the use of unprotected, 'sacrificial' willow whips, taken as cuttings from hedges etc and heeled in, as a means of distracting livestock from protected trees and shrubs

in the first years of establishment. They will make records against a checklist issued by FWAG to show how the livestock interact with the trees.

- Impact of livestock grazing on shrubs: Records will be kept by farmers/FWAG to investigate how livestock browsing influences the development of shrubs through the establishment phase. Research will look at the impact of sheep vs cattle on shrub development, and look to identify the appropriate levels of browsing to encourage leaf growth. Records will be kept by farmers against a checklist issued by FWAG and designed with the Woodland Trust.

- Establishment speed: the trial includes a number of farms which are trialling a range of different planting densities and designs. FWAG/WT will record growth rates of trees and analyse results for correlation with different planting designs/densities. Methodology to be developed by the Woodland Trust