Tree fodder in silvopasture systems

Tim Pagella,
School of Natural Sciences, Bangor University

With inputs from: Andy Smith, Diego Moya, Christina Marley, Charlotte Pritchard, Prysor Williams, Peirs Davies and Dewi Jones
Silvopasture

- Combinations of trees with grazed pasture
- Includes various forms of forest grazing as well as trees retained in pasture to provide fodder and either shelter or shade, or both, for animals
- Most common form of agroforestry in the UK
  - Approx. 547,600 Ha in the UK (excluding hedgerows) - den Herder et al., (2016)
Benefits of silvopasture

Seen as critically important climate change strategy
Ranked #9 in Project Drawdown’s 100 Climate solutions

Additional On farm benefits in the form of shelter, fodder

https://www.drawdown.org/solutions/food/silvopasture
Shelter benefits

• Livestock productivity is all about...energy balance and welfare!
• Strategic placement of green infrastructure (shelter) such as trees and hedgerows could improve the productivity of pasture-based livestock systems
Overall, ewes that were given access to shelter experienced fewer shepherding problems than those without.
Why Tree Fodder?

• Farmers have used fodder trees since ancient times and they were common in traditional feeding systems.

• Fodder trees are a common and important feed source for livestock in a wide range of farming systems throughout the world.

• In the UK there is renewed interest in the potential for using tree fodders particularly for addressing micronutrient deficiency and for their anti-parasitic properties associated with the secondary compounds (tannins) found in the leaves.

Photos courtesy of ORC
Tree hay
Forgotten art

- Traditionally a cut and carry system
- Tree material was harvested and stored June/July
- Stored for up to 24 months
- Traditionally major species in the UK were Ash (*Fraxinus excelsior*) and Elm (*Ulmus minor*)
- Important in drier conditions as trees will continue growing when grass fodder has dried.
Why is tree fodder important?

Trees generally contain higher levels of some micronutrients than grasses.
- Varies by species, season and context
- The balance of compounds found in the leaves will vary through the year (including the levels of tannins found).

As a result tree fodder has a number of potentially important properties:
- The presence of condensed tannins may be important for increasing the flow of proteins to the intestine in ruminants
- Presence of secondary compounds may have anti-parasitic properties (health benefits)
- Tree fodder may improve uptake of some trace elements.
Methane is produced by the rumen microflora (bacteria, protozoa & fungi) that are critical to support digestion of fibrous material.

- Microbes also use some of the energy and nutrients ingested themselves, reducing the amount available for the animal.

- Bioactive compounds (such as tannin), in tree leaves can suppress methanogenic microflora and so potentially increase the nutrient pool available for animal metabolism and growth.

- More work required on understanding long term effect of tree leaf material on animal productivity, health and GHG emissions.
Where now?

• Knowledge
  • Farmers will need advice on which species to grow to suit their context
  • Design will vary with farming system
  • Trial and error

• Area
  • How much land is required for tree fodder systems to be effective?
  • Row systems may be most practical in terms of feeding efficiency and ease of management but that may not fit in some systems? Are there other design options?
Thank you