Fodder trees on dairy farms

Sandra Novak

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Extend the grazing season with trees and shrubs

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Dairy cows grazing a paddock recently planted with fodder trees *Ref : Sandra Novak*

Why browse woody plants?

To face the challenges arising from decreasing water and fossil fuel resources, dairy systems will have to limit their use of irrigation, mineral nitrogen fertilisers and exogenous concentrates.

Grazing is a critical aspect of energy and water-saving management. However, the quantity and quality of grazed forage are highly dependent on climatic conditions. In Atlantic French regions, grazed grasslands currently provide forage in spring and, to a lesser extent, in autumn. However, grassland production is much reduced in summer. Climate change will probably increase drought conditions in late spring and summer, and also the overall variability of grassland production annually. Trees and shrubs could provide a complementary forage resource on dairy cattle farms.

White mulberry and grassland in August 2016
Ref : Sandra Novak

How to integrate woody plants in a grazed paddock

An agroforestry paddock (3 ha) was co-designed with farmers, researchers, technical institute engineers and extension agents and implemented in February 2015 on the experimental cattle dairy farm of INRA in Lusignan (Nouvelle Aquitaine, France). Fodder trees were planted in the grazed paddock to be browsed by cattle in a couple of years, but also to provide wood chips. Two types of pruning techniques of fodder trees will be tested: pollards of *Morus alba* and *Alnus cordata*, and coppices of *Salix caprea, Ulmus minor, Robinia pseudoacacia* and *Alnus incana*. High stem trees (*Pyrus communis, Gleditsia triacanthos, Sorbus domestica*) were also planted, mixed with various layouts with pollards and coppices, as farmers wanted to test the diversification of tree uses.

Three spatial organizations of trees were tested with single, double or triple-row sets, with an inter-row spacing of 20 m. To restrict the browsing of the newly established trees, seven types of tree protection were compared: single or double line of electric fence, electric fencing tape, metal or plastic fences, olfactory repellents and a barrier tape. Another option of tree protection was to exclude the paddock from grazing and to mow the grassland during the first years of the establishment phase.
Additionally, the nutritive value of several woody plants leaves was evaluated to determine the woody species that could be included in the diet of lactating cows.

A pasture-fodder tree agroforestry demonstration paddock for ruminants in Lusignan (France)
Ref : Sandra Novak

AGFORWARD Agroforestry for Europe

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Advantages

- Integrating fodder trees and shrubs in a cattle dairy farm can provide additional fodder, especially in summer and autumn, when grassland production is low. It therefore contributes to strengthening the resilience of the farm.
- Integrating trees and shrubs can also improve animal welfare by providing shade in summer and shelter from wind and rain in winter.
- The deep rooting of trees and shrubs also permits them to use soil nutrients and water resources not available to herbaceous plants, and hence to produce fodder without the need for fertilisers and irrigation.

Leaves of Italian alder collected to be analysed
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How to protect young trees from cattle

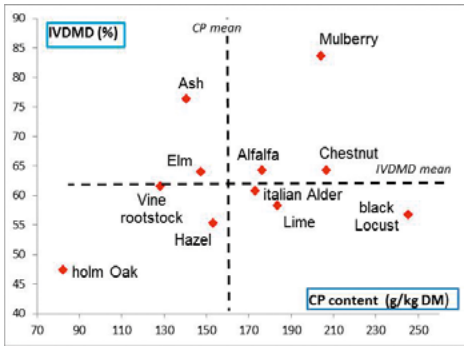
After two years of evaluation, the most efficient forms of protection were the following: electric fence, electric fencing tape and metal fence. Electric fence and electric fencing tape are quickly installed and facilitate the mechanical control of the vegetation although they are relatively expensive. Metal fencing is cheaper and offers the opportunity to be used as a trellis for fodder climbing plants (e.g. vines). However, it needs more time to be installed and it complicates the control of the vegetation on the tree rows. To limit the damage of deer, it is necessary to use mesh tree guards and it is recommended to spray a wild deer repellent.

Spatial organization

Planting trees reduces the available grazing area. This loss will be recovered once trees become productive. However, when considered relative to the number of tree seedlings, double and triple row sets could become more beneficial than single row sets in terms of time needed to control the vegetation on the tree rows and on costs. Double and triple row sets also open opportunities not provided by a single row set, e.g. a mix of different tree uses. An understorey cover composed by species with low growth helps to limit the maintenance of the vegetation within the tree rows.

Nutritive value of tree leaves

The composition, nutritive value and ruminal degradability of leaves from woody resources exhibit large variation between species. White mulberry and common ash have sufficient digestibility and nitrogen degradability to be included in the diet of lactating cows in mixed crop-livestock systems, and their quality is higher than those of grasses or lucerne in summer. Other species such as lime, elm, Italian alder are also promising and may be used to feed ruminants with lower needs (e.g. suckler or dry cows).



In vitro **digestibility (IVDMD, %) and crude protein content (CP, g/kg) in leaves of woody plants and lucerne collected in summer 2015 (Emile et al. 2017)**

Further information

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