Agroforestry for ruminants in Northern Europe: recent studies to address challenges expressed by stakeholders

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Agroforestry could play several functions in ruminant production systems, but at present it constitutes only a minor part of ruminant husbandry in Northern Europe. Ruminant livestock farmers need more scientific and practical knowledge for the implementation of agroforestry systems. During meetings held in France, the Netherlands and UK in 2014 in the framework of the AgForward project, the expectations and questions of farmers related to agroforestry were collected. They identified the need for more data on the nutritive value of tree leaves, as well as information on methods to protect young trees from ruminants and on the spatial arrangement of trees in the paddock. Other demands were more country-specific. In the Netherlands for example, dairy farmers were preferentially interested in the health benefits for cows and the effect on soil.

To answer these multiple demands, several studies were implemented in these three countries (Table 1) and gave first promising results. However, to promote agroforestry in ruminant production systems several knowledge gaps still remain, such as the proportion that tree biomass could play in the diet, the presence of antinutritional compounds, the effects of nutritive value of tree leaves on the health and production, and the role of trees on ruminant welfare, especially in the case of climate change.

Country	France	The Netherlands	UK
General aims of the studies	integrating agroforestry into dairy cattle systems	fodder trees for cattle and goats	combining organic livestock and bioenergy production
Authors	Novak et al. (2017)	Luske et al. (2017)	Smith et al. (2017)
Specific studies conducted in each country			
Nutritive value of tree fodder	Analyses comparing tree species, management modes, seasons (Emile et al., 2017)	Analyses of macro and micronutrients of three tree species on two soils at three periods (Luske & van Eekeren, 2018)	Analyses comparing five tree species
Spatial organization of the trees in the paddock	Test of multipurpose trees (fodder, timber, litter, fuelwood)		
Tree protection from cattle	Test of seven types of protection		
Use of tree leaves as conserved fodder			Test of air-drying three tree species and analyses of dried material
Effect of trees on soil properties		Effect of two tree species on soil organic matter and earthworm biomass	
Self-medicative behaviour of dairy cows		Preliminary case study	

Table 1: Studies implemented in three European countries to answer questions of farmers expressed in the framework of the EU FP7 AgForward project (2014-17)

Keywords: silvopastoral, ruminants, innovations.

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