

Quality legume-based forage systems for contrasting environments: COST Action 852

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Introduction Agricultural systems that reduce environmental degradation, sustain agricultural productivity and economic viability, maintain stable rural communities, enhance the quality of life and respond to increasing demand for livestock products are promoted in developed countries. Though major challenges exist, forage legumes, adapted to a wide range of soil types, climatic conditions and management systems, will become increasingly important components of sustainable agricultural production systems in Europe. Temporal and spatial variation in legume performance often occurs. Compared to pure grass systems, legume-based systems may lead to increased N losses. To what extent ruminants can use the protein from forage legumes, and whether there are differences among species and cultivars are unknown. To improve reliability and the range of forage legumes, we must understand the constraints of environment, the reasons for divergence between species potential and actual performance and the most efficient way to use the herbage. The COST Action 852 - Quality legume-based forage systems for contrasting environments was set up to help resolve some of these questions.

Objectives and benefits The overall objective of Action 852 is to increase the quantity and quality of home-grown proteins from regionally adapted legume-based forage systems. This will benefit: society by producing high quality animal products (e.g. low in residues, high in fatty acids) coupled with reduced environmental impact, the farming industry by developing more reliable systems (species selection and management), and the scientific community by stimulating active communication between scientists by a multidisciplinary approach. To achieve this, Action 852 has 3 working groups, each with its specific objectives and common experimental protocols. The countries in Europe with sites in the common protocols range from Iceland to Greece and Finland to Spain. There are sites in North America and Australia also.

Working Group 1: Legume genetic resources The main areas of study are: mechanisms of adaptation of the legume plant and its associated micro-organisms, the genetic basis of adaptation, and breeding of plants/micro-organisms (including both traditional and molecular techniques). A common experiment started in 15 sites in 12 countries to determine whether populations of forage legumes with a wide genetic base are more productive and stable over time and location than those with a narrower genetic base.

Working Group 2: Sward management The main areas of study are: mechanisms resulting in successful sward establishment, mechanisms affecting competition and complementarity in mixed swards, sward dynamics, and nitrogen flows in legume-based systems. A common experiment has started in 38 sites in 20 countries to examine whether there are benefits of species mixtures over monocultures in terms of productivity, persistence, resistance to invaders and increased nutrient retention over broad environmental gradients.

Working Group 3: Forage utilisation The main areas of study are: animal intake and grazing behaviour, quality aspects of legume-based fresh and ensiled forage, and the mechanisms of N-flows within the ruminant. A common experiment has been developed at 9 sites in 7 countries to examine the quality of legume-based fresh and ensiled forage and investigate how herbage composition relates to N use efficiency and milk and meat quality.

Conclusions COST 852 is still in its early days, yet already we have seen the power of internationally integrated experimentation. Such interaction has the potential to extend beyond the confines of the action and sets up a framework for true international exchange of research findings.