Enhancing the sustainability of ruminant livestock systems through multispecies swards

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Ruminant livestock production systems have an undeniably important role to play in ensuring global food security and human nutrition. However, the intensification of many grassland areas, particularly in temperate regions of the world over recent decades, has given rise to increasing societal concerns regarding the environmental sustainability of these systems. These concerns and associated pressures for change, often relate to the simplification and homogenisation of more botanically diverse grasslands to monocultures of high yielding species such as perennial ryegrass (PRG; *Lolium perenne* L.).

From an agronomic perspective, PRG offers many benefits, however, its performance is largely predicated on high inputs of fertiliser nitrogen (N). Such reliance on N fertilisers presents a number of significant challenges, including: 1) economic cost to farmers and 2) environmental costs, including elevated nitrous oxide emissions, increased risk of water pollution, and loss of biodiversity. Such simplification of sward composition can also result in reduced resilience to environmental perturbations such as drought.

While there is no definitive definition of what constitutes a multispecies sward (MSS), they are generally regarded as agronomically improved grasslands that have been sown with 3+ species that represent different plant functional groups i.e. grasses, legumes and forage herbs. Species are selected for inclusion based on differing but complementary traits, and commonly include, but are not restricted to: PRG, timothy (*Phleum pratense*), cocksfoot (*Dactylis glomerata*), white and red clover (*Trifolium repens and pratense*), chicory (*Cichorium intybus*) and ribwort plantain (*Plantago lanceolata*).

Based on more than a decade of research and a number of projects, including SmartGrass and SmartSward(<https://www.ucd.ie/research/impact/casestudies/smartgrassimprovingthesustainabilityoflivestockfarming/>), HeartLand (<https://www.heartlandproject.eu>), Multi4More (<https://multi4more.ie>) and FaSTEN, this presentation focuses on the potential of MSS as a low-input, high-output alternative sward type, with the potential to address many concerns regarding the sustainability of ruminant production systems. In particular it will focus on MSS potential to: 1) maintain, and in many cases increase production of high nutritive value herbage dry matter, at relatively low rates of N inputs; 2) enhance animal performance and health; 3) reduce the carbon footprint of food outputs; 4) maintain high quality food production; 5) increase resilience to environmental perturbations e.g. drought; 6) enhance invertebrate biodiversity; 7) reduce economic costs incurred by farmers – all relative to high N fertiliser input PRG monocultures. In addition, barriers to MSS usage including: 1) farmer perceptions, 2) weed management, and 3) concerns regarding persistence of the forage herb component of the swards, will be considered and discussed.