Teagasc's current grassland research programme

Researchers across TEAGASC cover a variety of topics from clover and grass breeding to environmental sustainability and more in the grassland research programme.

The competitive advantage of Irish animal production systems is based on the efficient production and utilisation of grazed grass. Irish pasture has the potential to grow between 11 and 15 tonnes of dry matter (DM)/ha/annum, which is approximately 20 % more than that produced in Western Europe. Recent technological advancements have resulted in significant increases in farm profitability through an extended grazing season and higher pasture performance. The development of the PastureBase Ireland decision support tool has allowed the adoption of best grazing management practice at farm level.

The key challenge in the future will be to further increase animal production per hectare by improving pasture growth, grass quality, increasing nitrogen (N)-use efficiency and reducing greenhouse gas (GHG) emissions. The grassland research programme is focused on the following themes.

Grass and clover breeding and evaluation

The research focus is to improve grass production, utilisation and consequently animal performance through the application of plant-breeding technologies. This will be achieved by selecting grass and white clover varieties with improved DM production, canopy structure, quality characteristics, N-use efficiency and persistence.

The continued development of the Pasture Profit Index and a new Clover Profit Index, combined with the continued development of on-farm evaluation of varieties, will ensure that grass breeding and evaluation will be aligned with those traits of most importance at farm level.

The integration of genomic selection into the breeding process has just been initiated into the Teagasc breeding programme.

Grazing management

The focus of this research is to improve the growth and utilisation of grazed grass through improved grazing management practices. Key factors include: pre-grazing herbage mass; post-grazing residual; pasture allowance; and, sward digestibility. Daily grass DM intake will be increased, if not maximised, by adhering to important sward characteristics, such as maintaining a high proportion of green leaf combined with a high clover content within the grazing horizon, while allocating an adequate daily herbage allowance. The extension of the grazing season length is a major objective of all grassland farmers and this will continue to be a focus of the grassland research programme.

Evaluation of grass-clover-based systems

The recognition of the benefits accruing from the high forage quality and N fixation characteristics of grass-white clover pastures has led to a resurgence of interest in white clover. Recent research has shown very promising results in terms of increased animal performance and reduced chemical N requirement, without any reduction in grass DM production from perennial/white clover pastures. This has resulted in

increased N-use efficiency. This will require a strong and focused knowledge transfer (KT) programme in order to get it adopted at farm level. A new aspect of the clover research programme is to incorporate commercial farms with high sward clover content across the country into an outreach project to complement the research.

Rumen digestion and supplementation

There are opportunities to increase the productivity and efficiency of pasture-based systems by strategically modifying the nutrient supply of the cow. Strategies include, but are not limited to, improved pasture management, optimisation of concentrate supplementation, and selection of superior plant genetics. To select the optimal strategy, quantitative knowledge of how the diet interacts with the ruminant, the nutrients it supplies, and the metabolic requirements of the cow, is crucial. Recent results from new feed analysis demonstrate that the neutral detergent fibre fraction (aNDFom) of immature pasture comprises a large, potentially digestible pool that degrades rapidly in the rumen, allowing for high milk production performance to be achieved from pasture-only diets. Autumn pasture was shown to contain a lower proportion of digestible material, which degrades at a slower rate when compared with spring and summer pasture. Incorporating a novel experimental measurement procedure (i.e., the omasal sampling technique) has demonstrated that extensive rumen degradation of pasture amino acids (AA) occurs. It also showed that protozoa supplied a much larger amount of microbial AA and exhibited shorter generation time than previously assumed. This indicates that cows consuming pasture-based diets exhibit a large dependence on microbial AA to support metabolisable AA supply. Overall, these findings highlight new opportunities to increase the productivity and efficiency of pasture-based systems.

Grass growth modelling

Grass growth is highly variable, largely due to the interaction between grazing management, weather and soil components. Additionally, sward growth will be influenced by sward age and composition, and fertilisation management. Increasing the predictability of grass growth and animal requirement increases confidence in feed budgeting. In recent years, there have been major gains in this research area. The Moorepark-St Gilles model is now used to predict grass growth on grassland farms across the country. Information required to complete the predictions includes grassland measurements and fertiliser management recorded in PastureBase Ireland, as well as meteorological data from Met Éireann. It is hoped that this will be rolled out nationally in 2022 for grassland farms on PastureBase Ireland.

Environmental sustainability

Grazing systems need to become more environmentally sustainable, as necessitated by a range of environmental directives including the EU Nitrates Directive, EU Water Framework Directive, the Kyoto Protocol and the EU Farm to Fork strategy. In developing sustainable grass-based systems, research will focus on ways to avoid conflicts in meeting these demands and find win-win situations that boost production and decrease environmental impacts. The research programme is focused on the improvement in use efficiency of phosphorus (P) and N on farm, and defining the net global reduction in GHG per unit of milk production (kg milk solids) that can be achieved with grass-based systems.

Evaluation of grazing systems

The focus of this research is to achieve maximum performance of the whole farm system by optimising the interaction between grass, supplementary feeding and grazing animals. Grazing systems must integrate the main technologies from component research studies within the farm system to achieve a balance between best management practices to maximise grass growth and utilisation, while continuing to achieve relatively high animal performance. The major limiting factor to increased animal production from pasture is acknowledged to be the amount of pasture grown and utilised on the farm. The emphasis in grazing system research is on improving growth of the existing sward on the farm through a combination of improved nutrient-use efficiency and achieving an improved alignment between grass growth and feed requirement during the grazing season, as well as reseeding poor-performing pastures with higher-performing varieties (grass or grass-clover combinations). The evaluation of multispecies swards is now part of this research strategy, with some of these species having potential beneficial effects on reducing urinary N leaching (plantain).

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