Dairy systems for a sustainable tomorrow

Sustainability is hard to define and hard to achieve, but in Ireland dairy farmers start with some great advantages.

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Can you think of another word for 'sustainable'? Difficult, isn't it. We know it's a good thing for a business, or for any set of circumstances, to be 'sustainable'. Basically, it means there are no weaknesses in the system which might lead to someone crying halt, this just has to stop!

Sustainability, or lack of it, is used a lot in relation to farming systems. And sustainability is not just confined to environmental considerations. It also covers the economic, physical and mental well-being of those involved in farming, the quality of food produced and animal welfare.

If performance in any one of these areas falls below an acceptable standard something will 'give' and the business may fold. The coming decades are likely to see increased pressures on food production systems, both on the demand side, from increasing population and per capita consumption, and on the supply side, from greater competition for inputs and climate change.

Society's requirements are changing too, as discerning consumers have become increasingly engaged in how food is produced and sceptical about industrial-scale food processes. In addition to being more profitable and less complex to farm, future farm systems must be more transparent, supplying healthier foods from traceable production models.

They will differentiate their products based on tangible evidence of improved environmental conservation, biodiversity and animal welfare, and a reduced reliance on hormones, chemicals, and antibiotics. For grassland production models, such as those traditional to Ireland, improving the sustainable production of livestock products provides challenges and opportunities.

While the shift to more intensive production within both industries, has put more pressure on natural resources, at the same time, there is a greater understanding of the role of pasture-based food production in efficiently converting human inedible feed to high-quality nutrients, while building 'natural capital' and delivering a range of multifunctional services to society.

In comparison with cropping, permanent pastures provide an important biological filter that reduces nutrient and chemical run-off to surface and groundwater, conserve soils and support unparalleled biodiversity and carbon storage.

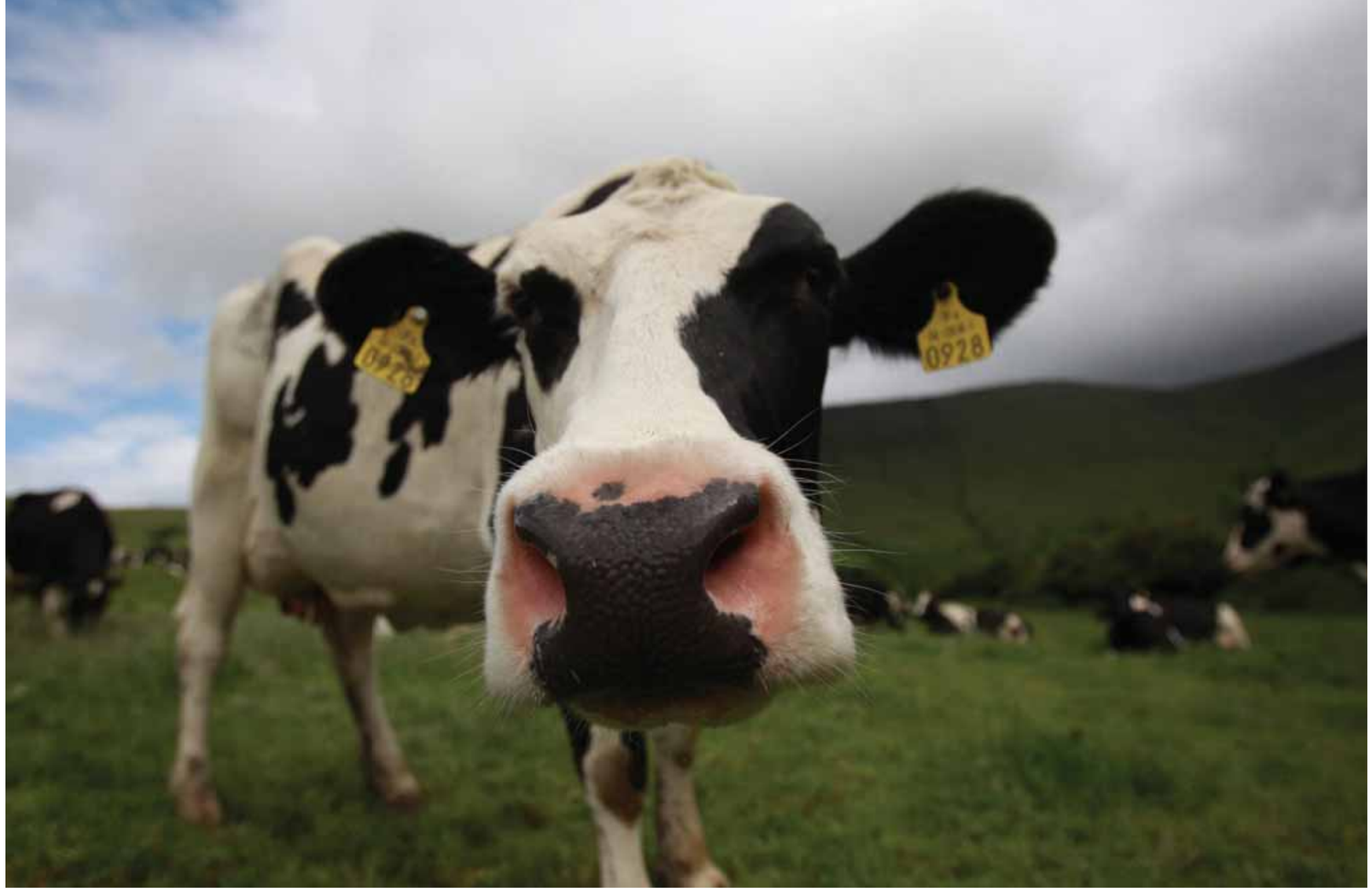
In a European context, improving the efficiency of grazing production systems is considered as the greatest primary opportunity to develop more resilient farming systems in the future.

Future pasture-based dairy systems will continue to depend on highly productive pastures and efficient ruminants.

Substantial additional gains in farm profitability can be achieved on most farms by refining the grazing system. The greatest gains will come from increasing pasture production and utilisation followed by conversion to milk fat plus protein (milk solids; MS), and this will continue to be the primary avenue to improved environmental efficiency over the next two decades.

Research modelling results indicate that for each 1t DM/ha increase in pasture utilisation on dairy farms, GHG emission intensity is reduced by 4% and net farm profit is increased by €173/ha.

Further improvements in pasture productivity can be achieved by improving grazing management, reseeding unproductive swards and improving soil fertility to optimum levels. Optimising the soil pH to ≥ 6.3 through application of lime on acidic mineral grassland soils is vital to ensuring efficient use of applied nutrients.



Teagasc data indicate that a 10-day increase in grazing season length increased annual farm profitability by €30 per cow, and reduced GHG emissions by 2% per annum. In addition, where soils are maintained within the optimum pH range, productive grass and clover persist for longer, resulting in reduced cultivation and increased carbon sequestration.

Selecting more efficient dairy cows is also paramount. There are two key goals: firstly, to extend the lifespan of each animal and reduce the requirement for replacements; and secondly, to further increase individual animal performance from grazed pasture.

Increasing herd Economic Breeding Index (EBI) by €10 per year increases annual farm profitability (by €20/cow) and reduces GHG emissions by 2% per annum. In addition, selection of dairy cows that are capable of achieving large intakes of forage relative to their size and genetic potential for milk production increases feed efficiency and reduces nutrient losses.

Efficient grazing animals should produce in excess of 90% of their body weight in annual milk solids production to increase N use efficiency. On that basis, dairy farmers should aggressively select using EBI and use milk recording to identify and eliminate inefficient animals.

Stocking rate

Stocking rate (SR) is the key strategic decision for pasture-based dairy farms and is defined as the number of animals allocated to an area of land (ie cows/ha). Although the beneficial impacts of SR on grazing system productivity have been widely reported, as part of a resilient system focus, the impact of SR on environmental efficiency must also be considered.

Previous studies have indicated that where increased SR is associated with increased chemical fertiliser and supplementary feed importation, nutrient surpluses increase, and nutrient-use efficiency is reduced. This can result in increased losses to groundwater and the general environment.

However, recent SR studies have reported either stable or declining nitrate leaching with increasing SR; the critical proviso, however, was that strictly no additional N fertiliser or supplements were introduced at higher SR.

It is now recognised that a number of changes to management practices are required to maintain low levels of nutrient loss within more intensive pasture-based systems, including increased grazed pasture utilisation, greater use of organic manures to replace chemical fertiliser, more strategic use of chemical N.

Reduced cultivation reseeding methodologies, improved grazing management and nutrient budgeting, and, importantly, the preferential management of higher risk farm areas will also play a role. Previous studies have also reported that the carbon footprint of milk production will be reduced by maximising the use of grazed pasture at appropriate overall SRs.

In short

Improved efficiency in dairy systems is a significant challenge for the future. The world demand for food will increase with both population growth and increased economic prosperity, but milk production systems must be sustainable, without negative impacts on animals and the environment.

Resilient pasture-based milk production systems have the capacity to absorb shocks and thrive within the changing and uncertain global milk production environment. Such systems, based on high-productivity grassland management in combination with genetically elite adapted animal genotypes, are well placed to meet the increasing global demand for food within a resource constrained environment, while producing high quality products produced meet the highest standards of sustainability, sanitary quality and nutritional value for increasingly discerning consumers.