

**Project number:** 5663  
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## Development of a grass economic index for ranking perennial ryegrass cultivars



### Key external stakeholders:

Grassland farmers, dairy industry, grass seed industry, grass breeders, grass evaluators, advisors

### Practical implications for stakeholders:

The development of this index has identified key traits which influence the economic performance of a grass based dairy farm and quantified the effect each trait will have on the overall profitability of the system

- Rank cultivars based on their economic performance
- Assist farmers in the selection of cultivars
- Farmers can easily identify cultivars which are performing well in a particular trait and can select cultivars to meet their farm requirements accordingly

### Main results:

- The grass economic index was published in 2010
- Cultivars ranked according to their performance with a grazing system
- Cultivars with highest economic contribution to the system can be identified
- Scenario analysis identified that economic ranking is stable regardless of system, farming intensity or milk price

### Opportunity / Benefit:

- This information will assist farmers in the selection of perennial ryegrass cultivars by highlighting the advantages and shortcomings of a cultivar in economic terms
- Key traits identified which grass breeders should incorporate into their breeding program in order to ensure the best cultivars are being selected for grazing systems.

### Collaborating Institutions:

DAFM  
AFBI  
UCD

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### Project background:

Perennial ryegrass is the most important forage grass species used in temperate agriculture for ruminant animal production. In Ireland, 80% of the agricultural area is devoted to pasture, hay and grass silage. The economic merit of an individual grass cultivar across a full production year has not been quantified previously. In cattle breeding, the development of a total merit index to assist farmers in identifying the most profitable bulls and cows (Veerkamp et al., 2002) has been successfully adopted and accepted in many countries including Ireland (Economic Breeding Index; ICBF, 2008). The development of a similar approach to rank grass cultivars would be a significant advancement in grass selection to guide grass breeders, research scientists, advisors and farmers in identifying grass cultivars that would deliver the highest increases in profitability at farm level. The identification and application of economic values to each trait of economic importance (DM yield, silage yield, quality and persistency) and the presentation of grass cultivar ranking based on their total economic merit will provide the industry with information on the optimum cultivars for a system.

### 1. Questions addressed by the project:

- What are the key grass production traits influencing farm profitability?
- What is the economic value of a change in each trait?
- Is cultivar ranking stable in economic terms if farming system, intensity or product price is altered?

### 3. The experimental studies:

The economically important traits were identified based on their importance in influencing the profitability of a farm system. The key traits were spring, mid-season and autumn grass dry matter (DM) yield (€ per kg DM per ha), grass quality (€ per unit DMD), first and second cut silage DM yield (€ per kg per ha) and sward persistency (€ per % change in persistency per year). The economic value for each trait was calculated by changing the trait of interest while keeping all other traits constant using the Moorepark Dairy Systems Model (MDSM). Herd parameters (including cow numbers and calving pattern), milk production, energy demand, supplementary feeds and land area were readjusted to calculate the economic value for the trait of interest. The base scenario assumed fixed cow numbers with 40 ha of land available, with full costs included. Sensitivity of the economic values to changes in milk price and scenarios were tested. The economic values were applied to experimental production data collected over three years for 20 perennial ryegrass cultivars to establish the total economic merit for each cultivar and then to rank each cultivar based on their economic performance. Rank correlations between the base and alternative scenarios ranged from 0.90 to unity. This indicates that the economic values are reliable regardless of system, intensity or price. The total merit index will identify the cultivars that can make the greatest economic contribution to a grass-based production system.

### 4. Main results:

The key traits influencing farm profitability are: Seasonal DM yield (spring, mid-season and autumn), 1st and 2nd cut silage DM yield, quality (April to September inclusive) and sward persistency. The economic value of a trait can be described as follows:

$$\text{Economic value} = \frac{\Delta \text{ net margin per hectare}}{\Delta \text{ in trait of interest}}$$

Economic values calculated per unit change in each trait were as follows: Spring DM yield (€0.15 per kg DM), Mid-season DM yield (€0.03 per kg DM), Autumn DM yield (€0.10 per kg DM), 1st cut silage (€0.03 per kg DM), 2nd cut silage (€0.02 per kg DM), quality was €0.001, €0.008 and €0.010, €0.009, €0.008 and €0.006 per unit change in DMD per kg DM yield for the months of April, May, June, July, August and September, respectively, and -€4.961 per 1% decrease in persistency/ha/year.

The scenario analysis identified that rank correlations between the base and alternative scenarios ranged from 0.90 to unity. This indicates that the economic values are reliable regardless of system, intensity or

price. The total merit index will identify the cultivars that can make the greatest economic contribution to a grass-based production system.

#### 5. Opportunity/Benefit:

The grass economic index will assist in the selection of grass cultivars by ranking them based on their economic performance. It will simplify the selection process of a cultivar for the farmer, while also highlighting the key traits which a grass breeder must select for.

#### 6. Dissemination:

Economic values will be applied to data generated within the Recommended List Trials to present the economic merit of individual cultivars to farmers. Farmers will then be able to select cultivars which best meet their needs. In addition farmers will be easily able to recognise the most appropriate cultivars for grazing systems or silage systems depending on their requirements.

#### Main publications:

- McEvoy, M., O'Donovan M., and Shalloo L. (2011). 'Development and application of an economic ranking index for perennial ryegrass cultivars' *Journal of Dairy Science* 94:1627-1639.
- McEvoy, M., O'Donovan M., and Shalloo L. (2011). 'Capturing the economic benefit of *Lolium perenne* cultivar performance' *Irish Journal of Agriculture and Food Research* 50: 83-98.
- McEvoy, M., O'Donovan M., and Shalloo L. (2010). 'Capturing the economic benefit of cultivar performance'. *Proceedings of the Grasses in a Changing World Conference*. Cork. 14-15 October 2010. Teagasc.
- McEvoy, M., O'Donovan M., and Shalloo L. (2011) 'Economic index for ranking perennial ryegrass cultivars.' *Proceedings of the Agricultural Research Forum 2011*. Tullamore. 14-15 March. p143.
- McEvoy, M., O'Donovan M., and Shalloo L. (2009). 'Evaluating the economic performance of grass varieties.' *Proceedings of a joint meeting of the Agricultural Research Forum and the British Society of Animal Science* (Cambridge University Press), Belfast. p328.

#### Popular publications:

- McEvoy, M. Variety Selection. *Today's Farm*. March/April 2011.
- McEvoy, M. and O'Donovan, M. (2011). Evaluation of perennial ryegrass cultivars. *Irish Dairying Planning for 2015*, Moorepark'11 Open Day (29/6/11). Teagasc IE p. 68-70 ISBN 24964 B3

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