

Improving grassland farming by improving varieties

Dr Trevor Gilliland, Agri-Food Biosciences Institute

At the European Grassland Federation 2014 conference, DairyCo and EBLEX hosted a live webinar with Dr. Trevor Gilliland, Head of the Plant Testing Station at Crossnacreevy, in Northern Ireland.

His talk on grass breeding refers to many scientific papers that describe the benefits grass breeders can bring to ruminant production.

Research studies have linked increased grass utilisation with improved farm net profitability. Breeding grasses for improved production and nutrition can boost profit margins further.



The Recommended Grass and Clover Lists

The Recommended Lists (RGCL) are the product of rigorous independent testing to determine the varieties that perform best in the UK.

The European catalogue of plant species contains around 960 commercially-available grass varieties, of which only 120 have made it onto the RGCL. The top varieties can yield 1.1-1.7 dry matter (DM)/ha extra silage or 1.1-1.2 DM/ha extra grazed grass, compared with the average varieties on the list.

How much genetic improvement can be achieved with breeding?

Several scientific papers show continual improvement in silage and grazing yields in the variety testing trials. The most recent paper showed, over the past 40 years (1973 – 2012), grazing yield improved 0.35% (per year 1.6t DM/ha in total) and silage yield improved 0.51% per year (2.8t DM/ha in total). This progress shows no sign of slowing.

Yield is not the only characteristic that is important for grass production. Other important traits include:

Grass digestibility The D-value difference between the top and bottom of the list for diploid and tetraploid varieties is 8 units for conservation and 5-5.5 units for grazing. D-value reflects the energy content of the grass, which is important for lamb and cattle growth.

Extending the grazing season Increases in spring and autumn grass growth will hold off the need to feed concentrates. Differences between the strongest and weakest varieties are 1t DM/ha in spring and 0.4t DM/ha in autumn.

As grass is often limiting during these periods, the value of the additional yield is higher than for summer production

Water-soluble carbohydrates (WSC) Breeders have successfully bred varieties with higher WSC content throughout the season, which also improves protein utilisation. Research has demonstrated significant increases in cattle and lamb growth rates when fed high WSC varieties, although only where energy is limiting production.

Grass fats (α linoleic and α linolenic acids) These are associated with human health benefits in ruminant products such as beef and cheese. Their concentrations vary between varieties, and can be selected for. They occur in higher concentrations when grass growth is slowest in early spring and autumn, contrasting to WSC. This means breeding for both is difficult.

Secondary seed heads Some varieties are coming back with increased seed heads in the mid-summer period which reduces feed quality. Research has illustrated potential to select against this.

Fibre digestibility Even where neutral digestible fibre (NDF) is identical, the truly digestible fibre content of grasses can vary, affecting energy output. Trevor referred to one project that showed 7.5% more digestible nutrients in one variety compared with another.

At the end he drew up the following ideal grass or mixture wish list for farmers:

Requirements	Target
Grass DM production (tDM/ha)	17-18
Energy (ME MJ/kg DM)	>13
Organic Matter Digestibility (%)	82-86
CP (g/kg DM)	170-200
NDF (g kg DM) as dNDF fraction	350-450
Dry matter (g/kg DM)	180-210
Green leaf mass (%)	>80
No re-heading, high nutrient efficiency	
Grass intake mid-season (kg DM/cow)	18-20
Sward persistency (years)	7-10
Water-soluble carbohydrate content (mg/g DM)	>200-220
Fatty acids: linoleic acid (mg/g DM)	>115

NB: To convert figures given in g/kg to % - convert the g to kg, divide by 1000 then convert to % by multiplying by 100.

A video of the webinar will soon be available on the [DairyCo YouTube channel](#)