Teagasc Forage Breeding Programme: Perennial ryegrass

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Variety improvement

Stage 1
Breeding (Variety development)
7 to 10 years

Stage 2
Independent variety testing (DAFM)
5 years

Stage 3
Commercialisation (Seed release)
≥ 2 years
What is grass breeding?

**Breeding is man directed evolution**

**Evolution:** The genetic change in a species over time

- Natural and ongoing process
- Slow
- Direction of evolution favoured by man & nature may be different

**Breeding is necessary:**

- To speed up the process of evolution
- To ensure evolution proceeds in a direction favourable to man’s needs
Breeding process

Yield

1) Evaluation
2) Selection
3) Recombination

REPEAT

REPEAT

REPEAT
Teagasc breeding station

Animal & Grassland Research & Innovation Centre, Teagasc, Oak Park, Carlow
40 ha for forage breeding
Breeding traits: now & future

*More traits = more time, slower gain*

Rule no. 1: Select the minimum number of only the most important traits

**Improvement traits:**
- Persistency (change in yield over time)
- Grazing yield (spring, autumn + annual)
- Quality (digestibility, leafiness)
- Ground cover
- Disease resistance (crown rust)

**Maintenance traits:**
- Silage yield

**Future:**
- Current traits remain foundation
- May be change in classification from improvement to maintenance trait
- New traits introduced depending on research, agricultural laws, farming practices etc.
**Future breeding methods**

**Genomic selection:** Selection based on DNA analyses

**Advantages:**
- Speed (3 cycles GS vs. 1 cycle conventional breeding)
- Cost
Breeding process

- Individual plants
- Half-sib progeny
- Full-sib progeny

10,000's 1,000's DNA

Evaluation

Recombination

Selection

2 to 10 years
Genomic selection

Part 1: Genotyping
DNA analysis

Part 2: Phenotyping
Plant evaluation

Part 3: Statistical analyses
Applying genomic selection values

Genomic selection in 2018
Acknowledgements

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