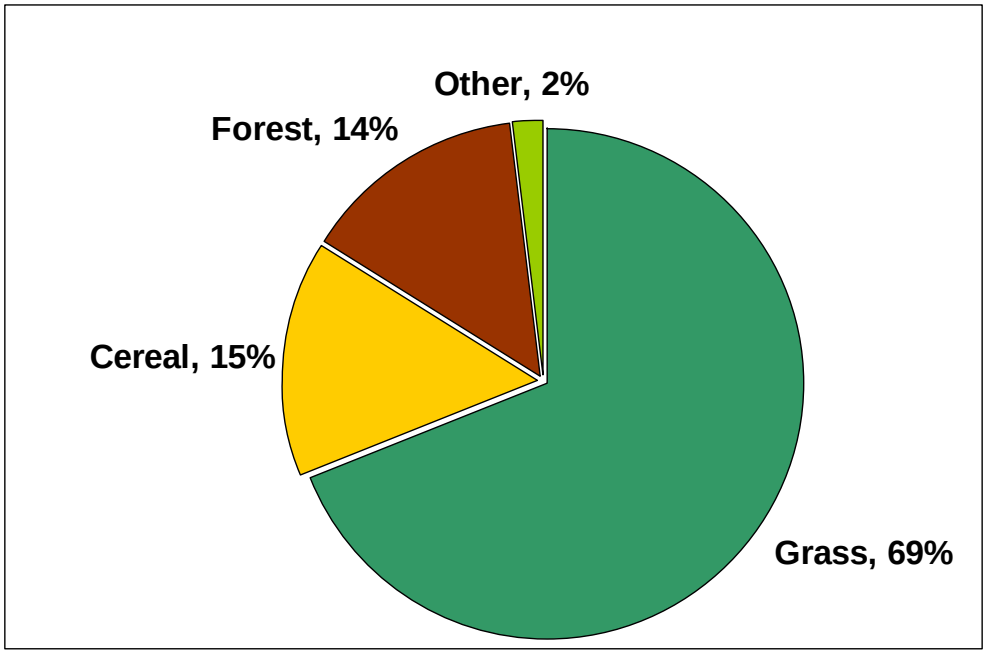
Welcome to Teagasc Grange August 6th 2019

Family farms

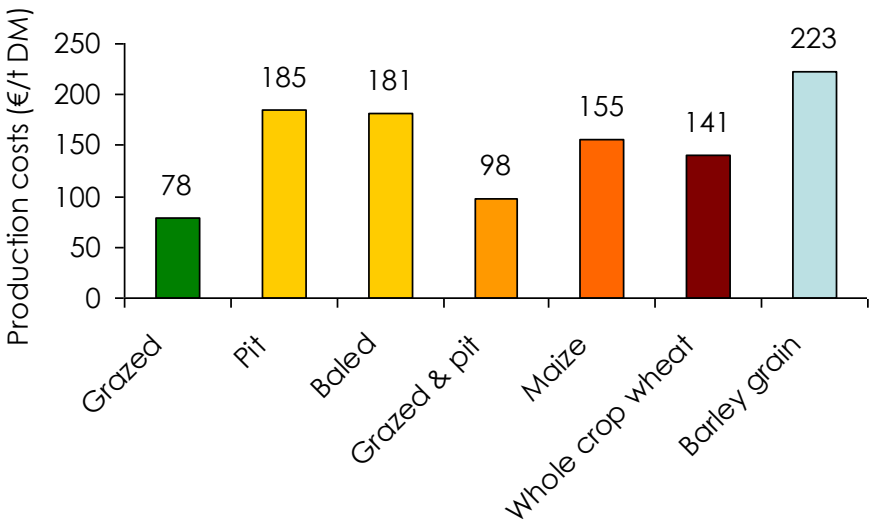
- ✓ 4.6 m ha of agricultural land
  - ~69% in grassland
- ✓ Beef & dairy = main enterprise
- ✓ 140,000 farm holdings
  - 80,000 have some beef
- ✓ Average farm size: 32 ha
- ✓ 6 million cattle; 2.4 m cows



Production systems

National picture: beef

- Pasture based production systems
- Spring-calving (Feb to April)
- Grazing 7 to 9 months/annum
- Nationally
  - Steers finished at ~28 months
  - Heifers finished at ~25 months



Irish agri-food sector

- Ireland is primarily an exporting nation: food & drink exports worth ~ €12 billion
  - 90% of beef and dairy products exported

Two sources of beef in Ireland

Suckler cow herd

- 1 million beef cows
- mainly late-maturing (Charolais/Limousin/Simmental crossbred cows)
- mated to late-maturing sires
  - Progeny = late-maturing males and females for beef production

Dairy herd

- ~1.4 million dairy cows
- mainly *Holstein/Friesian*
- *~50% mated to Holstein/Friesian sires*
  - *females as dairy replacements*
  - *males for beef*
- *~50% mated to beef sires (mainly Aberdeen Angus and Herefords)*
  - *progeny for beef production*

Grange Resources

Land: 230 ha

Animals: ~1200+

Housing for over 1200 animals

- 250 individual feeding units

Laboratories: Forage/nutrition and blood/tissue/Molecular/Microbiological

~90 Staff on site

Programme areas in **Beef** Production Research

Nine key areas in BEEF research:

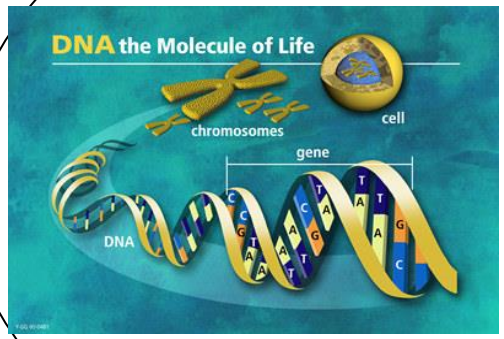
1. Genetics and Breeds
2. Animal Reproduction
3. Nutrition and Feeding
4. Forage Conservation
5. Grassland
6. Animal Welfare and Health
7. Beef Quality
8. Beef Systems
9. Computational Biology

Animal Bio-science

integrating 'omic' with animal science

Bioscience
- -Genomics
- -Proteomics
- -Metabolomics

Bioinformatics



Animal Science
- -Genetics
- -Reproduction
- -Nutrition
- -Health
- -Physiology
- -Immunity
- -Product Quality

An applied programme underpenned by science

1. Genetics and Breeds

Theme 1. Beef cow Maternal Index validation

Assessing maternal traits (Phenotypes/genotypes):

- **Reproductive performance/intake/milk yield/progeny performance, etc.,**

Theme 2. Crossbred beef cow comparisons

(Research Demonstration Herd –Derrypatrick herd)

Theme 3. Dairy calf-to-beef systems: beef sire evaluation

2. Animal Reproduction

Theme 1. Production factors affecting heifer puberty

→ facilitating calving at 24-months

Theme 2. On-farm **Oestrus synchronisation**

greater AI usage

Theme 3 Puberty in males:

molecular markers for early puberty, semen quality, bull fertility

3. Nutrition and Feeding-applied

Theme 1. Genotype x Diet interactions

Theme 2. Nutrient efficiency

Theme 3. Animal feeding (feedstuffs) and finishing

- Evaluating feeding value of feed ingredients

3. Nutrition and Feeding-basic

At a more basic level: Rumen Microbiome Research

A molecular approach to improving nutrient digestion and utilisation while reducing the environmental impact (particularly GHG) in ruminants

Research Projects:

- Early life and dietary transition – establishment of the rumen microbiome
- GHG emissions from livestock
- Feed efficiency and compensatory growth

Integration of rumen microbiome data into beef, dairy and sheep breeding programmes.

NUI Galway OÉ Gaillimh
agresearch
UCD DUBLIN
PRIFYSGOL ABERYSTWYTH UNIVERSITY
UNIVERSITY OF ALBERTA
FACCEJPI
INRA SCIENCE & IMPACT
UNIVERSITY of GUELPH

4. Forage Conservation

Theme 1. Grass silage and Baled silage and mycotoxins

Theme 2. Alternative forages: Forage maize for silage

Theme 3. Biogas/biomethane from grass (150 kW plant)

5. Grassland

Theme 1. Optimising grazed pastures for beef

Theme 2. **Sward species mixture and Legumes**

in swards –multi-species swards

Theme 3. Grass fed beef: all-grass forage diets

Theme 4. Grass growth

6. Animal welfare and health (1)

Theme 1. Development of *immunocompetence* in dairy and suckler beef calves

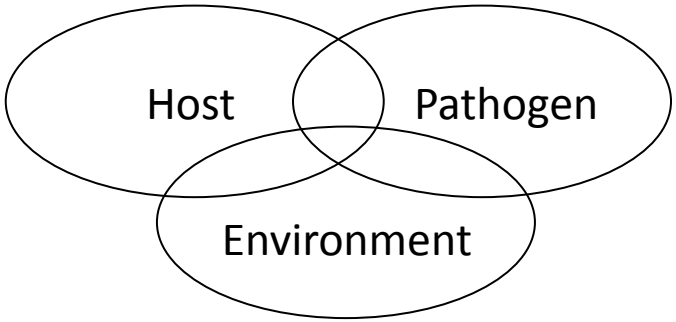
Theme 2. Immunological *characterisation of colostrum* from dairy and beef cows with implications for calf health and welfare

Theme 3. Development of portable and *rapid molecular diagnostics* for pathogens associated with Bovine Respiratory Disease.

Theme 4. Effect of *floor type and space allowance* on the performance and welfare of finishing beef cattle.

Theme 5. Characterisation of welfare and performance responses of calves to *disbudding and castration* procedures.

6. Animal welfare and health (2)



Infection = interaction between host, pathogen and environment

- Depends on Host and Pathogen genetics, Management

- *Anthelmintic resistance* in *gastro intestinal nemetodes* – resistance diagnosis, development of molecular markers

- Mechanisms of *pathogenesis of intra mammary infectious* (IMI) microorganisms – species and strain-specific pathogenicity, antimicrobial resistance

7. Beef Eating Quality

Theme 1. *'Healthy'* beef (post-slaughter)

Grass-fed beef: Improved fatty acid profile, more yellow fat, darker muscle, small differences in eating quality

Theme 2. Meat quality

- **Age**
- **Gender**
- **Production system**

8. Beef Systems Modelling

Theme 1. Suckler beef systems analysis

- Modelling effects of breeds, grazing/forage management, price and policy scenarios
- Deriving economic values for beef breeding indexes

Theme 2. Dairy calf-to-beef systems analysis

Theme 3. Feed costs analysis

Theme 4. GHG emissions from beef systems

Theme 5. Sustainability

Teagasc
Agriculture and Food Development Authority

The Irish Agriculture and Food Development Authority