

# Innovative and sustainable systems combining automatic milking and precision grazing

**Dr. Bernadette O'Brien**

Animal and Grassland Research and Innovation Centre,  
Teagasc, Moorepark, Fermoy, Co. Cork

# Background

- Automatic milking systems (AMS)
  - Common across continental Europe – 10,000
  - Indoor feeding systems, high milk production cow, year round calving
- Differences between automatic and conventional milking
  - Cows volunteer themselves for milking based on expectation of feed during or after milking
  - Milking is distributed over a 24 hour period
- Big challenge to integrate fully with grass-based system
  - »Grass allocation is key in achieving this
  - Optimizing milk output from AM unit (rather than /cow)

# Advantages of AM

- Potential reduction in labour input – 3.8h, 20%, 40%
- Increased milk production :- 6 to +35% (MF, Conc)
- Improvement in cow well-being (stress, lameness)

# Advantages of cow grazing systems

- Economic : the cheapest way to feed dairy cows, with lowest input of labour and mechanization (zero grazing farms earn ~0.5 to 2 Euro per 100 kg milk less than farms on full or limited grazing)
- Animal welfare and consumer demands : necessary for cows to be outdoors e.g. Sweden and Denmark
- Positive impact on milk quality and environment

# BUT

**Number of grazing dairy cows is decreasing sharply  
– particularly with AMS**

## Perceived constraints to grazing with AM

- cows at pasture may not return to the AM voluntarily
- dairy operator may have to collect the cows
- increased labour demand with grass management
- reduction in milking frequency - cow milk yield

**BUT AM can be adapted to extensive herd scenarios  
with technical innovation in grazing management and  
increased efficiency of grass utilization - NZ**

# Irish context

- If AM could be combined with cow grazing - could be very relevant to Irish dairy farms
  - (i) Land fragmentation
  - (ii) labour – AM has the potential to reduce labour costs on farms, particularly as they expand
  - (iii) Lifestyle - change in type of labour input
  - (iv) entry level – continue other employment until the farm is viable.

# Objective

To integrate an automatic milking system (AMS) into a cow grazing system where both milk output from the AMS unit and the grass proportion of the cow diet are maximized simultaneously

**•AMS at Moorepark 8<sup>th</sup> March 2011**  
**63 cows of mixed breed (start-up) – 75-80 in 2012**  
**Mean calving date 15th February**

# Moorepark trial

- 24 ha milking platform - 63 cows, 2011 – 25, 16, 20, 2
- Land area is divided into 3 grazing sections of 8 ha each (A, B, C) - further divided into 1 ha paddocks
- Water is located at the dairy
- Maximum distance to furthest paddock is ~ 700 m
- Merlin AMS unit installed
- Drafting units: entrance to dairy - pre- or post- milking area, at the dairy exit (holding yard for treatment) or to grazing (Section A, B, C)
- Evaluation of KPIs of the AMS – production, energy and economics
- Evaluation of the AMS in terms of milk quality, labour and cow behaviour

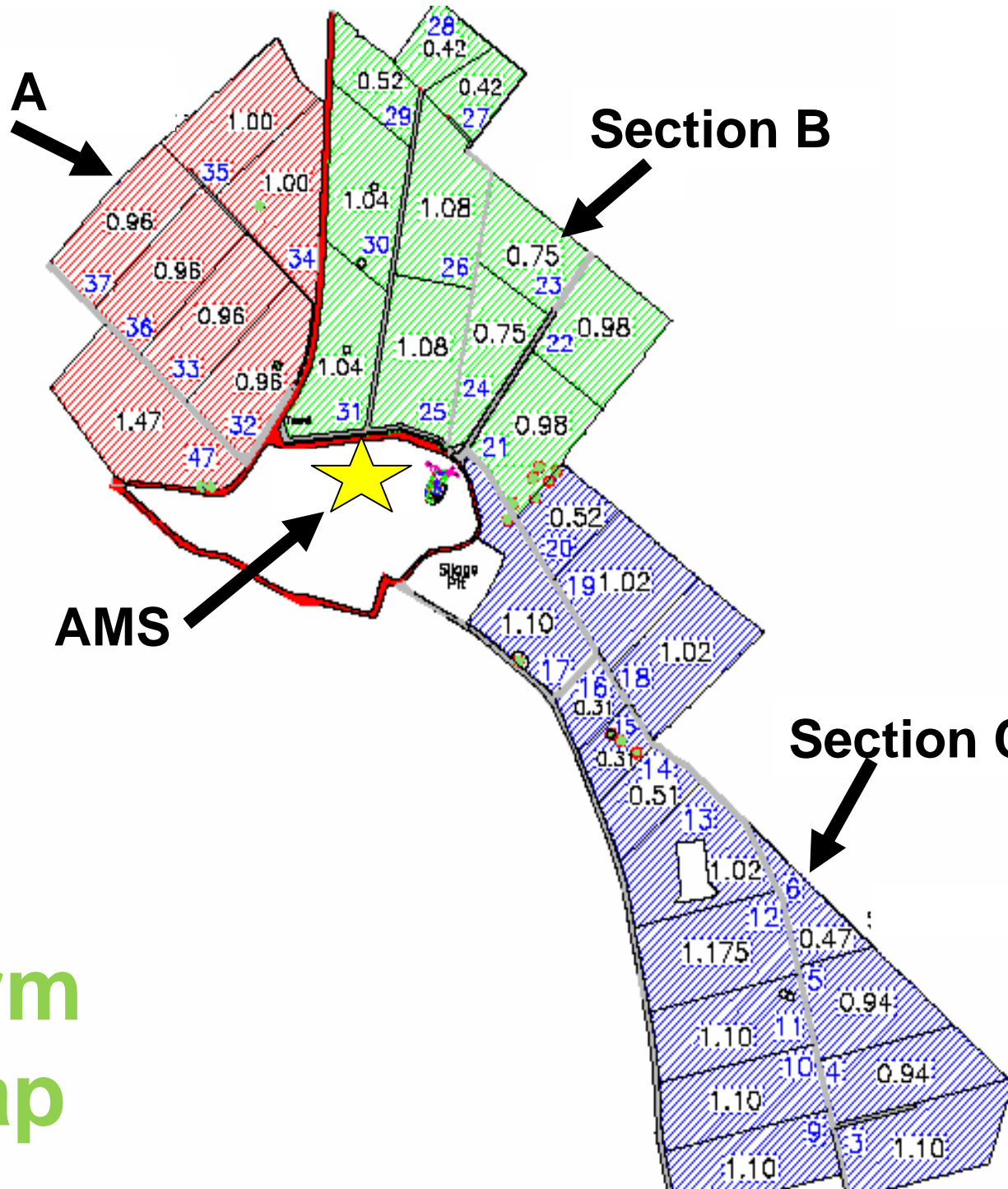
**Section A**

**Section B**

**AMS**

**Section C**

**Farm  
map**





# Grassland management

- Grass allocation is critical for optimal cow visits
- Cows graze 1 section of 3 grazing areas in each 24 h
- Cows allocated 5 kg DM in each of the 3 grazing sections (A, B and C) over each 24 h period
- Cows go into grazing areas with grass covers of 1400-1500 kg DM/ha
- Cows move between the grazing Sections A, B and C at 1 am, 11 am and 5 pm, respectively
- Pasture mass estimated twice weekly. Covers greater than 1500 kg DM/ha would discourage cow movement and may reduce milking frequency
- Cows graze to a post-grazing height of 3.5-4.0 cm
- Cows stocked at an average target of 3.5 cows/ha
- All cows received 1 kg concentrate feed per 24 h















# Summary

- Cow selection – udder trimming
- Cow training – approx. 4 days/cow
- Daily routine
  - 30 mins morning and 15 mins evening
  - Check cow milking data, udder and cow health
  - Routine maintenance checks
  - Grass allocation
- Liners replaced every 3 weeks
- Good backup service vital

# Future Research

- Optimum cow feeding strategy to maximise milk output
- Investigate interaction of milking frequency, cows per unit and stage of lactation
- Identify optimum cow breed/type for the AMS
- Sustainability
  - economics, energy usage, environmental impact, cow well-being and milk quality

## List of participants: 14 members comprising 6 SME-AGs from 6 different counties, and 6 RTD Performers and two SMEs

1 (Coordinator) / RTD	Teagasc - Agriculture and Food Development Authority	TEAGASC	Ireland
2 / SME-AG	Irish Grassland Association	IGA	Ireland
3 / RTD	Stichting Dienst Landbouwkundig Onderzoek	WLR	The Netherlands
4 / SME-AG	LTO Noord	LTO	The Netherlands
5 / RTD	Aarhus Universitet	AU	Denmark
6 / SME-AG	Videncentret For Landbrug	VFL	Denmark
7 / RTD	Institut de l'Elevage	IDELE	France
8 / SME-AG	Centre National Interprofessionnel de l'Economie Laitiere	CNIEL	France
9 / RTD	Sveriges LantbruksUniversitet	SLU	Sweden
10 SME-AG	Svensk mjölk ab	SDA	Sweden
11 / RTD	Universite de Liege	ULg	Belgium
12 / SME-AG	Filiere Lait et Produits Laitiers Wallonne	FLPLW	Belgium
13 / SME end user	Aidan+Anne Power, Farmer	SME FARM IE	Ireland
14 / SME end user	Thure Worm, Farmer	SME FARM DK	Denmark

# The objective

to develop and implement innovative and sustainable systems that **combine Automatic Milking and Precision Grazing for dairy cows** which are appropriate to the different approaches to dairy farming to be found in the different regions in Europe



# Concepts and main focal points

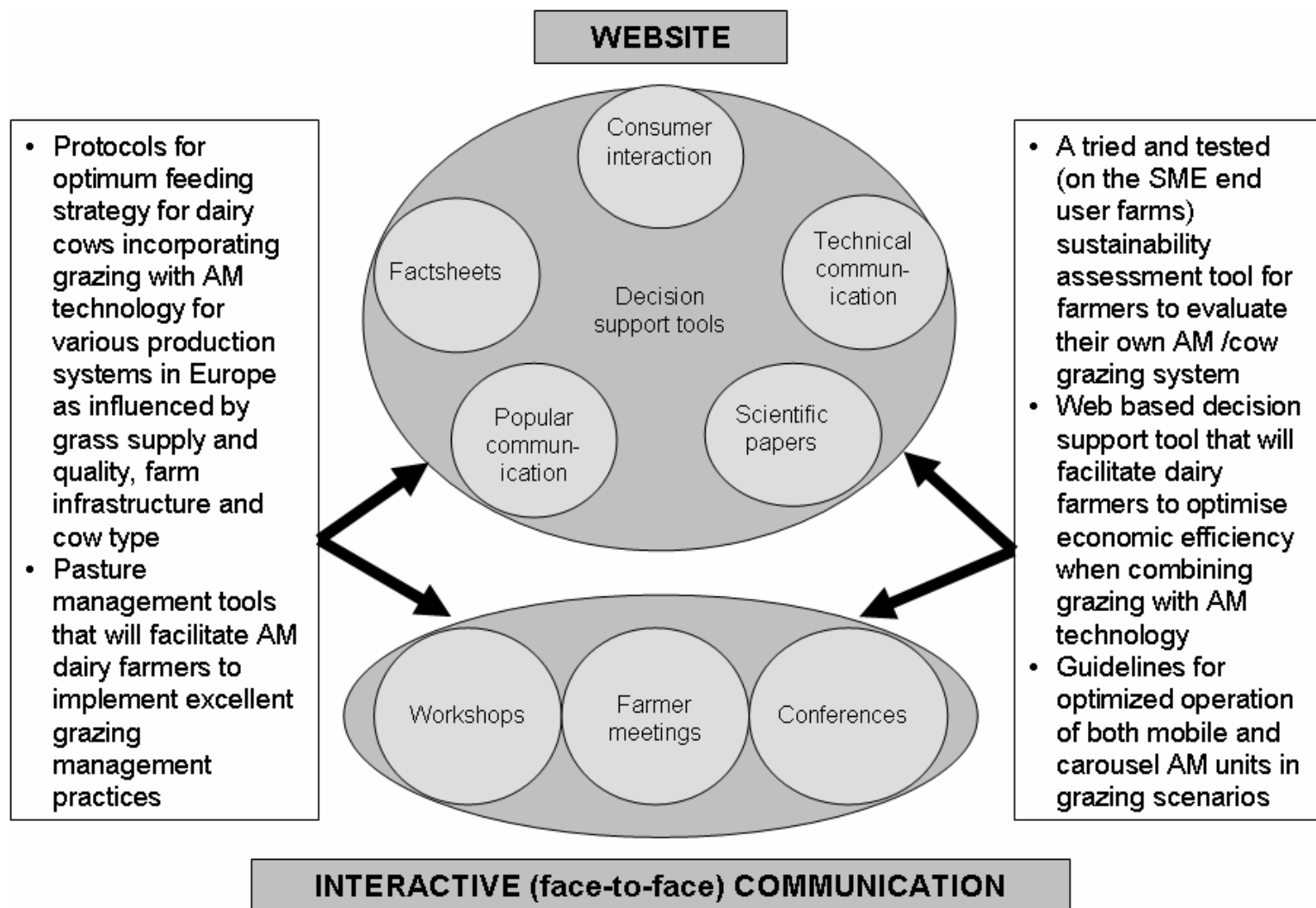
- AM operated mainly with cows indoors on diets high in conserved forage and concentrate feed, e.g. Denmark
- Alternatively, e.g. Ireland, have well developed cow grazing systems but are not familiar with AM
- This project brings the two concepts together.
- Will focus on: farm labour demand, farm fragmentation where land is a constraint to herd expansion at one location, legislative requirements for cow grazing times, reduction in feed costs, consumer preference for milk from grazed grass



# Outputs of AUTOGRASSMILK

- Protocols for optimum feeding strategies for dairy cows incorporating grazing and AM for different grass supply and quality, farm infrastructure and cow breed scenarios in the six partner countries
- Pasture management tools that will facilitate AM dairy farmers to implement excellent grazing management practices
- A tried and tested sustainability assessment tool for farmers to evaluate their own AM /cow grazing system
- Web based decision support tool that will facilitate dairy farmers to optimise economic efficiency when combining grazing with AM
- Guidelines for optimized operation of both mobile and carousel AM units in grazing scenarios

## Dissemination



## *Potential impact of project*

- *European competitiveness in dairying*
- *Conforming to animal welfare EU legislation*
- *Herd expansion*
- *Profitability*
- *Labour costs and efficiency*
- *Sustainability*
- *Farmers well-being*
- *Milking equipment industry*
- *Collaboration within the EU*

# Discussion

- Feedback - relevance of this project to your country
- Other issues that we should focus on
- Ideas on dissemination methods – key element of this project – methodologies used for grazing technology – may be appropriate for this project

# Thank you for your attention