AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

The Irish Agriculture and Food Development Authority

ICT and Agriculture

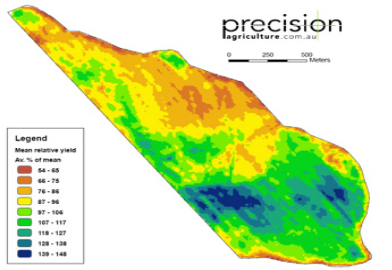
Teagasc perspective

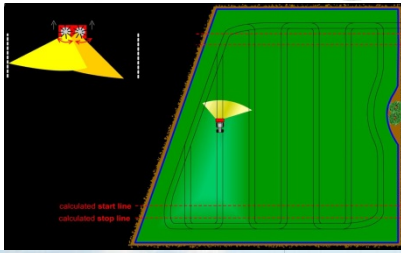
Dr. Frank O'Mara

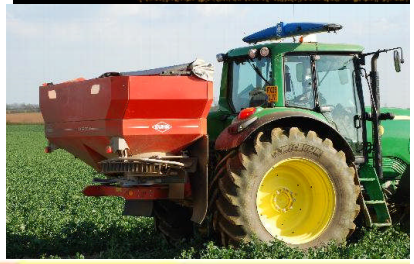
Director of Research

What is the opportunity?

- Most precision or SMART agriculture developments have been in cropping
- Irish agriculture is mainly grass-based ruminant production
- Need to focus our efforts here, and become world leaders in this segment



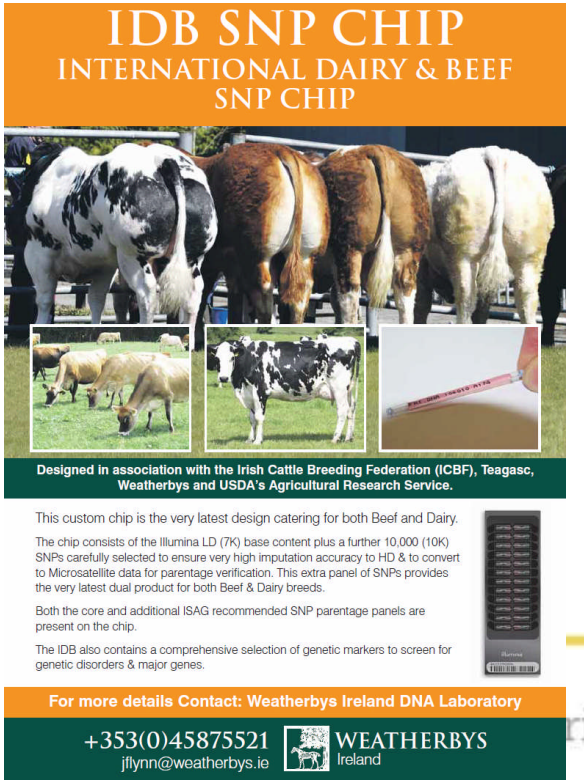


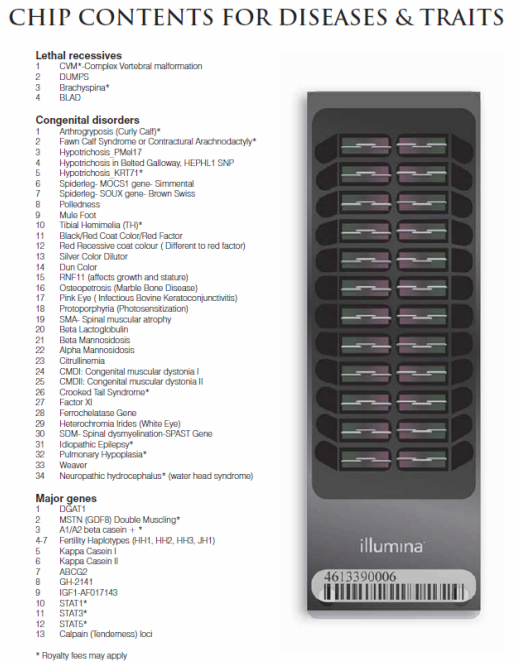


How can ICT help this farm?

Genotyping the herd

- Genomic selection has increased rate of genetic gain in dairy herd by 60%
- Custom SNP chip (Teagasc, ICBF, Weatherby's, Illumina) developed in 2013
- Ireland will soon have the largest set of genotyped animals in the world – 250,000
- New SFI funded project – *Precisiongenomics* – will leverage this data – 250 trillion data points





rish Agriculture and Food Developmer

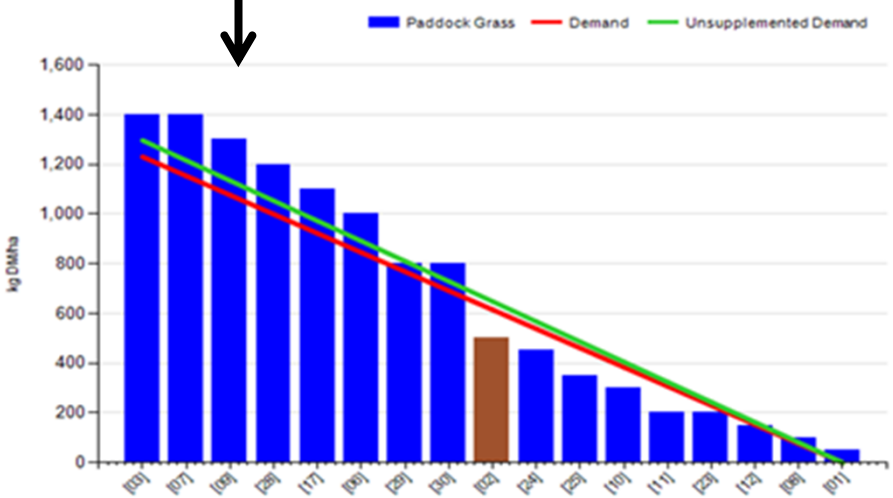
Automating grass measurement and allocation

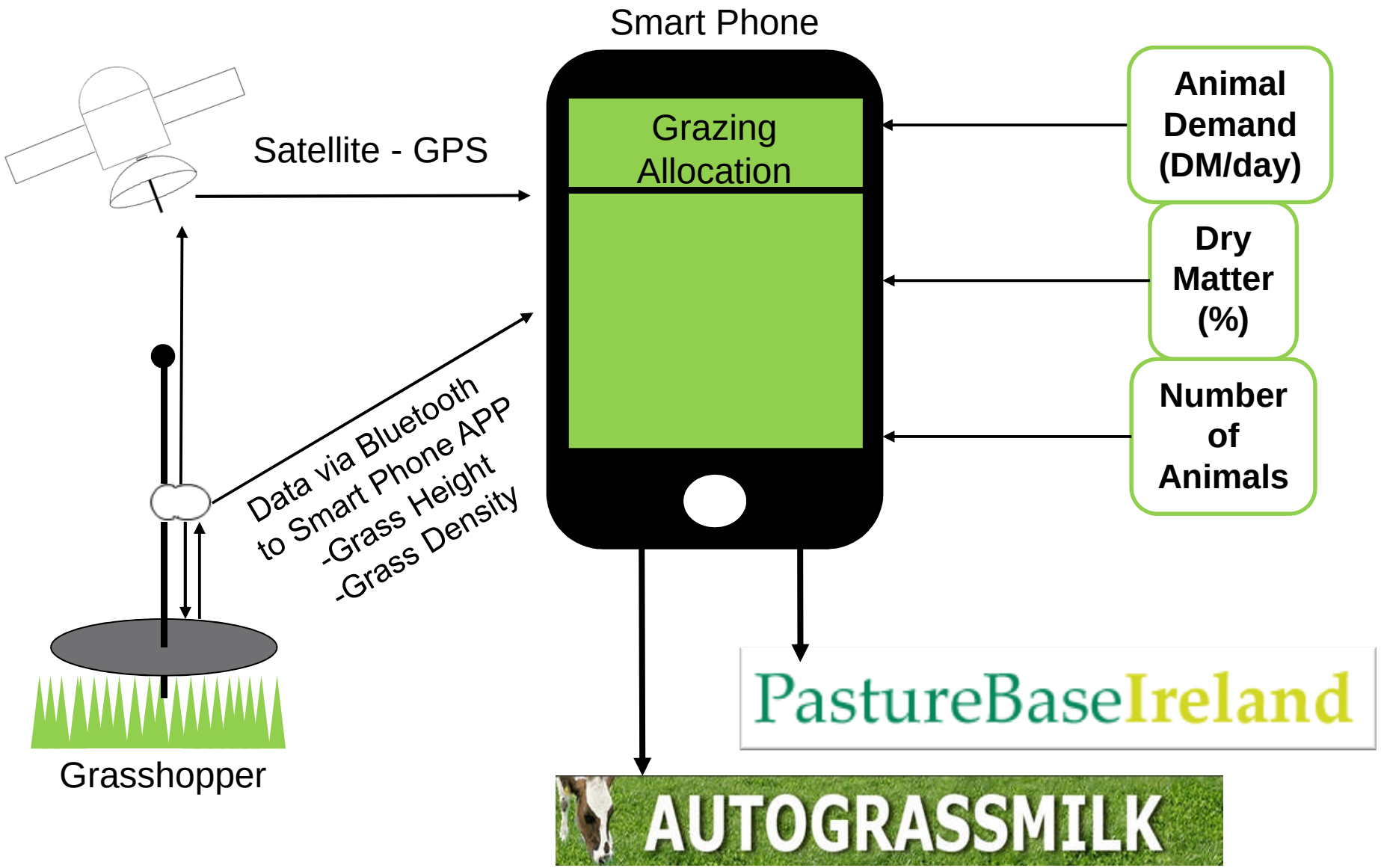
Should be done as precisely as weighing concentrate feeds

Good tools available, but need to automate them

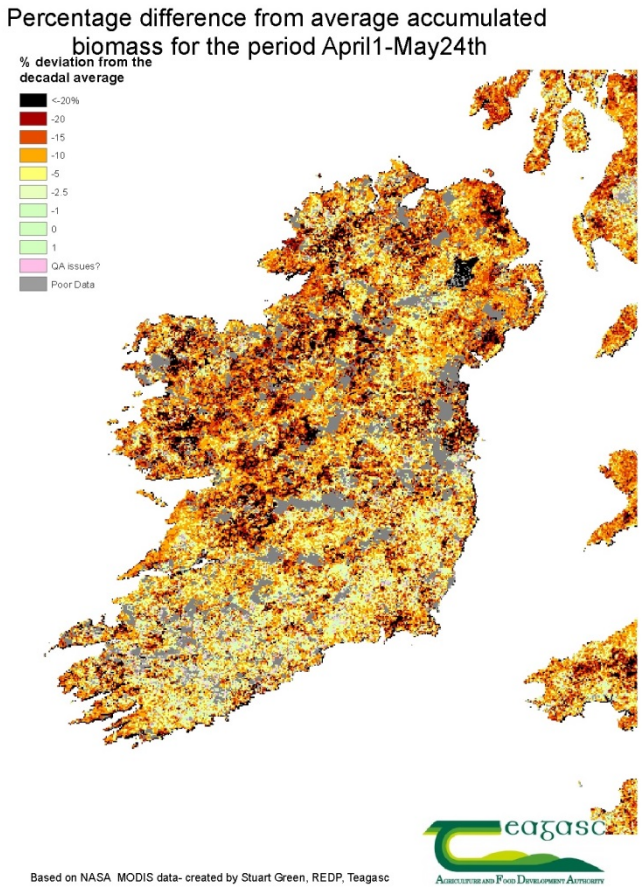
Platemeter to measure grass quantity

Grass wedge – a DSS that uses data from platemeter readings to assess feed stocks and make decisions



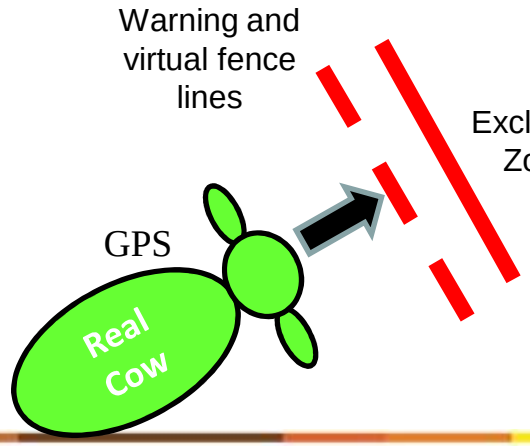

Smart Phone
Satellite - GPS
Grazing Allocation
Animal Demand (DM/day)
Dry Matter (%)
Number of Animals
Data via Bluetooth to Smart Phone APP
-Grass Height
-Grass Density
Grasshopper
PastureBaseIreland
AUTOGRASSMILK

Measuring pasture growth from space

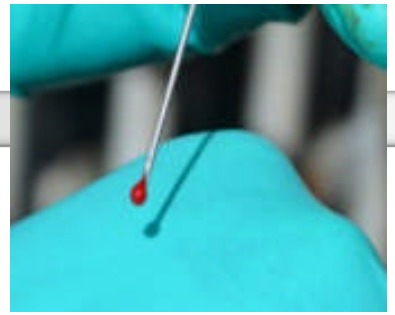


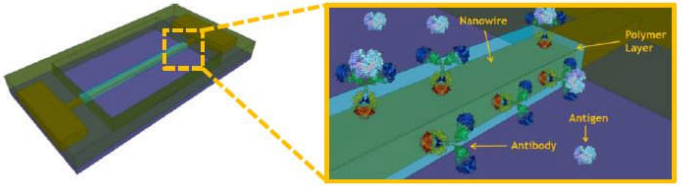
Drones could be a future technology for grass measurement

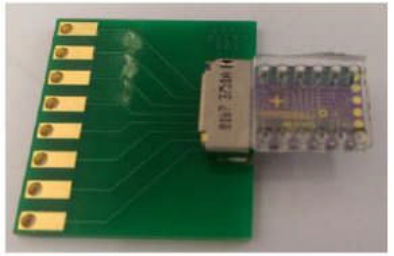
Virtual fencing – allocating grazing area without fences



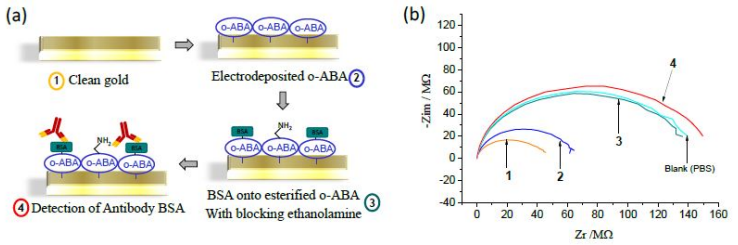
Biosensors in veterinary diagnostics







- Nanosensors to allow rapid on-site diagnostics
- To both replace and support laboratory based diagnostics such as ELISA



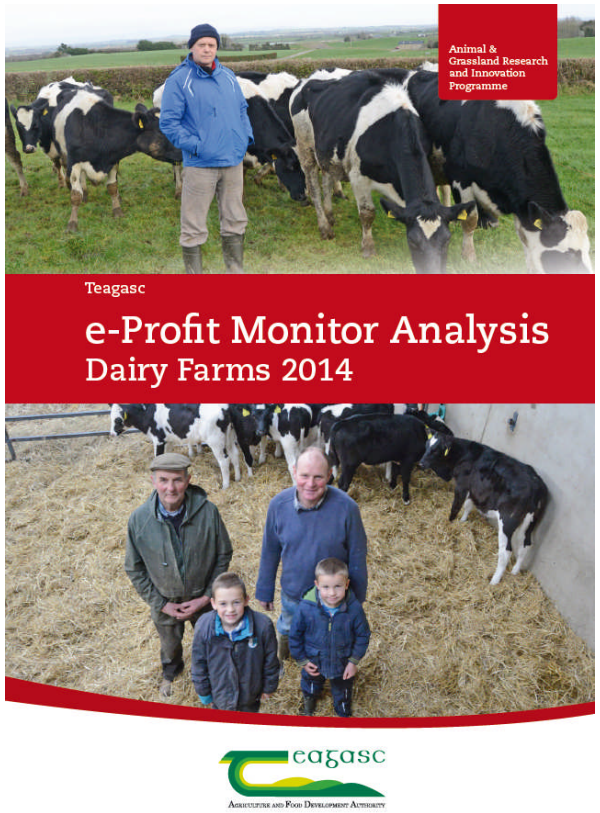
Advantages

- Handheld devices
- Small sample volumes required
- Microfluidics coupled to biosensor chip
- Results in minutes

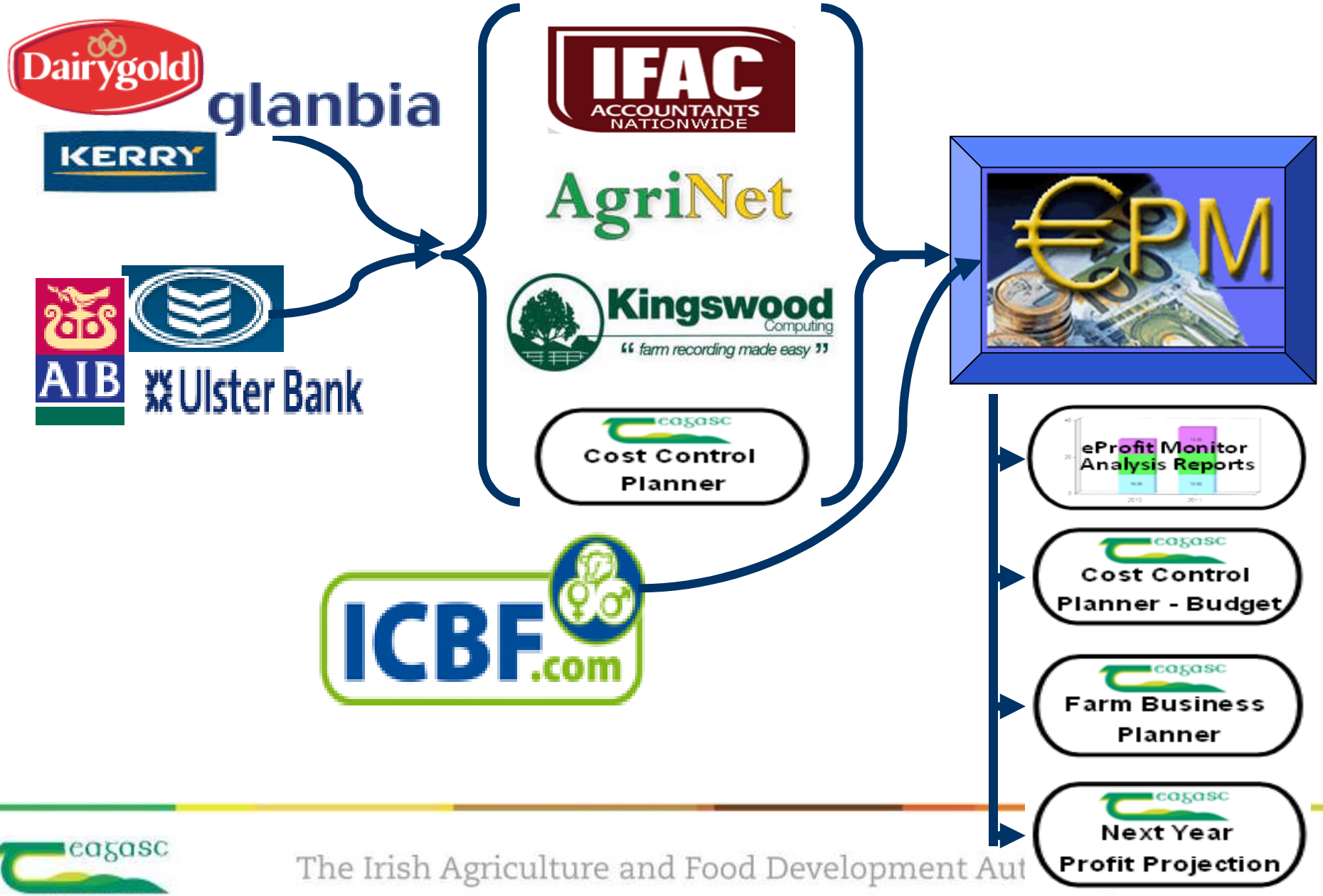
Currently working on BVD, Liver fluke, IBR, and IgG
Have achieved proof of concept for BVD antibody

Farm Business Analysis

Teagasc e-Profit Monitor is an on-line tool to analyze performance and benchmark yourself against other farmers



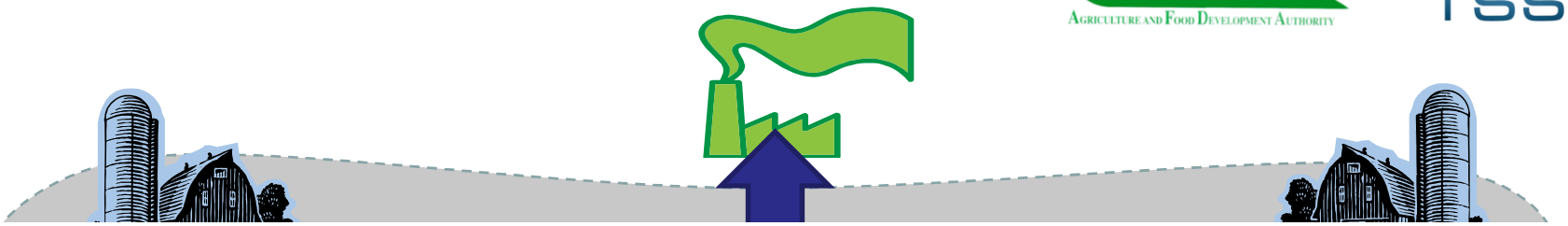
Farm Business Data flows



Many large databases related to agriculture

- **Department of Agriculture**
  - AIMS: Animal identification and Movement System
  - LPIS: Land Parcel Identification System
- **ICBF**
  - cattle/sheep breeding databases – huge amount of performance data
- **Teagasc**
  - PastureBase Ireland: Unique database of grass growth measurements
  - ISIS: Irish Soil Information System
  - NFS: National Farm Survey – 40 years x 1,000 farms x huge level of detail
  - €PM: unique on-line farm business analysis tool
- **Other**
  - Met Eireann: high resolution weather forecasts
  - GSI / OSI: mapping, lidar, aerial photography, Tellus project

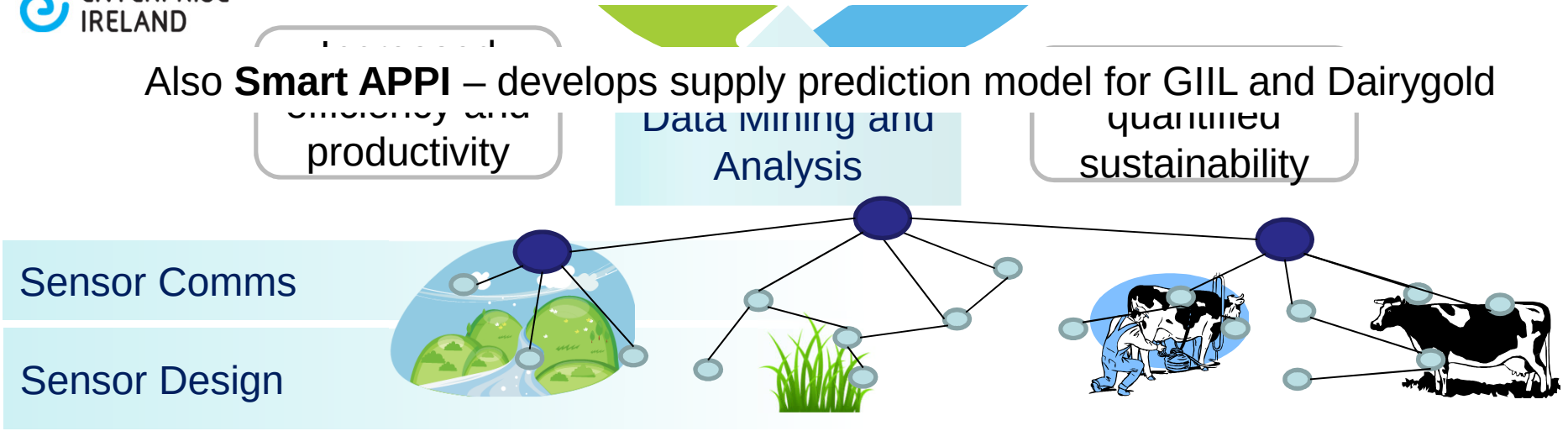
PRECISIONDAIRY



Develop robust, accurate technologies that measure and communicate useful data from dairy farms, develop methodologies that interpret that data and finally to present the intelligent outputs back to the farmer in real time while integrating the collected data with national databases, all of which must be done in a low cost fashion

SFI-Teagasc funded

Also **Smart APPI** – develops supply prediction model for GIIL and Dairygold



How can ICT help this farm?

Genotyping the herd

Many more:
robotic milking, animal monitoring, milk supply forecasting, nutrient management, weather forecasting, environmental measurement…..

Biosensors in veterinary diagnostics

Warning and virtual fence lines

Exclusion Zone

GPS

Real Cow

Grazing Allocation

PastureBaseIreland

Conclusions

- Huge possibility to improve efficiency, profitability and sustainability through use of ICT and related technologies
- Ireland has excellent databases, and research strengths in agriculture, ICT and sensors
- Opportunity to converge these disciplines and give Ireland another competitive advantage: ***the most data-driven livestock agriculture in the world***

[SFI-Teagasc funding available now for projects linking agriculture and ICT/Sensor scientists – SFI Investigators Programme]