

RuminOmics

Connecting the animal genome,
the intestinal microbiome and
nutrition to enhance the
efficiency of ruminant digestion
and to mitigate the
environmental impacts of
ruminant livestock production



RuminOmics



Professor John Wallace

Collaborative project
Jan. 2012 – Dec. 2015
www.ruminomics.eu

RuminOmics - Response to technology

THE CALL:

KBBE.2011.1.1-03: Efficiency of ruminant digestive systems and reduction of the ecological footprint through a combination of systems biology, 'omics'

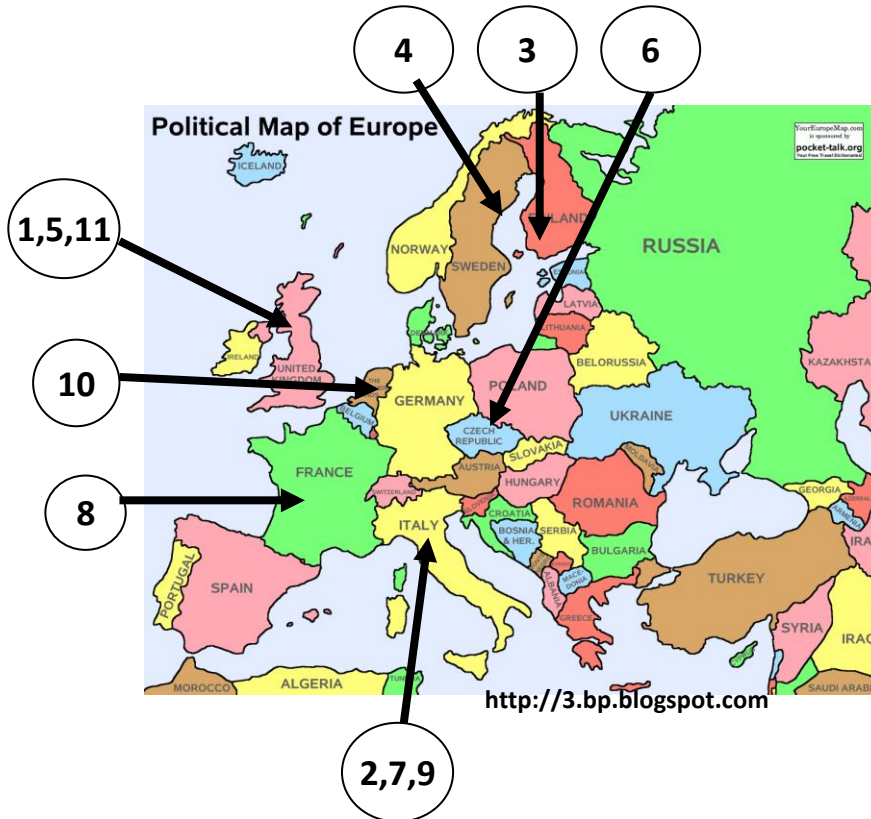


RuminOmics

RuminOmics - Partners



RuminOmics

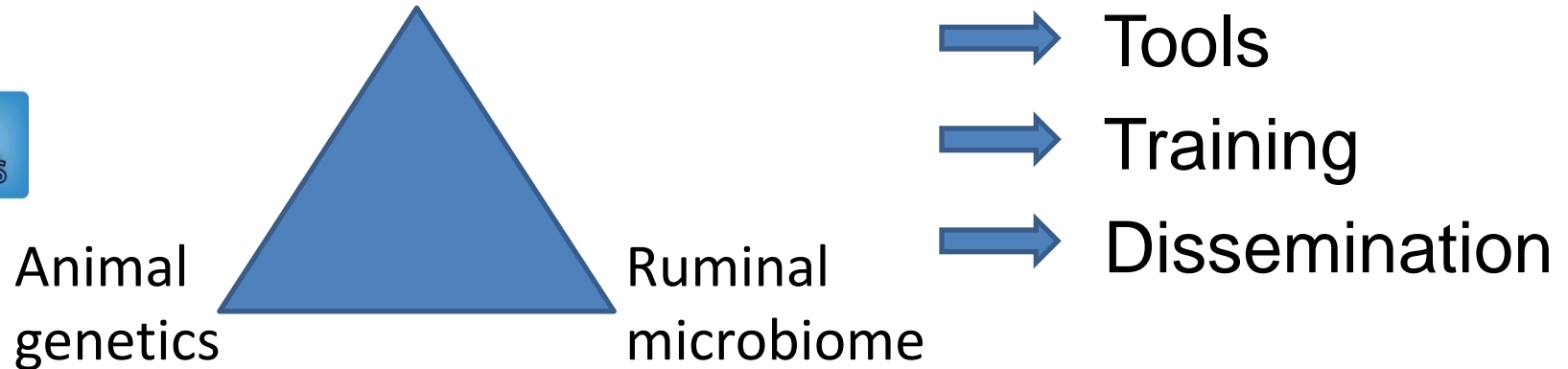


Participant no.	Participant organisation name
1 (Coordinator)	University of Aberdeen
2	Parco Tecnologico Padano
3	Agrifood Research Finland
4	Swedish University of Agricultural Sciences
5	University of Nottingham
6	Institute of Animal Physiology & Genetics
7	Università Cattolica del Sacro Cuore, Piacenza
8	Centre National de la Recherche Scientifique
9	European Association of Animal Production
10	European Forum of Farm Animal Breeders
11	Quality Meat Scotland

RuminOmics - Aims of project



Emissions



- Does the animal itself determine its ruminal microbiome?
- If so, is this a heritable trait?
- How does nutrition affect this relationship?

Methane, ruminants and the environment



Positive proof of global warming.



**18th
Century**

1900

1950

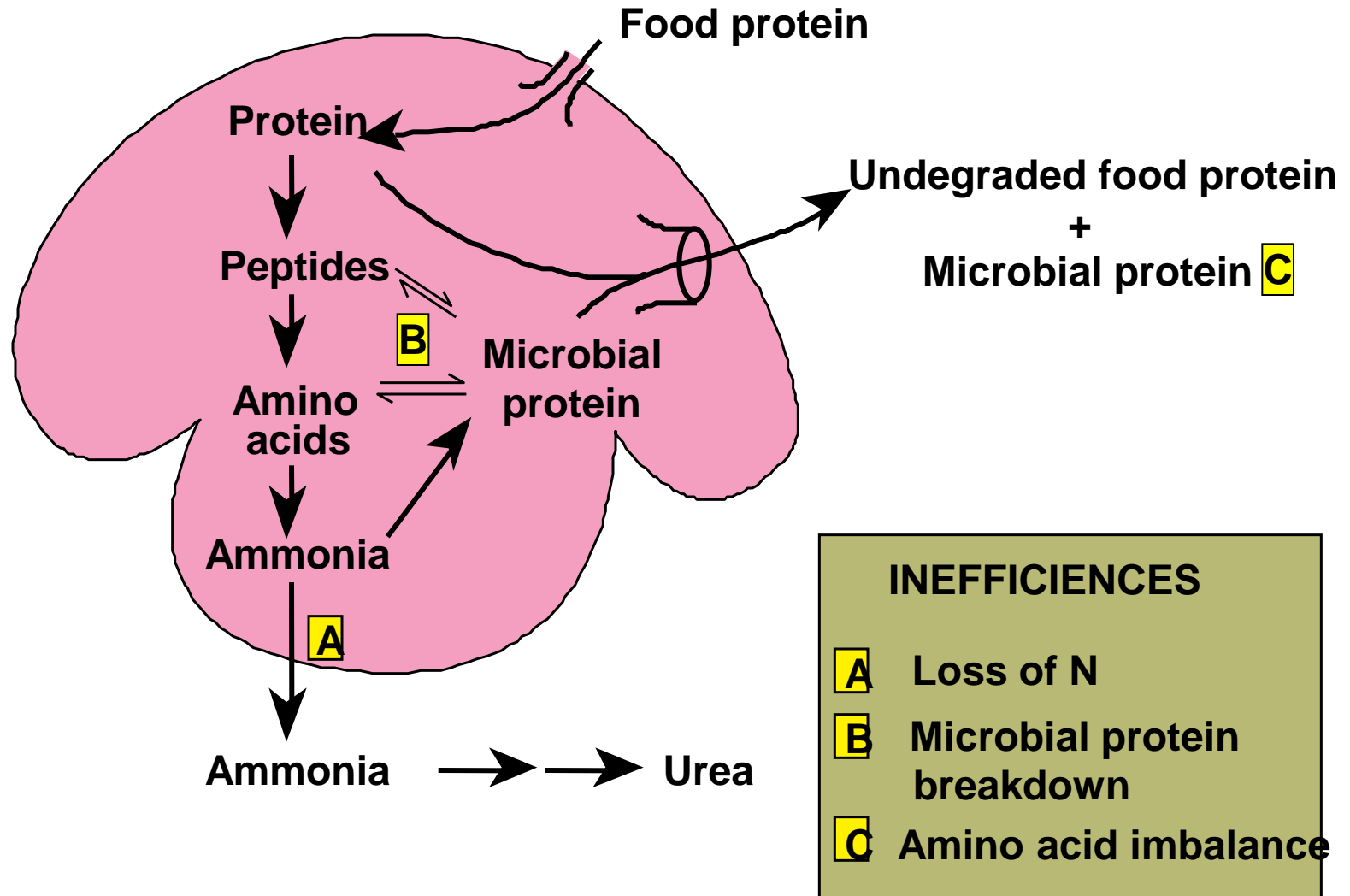
1970

1980

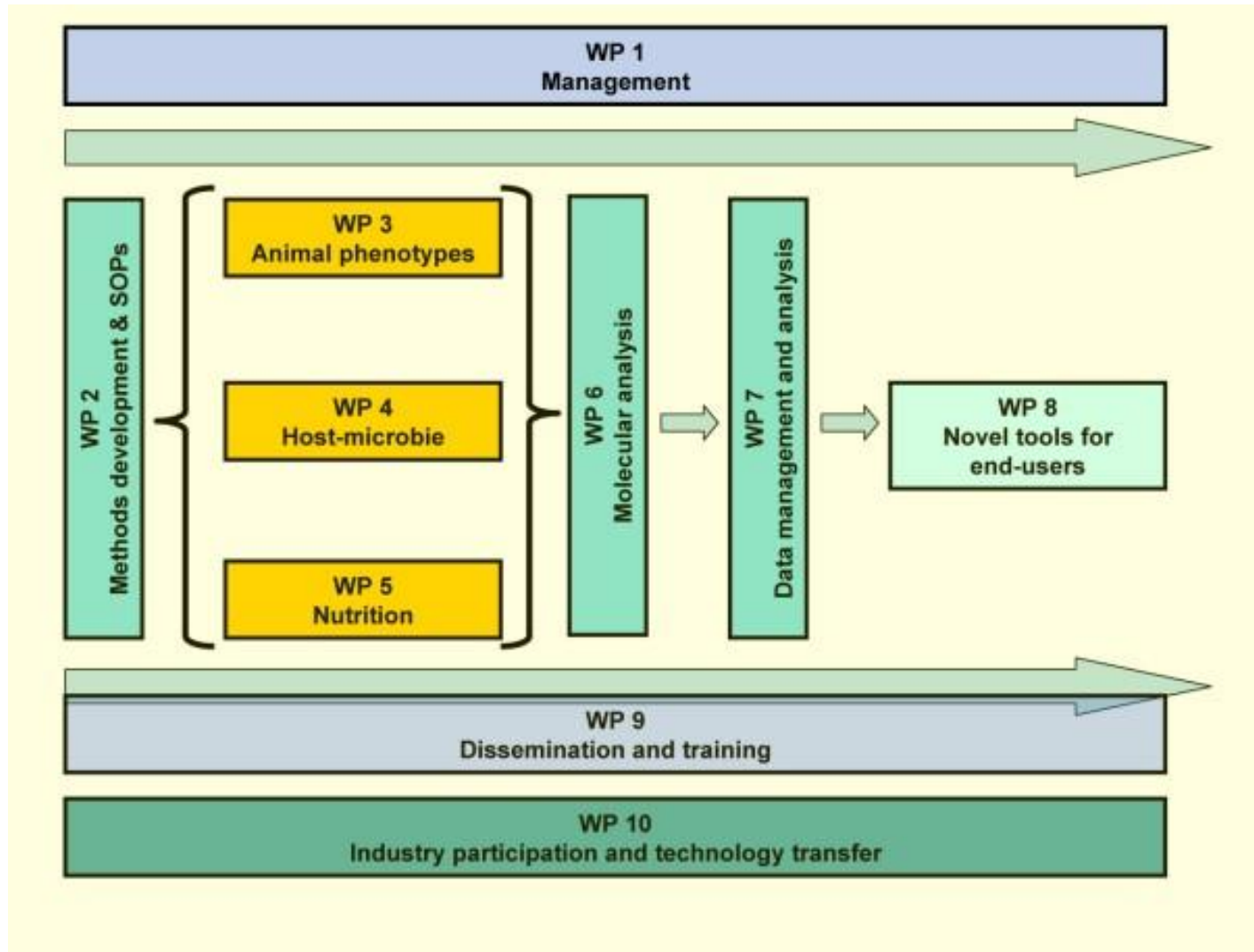
1990

2006

Protein metabolism



Work Package Structure



RuminOmics - Experiments



- **1000 cows in UK, Italy, Sweden and Finland**

Methane

N emissions

FCE

Milk quality



Ruminal
microbiome



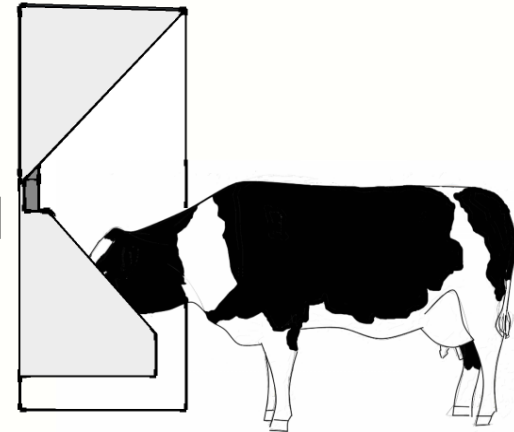
Animal
genotype

- **40 cows in Sweden and Finland**

Impact of N, CHO, lipid nutrition

- **50 cows in UK, Italy, Sweden and Finland**

Full metagenome analysis



RuminOmics - Experiments II

Bovine single-egg twins



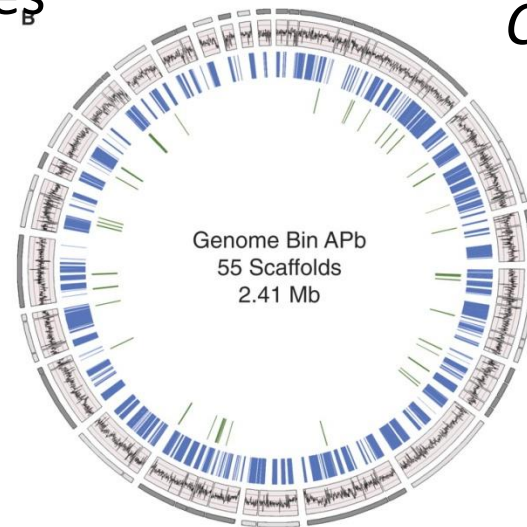
Interspecies digesta transfer



RuminOmics - Experiments III

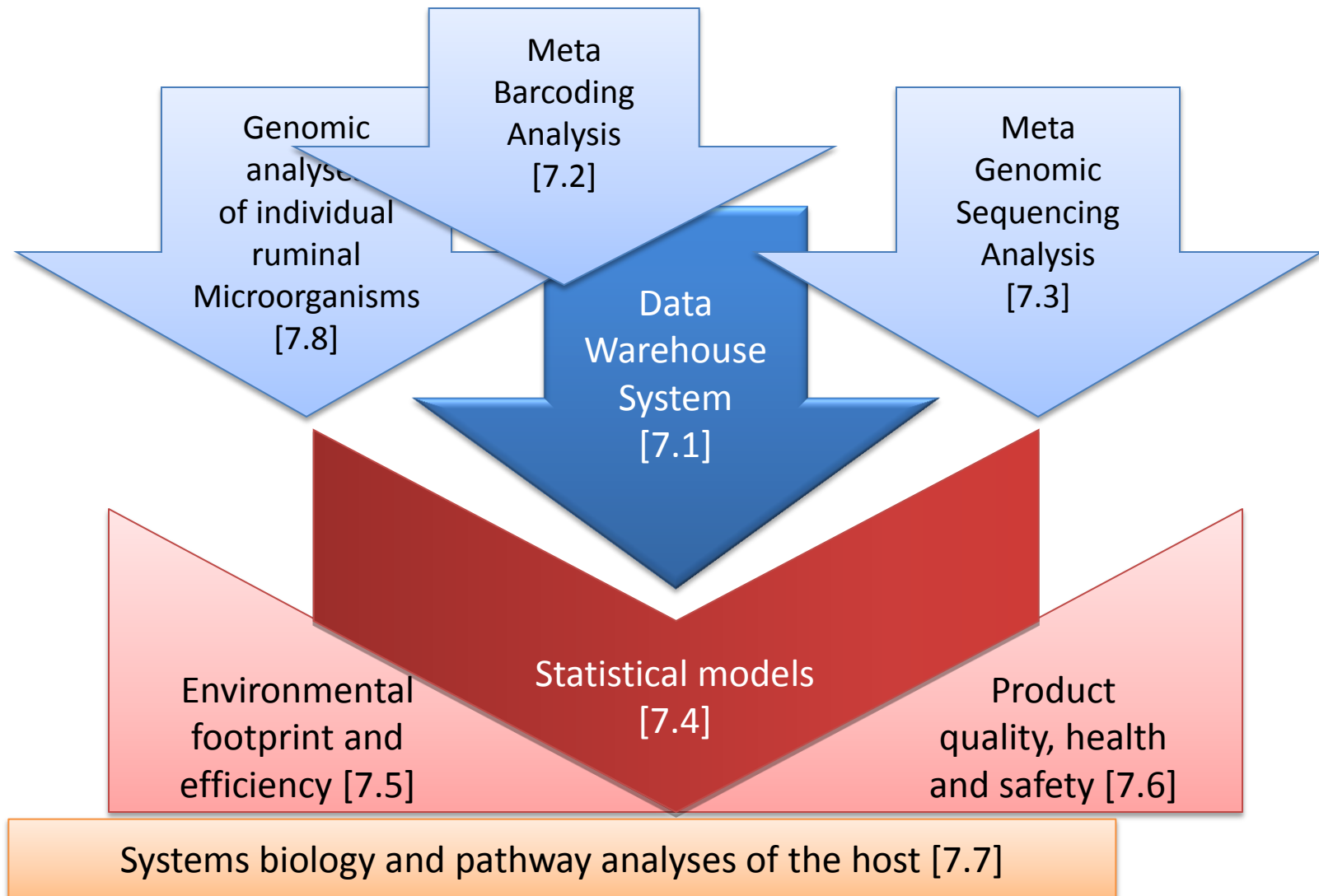
- **Bacterial genomes**
Six *Butyrivibrio* spp.
Two HAP species

- **Fungal genomes**
Anaeromyces sp.
Caecomyces sp.



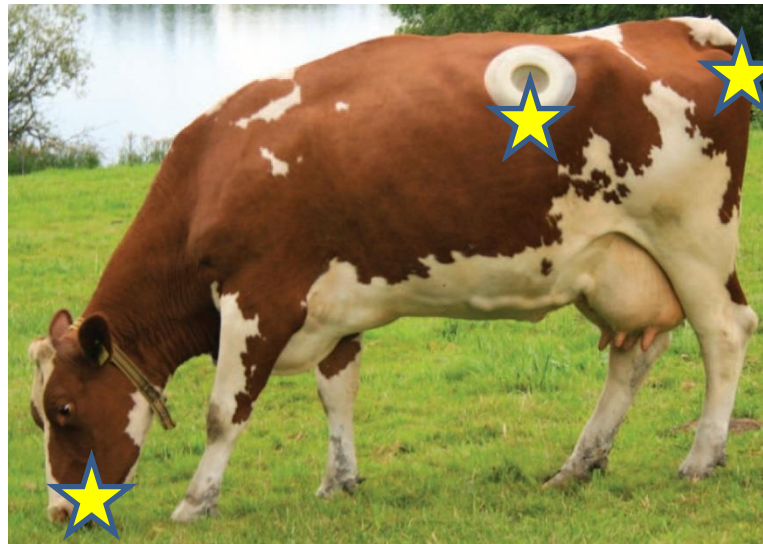
Tools, resources, legacy

Data warehouse



Tools, resources, legacy

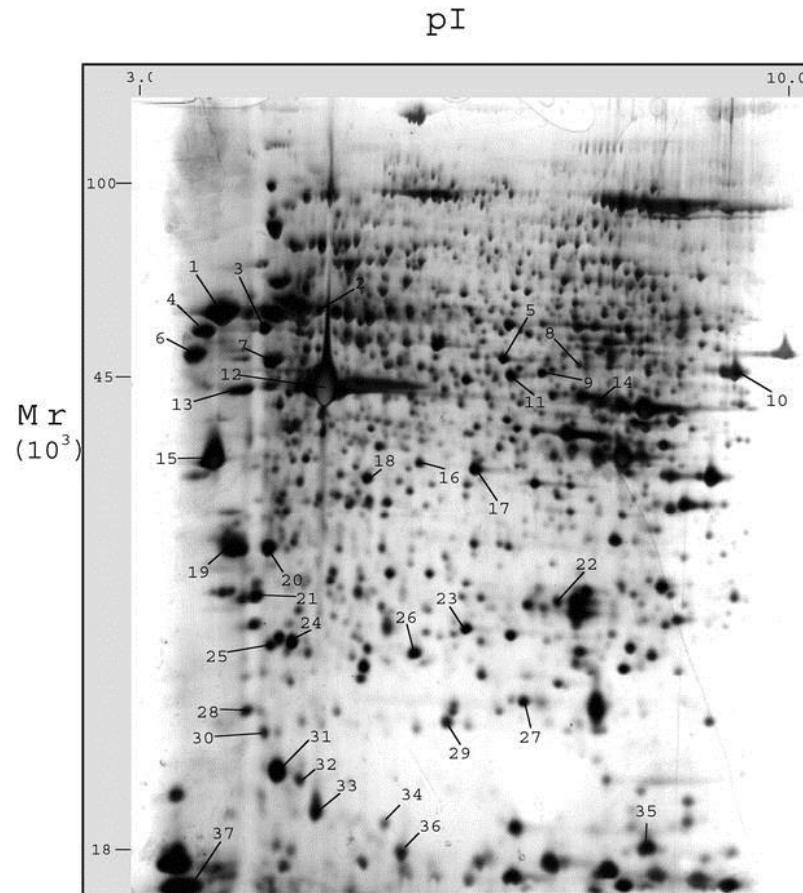
- **Proxies** Buccal-ruminal-faecal microbiomes



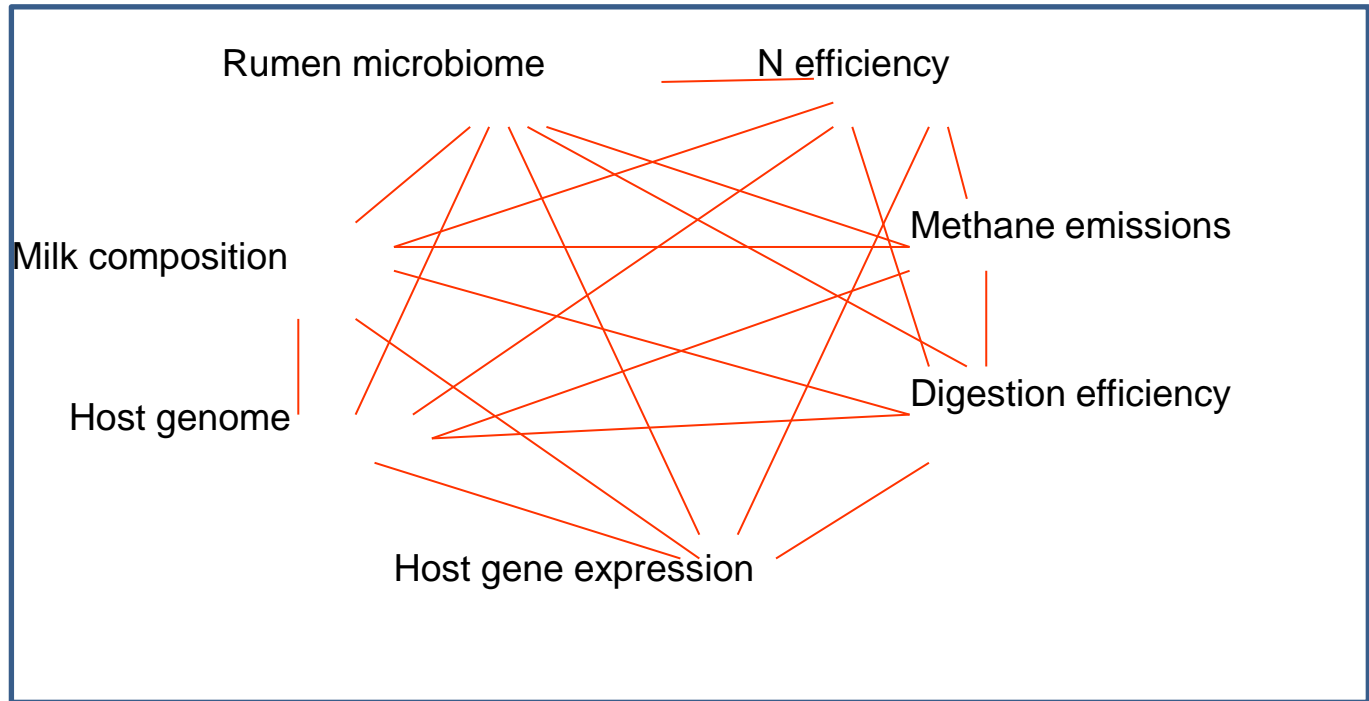
Tools, resources, legacy

- Tools

Metaproteomics



The Bioinformatics challenge



RuminOmics - Aspirations

- **The answer to the animal-microbe conundrum**
- **Bioinformatics legacy**
- **Trained & more efficient industry**
- **Environment legacy**

