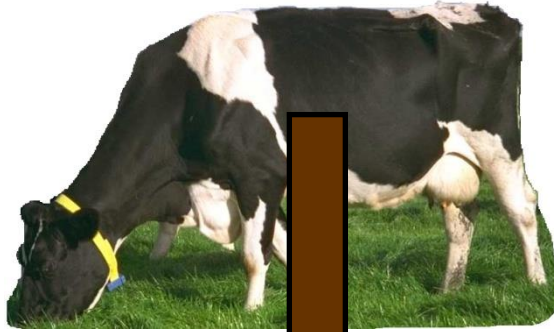




Cledwyn Thomas (EAAP) and John Wallace (Univ of Aberdeen)

Collaborative project
www.ruminomics.eu



Bacteria

~300 species
 10^{10} to 10^{11} cells/ml



Anaerobic Fungi

~30 species
 $<10^5$ cells/ml



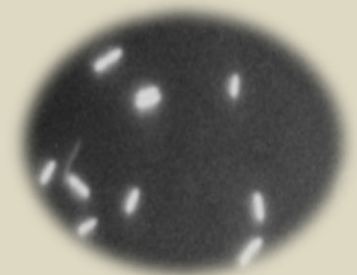
Ciliate Protozoa

~40 species
 $<10^5$ cells/ml



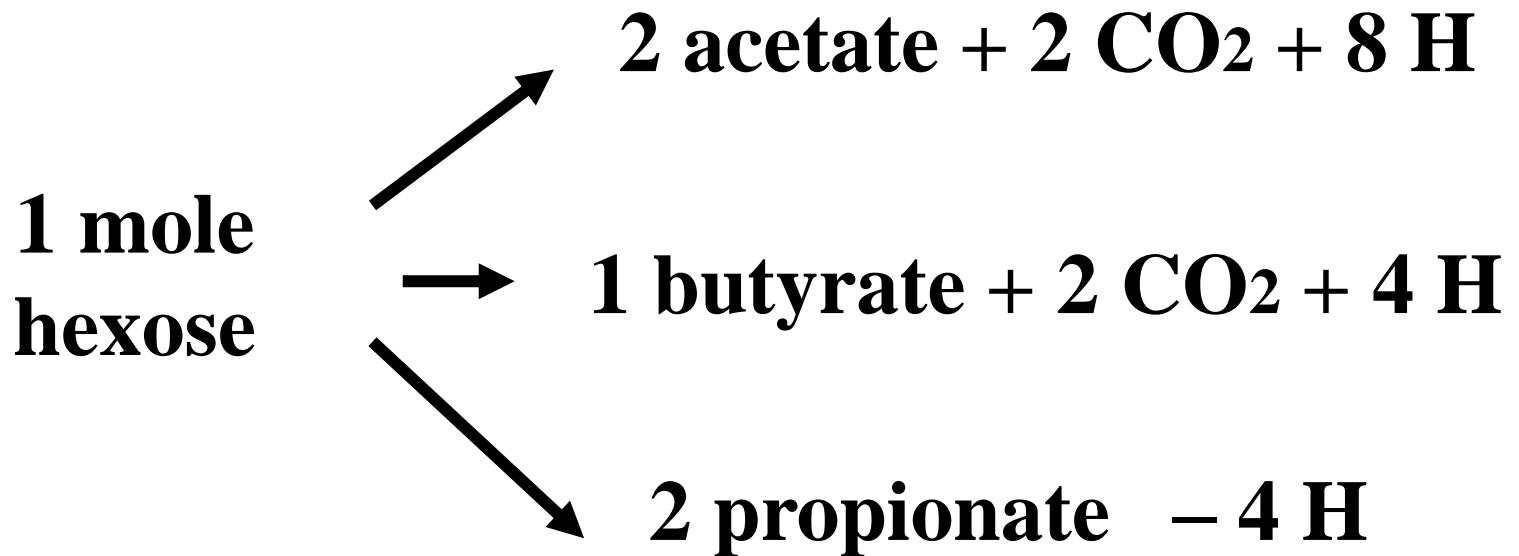
Methanogenic Archaea

~6 species
 10^6 to 10^8 cells/ml



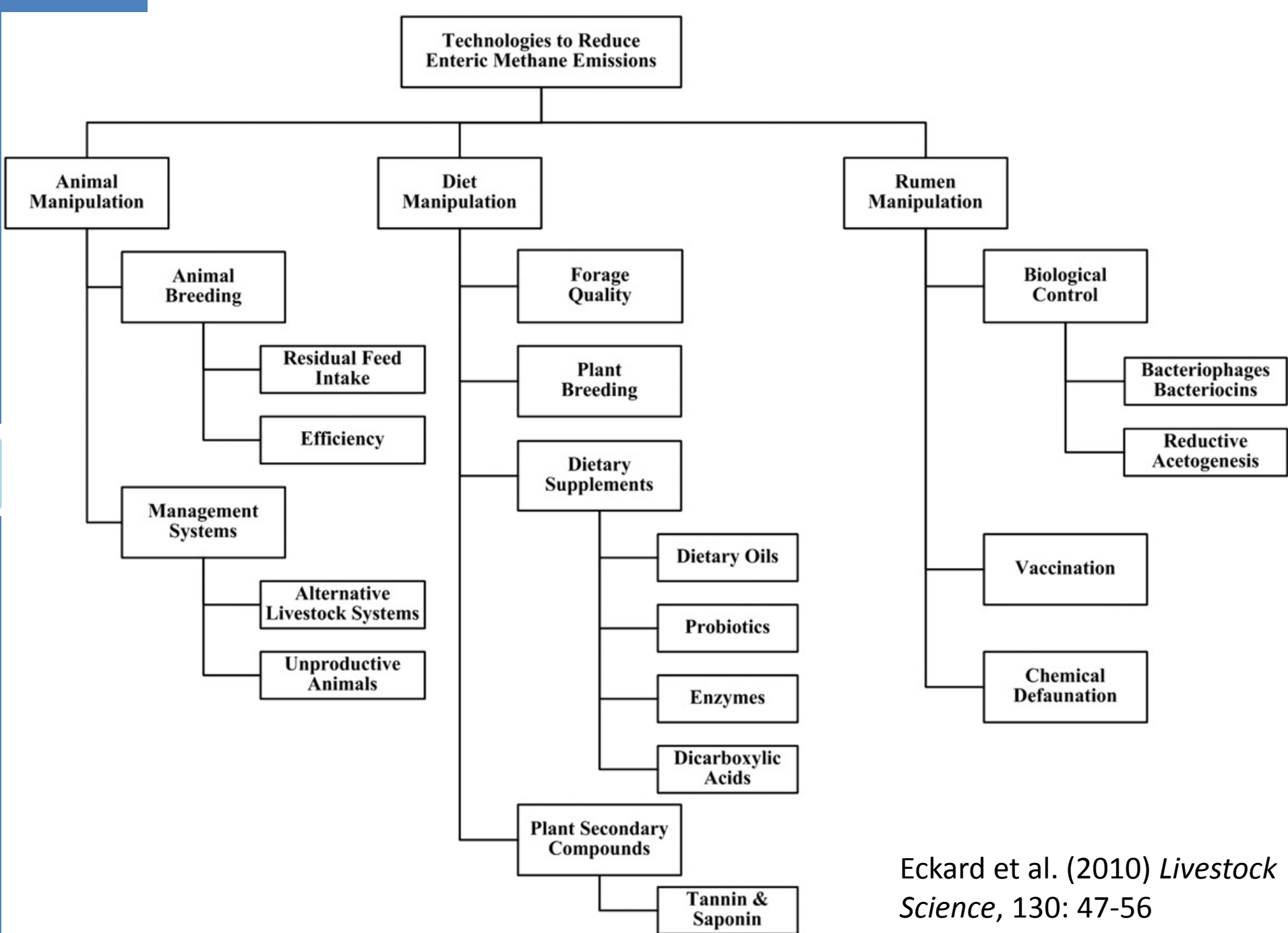
The rumen microbiota is essential for ruminants effectively to utilise dietary material.

Rumen fermentation



Hydrogen liberated by acetate and
butyrate production
and utilized in propionate production





Eckard et al. (2010) *Livestock Science*, 130: 47-56

Genetics/Genomics

- Variation in Milk Yield/Growth Rate and Efficiency – conventional breeding strategies.
- New information suggests also animal variation in Methane emission
- BUT Methane arises from the rumen microbiome



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

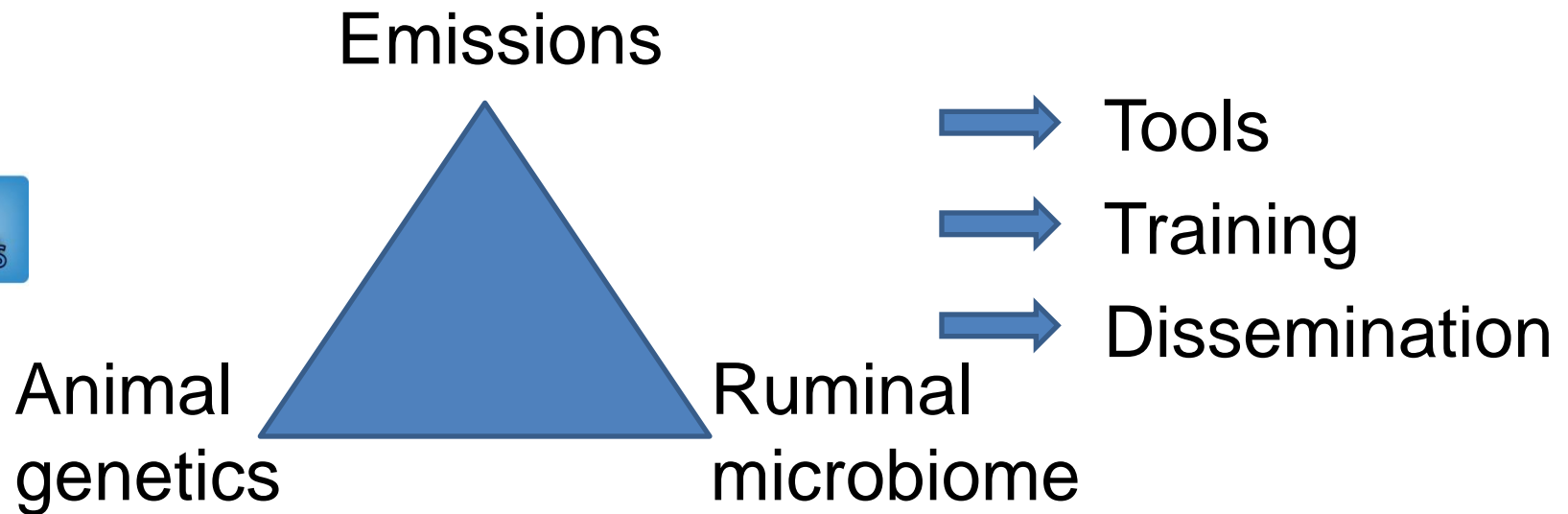


RuminOmics



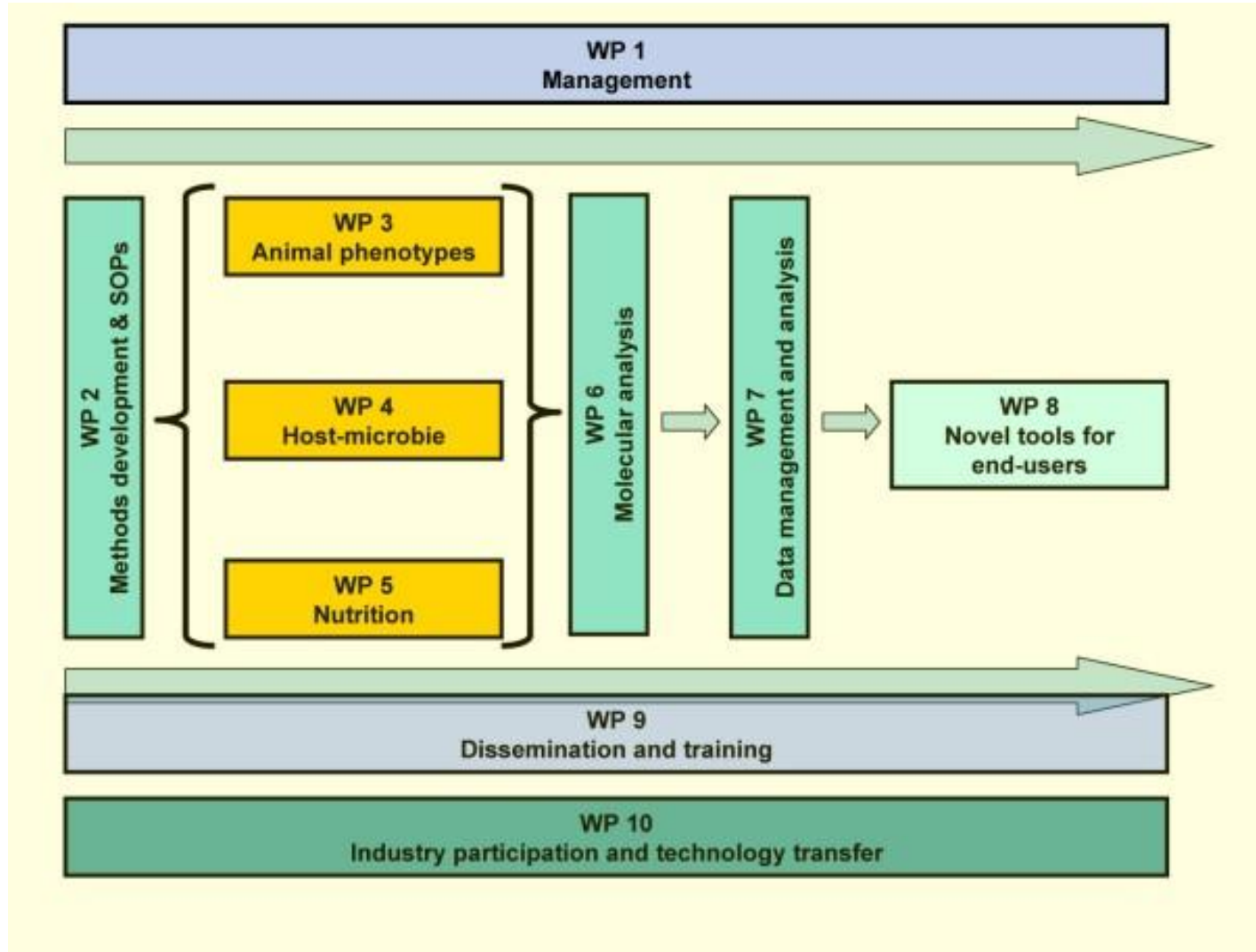
Collaborative project
www.ruminomics.eu

RuminOmics - Aims of project



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

Work Package Structure



Workpackages

The work plan comprises 9 interlinked work packages (WP 2 to 10) supported by a Coordination and Management WP.

- WP 2 will establish best approaches for metagenomics and microbiomics and will establish a common set of Standard Operating Procedures (SOPs) to apply across research sites.

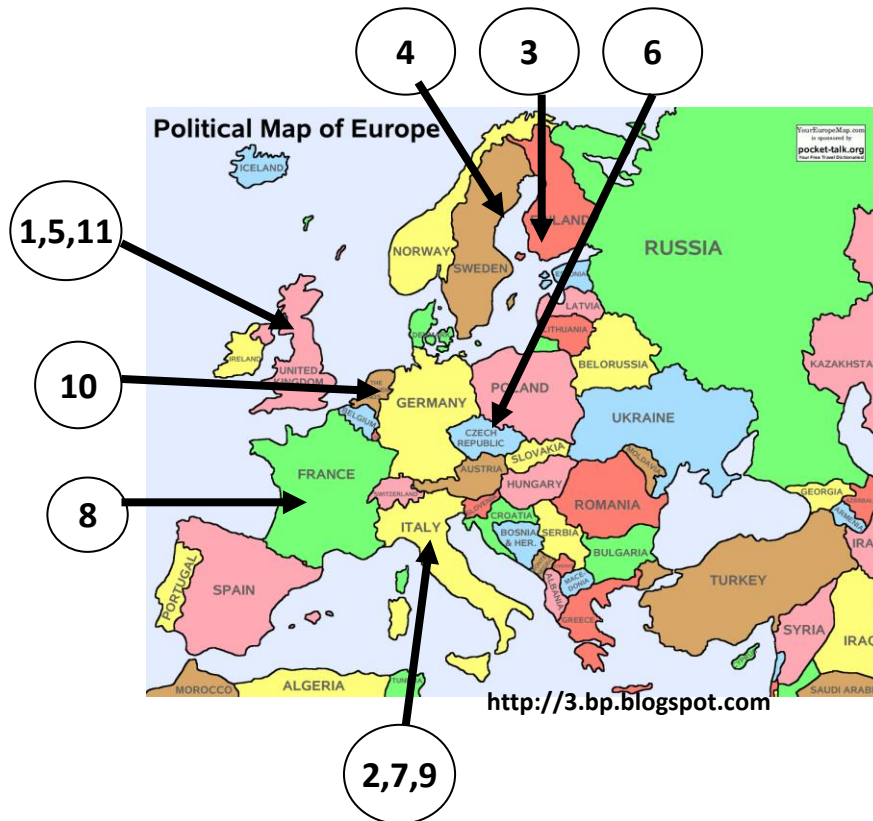


Workpackages

- WPs 3-5 are data-generating in relation to animal phenotypes, host-microbiome relationships and nutritional strategies.
- Samples will be subjected to molecular analysis in WP 6 and data will be modelled in WP 7 by a combination of advanced statistical approaches, bioinformatics and systems biology.
- Outcomes from these analyses will feed into the tools for end users in WP8
- WP9 will disseminate project outputs and enhance capacity



RuminOmics - Partners



| 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 - Experiments

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

Methane

N emissions

FCE

Milk quality



Ruminal
microbiome



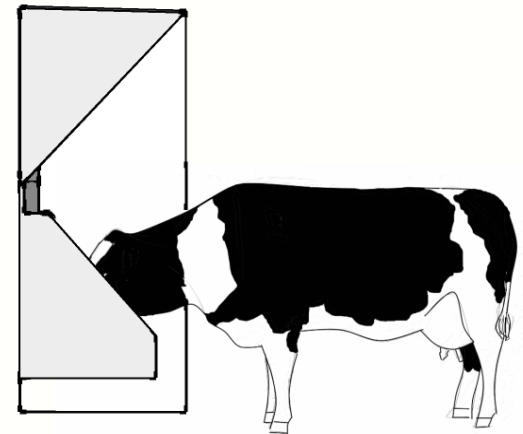
Animal
genotype

- **20 cows in Sweden, Finland**

Impact of N, CHO, lipid nutrition

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

Full metagenome analysis



RuminOmics - Experiments II

Bovine single-egg twins



Interspecies digesta transfer



RuminOmics - Aspirations

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



Collaborative workshops

- **Joint RuminOmics/Rumen Microbial Genomics Network workshop**- *Harmonization of techniques associated with ruminal microbiome and metagenome analysis*, Dublin June 2013



- **Joint RuminOmics/ECO-FCE/Rumen Microbial Genomics Network workshop** - *How does the gut microbiota influence feed efficiency*, Aberdeen June 2014.

You can find the presentations on the RuminOmics website:
<http://www.ruminomics.eu>

Training and ELearning

- Summer School for young scientists in Piacenza 2014
- Elearning courses being developed in
 - Environmental Impact of Livestock
 - Rumen Microbial Ecology
 - Next Generation Sequencing (Metabarcoding and Metagenomics)
 - Developing tools for end users



Regional Workshops

- Warsaw (see later)
- Budapest (28 and 29 September)
- Lodi (5 and 6 October)
- Edinburgh (10 and 11 November)

Information on
www.ruminomics.eu



For further information and discussion

Come to our workshop tomorrow at the WESTIN HOTEL in central Warsaw (10.00h – 18.30h). Free registration (lunch & dinner included)

www.ruminomics.eu



Sustainable Organic and Low Input Dairying (SOLID)

European Project n° 266367

www.solidairy.eu



RuminOmics