SOLID | Sustainable Organic and Low Input Dairying

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Novel feeds may provide multiple benefits

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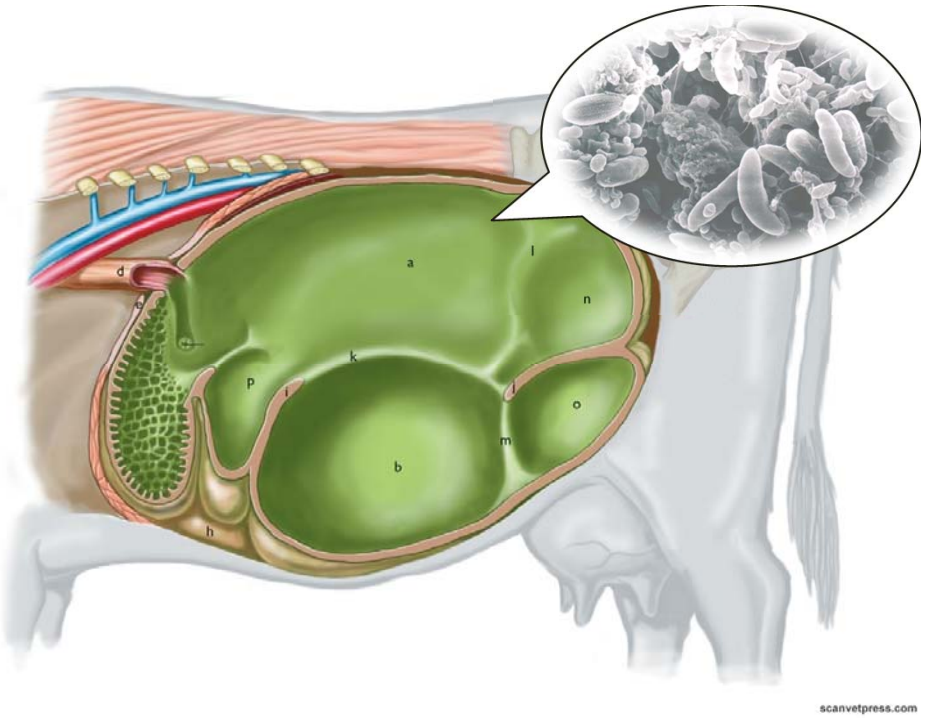
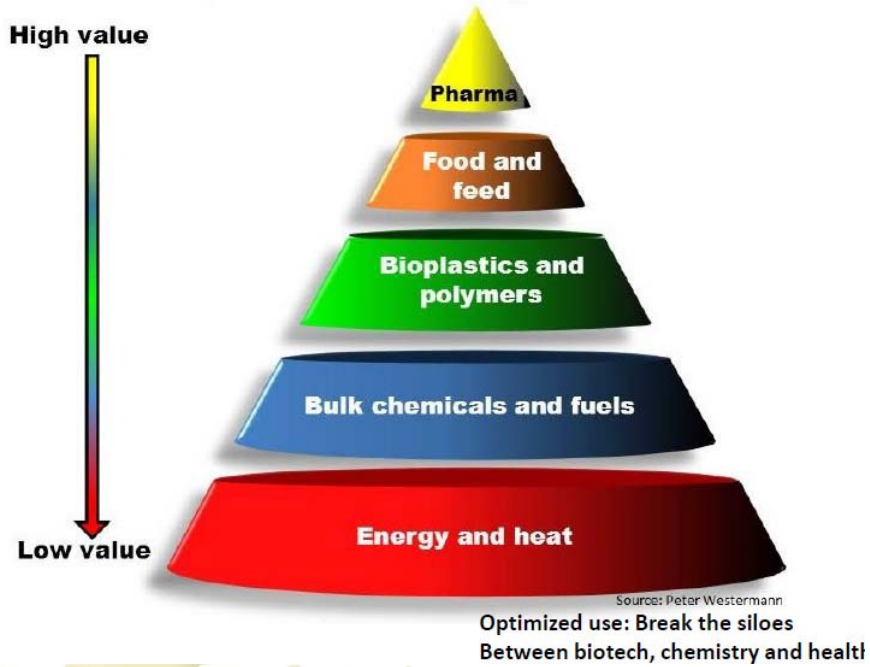
SEVENTH FRAMEWORK PROGRAMME

Forage or concentrate feeds!?

- Organic and low-iput dairy farms rely typically on forages produced on-farm – this is the key to success!
- However, in many systems, substantial amounts of conecentate feeds are also used
- By-product feeds may be beneficial to smooth out temporal feed shortages
  - Use as feed may be economically and environmentally a good choice for ”waste disposal”
  - Ruminants have an advantage of being able to utilize efficiently also fibrous by-products
- As organic food and beverage production develops, also organically labelled by-products emerge
  - More organic feeds available
  - Higher value of by-products supports the main product
- There are a lot of expectations for biorefineries, bioenergy production etc. which is likely to result in opportunities for new feed products
  - In some cases the biorefineries may also compete with animals for the biomasses

- Rumen allows cows to use efficiently fibrous by-products and feeds, which are otherwise of low value





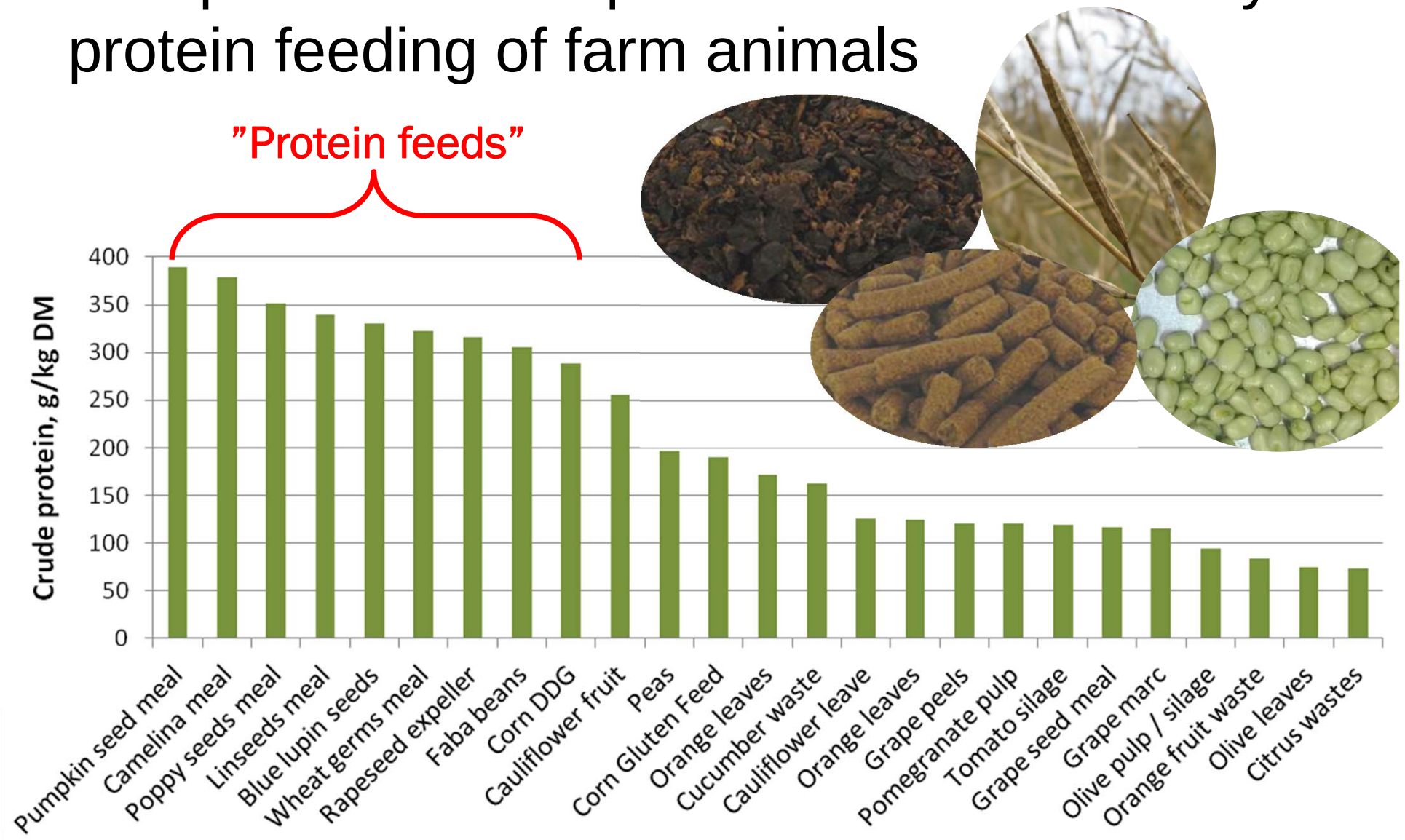
- But on the other hand it is difficult to improve the perfomance from the bulk feed category to higher levels of the cascade

European wide screening of novel & underutilized feeds in the SOLID project

- Research can support wider utilization of novel feeds
- We first conducted a literature review:
  - Rinne, M., Dragomir, C., Kuoppala, K., Marley, C., Smith., J. & Yáñez -Ruiz, D. 2012. Novel and underutilized feed resources – potential for use in organic and low input dairy production. The 2nd IFOAM Animal Husbandry Conference, September 12-14, 2012, Hamburg, Germany. http://orgprints.org/21764/1/Rinne%20IFOAM%20Animal%202012.pdf
- In the next step, feed samples were collected from farms, companies, and other projects in Finland, Spain, Romania and UK.
- Samples were analysed with relevant chemical and in vitro methods to evaluate their suitability as feeds in organic and low-input dairy diets

Protein feeds

- Europe needs to improve it's self sufficiency in protein feeding of farm animals



Fruit and vegetable by-products

- Roughly half of the fruits and vegetables in EU go to waste
  - Losses occur at all steps: Agricultural production, processing, distribution, consumers
- The materials are typically moist and easily spoiled, but with proper management (e.g. ensiling), can successfully be used as animal feed

On-farm trials in Spain: *by-products in dairy goats*

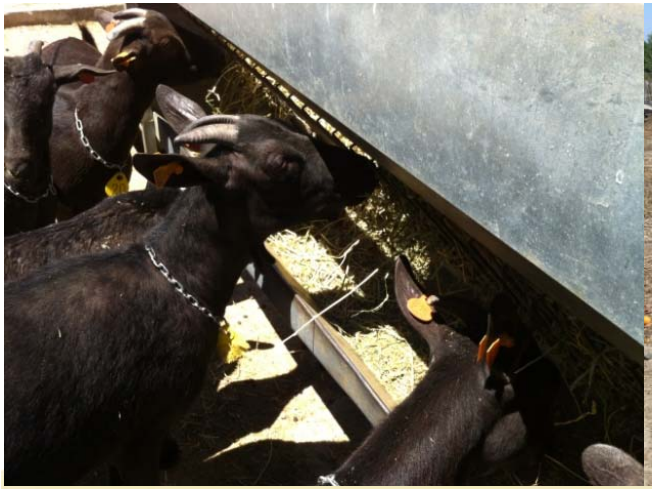
Farm 1 (*September-November 2013*)

- Olive and tomato silages
- 3 experimental groups

  Control : olive silage : tomato silage
- 2 months monitoring
- Feed intake, milk yield and composition and environmental assessment

Farms 2 and 3 (*September-December 2013*)

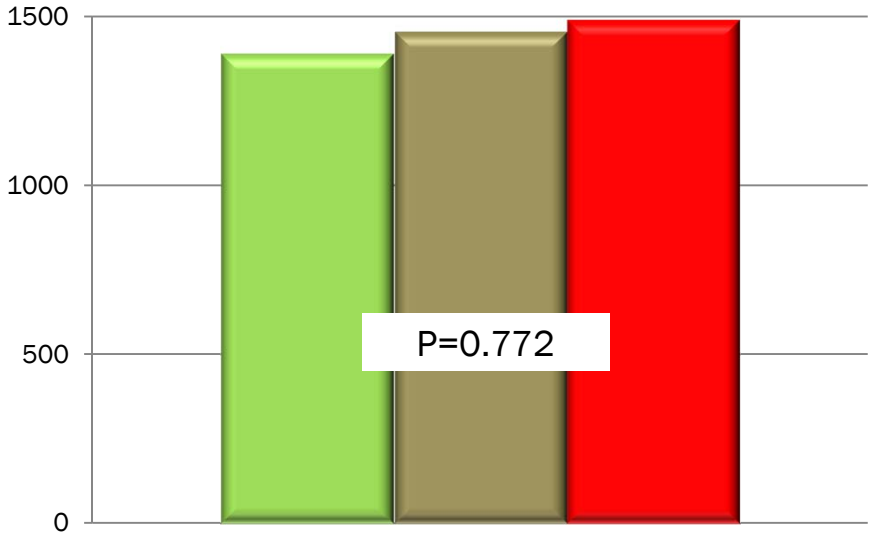
- Orange (farm2) and cauliflower (farm3) by-products
- 260 (1) and 600 (2) lactating goats
- 4 months monitoring
- Feed intake, milk yield and composition, farm inputs and outputs



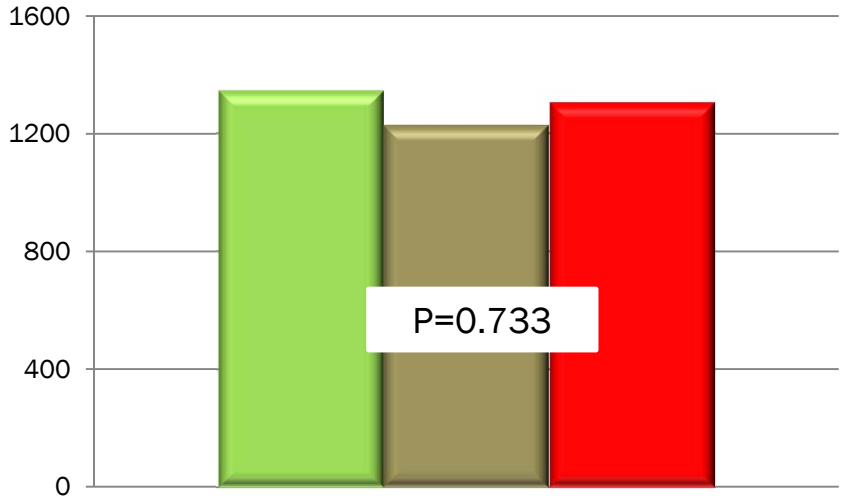
Control Olive silage Tomato silage

CSIC

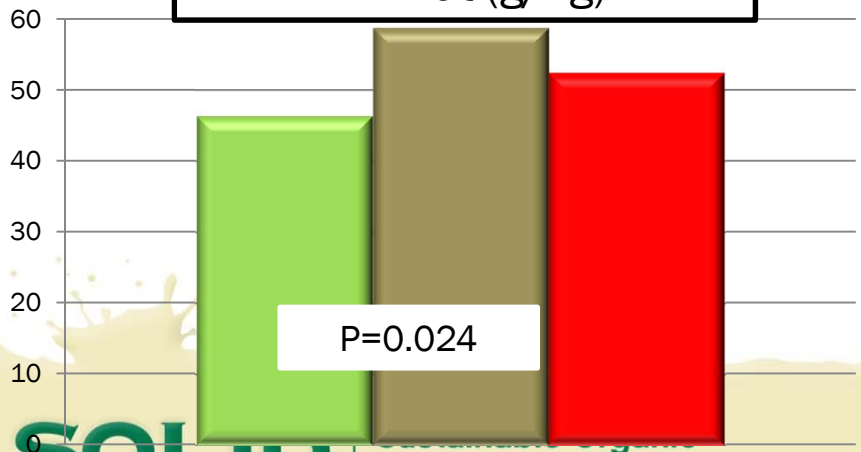
Daily intakes(g/d DM)



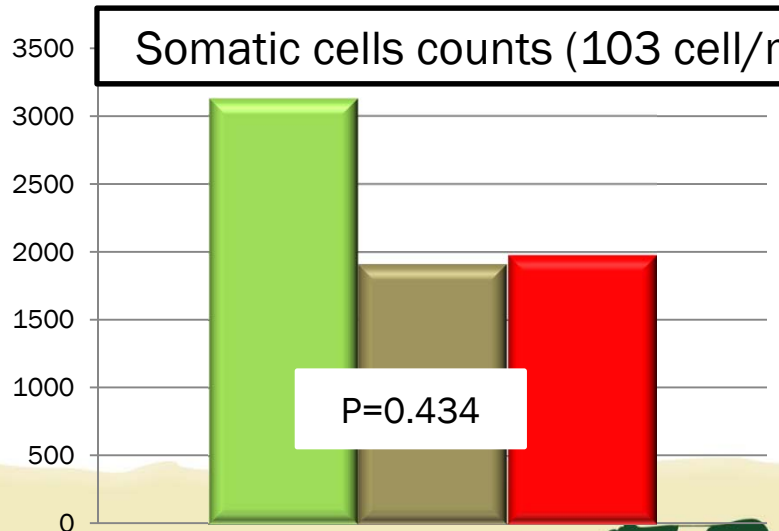
Milk yiled (g/d)



Milk fat (g/kg)



Somatic cells counts (103 cell/ml)



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VALORISATION OF CAMELINA CAKES in Romania

EXP 1: 0%, 50% and 100% replacement of sunflower meal
(in the context of diet based on silage & hay)

EXP 2: 100% replacement of sunflower meal
(in the context of diet based on green biomass)

insignificant decrease of milk yield

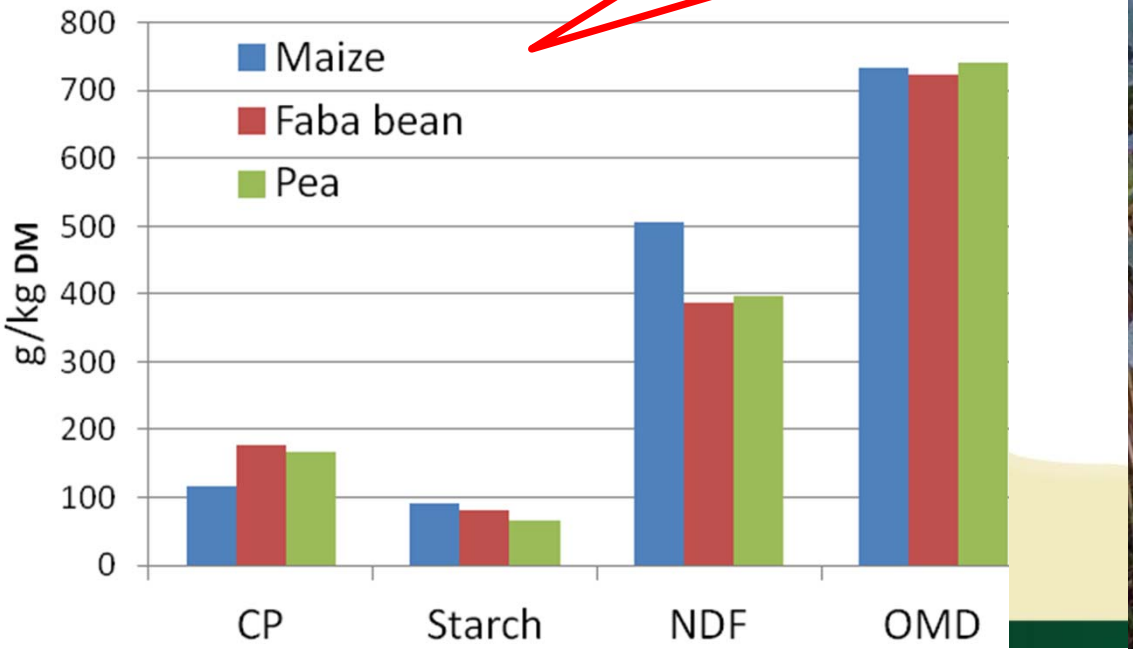
significant decrease of mil fat content

improvement of the milk fatty acids profile

Whole-crop cereal forages

- Grain legumes provide an option to maize with higher protein content, less dependence from N fertilization and suitable for environments where maize does not grow

Results from Finland



Agroforestry

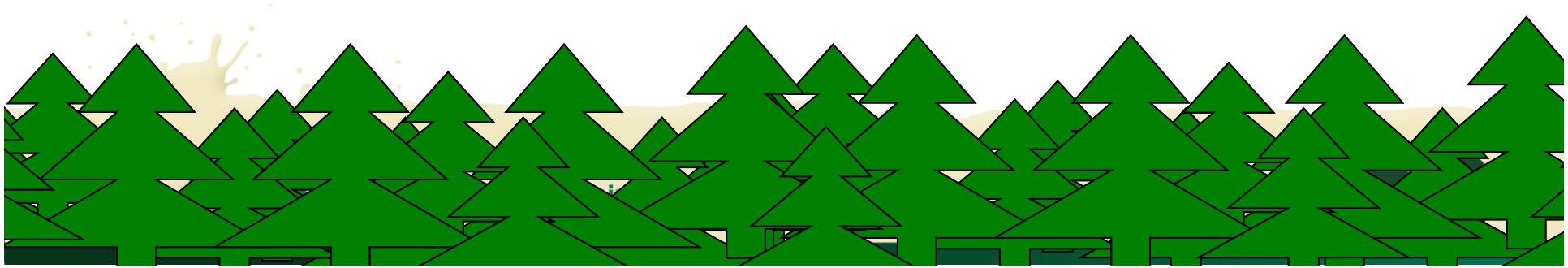
- Multifunctionality of agroforestry systems has benefits, but browse from trees has low nutritional value compared to needs of dairy diets

Ensiled willow leaves

Sampling of short rotation willow for both wood chips and feed in UK

Wood-derived novel products

- There is great interest in utilizing the forest biomasses in novel ways
- Ruminants are able to utilize variable fbrous products as energy sources – but value added is not very high
  - The conventional feeds are efficiently produced, logistics etc. well designed, and costs (relatively) low
- Industrial processing (hot water and pressure) of wood released hemicellulases into a highly digestible form
  - But commercially not (yet) feasible
  - What about consume reactions?



A palatability trial of birch and spruce extracts was condacted at Luke, Maaninka.

Kautto, O., Sairanen, A., Kuoppala, K., Byman, O., Ilvesniemi, H. & Rinne, M. 2014. Koivusta ja kuusesta kuumavesiuutetun hemiselluloosaliuoksen maittavuus lypsylehmille Maataloustieteen Päivät 2014.

Outi Kautto

Novel feeds from grass

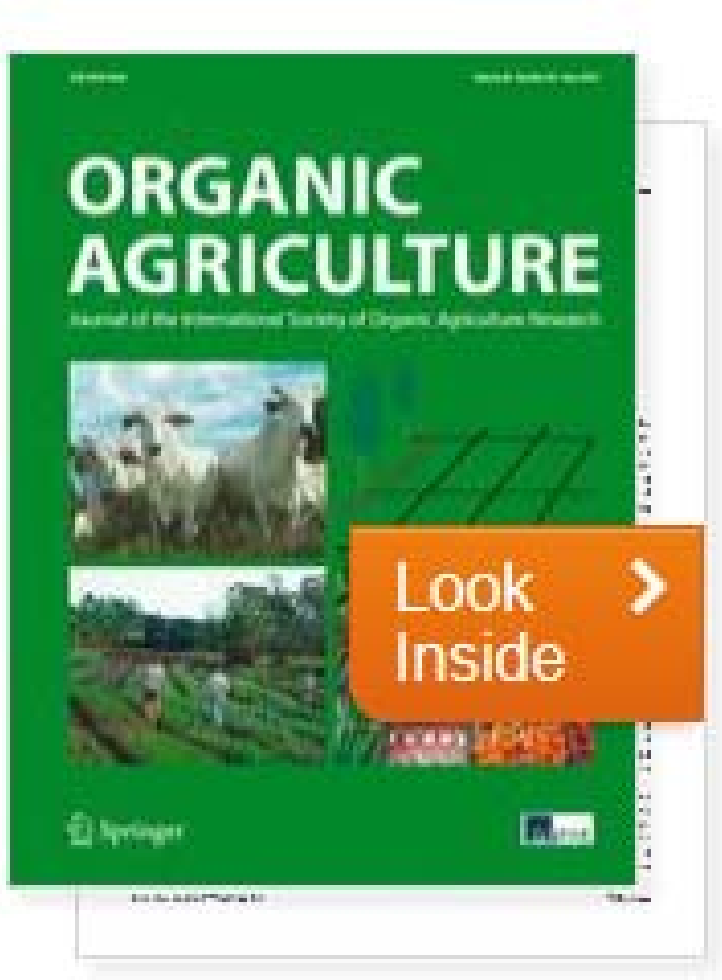
- Grass is an abundant feed source
- Ensiling makes it a stable raw material for biorefining
- Liquid part of it may be used even for pigs
- A national project going on in Finland (Innofeed)

Local niches vs. legislation

- Some by-products or plants may be produced in limited amounts
  - May have local significance
- EU feed material list is not closed
  - But the producer of the feed is responsible for the safety of it's use
- The information regarding feed regulations at EU level can be found at the European Commission website:
  - http://ec.europa.eu/food/food/animalnutrition/index_en.htm

Detailed report of ”novel feeds” work conducted in the SOLID project is available in ”Organic Agriculture”:

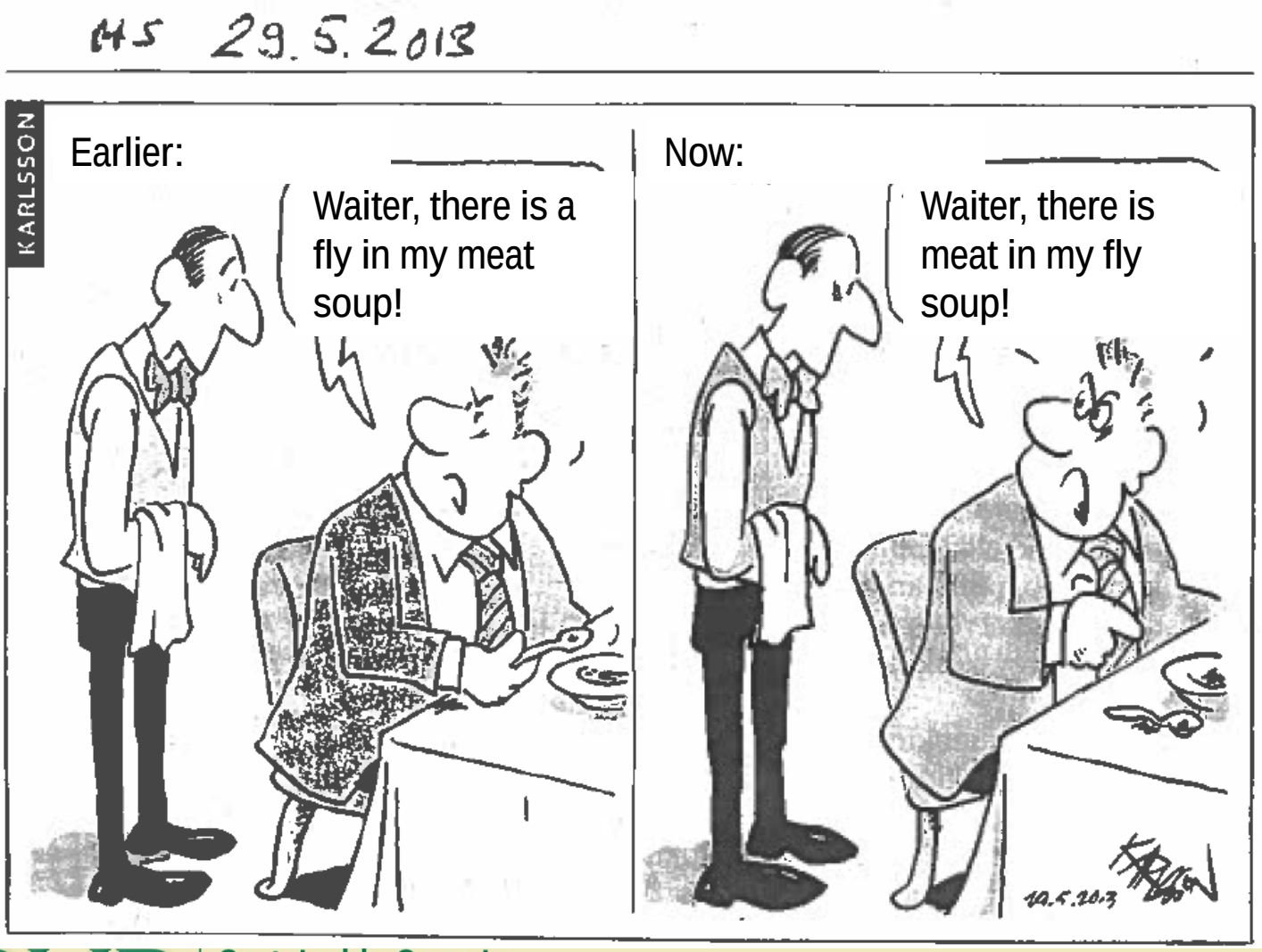
Rinne, M., Dragomir, C., Kuoppala, K., Smith, J. and Yáñez-Ruiz, D. 2014. Novel feeds for organic dairy chains. Organic Agriculture 4:275–284.



There is a feed for every need ☺

- The variability of the raw materials further modified by differing processing methods results in wide range of feed materials available
- Research can support the acceptance and optimal use of novel and under-utilized feeds
  - Demonstrations and publicity for the new options
  - Correct advice based on composition / characteristics
  - Some feeds have special characteristics (probiotic effects, modifications in product quality)
- Innovative use of novel and underutilized feed resources has the potential to improve the efficiency of the “green economy”

Things are changing!



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- In particular:
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