Sustainable Low Input Systems for Meat and Milk in Greece: Science-based evidence for innovation

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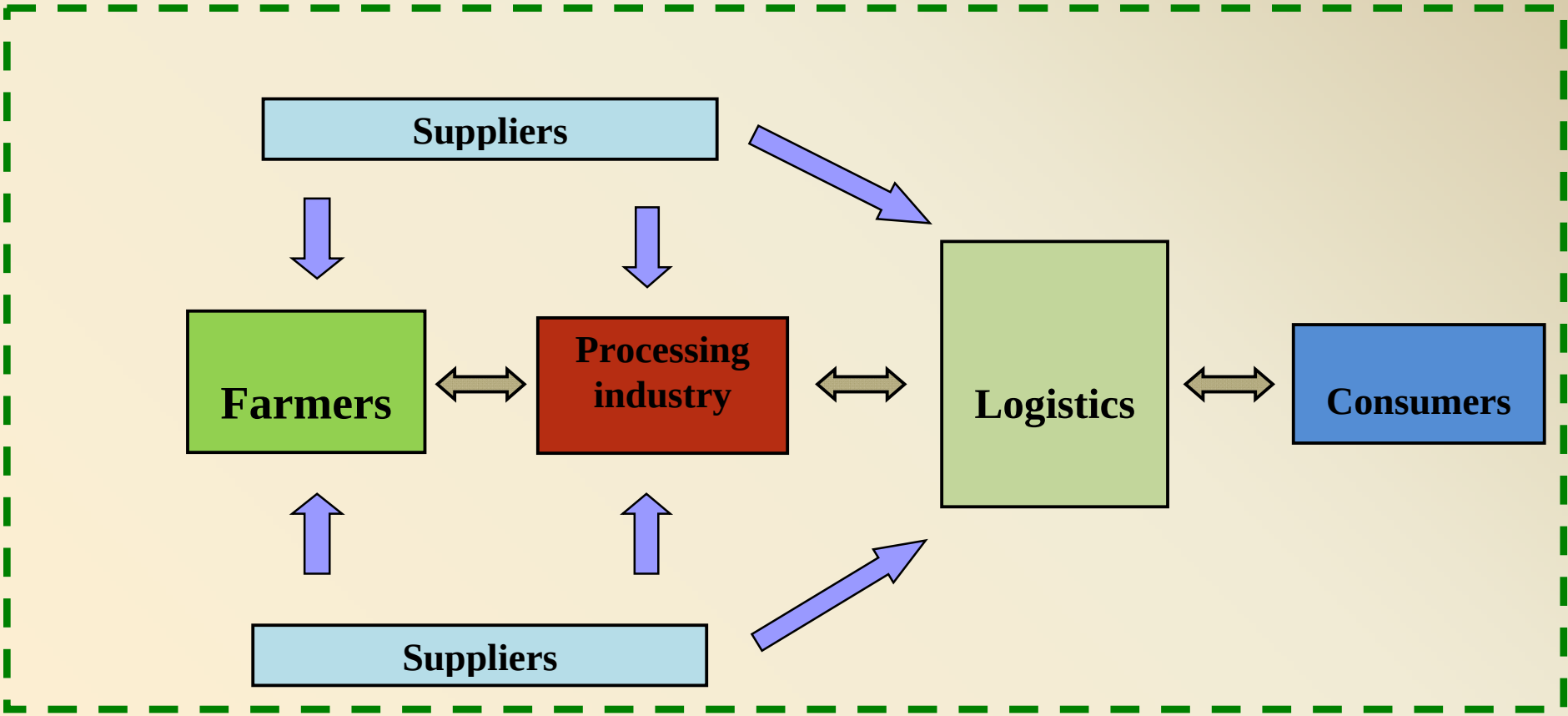
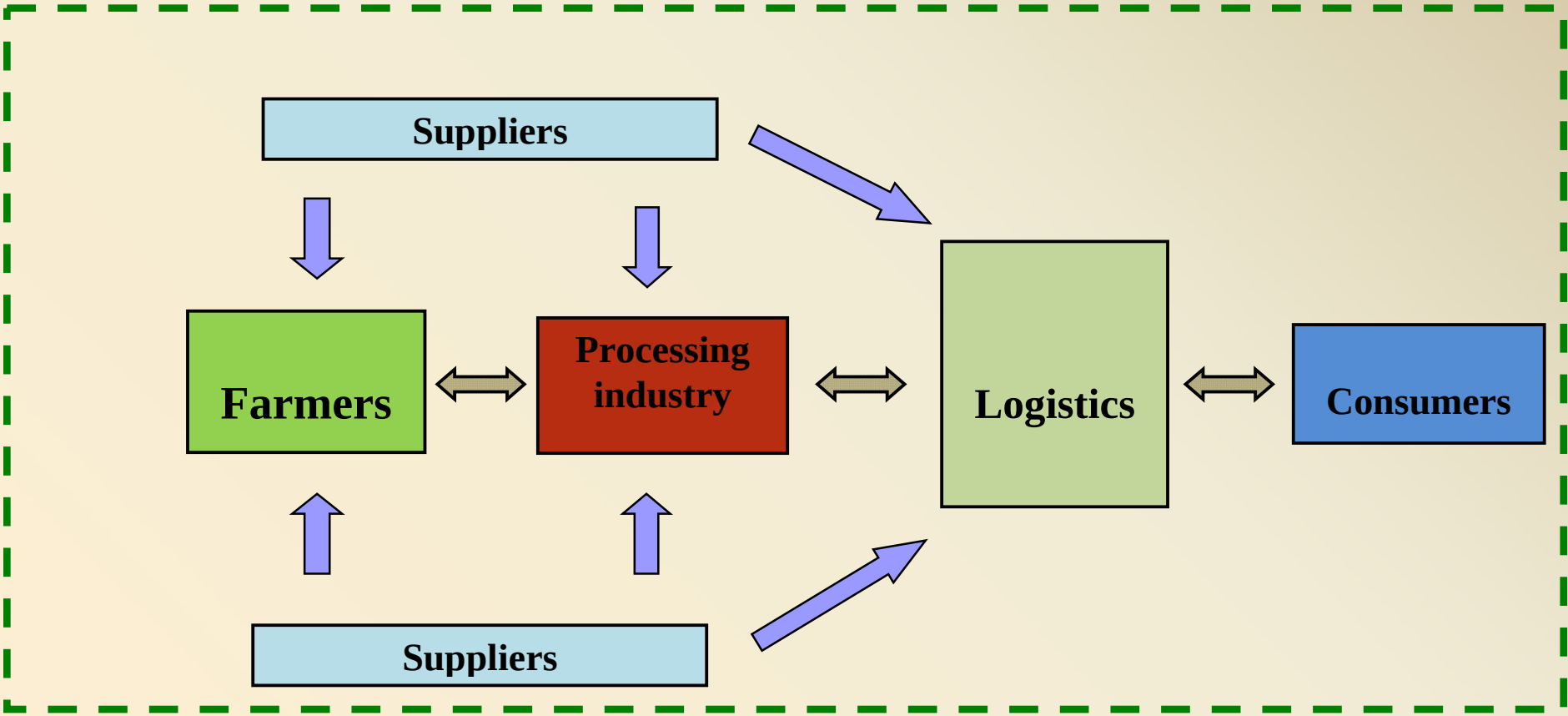
Presentation overview

- Review of the current situation
- Production systems and husbandry practices
- Main production limiting factors
- Scientific evidence as a driver for change
- Partnerships and open innovation
- Future trends

Production framework



Production framework



Constrains for milk and meat production

- lack of historical data
- Claims of “superiority” without solid foundation
- Application of research data and implementation pathways

Livestock production in Greece

Animal species	
Dairy cows	**117.971**
Beef cattle	**299.000**
Sheep	**9.747.325**
Goats	**4.562.684**
Pigs	**1.050.000**
Poultry	**34.500.000**
Rabbits	**1.000.000**
Equines	**44.307**

Source: minagric.gr, 2011

Production systems

- Traditional pastoral management systems
  - Transhumance
- Semi extensive
- Semi intensive
- Intensive systems (great variation of intensiveness in different regions)

Main production limiting factors

- Management is generally linked to systems of natural resources (e.g. forage)
- Large diversity in terms of
  - genetic potential,
  - distribution,
  - prolificacy
  - productivity

  - Farm size
  - Specialisation
  - Product quality
  - competition

- EU policy had a major effect on the industry

(Large subsidies – horizontal application)

Production systems

Meat ??

Milk

Milk

Transformed into typical dairy products that have a regional or local connotation of origin and quality

Meat

Species	Tones of meat	Greece - *self-sufficient*
Poultry	187.766	77,5%
Pigs	114.805	40,1%
Sheep& goats	108.769	88,5%
Cattle	58.956	28,0%
Other	3.969	40,3%

Milk

Species	Tones of milk	Greece - *self-sufficient*
Cows	627.481	91%
Ewes	497.347	98%
Goats	115.156	100%

Source: ELOGAK: 2013

One example…

Cattle

National herd	
Beef cattle	**299.000**

Tones of produced meet	Greece - *self-sufficient*
58.956	**28,0%**

Average carcass weight

Greece	E.E. -25 countries	France
235,7	323,5	372,4
	-87,8	**-136,7**

Πηγή: minagric: 2011

What do we know about meat?

3 large scale European projects focused on sheep and goat meat

CAMAR Project: 8001 CT 91-308 (1992-1994). The improvement of the quality and marketability of sheep meat produced in the less favoured areas of the community.http://cordis.europa.eu/projects/rcn/114_en.html

OVAX project: Identifying and changing the qualities and composition of meat from Europeans sheep types which meets regional consumer expectations, Project: FAIR 3 CT 96-1768 - (1997-2000)
http://ec.europa.eu/research/agro/fair/en/uk1768.html

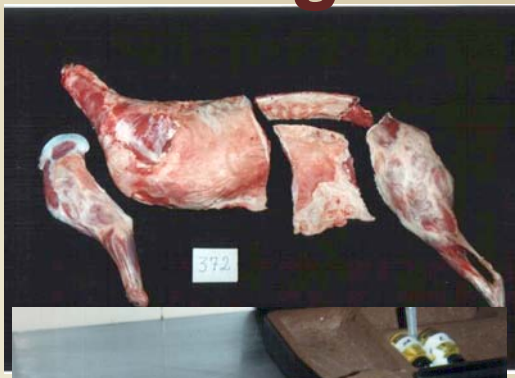
PARASITES project: Environmentally sensitive approaches to nematode parasite control in sustainable agricultural systems for sheep and goats, Project: FAIR 3, CT 96-1485 (1998-2000),
http://ec.europa.eu/research/agro/fair/en/uk1485.html

Scientific evidence as a driver for change

- Growth potential of lambs and kids from indigenous Greek breeds
- Different levels of nutrition and their effects on growth and carcass development.
- Optimal marketable carcass weights
- Production costs and marketing opportunities
- Use of sown and irrigated pasture for the production of lamb carcasses at heavier weights

Scientific evidence as a driver for change

- Taste panels of trained sensory assessors and consumers in different European regions
- Instrumental measurements of meat texture,
- Fatty acid composition of adipose and muscle tissues,
- Concentration of collagen,
- Heat soluble collagen,
- Moisture,
- Total lipids



Scientific evidence as a driver for change

Beef cattle data

Growth and carcass weights

Carcass conformation

pH

Pigment

Fatty acids composition of muscle

FAIM

Farm Animal IMaging

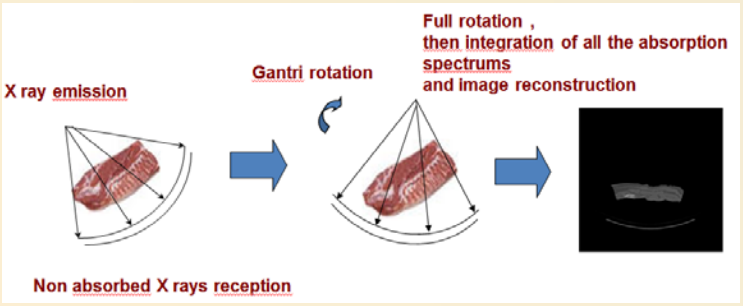
http://www.cost-faim.eu/

FANIMAG: Optimising and standardising non-destructive imaging and spectroscopic methods to improve the determination of body composition and meat quality in farm animals. COST Action (FA 1102), 2011-2015.

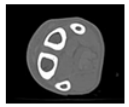
Pig Body composition measurement by CT or MRI

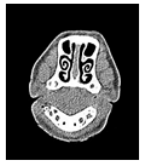
FAIM Cost training school
08-10/10/2013
Mathieu Monziols

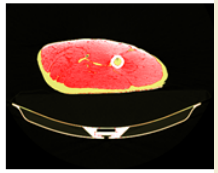
CT scanning

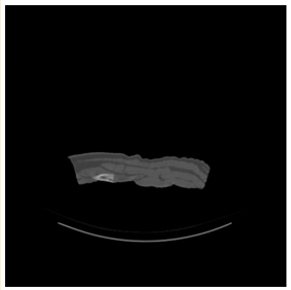


- Others applications
  - Bone density
  - Rhinitis diagnosis
  - Salting processes on dry cured hams

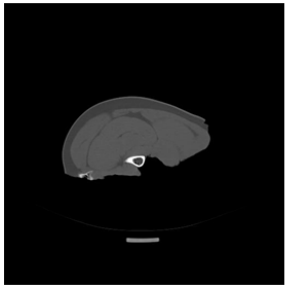




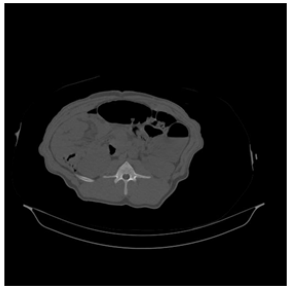




Pork Belly image

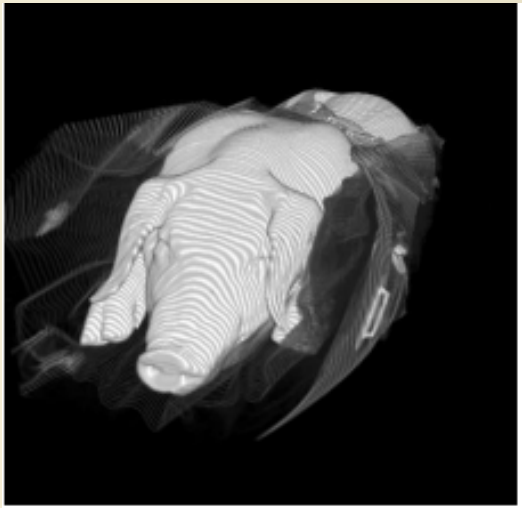


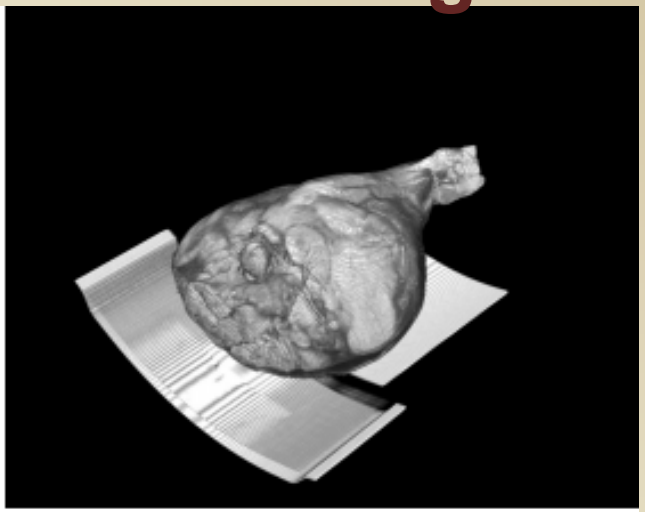
Pork ham image



Live pig abdomen image

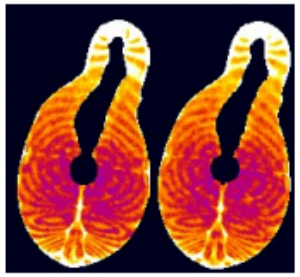
Scientific evidence as a driver for change





High throughput MRI

Fat distribution in fish



Sex determination of oyster

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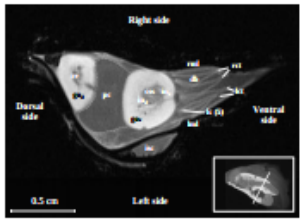
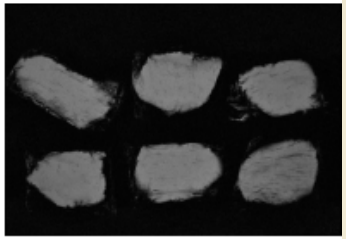
PRISM
Imagerie et Spectroscopie Structurale et Métabolique



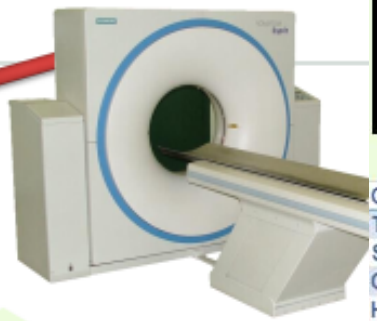
Intramuscular fat in pig muscle



Between 300-400 samples scanned per day

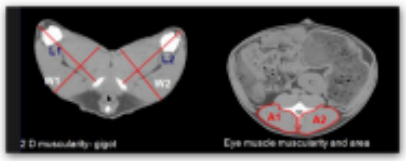
Good practice: The work of SRUC Scotland that helped the sheep industry in terms of genetic improvement and meat quality

Traits we predict from Reference s

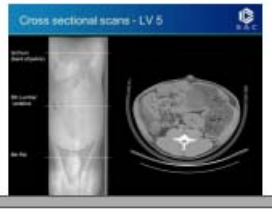


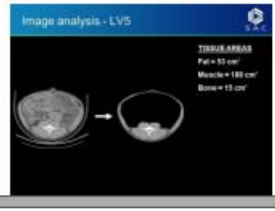
Reference scanning

- Pred. Carcass and tissue weights(M, F, B)
- Pred. Tissue proportions
- Pred. Killing out %
- 2D- Gigot muscularity,
- EM-area and 2D-EM- muscularity



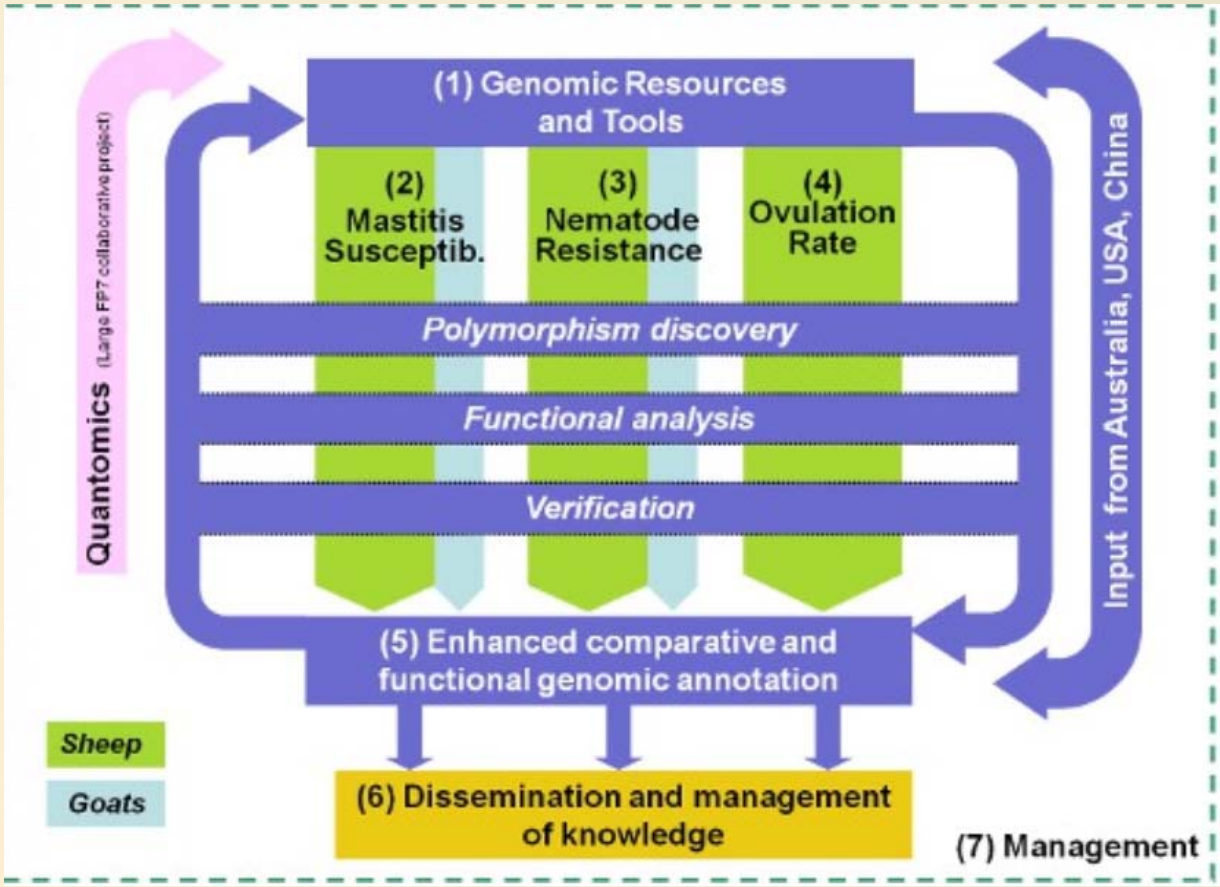
Column1	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	total
Texel	353	0	107	148	204	137	124	83	89	108	198	378	333	**2262**
Suffolk	353	0	59	100	156	168	107	36	27	128	98	71	133	**1436**
Charollais	129	0	0	58	122	92	134	100	20	107	117	10	242	**1131**
Hampshire D	30	0	0	25	25	0	46	21	0	36	27	10	40	**260**
Meatlinc	57	0	20	25	30	26	0	0	28	24	0	48	42	**300**
Beltex									50	34	20	15	26	**145**
Innovis												154		
total per year	922	0	186	356	537	423	411	240	214	437	460	686	816	**5534**





What do we know for milk?

"Sustainable Solutions for Small Ruminants, 3SR" (http://www.3srbreeding.eu). FP7 2010-2013:



The objectives of the project are to:

1. Develop selectable genetic markers for mastitis susceptibility, resistance to nematodes and ovulation rate.

2. Develop tools and resources – specifically improving the genetic information available for sheep and goats

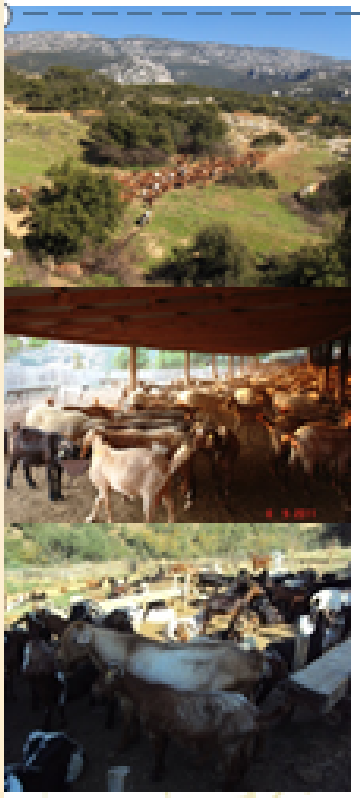
3. To disseminate results from the project to ensure a broad and long-term beneficial impact on European competitiveness and EU policy on animal health, welfare and sustainable agriculture.

Greece: Resource population of ~613 dairy ewes of Chios Sheep

SOLID project: Sustainable Organic and Low i
FP7-KBBE-2010-4, (2011-2015) www.solidairy.eu

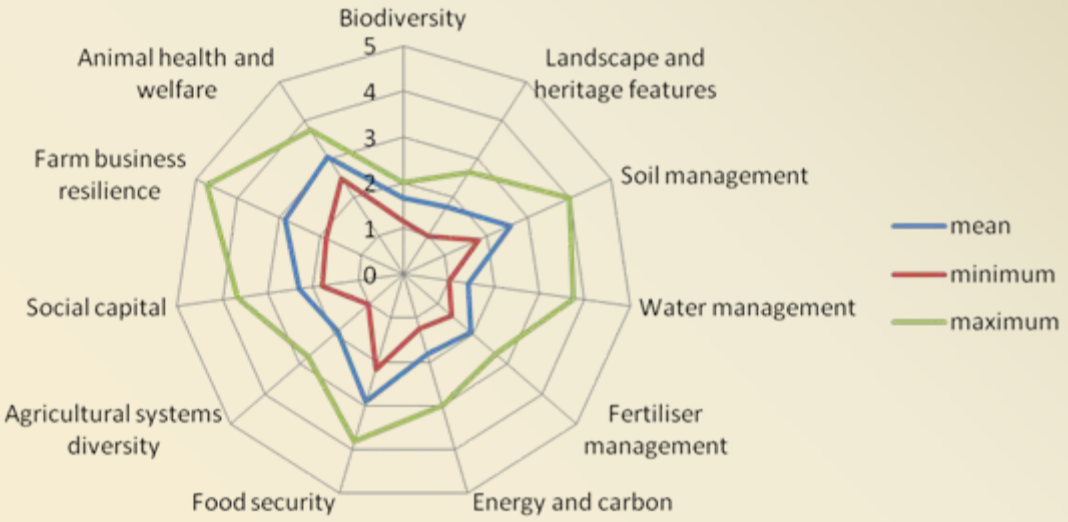
SOLID | Sustainable Organic and Low Input Dairying

Genetic & phenotypic characterisation of dairy goat breeds perceived to be adapted to LI conventional production systems



- Partners involved: AU, BOKU, DAPVET
- Objectives:
  - Quantification of phenotypic & genotypic differences between adapted and conventional genotypes
  - Productivity, animal health, milk quality

Case 1. Sustainability assessment of goat farms in Greece

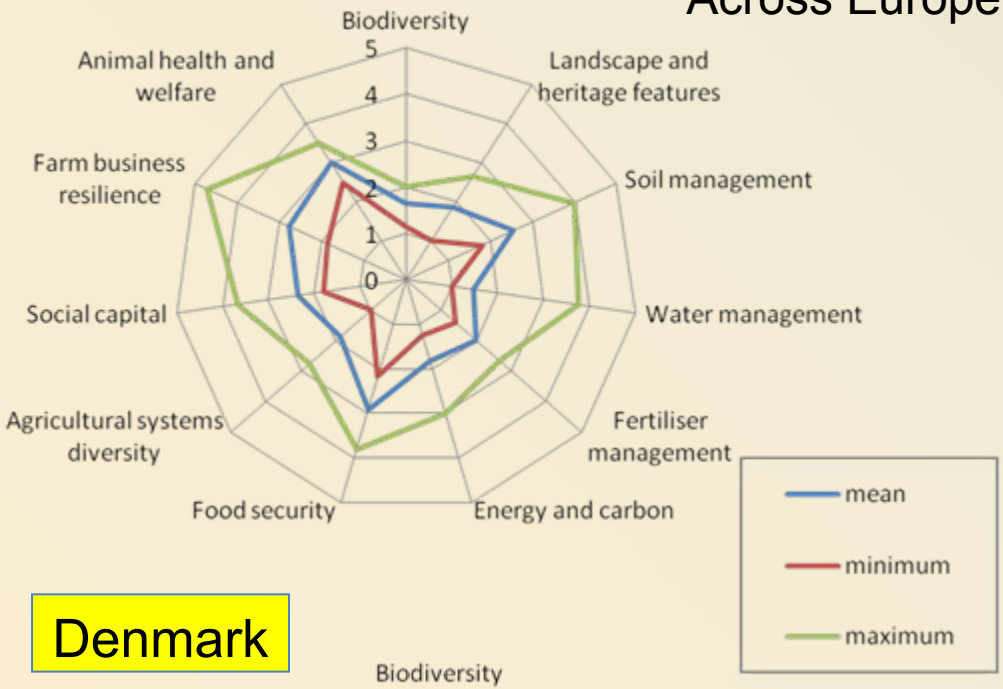


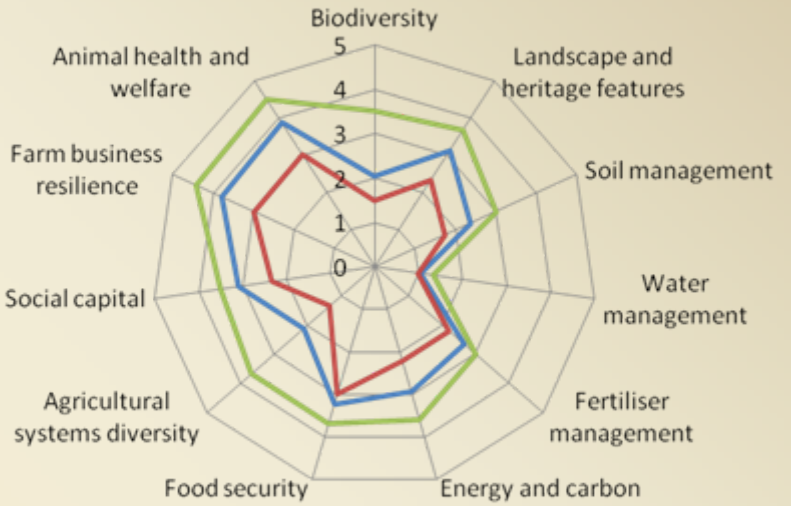
Greek goat farms

SOLID | Sustainable Organic and Low Input Dairying

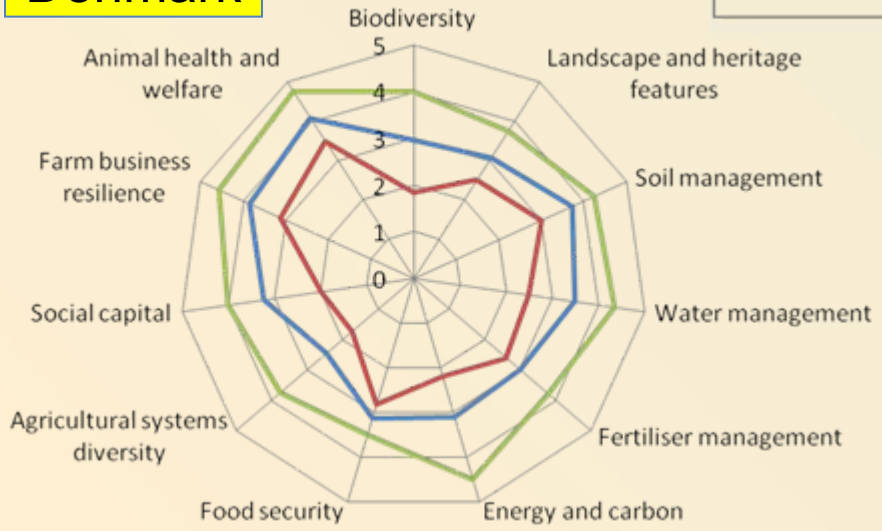
Austria

Across Europe Sustainability assessment

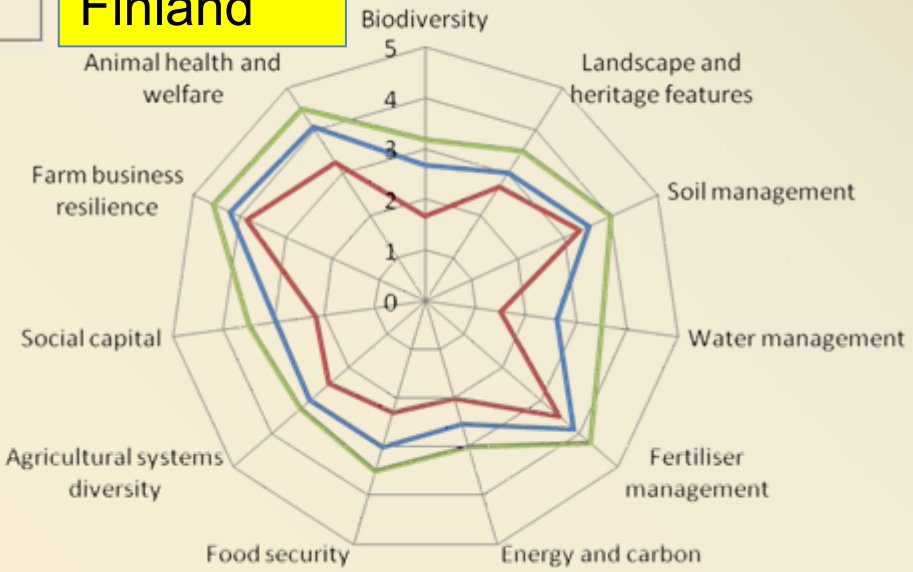




Denmark



Finland



SOLID project: Sustainable Organic and Low input Dairying
FP7-KBBE-2010-4, (2011-2015) www.solidairy.eu

A database of all records has been developed (excel)

8,600 individual milk yield records

8,300 *records of milk quality (fat, protein, lactose, SNF, cells and TVC).*

1,350 milk samples from individual goats - cultured for pathogens such as CNS, Staphylococcus aureus, Streptococci spp, Listeria, Coliforms.

2,000 parasitological examinations (from individual goats) have been performed including coprocultures for the identification of nematode genera.

Data regarding the fertility status as well as assessments of welfare for individual goats of the participating flocks (900 goats).

Three genes have been selected that encode for

	Total	Completed	% Completed
a_{s1} casein	795	745	94
β-lactoglobulin	795	570	72
κ-kasein	795	95	12

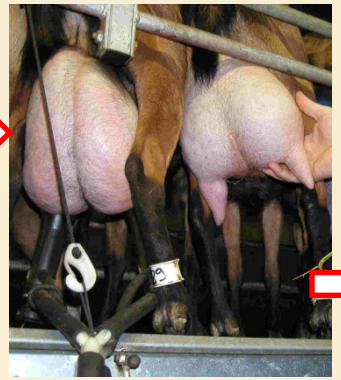
Case study:

Amalthia farm – member in SOLID project

http://www.agroamalthia.gr/

Vertical organization

direct implementation of research data



Future trends in livestock production in Greece

- **Meat production must focus on sheep and goats**
- **Calves from dairy herds should be used in feedlots**
- **Demand for Milk production will increase**
- **Economic pressures will dictate production systems:**
  - Semi-Intensive and intensive systems will prevail
  - Number of farm holdings will decrease
  - There will be major changes in housing and nutrition
  - Machine milking will be the norm
  - Smallholder flocks will disappear

The way forward

Effective cooperation of academia and industry

We propose the formation of two major clusters

Cluster 1 – MILK

Cluster 2 - MEAT

- Effective communication between stakeholders
- knowledge exchange to increase efficiency and effectiveness;
- Transparency in disease reporting and sharing of accurate information
- Wide implementation of ground breaking technologies (DNA markers for economic traits)

The way forward

- **Understanding the changes in milk and meat production and their implications for health, welfare and product safety**
- **Ability to address the complexity of production systems**
  - socioeconomics
  - Sustainability
  - globalisation
  - Climate change and its impact on the epidemiology of diseases
- **Invest in innovation and better training to improve skills and knowledge (CPD)**

Thank you for your attention