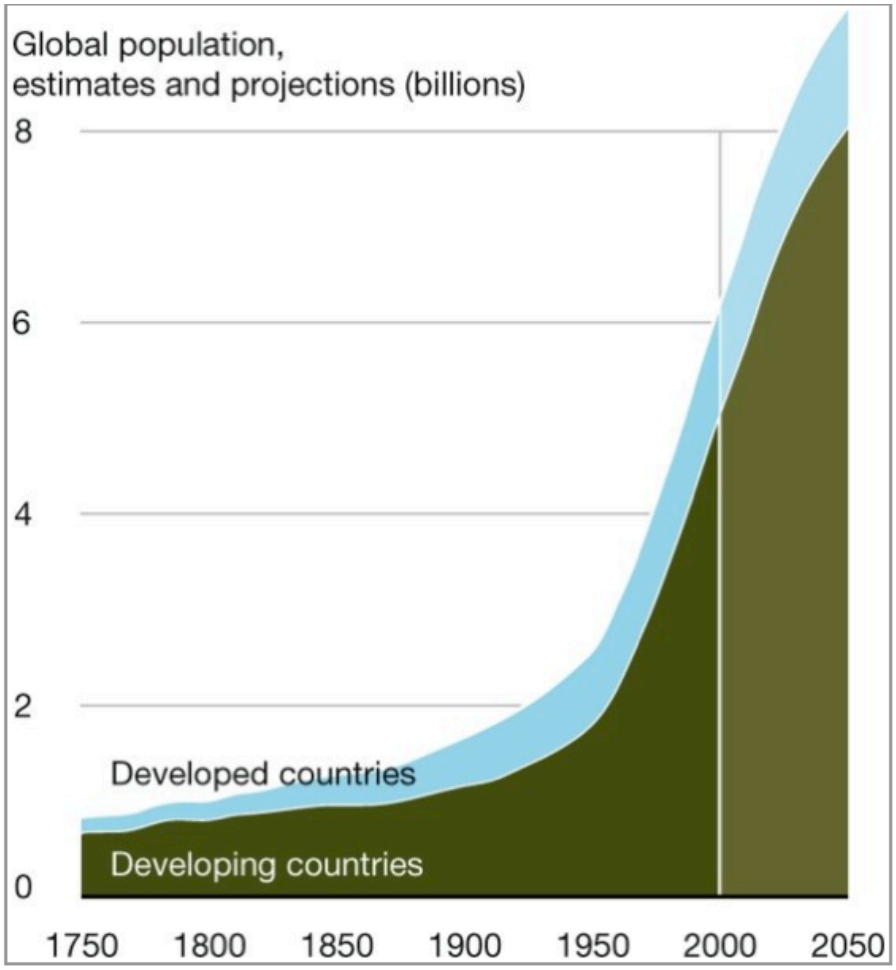
THE CANTOGETHER PROJECT

P LETERME
Project Coordinator

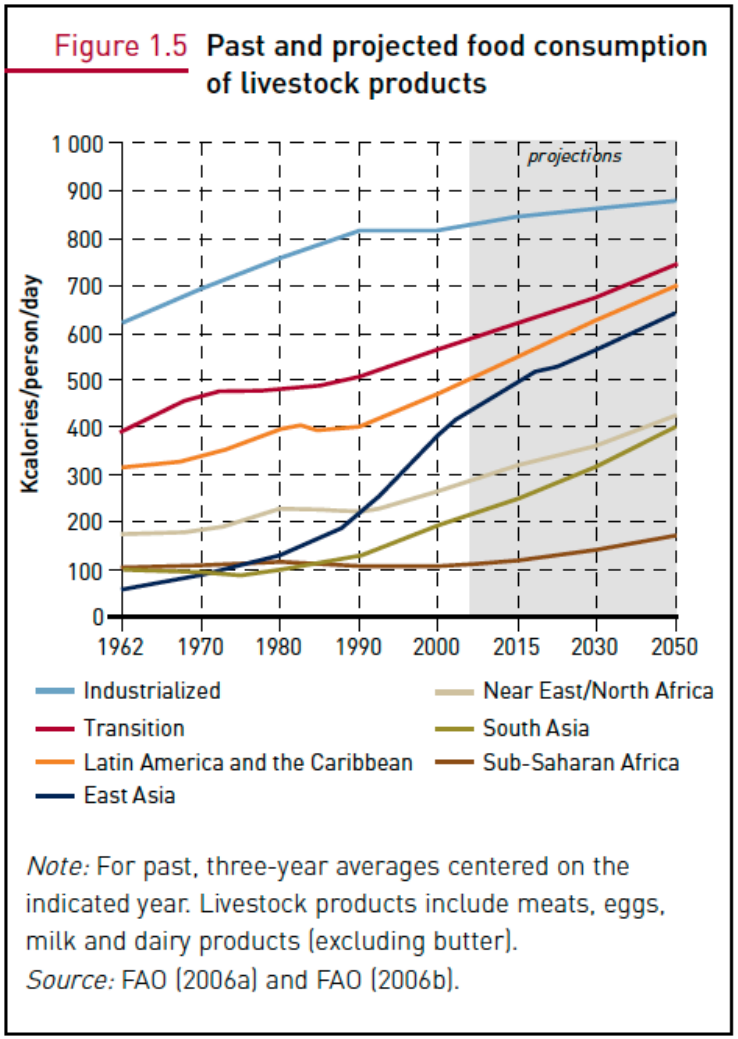
Kick-off meeting, Rennes 29/02-02/03/2012

CONTEXT AND CHALLENGES

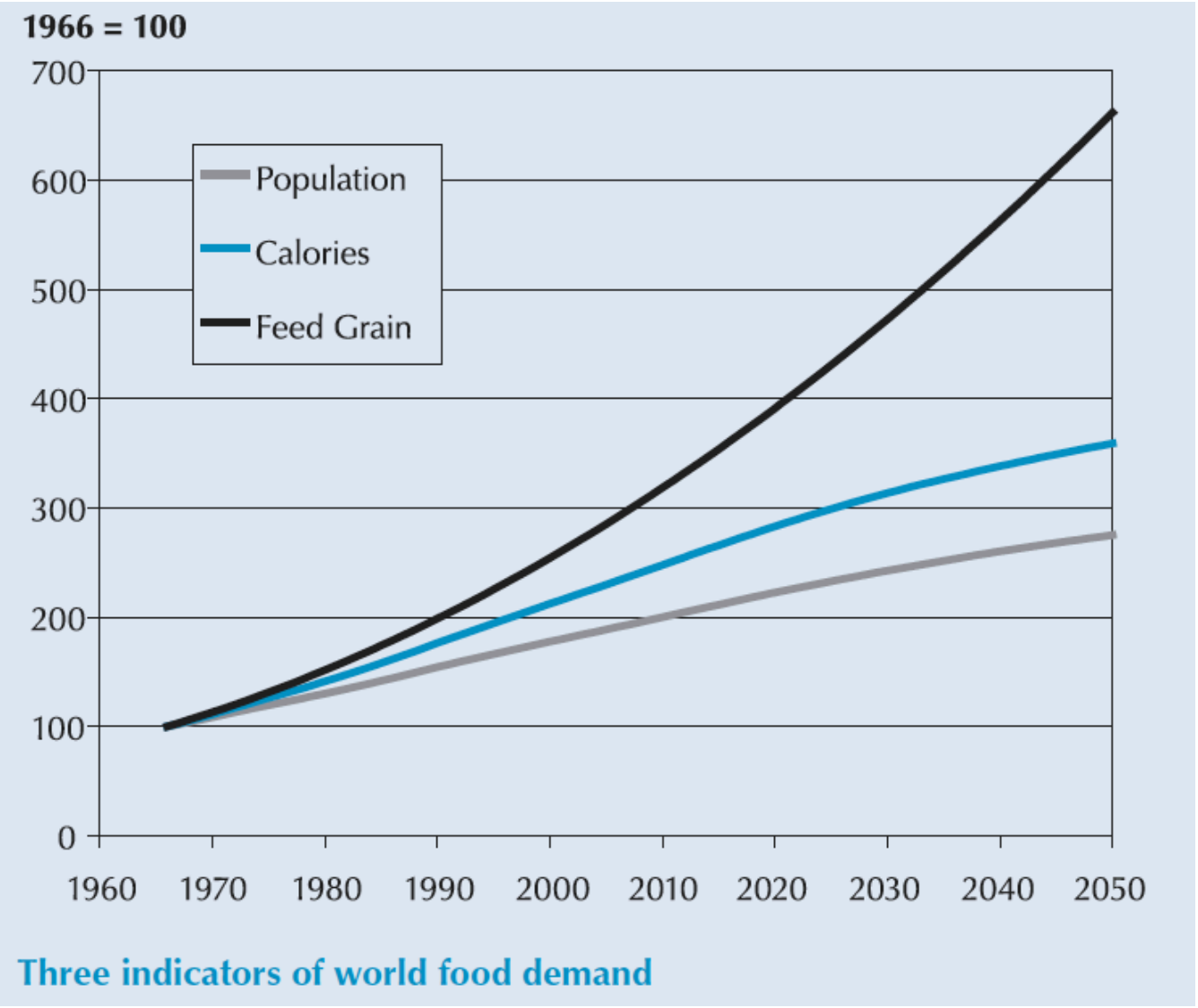
An increasing and changing food demand



http://maps.grida.no/go/graphic/trends-in-population-developed-and-developing-countries-1750-2050-estimates-and-projections



FAO 2006 Livestock's long shadow



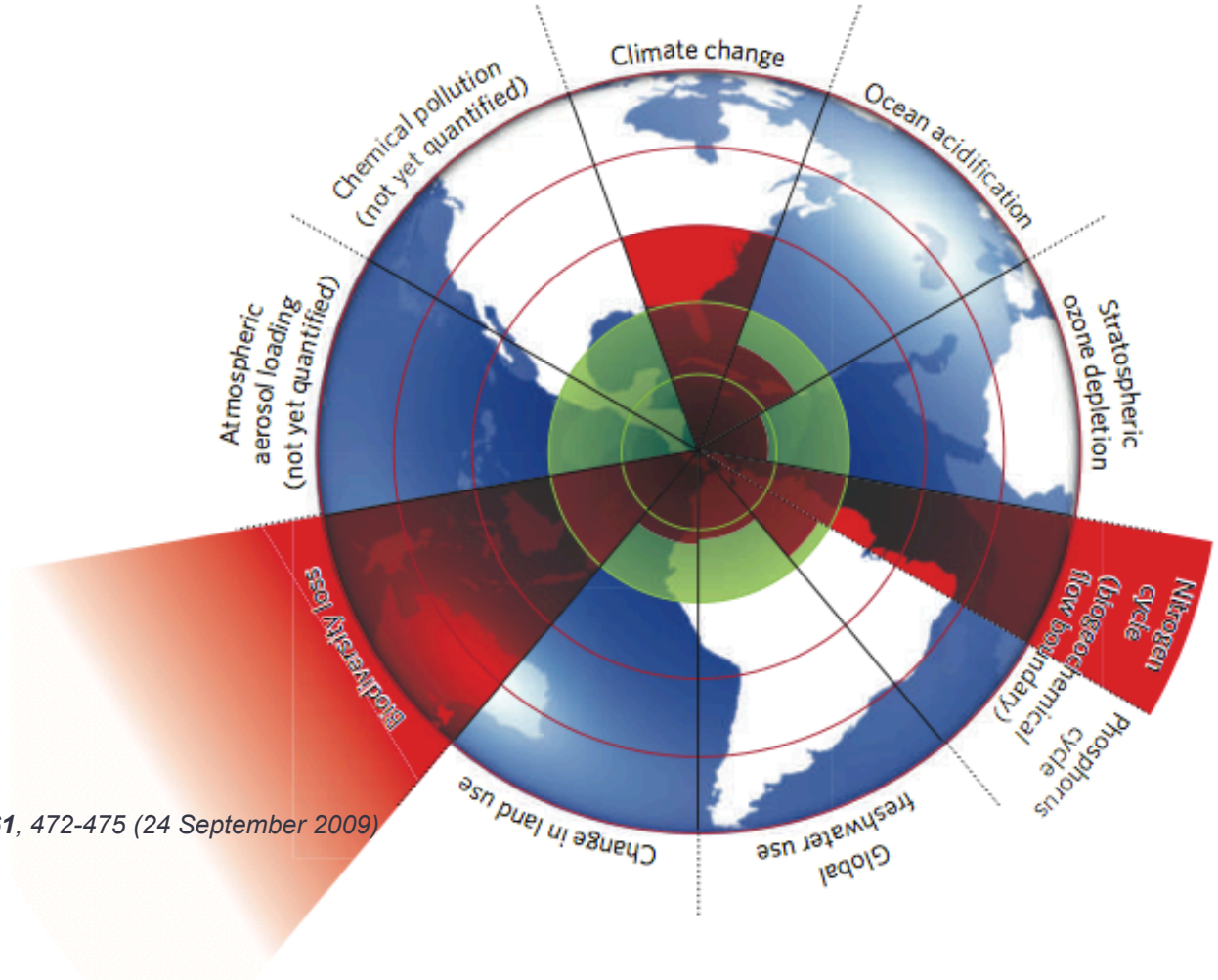
Three indicators of world food demand

X 2

Babcock 2008 Iowa Ag Review, 14, 3

→ **World has to produce more... and Europe has to participate to this effort...but not in just any old way!**

State of the environment



Rockström et al. Nature **461**, 472-475 (24 September 2009)

Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

Green House Gas Emissions

Carbon dioxide

Livestock account for 9 percent of global anthropogenic emissions

Methane

Livestock account for 35–40 percent of global anthropogenic emissions

Nitrous oxide

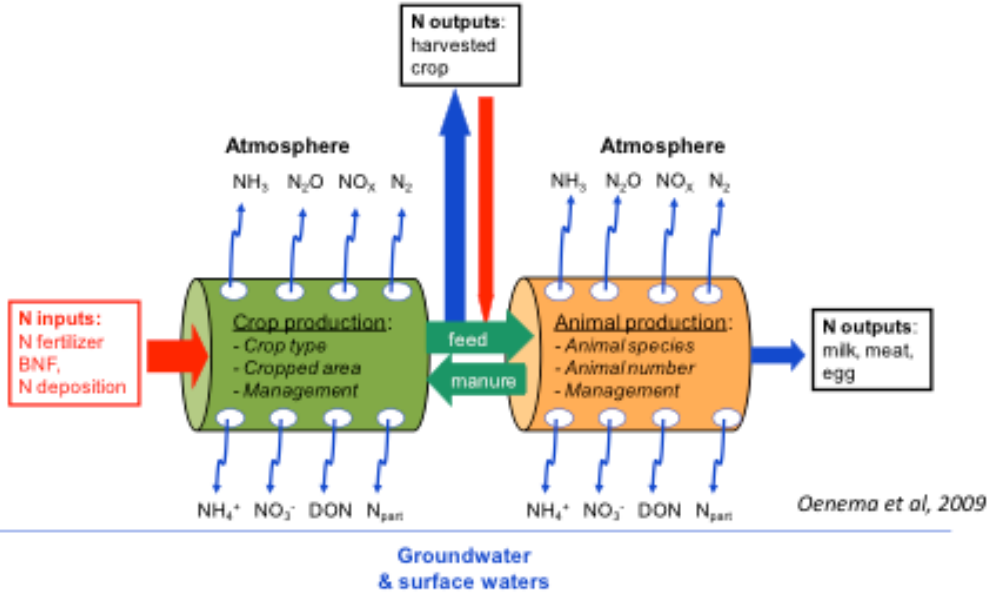
Livestock account for 65 percent of global anthropogenic emissions

18% to total anthropogenic GHG emissions

FAO 2006 Livestock's long shadow

Nitrogen cycle

N use efficiency = N outputs / N inputs



The global food chain has a mean N use efficiency of 14% for plant products and 4% for animal products (meat, dairy, egg) (*NitroEurope IP*)

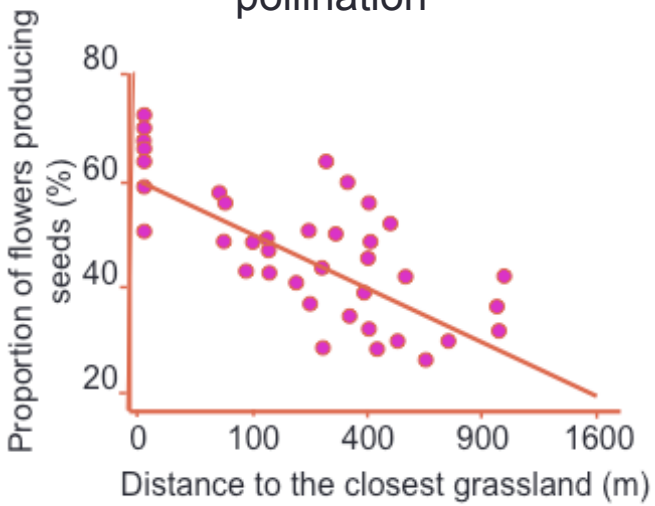
Ammonia

Livestock account for 64 percent of global anthropogenic emissions

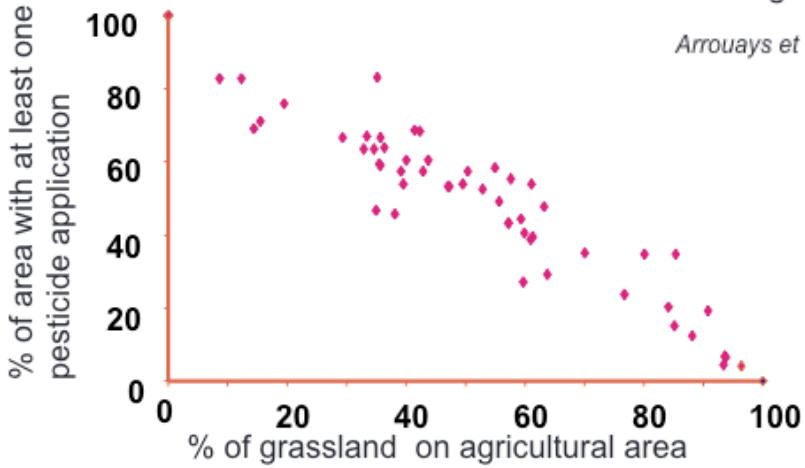
Biodiversity

Ecosystemic services :

pollination

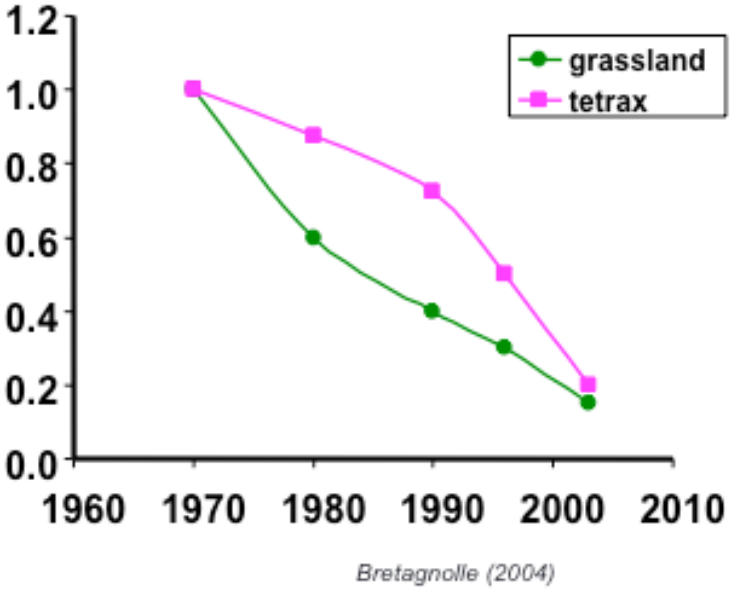


Arrouays et al (2009)



(Raison et al., 2008), Projet Greendairy

Grassland and *Tetrax tetrax* decrease (Niort France)



Bretagnolle (2004)

Agriculture today

- High level of specialization
- High dependance on importations (between countries, between regions) for feed and on non-renewable energy for mineral fertilizer
- High environmental impacts

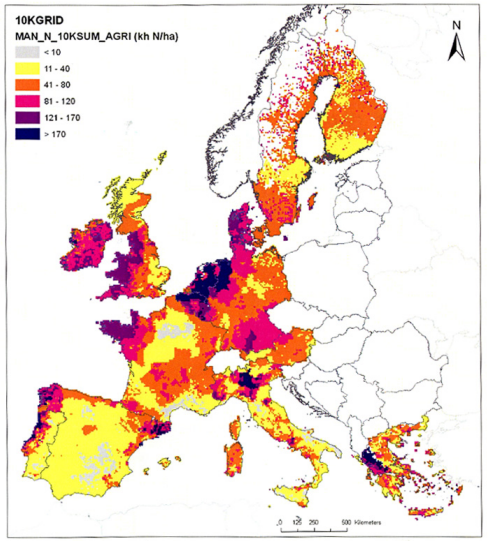


Figure 4.25 European map of nitrogen manure input per agricultural area in EU15, average on 10 km² area. (In Sweden and Finland the white colour indicates the absence of agricultural land within the 10 km² area).

JRC European Commission 2006

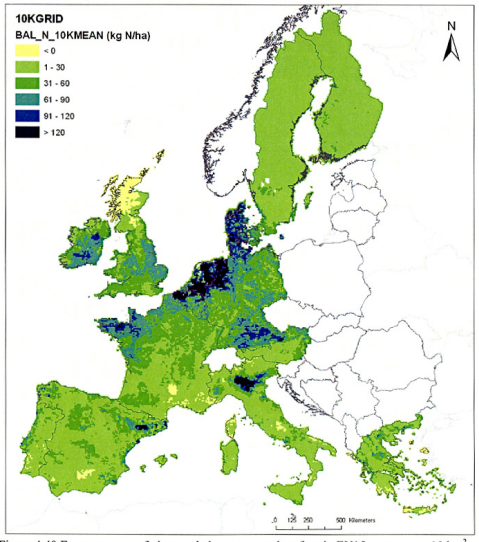


Figure 4.40 European map of nitrogen balance per total surface in EU15, average on 10 km² area.

JRC European Commission 2006

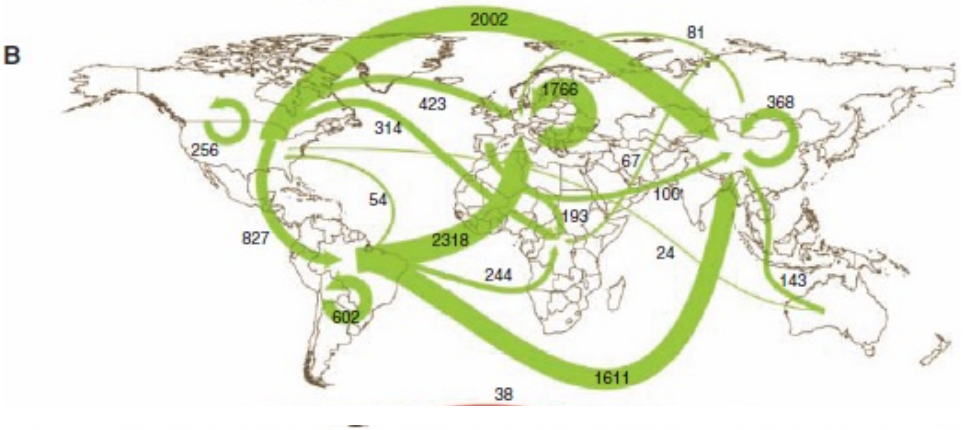
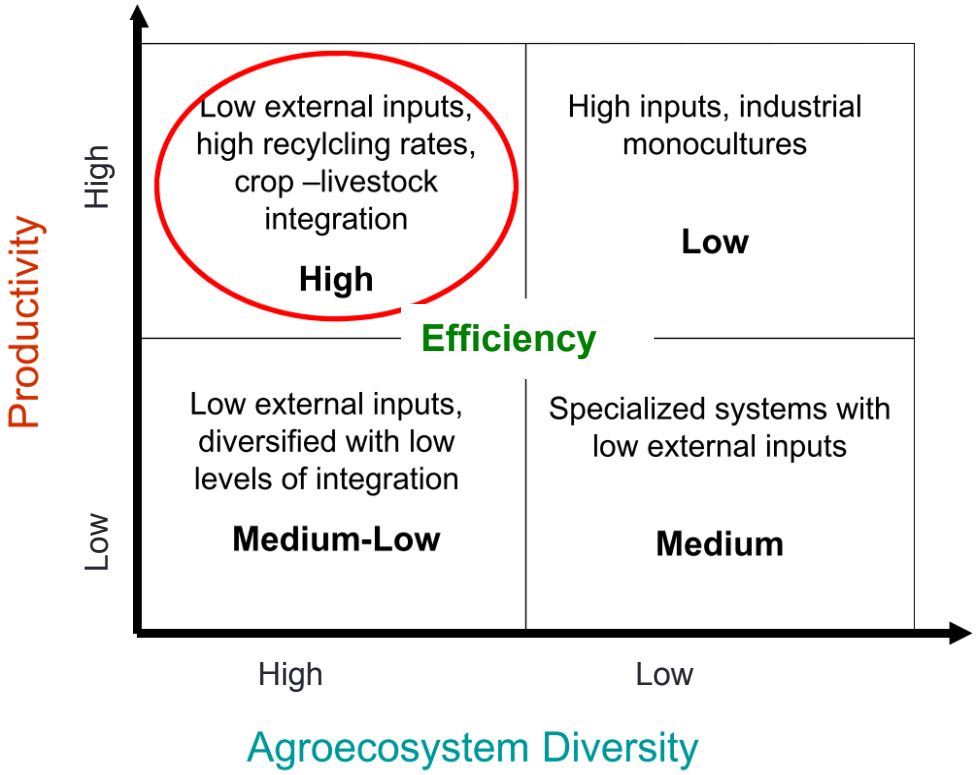


Fig. 1. N contained in internationally traded (**A**) fertilizer (31 Tg N), (**B**) grain (12 Tg N), and (**C**) meat (0.8 Tg N). Data are for 2004 and are in units of thousand of tons. Minimum requirements for drawing a line are 50,000 tons N, 20,000 tons N, and 10,000 tons N for fertilizer, grain, and meat, respectively (*42*).

Galloway et al, 2008, Science

➔ Agriculture must change... How ?

Towards more diversity



ALTIERI MA, 2012 - Agroecology, resilience and food sovereignity. (conf INRA)

The diversity of agricultural systems is a potential asset, **in particular systems mixing livestock and crops**

CANTOGETHER

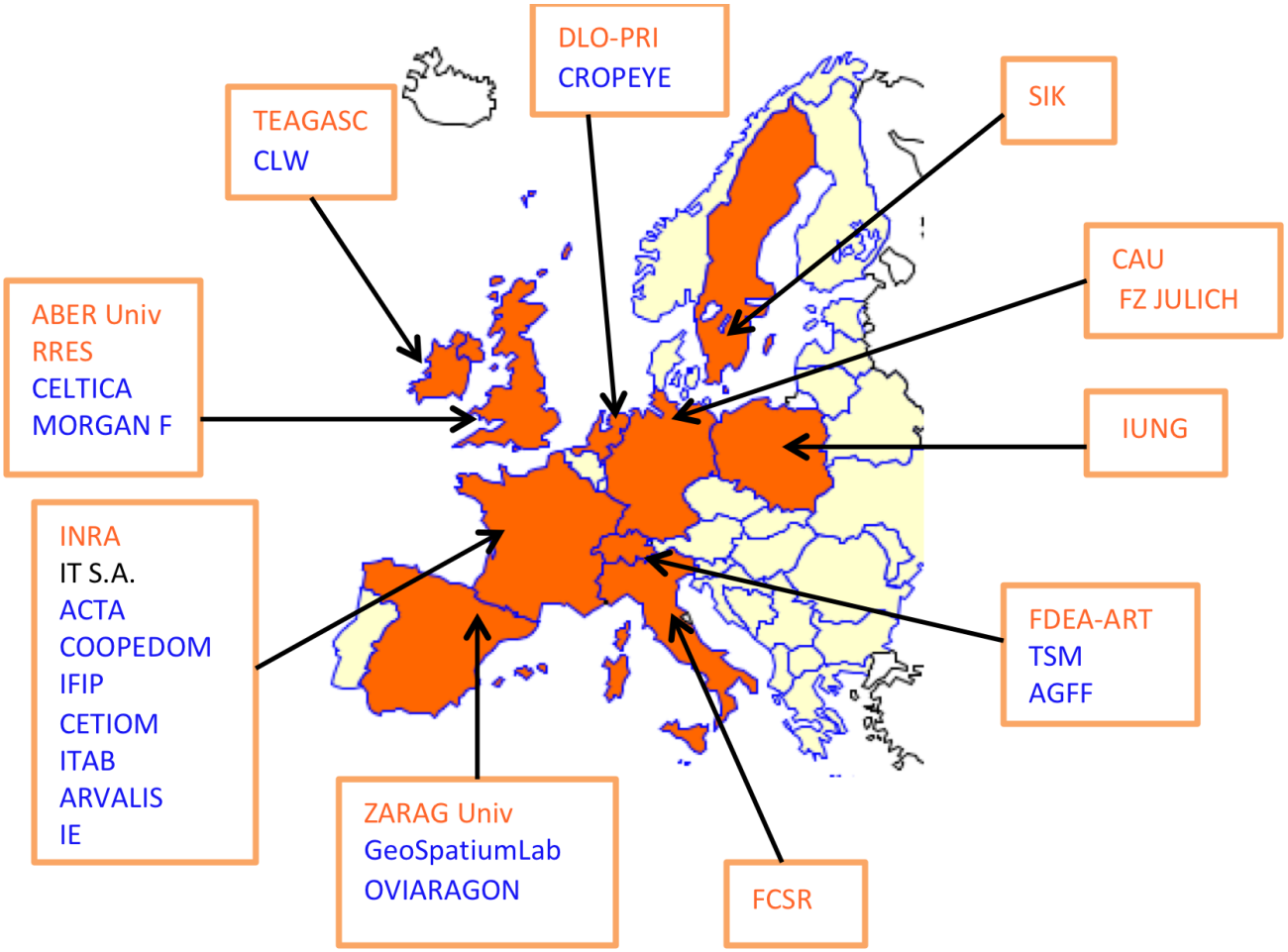
KBBE.2011.1.4-06
Towards land management of tomorrow - Innovative forms of mixed farming for optimized use of energy and nutrients

CONSORTIUM

12 academic partners

14 SME

1 consulting company



MAIN GOAL

- conceive, evaluate and promote new **mixed-crop livestock systems** (MFS) at farm, district, and landscape levels to optimise energy, carbon and nutrient flows, to conserve natural resources and to maximise production.

- associate **all the concerned actors** in Europe: farmers and extension services, policy-makers, feed industry, supply chains, consumers, researchers, nature conservation groups etc.

OBJECTIVES

1. **Identify** new combinations of agronomic and livestock practices
2. **Design** innovative MFS for the different European soil and climate zones and socioeconomic contexts
3. **Test** innovative combination of agronomic and livestock practices and new MFS
4. **Assess** the environmental, economic and social viability of the most promising innovative mixed strategies
5. **Promote** the development of MFS
6. **Disseminate** innovations

EXPECTED IMPACTS

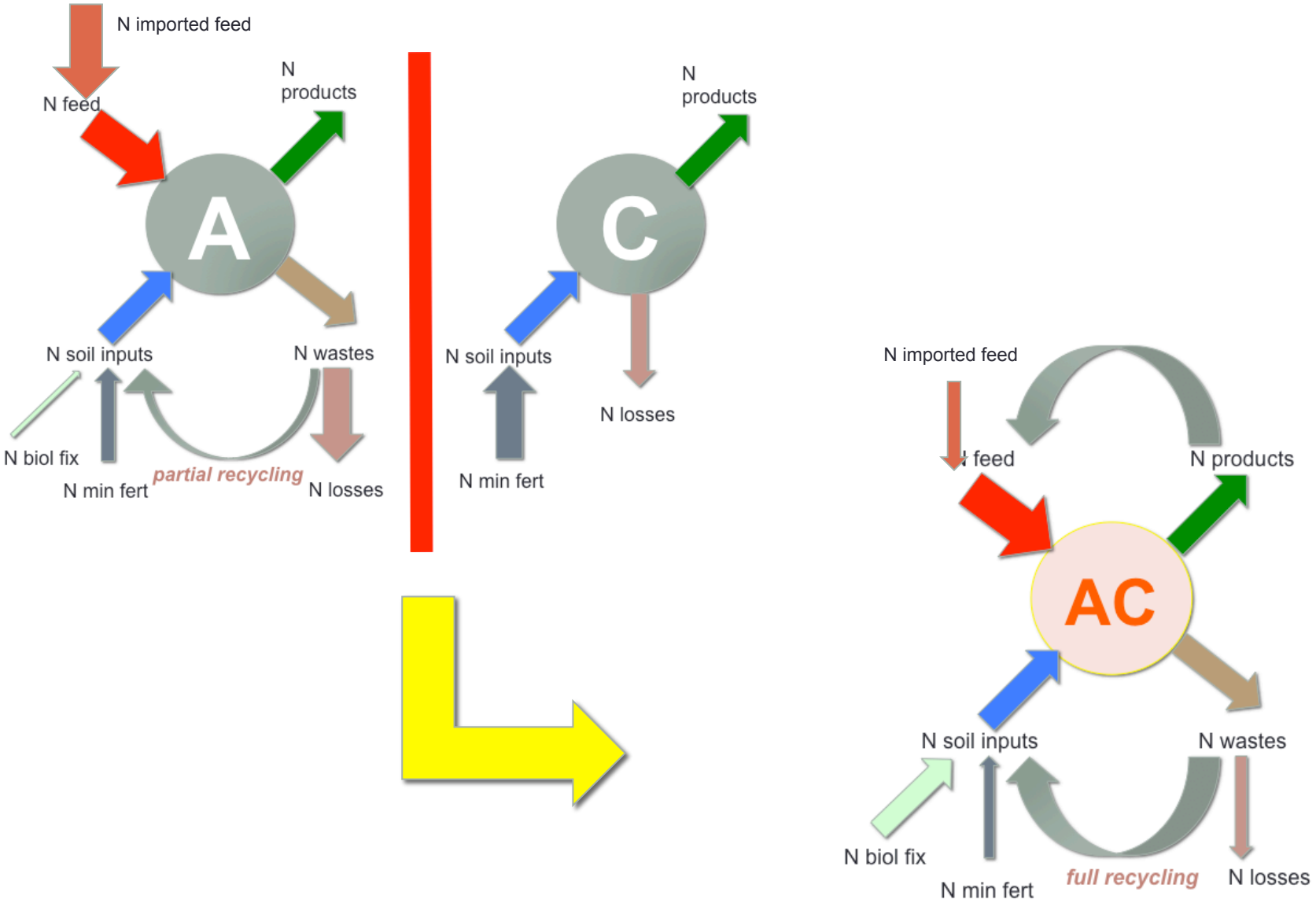
Alleviate environmental problems in crop and livestock production

- Minimising reliance on external inputs

  (mineral fertilizer, imported feed, non-renewable energy)
- Prepare agriculture for a greenhouse gas mitigation role

  (C sequestration, renewable energy)
- Boost the role of MFS in landscape protection

  (soil quality, biodiversity)


N imported feed
N feed
N products
A
N soil inputs
N wastes
N biol fix
N min fert
partial recycling
N losses
N products
C
N soil inputs
N losses
N min fert
N imported feed
N feed
N products
AC
N soil inputs
N wastes
N biol fix
N min fert
full recycling
N losses

EXPECTED IMPACTS

Reinforcing agriculture competitiveness and acceptability

- MFS deal with the need of European sustainable agro-food systems (integrated, resource efficient, environmentally acceptable and based on an ecosystem-service approach to produce “more and better”)
- Integration of an energy-producing component into mixed-farming systems
- MFS will lead to smaller production units, generating more work per unit of agricultural land
- Participative approaches associating different types of stakeholders are a guarantee of the social acceptability of the innovations proposed

EXPECTED IMPACTS

Implementation of EU policies and initiatives

- Nitrate Directive and Water Framework Directive
- European Community Biodiversity Strategy (ECBS),
- Soil Framework Directive
- Agriculture and Climate Change policy.
- Biomass Action Plan and related Directives

- CANTOGETHER will provide **principles to elaborate a new CAP** that could offset the strength of economic mechanisms leading to evermore specialisation and so promote development of MFS.

KEY CANTOGETHER FEATURES

DESIGNING BY PARTICIPATORY APPROACHES

- **Two types of innovations:**
  - Incremental innovations
  - Radical innovations

- **A need to build relevant methodology:**
  - Involving stakeholders
    - By focus groups
    - By 6 Stakeholder Advisory Boards

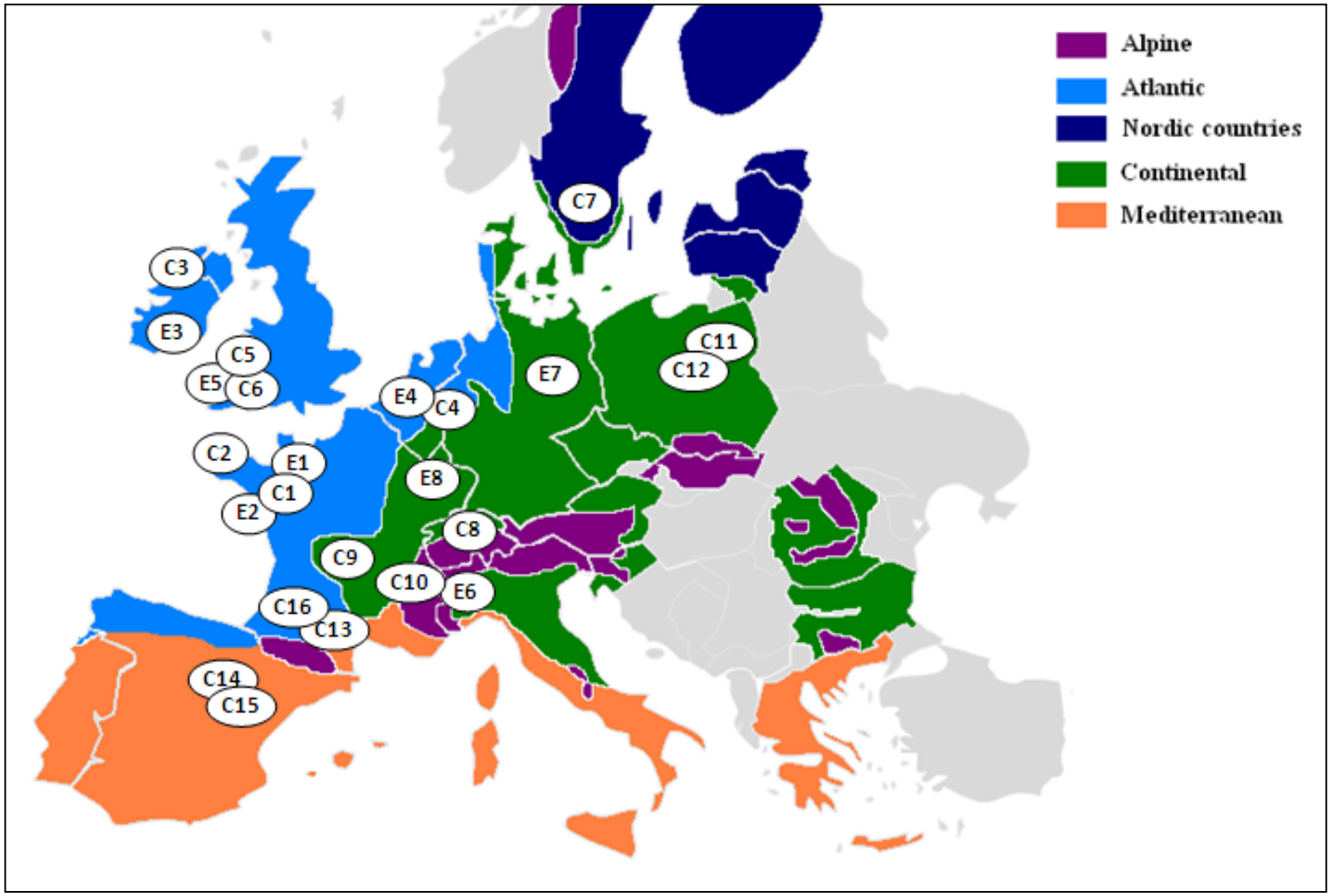
  - to conceive radical innovations well fitted to contexts
    - Reflexive Interactive Design (RIO methodology)
    - DEXi for ex ante assessment

CASE-STUDIES BASED APPROACHES

CANTOGETHER will:

- Use a network of 24 case-studies to :
  - collect relevant data about innovative practices and systems (features, outcomes...)
  - test feasability of innovations
  - determine some parameters for modelling
- Case-studies at farm-level and at district-level

Location of the CANTOGETHER case studies in the European biogeographic regions



		Location	Ecological area	DESCRIPTION								
				Farm / Dist	H/L/O	Self suffic. fodder crops	Cash crops developm.	Renew. energy	Full waste recycling	Exchang. between farms	FS compar.	Anim.
EXPERIMENTAL STATIONS	1	F Crecom	ATLANTIC	F	HL	*			*			PIG
	2	F Derval		FD	HLO	*		*			*	COW
	3	Irl Solohead/Moorepark		F	H	*	*					
	4	NL De Marke		F	H	*						
	5	UK Aberystwyth Ty Gwyn		F	O	*						
	6	It Parme Azienda Cotti	CONT/ALPINE	F	H	*	*	*				
	7	D Lindhof	CONTINENTAL	F	O						*	COW PIG
	8	F Mirecourt		F	LO	*	*		*		*	COW
COMMERCIAL FARMS	1	F Coopedom (SME)	ATLANTIC	D	H	*		*				COW PIG
	2	F Lieue de Grève		D	HLO						*	
	16	F Midi-Pyrénées		F	H	*			*			PIG
	4	NL Winterswijk		F	H(O)	*	*	*			*	COW
	5	UK CELTIC (SME)		F	H	*					*	COW PIG
	3	Irl Cavan Cork		FD	H		*		*	*		PIG
	6	UK MORGAN F (SME)		FD	L		*	*				COW
	7	S Vaestra Gotaland	BOREAL	F	H	*						PIG
	8	SW N/E/W	CONT/ALPINE	FD	HLO					*	*	COW PIG
	9	F IE network	CONT/ATL/ALPINE	F	HLO						*	COW
	10	F G/D/R	CONTI/ATLANT	D	HLO						*	COW PIG
	11	PL Narew river basin	CONTINENTAL	D	HL						*	COW
	12	PL network		F	HLO			*			*	COW PIG
	13	F Aveyron	MEDITERRANEAN	D	HL	*				*	*	COW
	14	SP Ebro River (Aragon)		FD	H	*				*		SHEEP
	15	SP Oviaragon (SME)		FD	HL		*			*	*	SHEEP

CANTOGETHER will:

- define a **minimum common dataset** to characterize the case studies
- permit a **harmonisation of terminology and measures** to allow robust comparisons of the various case studies
- build a **database** to guarantee a management of the data in a secure and fully auditable manner
- provide an **open-access repository** for data and information related to MFS

MODELLING

- **Biogeochemical models**

  - C, N, P cycles and nutrient losses:
    - SPACSYS
    - Phosphorus cycling
    - SIMS(dairy)

  - GHG emissions:
    - Animal level: enteric fermentation
    - Field and farm levels: soil C sequestration
    - Global perspective: land use change

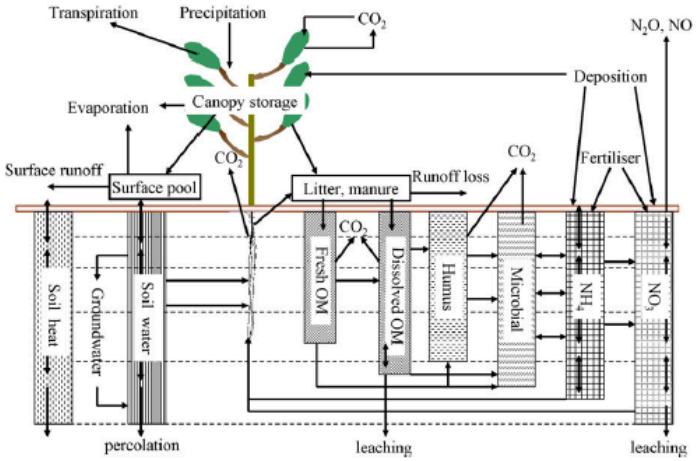


Fig. 1 – Framework of model components (OM, organic matter).

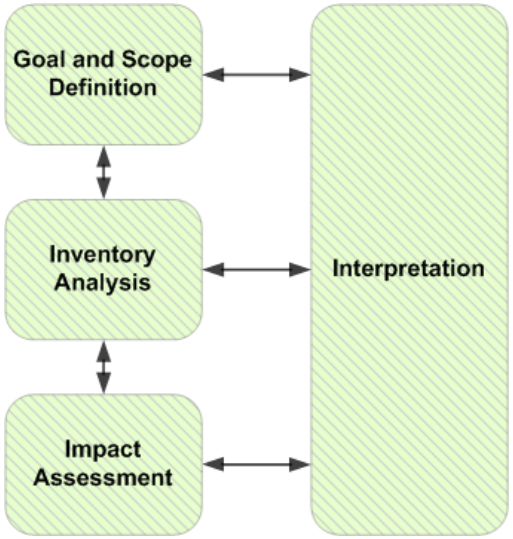
- **Whole-farm decision-making modelling**
  - SALCA-farm
  - MELODIE

- **Territorial-level modelling**
  - Linear programming
  - Farm to farm exchanges
  - TNT2 (Topography-based Nitrogen Transfer and Transformations)/ MELODIE

ASSESSMENTS

CANTOGETHER has to perform an integrated sustainability assessment of innovative systems combining environmental, economic and sociologic analysis

- **Methods for environmental analysis: LCA**
  - SALCA-Farm
  - + soil quality, biodiversity



- **Methods for socio-economic analysis and overall sustainability assessment**
  - data analysis of farm economic databases (FADN...)
  - use of a farm integrated assessment tools providing integrated sustainability benchmark score (MOTIFS)
  - social acceptability of new systems will be checked by:
    - dedicated workshops
    - focus groups of producers and other supply chain members

SOCIO-ECONOMIC AND POLITICAL DRIVING FORCES FOR ADOPTION

- **factors driving the choice of MFS** and the acceptance of such choices by producers and supply chains
  - motivations of the stakeholders,
  - risk aversion and risk acceptance
- **how future policies and regulations** might be developed to achieve the most sustainable balance of mixed and specialised FS at both the farm and regional scales
- **knowledge transfer and dissemination**

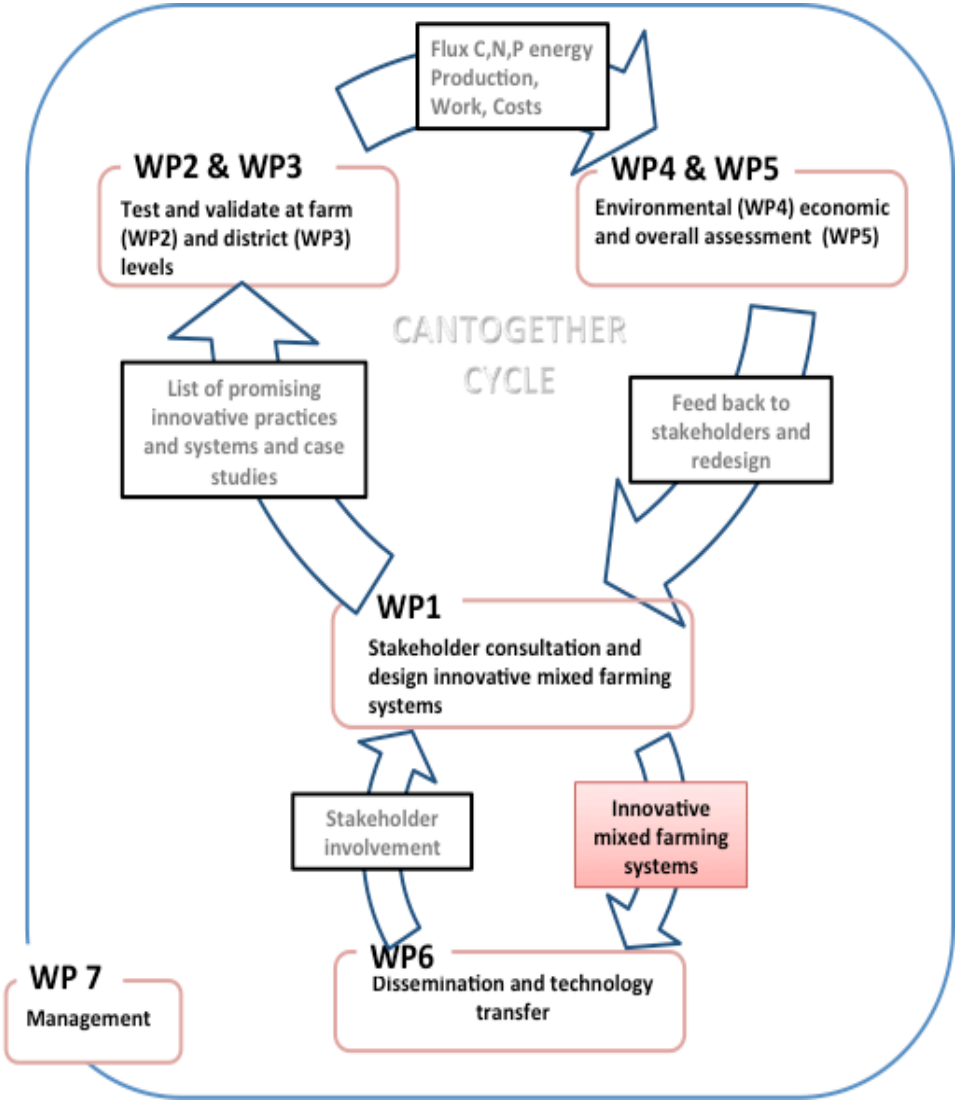
SCIENTIFIC ORGANIZATION

SCIENTIFIC ORGANIZATION

WP1 Design innovative mixed farming systems for the different European pedo-climatic zones using a participatory & modelling approach (INRA)

WP2 Test innovative combination of agronomic and livestock practices and validate innovative mixed farming system on established long running experiments at the farm level (IDELE)

WP3 Test and validate innovative mixed farming system at the district and landscape level (DLO-PRI)



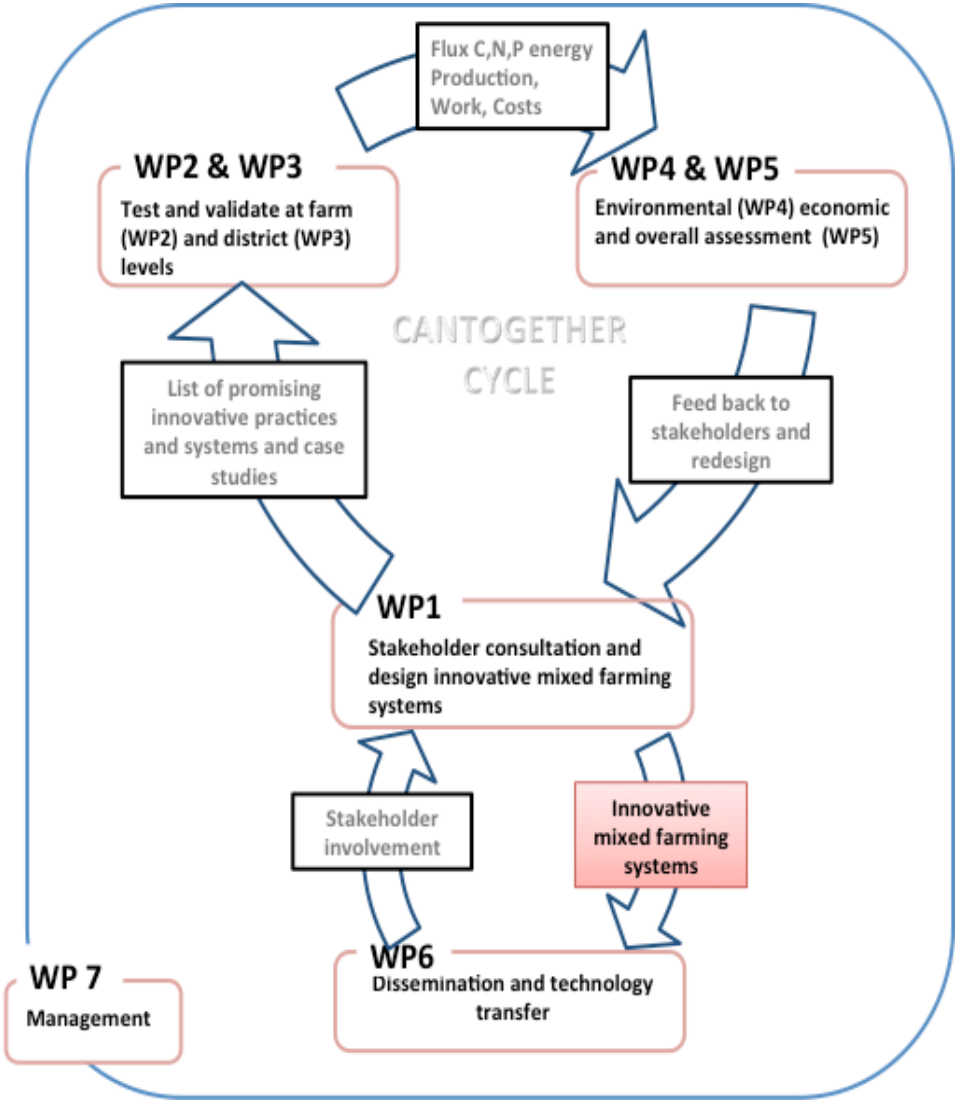
SCIENTIFIC ORGANIZATION

WP4 Environmental assessment (FDEA-ART)

WP5 Socio-economic viability of mixed farming systems (ABER Univ)

WP6 Dissemination, technology transfer, training and education (TEAGASC)

WP7 Management (I-Transfert)

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ABERYSTWYTH
UNIVERSITY


Oviaragón


eagasc
Agriculture and Food Development Authority


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Le réseau des instituts
des filières animales et végétales


WAGENINGEN UR
For quality of life


C A U


AGFF


iung


UNIVERSIDAD DE ZARAGOZA


ifip
institut du porc


Coopédom


SEVENTH FRAMEWORK
PROGRAMME


ROTHAMSTED
RESEARCH


Sik


ARVALIS
Institut du végétal


GeoSpatiumLab S.L.


INRA Transfert


CELTICA FOODS LIMITED


CLW Environmental Planners Ltd


ITAB


Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Federal Department of Economic Affairs DEA
Agroscope Reckenholz-Tänikon Research Station ART


crop eye


C.R.P.A.


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