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Sustainable Farm Animal Breeding and Reproduction Technology Platform

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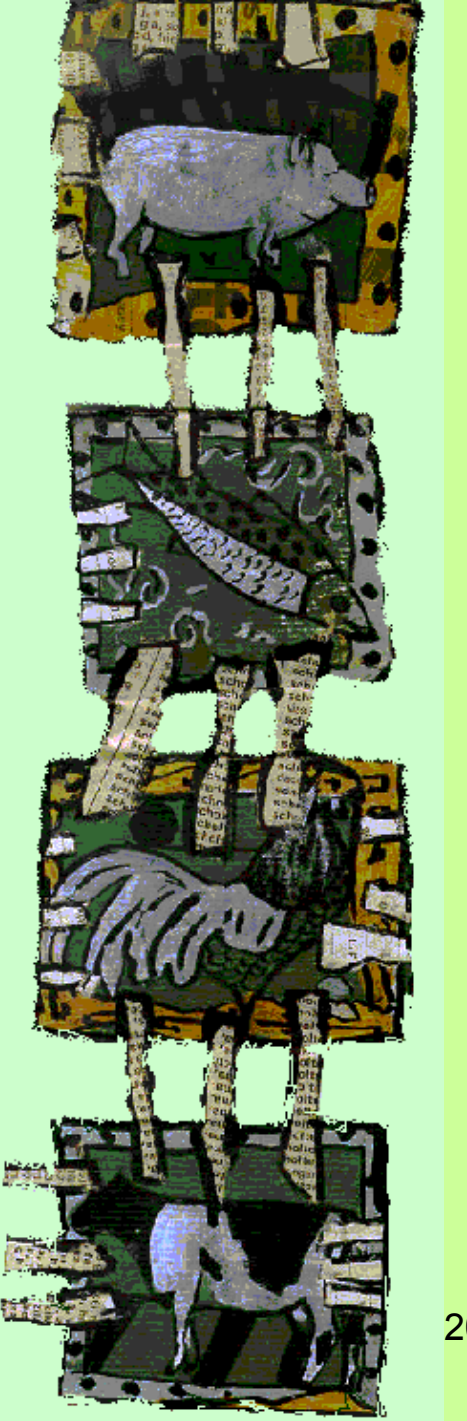

European Forum of Farm Animal Breeders

E F F A B

- Forum of European **farm animal breeding and reproduction** organisations (cooperative, industry)
- **Ruminants, pigs, poultry, farmed fish**
- Established in 1995
- **32** members in **11** countries

Farm animal breeding

⬆ €2 billion annually & cumulative

- support steady increase in **global need for animal food** *(demand driven)*
- breeding effects are **cumulative**
- knowledge and technology **intensive**
- breeding and reproduction are society **sensitive**
- **world leadership** for European breeders

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- **Industry** led
- Strong involvement **research**
- Commitment **98** European organisations

• Start	April 2005
• **Vision Paper** and Launch	March 2006
• EU funded project	July 2006
• **Strategic Research Agenda**	Autumn 2007
• **ImplementationAction Plan**	Spring 2008

EU Project

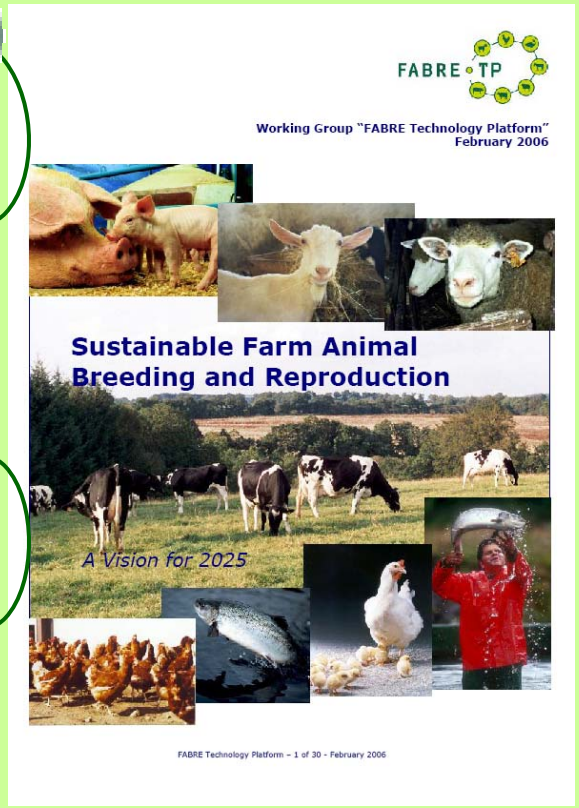
Aim

make Strategic Research Agenda (SRA)
Implementation Action Plan

- € 377.000
- Executing partners
  - EFFAB, EAAP, Roslin, Genesis Faraday
  - Over 500 specialists involved

3 Phases:

1 2 3



Vision Paper

Strategic Research Agenda

End 2007

Action Plan

Spring 2008

SRA

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- **Meet developed vision**
- **Facilitate and accelerate R&D** in animal breeding and reproduction to meet the opportunities and needs of stakeholders
- **Specialized subgroups** to prepare SR
- Involvement **Member States**
- Also socio-economic and horizontal issues
- Future: **Action Plan**

SRA planning

Initial draft	Autumn 2006
Draft + **expert group** opinions	June 2007
Draft + results of expert meeting	Summer 2007
Final SRA +	December 2007

- **Country** discussions
- **Horizontal** discussions

Implementation Action Plan

Spring 2008...

Expert Groups

1. **Species**
    1. Cattle
    2. Sheep/goats
    3. Pigs
    4. Poultry
    5. Horses
    6. Aquaculture
    7. Other/companion
2. **Themes**
    1. Food Quality and Safety
    2. Health, Welfare and Performance
    3. Diversity and Distinctiveness
3. **Technologies**
    1. Genomics
    2. Genetics
    3. Reproduction

Expert Group

Responsible for the work/drafts:

- Core group of 4 people
- 50% industry, 50% research
- Representations all over Europe

Involvement all interested

- Email discussions
- Stakeholder meeting June 2007 Utrecht

Expert Group Tasks

2 page report with

- **opportunities 5-15-25 years**
- **what if nothing is done**
- **needs to make opportunities come true**
- **state of the art**

Lost Opportunities: No Research (1)

- Competitiveness against **imported food**
- **Leading position** in animal breeding ↓
- **Balance** breeding goals for the benefit of animal welfare
- Manage **biodiversity** - optimise **land use**
- ↓ in the **environmental footprint**
- Opportunities to improve **animal welfare**
- Reduce **human ill health** through breeding for resistance to zoonoses

Lost Opportunities: No Research (2)

- Meet **consumer's needs** for affordable, high quality and distinctive food products
- **Respond** to a changing environment
- Inability to take advantage of **new scientific knowledge** for the benefit of agriculture, the environment and society
- A lack of capability to understand the **benefits and risks** of new technologies
- A missed opportunity to gain from **coordination, synergy and critical mass**

Expert Groups - Phenomics

- **Trait measurement and recording**
  - *Cost-effectiveness* of existing tools
  - *Novel measurement* technologies
  - Agreed trait *ontologies*
- **Information from entire chain**
  - Electronic *identification* technologies
  - Genomic *relatedness and traceability*
  - *Electronic* data capture, storage and retrieval
  - Data *interchange* and access *protocols*

Expert Groups - Reproduction

- **Efficiency of basic technologies**
  - AI and IVF *efficiency across species*
  - *Semen sexing* technologies
  - Closed breeding cycles for *'new'* species
  - Cryopreservation of *gametes* etc.
  - Improving *biosecurity*

- **Advanced reproductive technologies**
  - Derivation etc. of livestock *stem cells*
  - Improved *GM* technologies
  - Improved *nuclear transfer*
  - Novel technologies for control of *epigenetic factors*
- **15-25 years**
  - *In vitro gametogenesis and selection*

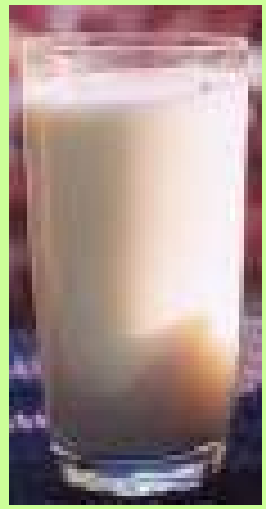
Expert Groups - Genetics

- **Tools to analyse, interpret, predict**
  - Performance across *environments*
  - *Heterosis* across genetic backgrounds
  - *Non-linear relationships among traits*
  - Population level *interactions*
- **Using quantitative + molecular data**
  - *Marker / Gene Assisted* Selection
  - *Genome-Wide* Selection
  - Optimisation of *diversity&heterosis*
  - Optimised breeding *programme design*

Expert Groups - Genomics

- **Basic tools of genomics**
  - Finished **sequence** chicken, cattle, pig, salmon, sheep (horse)
  - **Draft sequence** for duck, turkey, goat, trout
  - **Bioinformatics**: open-access annotation and interrogation within and across species
  - **SNP panels** (0.5 to 1M SNPs per target species)
  - **Transcriptomic tools**
  - Other '**omics** tools
- **Tools to dissect complex genetic traits from genomic information**
  - **Gene-gene** interactions
  - **Gene networks**
  - **Heterosis and epistasis**
  - **Epigenetic** effects
  - **Environmental** interactions

Expert Groups - Traits



Priorities traits that drive:

- Safe and healthy food
- Robust, adapted, healthy animals
- Balanced breeding and biodiversity
- Social responsibility
- Competitive and distinctive Europe
- Diversity of benefits

Expert Groups - Traits

- The research needs are:
  - **Genetic and socio-economic parameters** for **novel** traits and improved breeding goals
  - **Genetic loci** relevant to traits and to identify causative polymorphisms
  - **Basic biology** of genetic variation, interaction with the environment underlying trait variation (and genetic change)
  - The **inter-genomic biology** of traits for which there are population level interactions
  - 15-25 years
    - **Models predicting phenotypic consequences of genetic and environmental variation**

29 Country Visits

- Invitations:
  - Industries
  - Research Institutions
  - Ministry of Agriculture
  - Others…
- Number of participants is very large (from **15 to >100**)

- Comments and questions **on-going process**
- Any **items missed** in present SRA
- SRA: integrated information produced by 13 expert groups => **complex**
- Country discussions: to create national **awareness** & **additional** national funding
- How do we come to **priority list** for R&D subjects?

We have been…

16-1-2007	Portugal
10-2-2007	Greece
9-3-2007	France
29-3-2007	Poland
30-3-2007	Lithuania
3-4-2007	Estonia
5-4-2007	Latvia
21-5-2007	Bulgaria
25-5-2007	Slovenia
4-6-2007	Netherlands
5-6-2007	Luxembourg
6-6-2007	Belgium
29-6-2007	Cyprus
29-6-2007	Hungary
02-7-2007	Austria
11-7-2007	Czech Republic

We will go…

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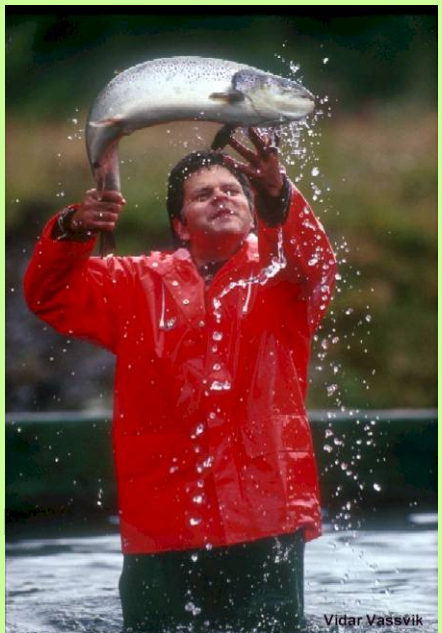
13-9-2007	**United Kingdom**
18-9-2007	**Slovak Republic**
20-9-2007	**Denmark**
25-9-2007	**Germany**
26-10-2007	**Italy**
21-11-2007	**Sweden**



Autumn and Spring furthermore:

Malta
Romania
Finland
Spain
Norway
Switzerland
Ireland

Country Visits

- **Positive aspects:**
  - Give voice to *everyone*
  - Raising interest in the FABRE TP activities
  - Advertising the EU support research activities
- **Negative side:**
  - Skepticism
  - *Political and Strategic Issues*

Country Visits

- **Preliminary Comments:**
  - Very interesting experience
  - Large **enthousiasm**, for many, for being for the first time involved in EU strategy
  - The SRA is **too broad**, needs to give priorities
  - Small countries must give few priorities

Horizontal issues

Technology transfer, education
committee advice in SRA 1

Legal aspects: legislation, IPR
committee workshop
autumn 2007 Brussels

Horizontal meeting ethics, global aspects, consumers...
'society' organisations
video web cam
Spring 2008 Rome

Future

- Easy reading brochure (20 languages...)
- Annually input/ideas → future research European level

1. New technologies & data recording for product quality and robustness
2. Network of excellence for cooperation research, knowledge transfer & innovation
3. Endemic infections & metabolic diseases of farm animals (incl farmed fish)
4. Gastro-intestinal health and functionality
5. International comparability, exchange and access animal health & performance data
6. Farming systems & climate changes
7. Genetic diversity & adaptation environments
8. Consumer perception and attitudes
9. International technology transfer and life long learning practices
10. Optimization methods maintain biodiversity
11. Male fertility genetics accurate phenotyping
12. Endemic viral diseases of livestock
13. Large scale genomic information
14. Genomic tools, novel phenotyping approaches and breeding concepts ruminants
15. Breeding approaches composition of milk, meat and eggs for nutritional factors

Implementation Action Plan

Exploration:

- Cooperations breeding/research
- The various countries:
  - National breeding platforms
  - Already existing informal platforms
- Funding bodies
- Life long learning breeding
- Technology/knowledge transfer/exchange across Europe

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Thank you for your input!

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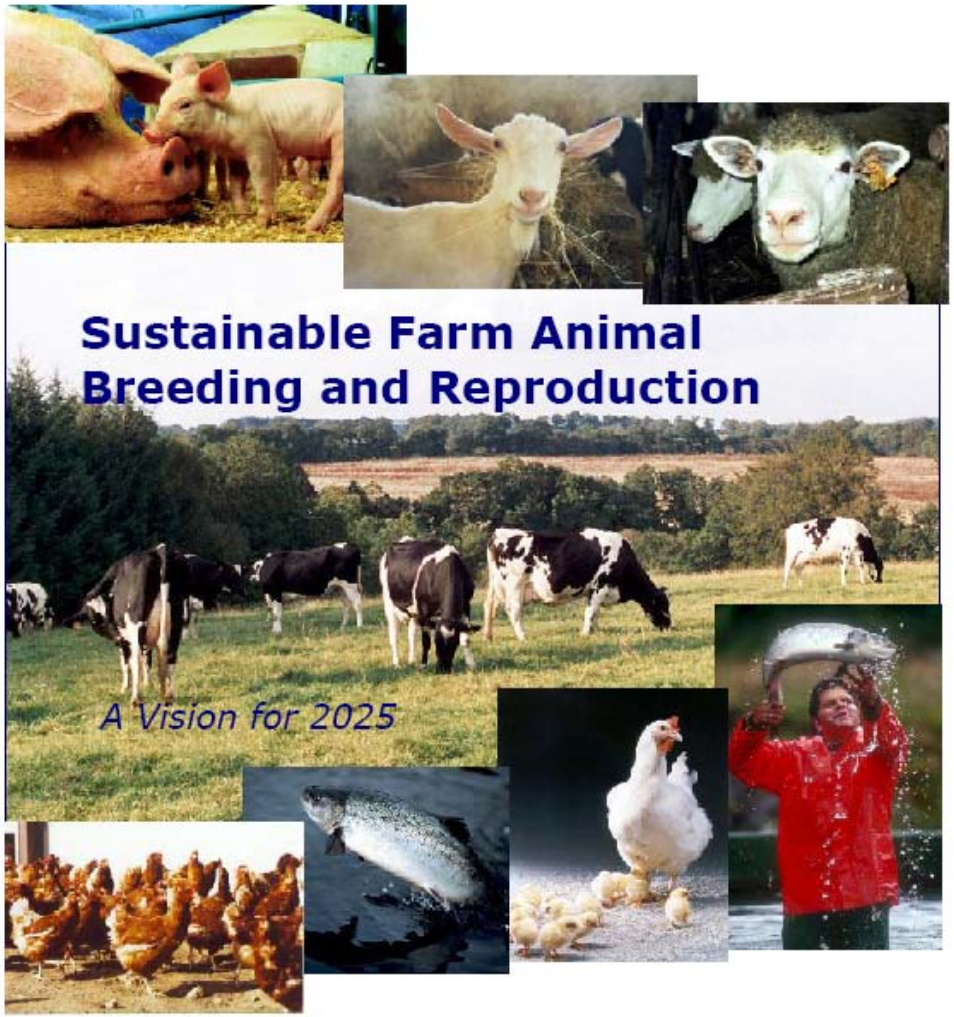
Working Group "FABRE Technology Platform"
February 2006



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INVITATION

Stakeholder meeting

24 October 2007 Paris

www.fabretp.org