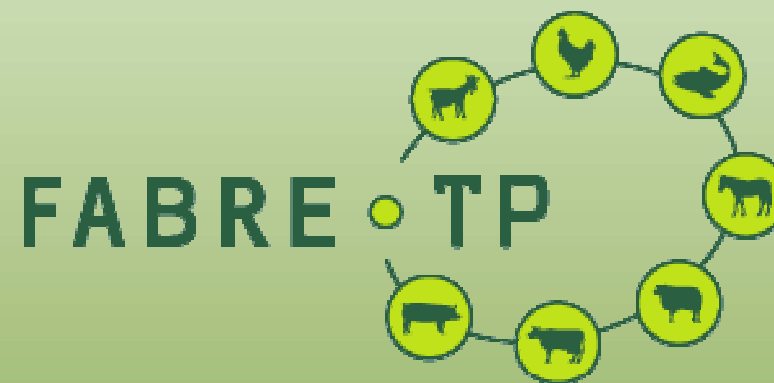




Society meeting

Future Scenarios for Competitive Cattle Breeding Systems

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Content

- ✦ Cattle breeding in 2008
 - Data
 - Breeding Goals and Genetic Evaluation
 - Breeding Scheme
 - Information for Decision Making
- ✦ Challenges and Opportunities
 - Genomic technology
 - Information technology
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 - Environmental
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 - Ethical
- ✦ Scenarios
 - Large vertically integrated “commercial” cattle breeding companies.
 - National & International data repositories and information service providers, independent of “commercial” cattle breeding organisations.

Cattle Breeding in 2008

✦ Data

- National databases serving multiple organisations and genetic evaluations – **increasing, greater for dairy breeds than beef**
- Organisation databases with integration for genetic evaluations – **decreasing, mostly in more “capitalist” countries**

✦ Breeding Objectives & Genetic Evaluations

- National organisations with Interbull providing international integration
- Dairy breeds more developed than beef breeds
- Some separation by trait – especially in countries with organisation specific databases
- Dramatic increase in emphasis on fertility, survival and fitness traits in recent years

Cattle Breeding in 2008

✦ Breeding Scheme Design

- Dairy – mainly country based progeny testing with widespread use of proven bulls to breed commercial replacements, considerable international trade in proven bull semen, and limited use of cross breeding
- Beef – limited use of AI, limited national structured breeding schemes and considerable reliance on phenotypic selection.

✦ Information for Decision Making

- Research – the full range of data is generally made available for cattle breeding research
- Breeding objectives & Genetic evaluation – open at national and international levels.
- Breeding companies – closed with very limited sharing of market and commercially sensitive data.
- Breeders – open through herd books, herd specific as for commercial herds,
- Commercial herds – closed by data protection but shared through a range of mechanisms (eg discussion groups), comparative data readily available

Challenges & Opportunities

✦ Genomic technologies

- Methodology and tools developing rapidly
- Cost of genotyping declining rapidly – phenotypes are more costly in time & money
- Fundamental problem of over parameterisation – 50,000 SNPs and 1 phenotype per animal – research to resolve will require many phenotypes
- Large cost to benefit ratio of genomic selection for breeding companies and pressure to protect intellectual property
- Many issues yet to be resolved

Challenges & Opportunities

✦ Information technologies

- Reducing cost of data collection, data storage, computation and information distribution
- Shared national (& international) databases increasingly cost beneficial
- Greatly increased volumes of phenotypes for wider range of traits
- Able to fit more complex and comprehensive models to national (& international) data for genetic evaluations
- Information readily distributed nationally & internationally

Challenges & Opportunities

✦ Environmental

- Green house gasses – methane, CO₂
- Reduction of pollution – chemical, biological, odour, sound, ...

✦ Economic

- Global market – new export opportunities and threat from imported products
- Freer trade –transition period, more volatile prices for inputs and outputs
- Alternative uses for main inputs – e.g. use of corn for fuel, use of land for housing
- Removal of subsidies – increases dependence on markets
- Scale and international breeding programs

Challenges & Opportunities

✦ Health & Disease

- Food “scares” – affecting markets
- “New” diseases – e.g. BSE, blue-tongue
- Existing controls – TB, IBR, Johnes
- Genetic control of disease – as an alternative or compliment to other methods

✦ Ethical

- Animal welfare – higher standards than in past
- Use of new technologies – restricted or prohibited e.g transgenics

Summary of Challenges & Opportunities

- ✦ New technologies require a substantial investment to ensure they are properly evaluated, their impact on all sectors is well understood and they are used wisely
- ✦ Breeding goal is increasingly focused on maximising production of high value products while minimizing use of scarce resources and minimizing impact on surrounding world.
- ✦ For cattle breeding to remain competitive in the future it must be innovative.

Future Scenarios

Large vertically integrated “commercial” cattle breeding companies

- Similar to pig and poultry breeding industries
- Control data, genetic evaluation, breeding scheme and information distribution.
- Compete internationally in the supply of commercial breeding stock.

National & International data repositories and information service providers, independent of “commercial” cattle breeding organisations.

- Data collection, databases, genetic evaluations and information distribution in hands of limited number of national/international organisations.
- “Commercial” breeding organisations control breeding schemes supplying breeding stock, semen, embryo's nationally & internationally.

Future Scenarios

Challenge or Opportunity	Integrated Breeding Company	Separate Data & Information from Breeding
Genomic tech.	** Motivated, Investment	** Phenotypes, Evaluations
Information tech.	* Decision making	*** Integration, Scale, Independence
Disease & Health		**** Integration, Scale, Motivation, Independence
Ethics	* Market pressure	*** Motivation, Independence, Wider role
Economics	** Commercial, Scale	** Scale, Diversity of Services
Environment	* Market pressure	*** Integration, Wider role, Independence
Innovation	** Commercial, Investment	** Wider role, Services

Conclusions

- Cattle breeding involves animals that have limited female reproductive capacity, a high commercial value, and a large number of relatively small commercial producers.
- Cattle breeding structures involve the use of data collected from commercial producers in the identification and selection of males for widespread use through artificial insemination.
- Consideration of the opportunities and challenges being faced by the cattle breeding industry favours a future scenario in which data and information are provided independently of commercial breeding activities.