

The Challenge of sustainability to design the future dairy farms

Philippe FAVERDIN,
Xavier CHARDON, Luc DELABY, Jean-Louis PEYRAUD

INRA- Agrocampus, UMR1080, Dairy Production



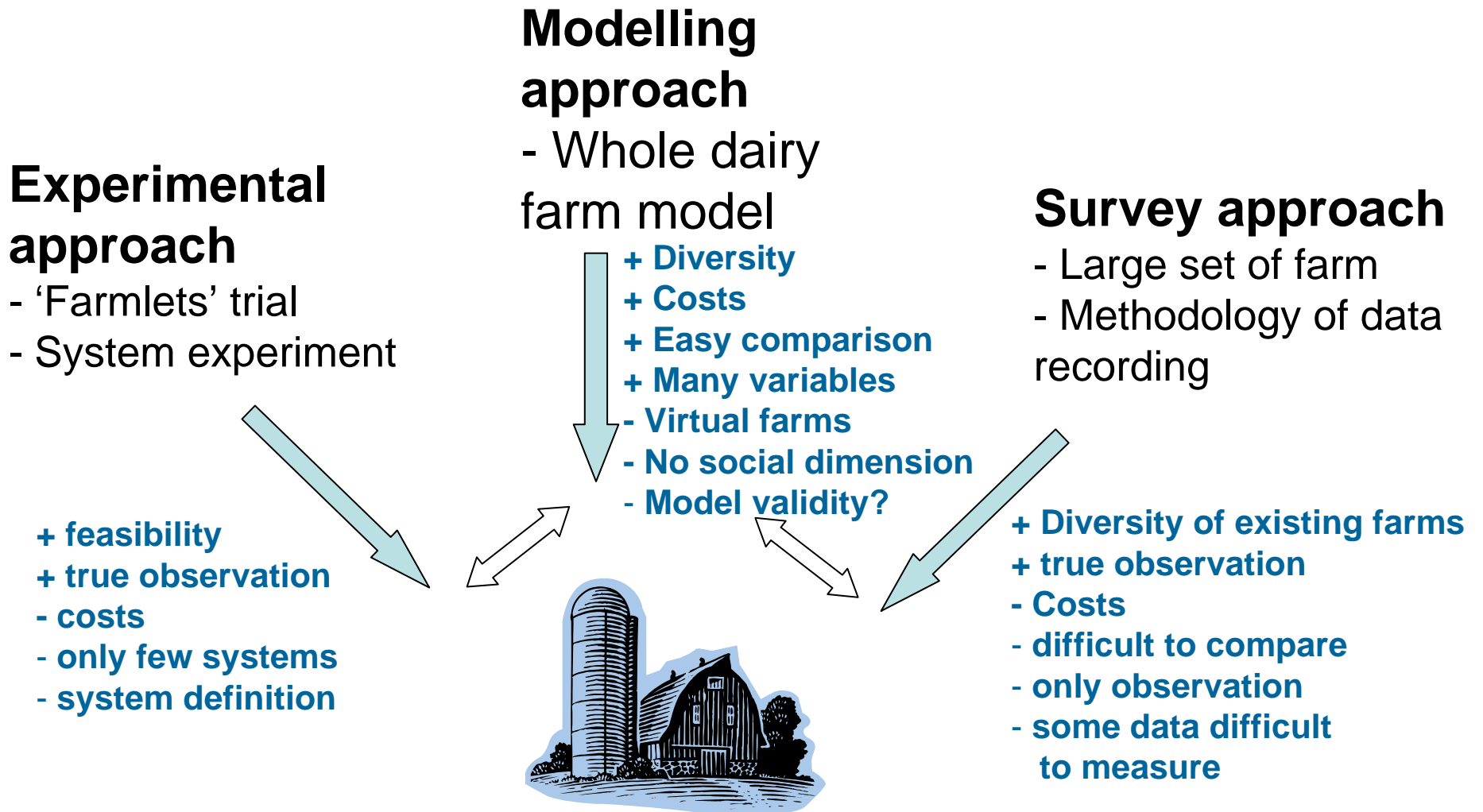
Animal production is facing the challenge of sustainability

- Environment
 - Animal production criticized for its low output/input efficiency, environmental impacts, land requirement
 - Submitted to climatic change
 - Economy
 - Rapid change in price products
 - Social
 - Animal welfare and safe production
 - Labour in animal production is less attractive
- Farm manager : decision but where to go ?
- Large diversity of dairy systems.
Does an optimal dairy system exists?

How to design future dairy farms?

- How to integrate sustainability to design dairy farms ?
 - Developing a whole dairy farm approach
 - Building new indicators adapted
 - Main research questions to improve the sustainability of dairy farms
- Some scenarios for future dairy farms

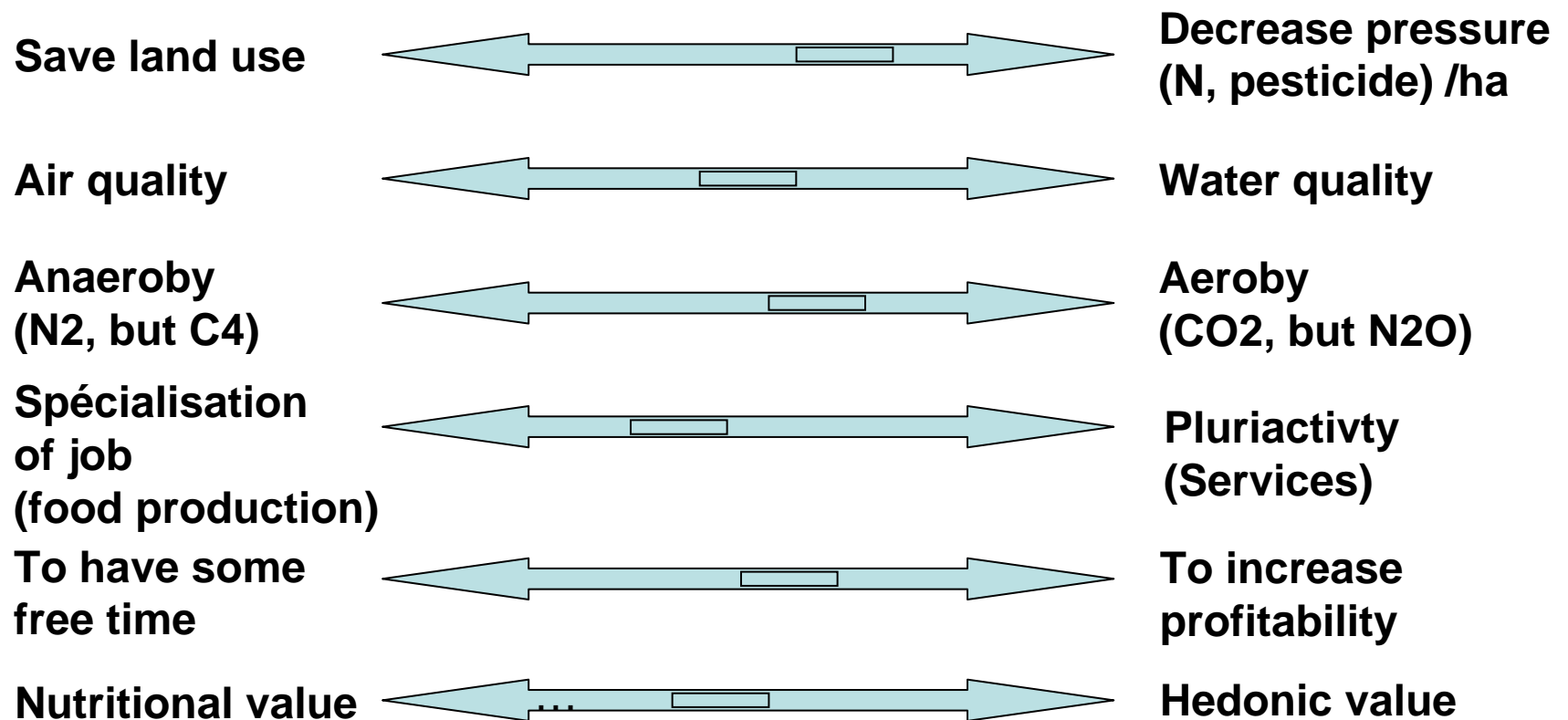
How to study whole farm systems?



How to evaluate sustainability?

- Elaboration of pertinent indicators at farm scale
 - to evaluate existing systems,
 - to propose a set of actions to improve weak points
 - to conceive new systems as the best combination of practices and techniques with specific indicators working ex-ante (modelling)
- simple Indicators, easy to use. Use information produced by large survey and models to simplify
- Aggregation of indicators to decide
- Detailed analysis to propose some actions
- Indicators = tools, evaluation required

Multicriteria evaluation: A set of Dilemma

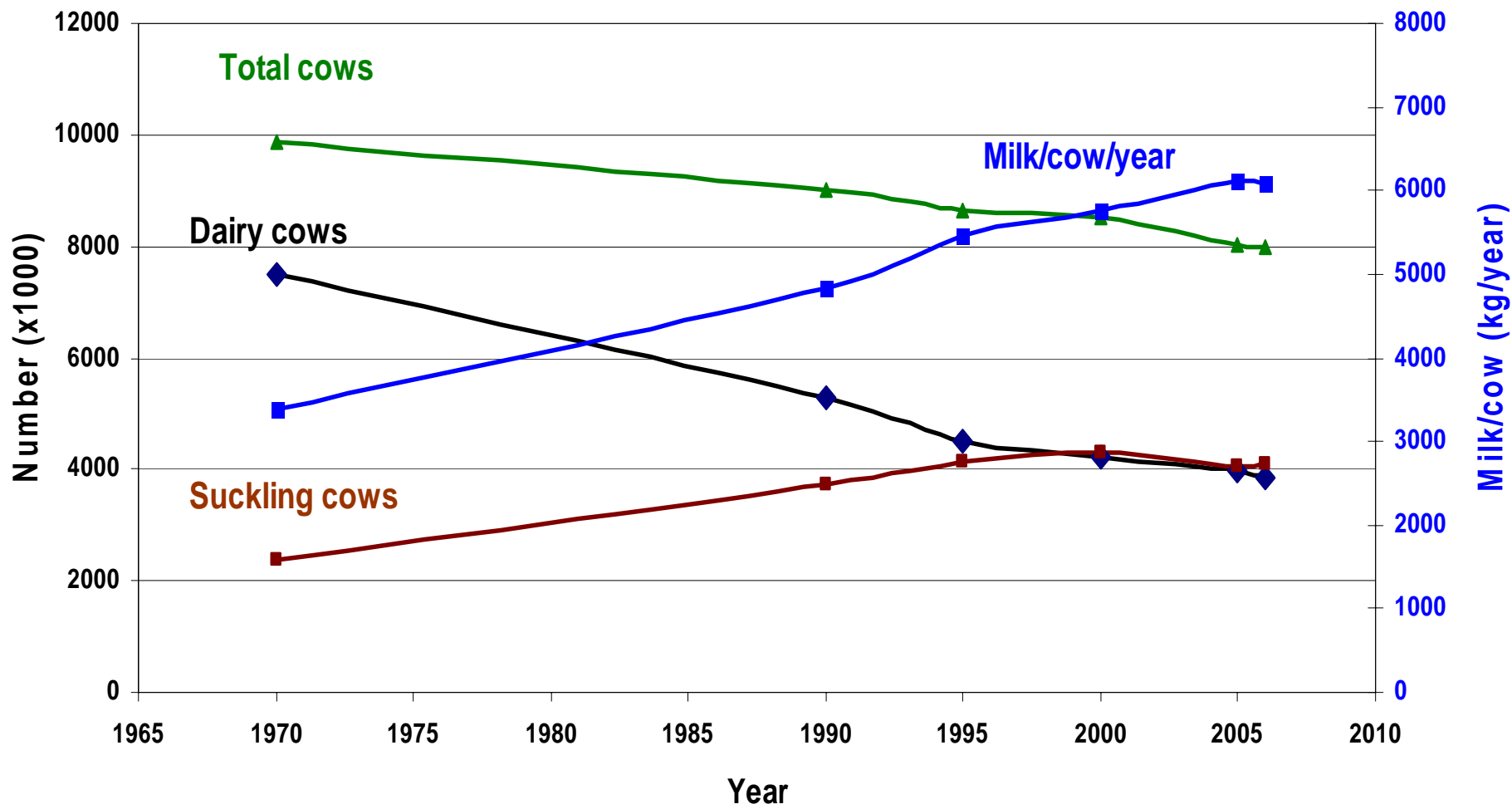


- No global answer
- Context is essential

The milk production is not the single product of dairy farm

- Emissions or impacts of a farm are specific to the system
- How to split emissions between Milk and meat ?
 - Meat alone is possible, not milk
 - Methane emission to produce a beef calf (suckling cow) is high but is devoted to milk with a dairy cow.
- Different conclusions according method used
 - Co-product not considered
 - Proportional to economic value
 - Proportional to nutritional value
 - Substituting the average emission of meat production estimated at larger scale (region, country...)
- And between different products or activities
 - Crops and milk, Co-energy (methane) and milk
 - Services activities (draft, bank, landscape)

Number of cattle : meat or milk



(Agreste)

Research questions

- How to increase efficiency of inputs by dairy herd?
 - Balanced diets (minerals, nitrogen)
 - Reduction of unproductive periods (dry period, age at first calving), increase persistency
 - Decrease replacement (better reproduction and health, longer lactations)
 - Specialization for milk only or for milk and meat ?
- How to increase efficiency of inputs at farm scale?
 - Better efficiency of waste use, reduction in environmental losses
 - Optimization of interactions between crop et animal production systems (OM storage in soil, use of legumes)
 - Better use of grassland, of land
 - Organization of activities at farm scale

Some scenarios for future

- Difficult exercise of futurology
- The future is still in diversity
- Farmers and labour in dairy system is a key issue
- 4 Evolutions of existing systems
 - Improvement of actual systems
 - Better efficiency in milk production, between animal and crop production
 - Reduction in emission losses
 - Different choice in the dilemmas
 - Land use – local environmental pressure
 - Specialization – pluriactivity
- All of them conserve different weak points in sustainability evaluation.

The high technology landless dairy farm

- >100 High yielding cows
- Fed indoors
- Long lactation, high persistency
- Optimal diet, with important use of by-products
- Total collection of wastes
- Energy production (solar, methane, wind generator)
- Meat production : not an objective
- High productivity of labour (automation, machinery)
- Forage, slurries: exchange with a crop farm with good practices
- Important capitalization
- Linked to dairy companies, constant production
- Environmentally efficient for direct emissions (not indirect), except NH₄

The improved mixed crop-dairy farming systems

- Self-sufficient mixed organic farms
- Large farm size
- Low stocking rate
- Long crop rotation, mixing temporary pastures and different crops
- Manure management is essential for crop production
- Dual purpose cows (meat and milk)
- Feeding system combine grazing and conserved diets
- Milk production all year long
- Organic products (milk, meat, ...) commercialized locally with specific markets
- Environmentally efficient for water quality

The specialized grazing systems

- Evolution of NZ dairy farms
- Requires good climatic conditions for grass
- Large herd >200 low yielding cows, small size
- Medium to high stocking rate
- Very low inputs (feeds, fertilizers reduced at minimum level)
- 100% grazing system of pastures with grass and legumes
- High seasonality of milk production ~ grass growth
- Grouped calving with low replacement rate due to good reproduction performance
- No building except milking parlour and a stand off pad for winter
- High productivity of labour, mainly devoted to milking
- High environmental and economic performance

The “terroir” dairy farms

- Located in natural areas
- Nice landscape and biodiversity
- Pluriactivities (transformation, commercialization, tourism...)
- Contribution to landscape ad-values
- Way of production are constrained to preserve natural resources
- Small herds
- Maintenance of local breeds
- Low stocking rate to maintain biodiversity
- Milk production is only a small part of farm income
- Typical products (special cheese, yogurt with local fruits and aromatic plants...)
- Environmental friendly for diversity and water.

Conclusions

- Where to go ? Optimal dairy farming system does not exist but sustainability of existing farms has to be improved
- Sustainability of dairy farms has to be evaluated at farm scale, but indicators has to consider the dilemmas according regional specificities.
- Research in indicators has focused on emissions. Evaluation in dairy farms not adapted to pluriactivity → new methods to better evaluate services, co-products.
- How to move ? New tools to propose transition.
- Solutions are not only at farm scale : Evaluation of coordination and complementarities of actors within a territory.