SOLID | Sustainable Organic and Low Input Dairying

Decision support tools for environmental improvements in dairy farms

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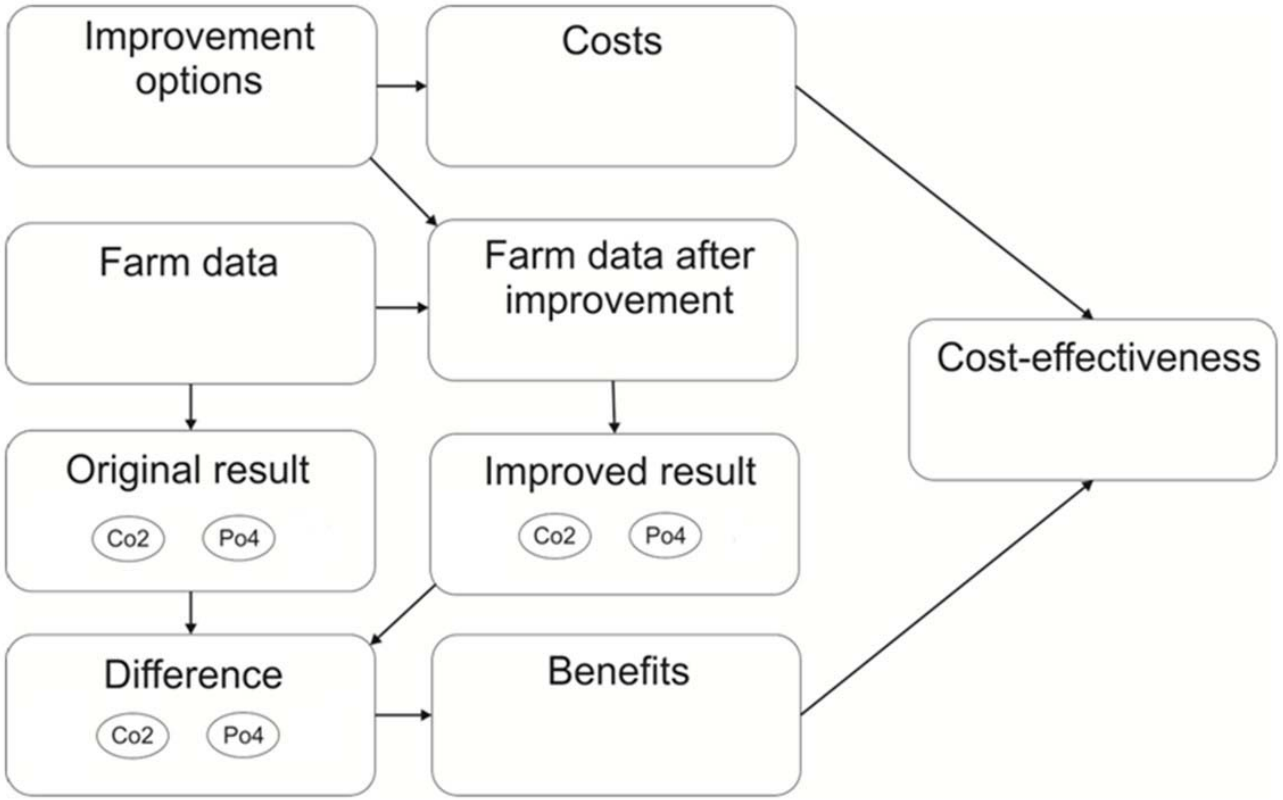
SEVENTH FRAMEWORK PROGRAMME

Basic principles and goals

- What kind of actions would most effectively reduce the environmental impact of dairy farms?
- Goal is to recognise and model the environmental impact a of wide variety of actions and find the most cost-effective improvements
- Internet based tool for public use targeted to farmers and other professionals
- Bayesian belief networks with Hugin researcher software

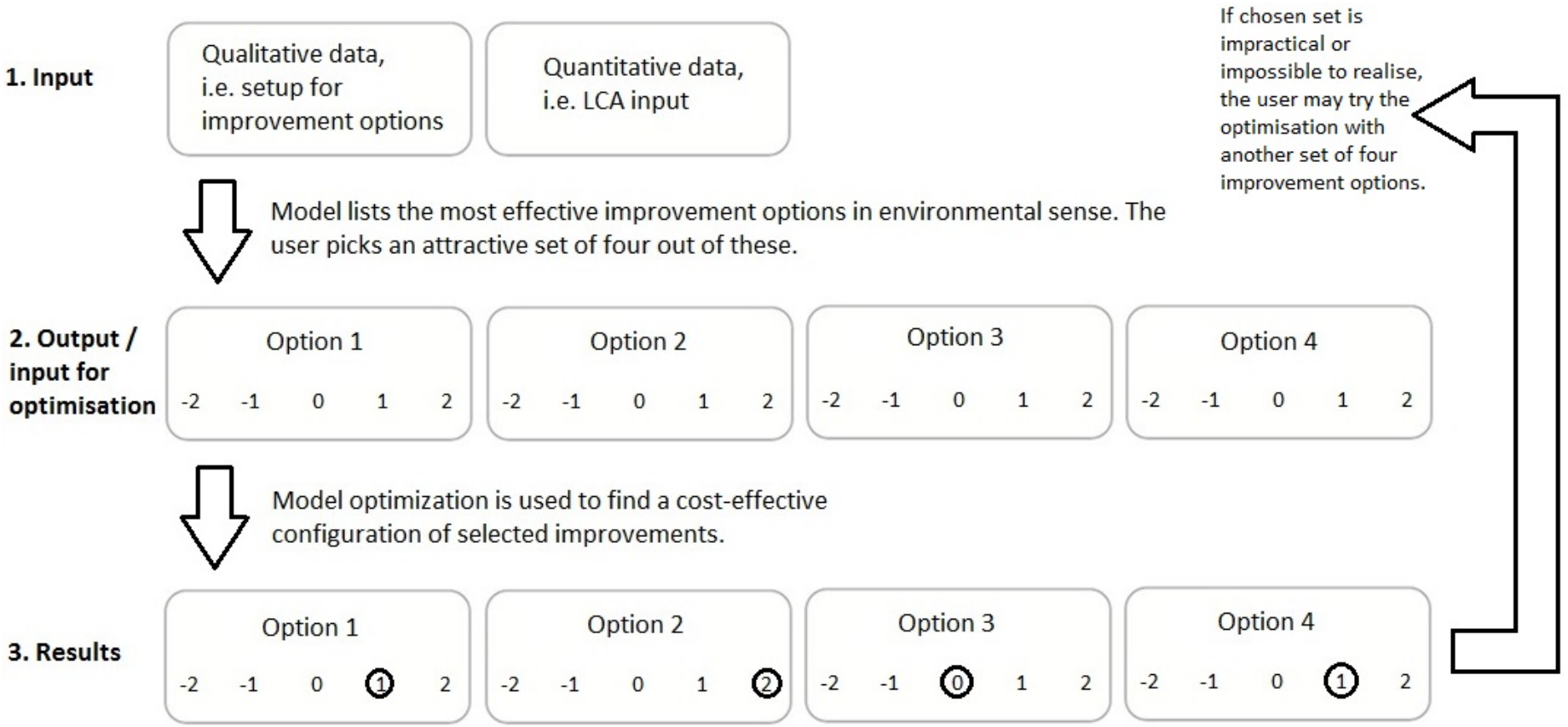
Model overview



End user point of view: a walkthrough for using the decision support tool

- Input data
- First model phase: find the four improvements that give the greatest environmental benefits
- Second model phase: optimise the simultaneous use of these improvements in terms of cost-effectiveness
  - i.e. to what degree should these improvements be implemented in light of their costs?
- If the results aren't practical for the case in question, the user should go back to first phase results and pick another combination of improvement options

User point of view



Input data

- User inserts both quantitative and qualitative data
- Quantitative data is the same as in Sanna's LCA model: number of cows, housing type…
- Qualitative data points are linked to the improvement options included in the model
- For example the user picks one option that best describes his current slurry storing method:
  - 1: Uncovered lagoon OR tank
  - 2: Covered lagoon OR tank
  - 3: Covered and aerated lagoon OR tank
- If the user picks option one, the possibility to upgrade to either only covered or covered and aerated lagoon is now an improvement option considered in the model

First phase: maximise environmental benefits

- Ideally every improvement option would be considered in the optimisation
  - Unfortunately this kind of complexity is too much for current computers to handle
  - Need for an additional phase
- Improvement options with great potential for environmental benefits are a good place to start searching for cost-effective solutions
- Output is a list of improvement options ranked by their potential to reduce environmental impacts
- Instructive phase: it helps the user to pick candidates for the optimisation in the second phase

Second phase: cost-effective use of selected improvements

- A very simple phase for the user
  - The model will automatically give the optimal configuration of changes for the selected improvement options
- Result interpretation is a bit more complex, the user needs to consider
  - Configuration of improvements
  - Effect on environmental impact
  - Costs
  - Cost-effectiveness
  - Uncertainty

Loop the first and second phase to find practical solutions

- Probabilistic decision support tool
  - There is room for interpretation and practical concerns
- If the result is impractical or too unreliable, the user can pick another set of four improvement options for optimising
- The user can repeat the process until the suggestions are satisfactory

Simple UI example

- http://www.hugin.com/solutions/fraud-detection-management/online-demonstration

Thank you!