



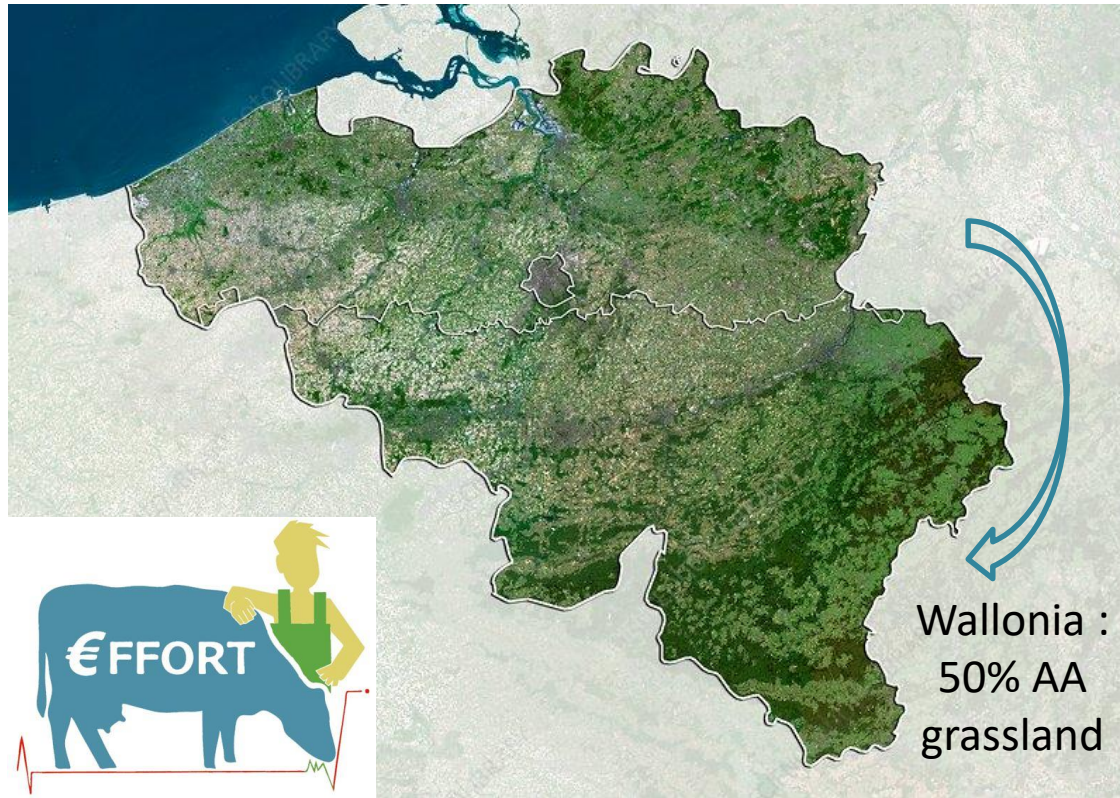
Walloon Agricultural Research
Centre

Decision support tools for grass-based fodder management on dairy farms: current adoption and perspectives

C. Battheu-Noirfalise^{1*}, E. Froidmont¹, D. Stilmant¹

¹ Department Sustainability, Systems and Prospectives, Walloon Agricultural Research Centre, Belgium.

Context



Objectives of the study was to investigate

- Dairy farmers' adoption of DSTs
- Barriers to and incentives for adopting DSTs
- The satisfaction with the guidance on using DSTs
- Future interest in DSTs

H : the perception of DSTs and the preferred DSTs depended on the type of DST user.

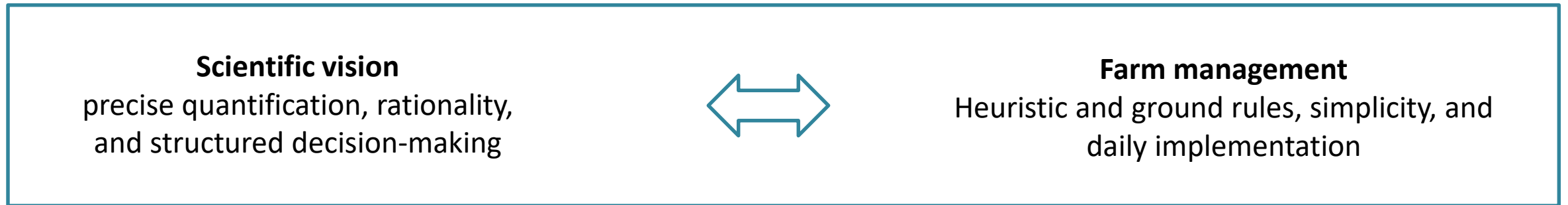
EFFORT : regional project aiming to increase the valorisation of fodders in dairy farms

Context

Preliminary talk with technicians

« The best grazers have the plate meter and the grazing calendar in their head »

« The first tool to use is simply the milk invoice (protein and fat content, urea, cell count) »

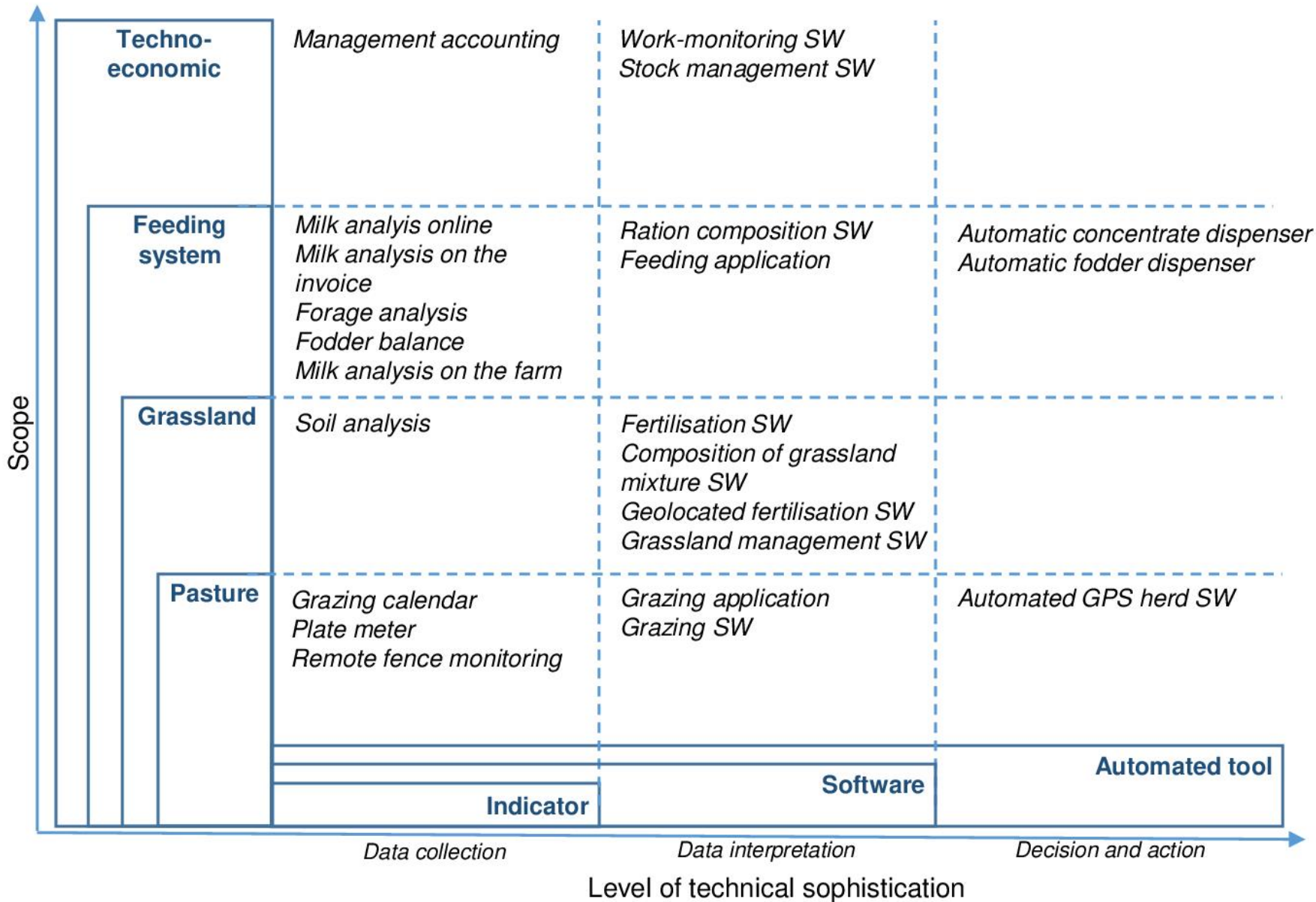


Supported and described by many : Donnelly et al., 2002; McCown, 2002b; Eastwood et al., 2009



Need to include this opposition in the study : classification of the DSTs following the step of decision making

Methodology



Steps of decision making



Methodology

Survey : Google Form

- Closed questionnaire (only one open answer was present to cite specific DST of interest)
- Five themes: farm characteristics, current DST use, barriers to and incentives for adopting DSTs, their satisfaction with the guidance on using DSTs, and future interest in DSTs.

→ 61 questionnaires were fulfilled

Results

Dairy farmers' adoption of DSTs

16/23 DSTs used by <25% of the farmers

DSTs used most frequently

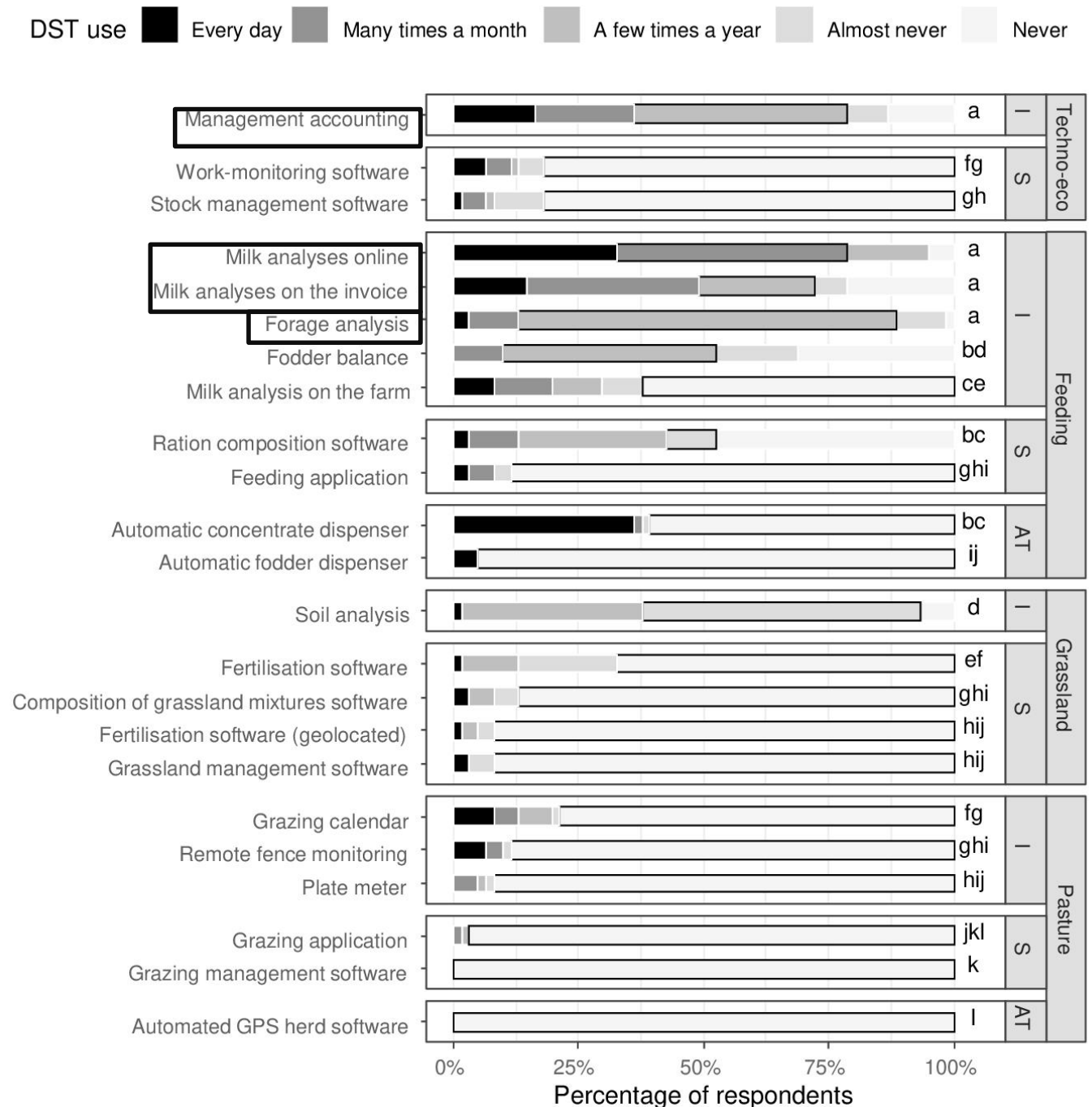
- Milk analysis (both online and on the invoice)
- Forage analysis
- Management accounting

Scope

- Techno-economic : 89%
- Feeding : 100%
- Grassland : 93%
- Pasture : 33%

Technical sophistication

- Indicator : 100%
- Software : 67%
- Automated tool : 41%



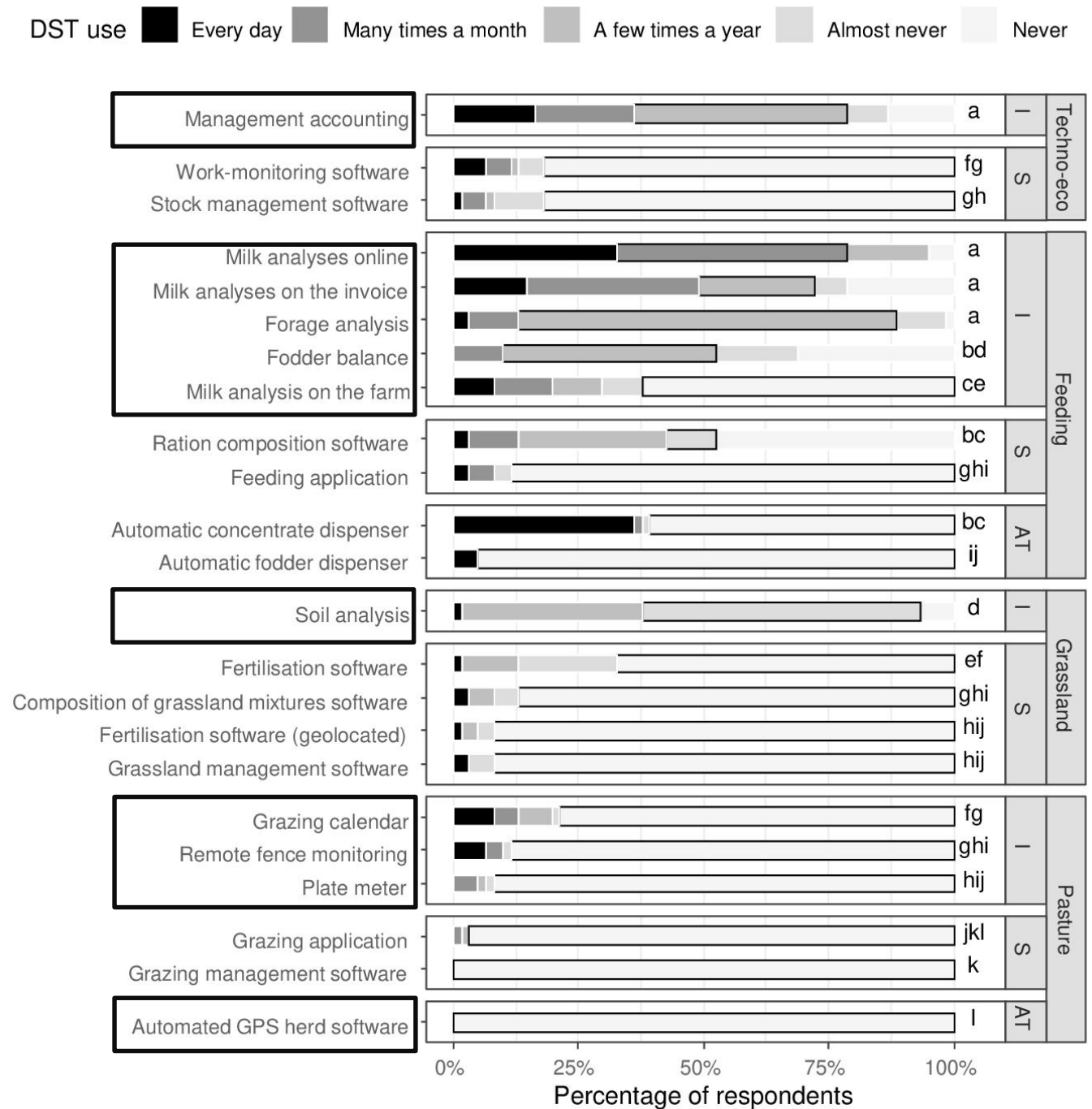
Results

Dairy farmers' adoption of DSTs

Indicators were used the most often
 ~ Bufe et al. (2018) : practical field measurement instruments and manuals

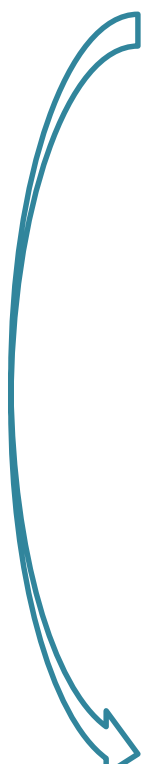
→ H. Kohnen “Give farmer simple figures and let them interpret it at the light of the knowledge of their own farm”

Invest in communication about available indicators' interpretation ?



Results

Barriers to and incentives for adopting DSTs



| Answer | Not at all (1) | I don't know (2) | I think so (3) | Absolutely (4) | Median answer | Significance |
|---|----------------|------------------|----------------|----------------|---------------|--------------|
| The equipment and services are too expensive | 4 | 5 | 31 | 21 | 3 | a |
| There are communication problems between tools | 9 | 15 | 25 | 12 | 3 | b |
| It takes too long to enter information | 10 | 19 | 26 | 6 | 3 | bc |
| The available tools are not robust enough | 11 | 21 | 19 | 10 | 2 | bcd |
| The available tools are not reliable enough | 13 | 20 | 20 | 8 | 2 | bcde |
| There are too many tools and services: I find it difficult to determine which ones to use | 14 | 20 | 18 | 9 | 2 | cdef |
| I would not use the tools on my farm | 14 | 17 | 26 | 4 | 2 | cdef |
| The terrain on my farm is not suitable | 18 | 20 | 15 | 8 | 2 | cdefg |
| The available tools are not autonomous enough | 17 | 21 | 19 | 4 | 2 | defg |
| Using these tools requires changing my working methods | 19 | 19 | 18 | 5 | 2 | efg |
| The digital tools are too complex to use | 22 | 18 | 15 | 6 | 2 | fg |
| Digital technology weakens the connection with the animals | 24 | 18 | 12 | 7 | 2 | g |
| Digital technology is not sold near my farm | 22 | 20 | 15 | 4 | 2 | g |
| Modernise the image of agriculture | 4 | 11 | 28 | 18 | 3 | a |
| Avoid losing information | 7 | 11 | 19 | 24 | 3 | a |
| Decrease costs (e.g., products, inputs, feed) | 7 | 14 | 30 | 10 | 3 | b |
| Save time | 10 | 13 | 25 | 13 | 3 | bc |
| Meet regulatory obligations | 7 | 18 | 25 | 11 | 3 | bcd |
| Improve knowledge of the animals | 16 | 9 | 23 | 13 | 3 | bcde |
| Prevent health risks | 11 | 17 | 25 | 8 | 3 | bcde |
| Make fewer trips | 14 | 15 | 22 | 10 | 3 | bcdef |
| Decrease the drudgery of work | 17 | 13 | 22 | 9 | 3 | cdef |
| Improve animal welfare | 19 | 12 | 20 | 10 | 2 | def |
| Increase respect for the environment | 18 | 16 | 18 | 9 | 2 | ef |
| Decrease labour costs | 17 | 19 | 17 | 8 | 2 | ef |
| Increase product quality | 18 | 18 | 16 | 9 | 2 | ef |
| Improve relationships with consumers | 19 | 20 | 15 | 7 | 2 | f |
| I don't trust the security and confidentiality of the data | 25 | 19 | 11 | 6 | 2 | g |

Results

Barriers to and incentives for adopting DSTs

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| | Digital technology weakens the connection with the animals | 24 | 18 | 12 | 7 | 2 | g |
| | Digital technology is not sold near my farm | 22 | 20 | 15 | 4 | 2 | g |
| Incentives | Modernise the image of agriculture | 4 | 11 | 28 | 18 | 3 | a |
| | Avoid losing information | 7 | 11 | 19 | 24 | 3 | a |
| | Decrease costs (<i>e.g.</i> , products, inputs, feed) | 7 | 14 | 30 | 10 | 3 | b |
| | Save time | 10 | 13 | 25 | 13 | 3 | bc |
| | Meet regulatory obligations | 7 | 18 | 25 | 11 | 3 | bcd |
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| Improve relationships with consumers | 19 | 20 | 15 | 7 | 2 | f | |
| I don't trust the security and confidentiality of the data | 25 | 19 | 11 | 6 | 2 | g | |

Discussion

Time/money gain or loss ?

- DSTs may require an initial investment of money and/or time to provide a gain later
- Need to address the lack of time (or question the time priority) and lack of financial support of farmers to invest in DSTs

Connected DSTs

- Decrease the data encoding time.
- Too complex to handle ? → Complexity of digital DSTs did not seem to be a major barrier

DST's interface : as simple as possible

Background model : as accurate as possible

→ *The “functioning” and associated knowledge system of the model must be well understood !*

Results

Satisfaction with the guidance on using DSTs

| Source of guidance | Not enough (1) | No, but I don't need it (2) | Sufficient (3) | Median answer | Significance |
|------------------------------|-------------------|--------------------------------|----------------|------------------|--------------|
| Internet | 18 | 11 | 32 | 3 | a |
| Advisers | 22 | 12 | 27 | 2 | ab |
| Technical documents | 24 | 14 | 23 | 2 | abc |
| Exchanges with other farmers | 28 | 12 | 21 | 2 | bc |
| Initial training | 26 | 17 | 18 | 2 | bc |
| Continuing education | 28 | 17 | 16 | 2 | c |

Need for continuous guidance + teach the knowledge system associated with the DST ~ life cycle project stressing the need for ongoing commitment of the host organization

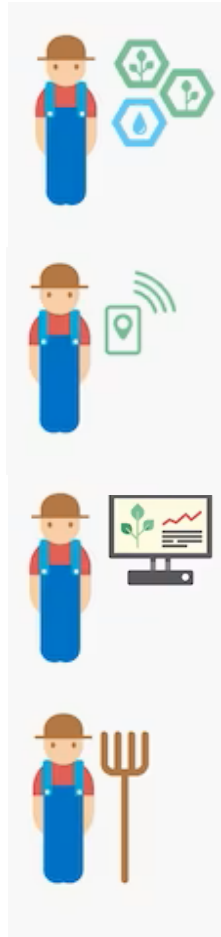
Results

Future interests in DSTs

| DST category | Absolutely not (1) | Not really (2) | Yes, why not (3) | Yes, I am already thinking about it (4) | Median answer | Significance | DSTs cited |
|-----------------|--------------------|----------------|------------------|---|---------------|--------------|--|
| Feeding | 5 | 30 | 23 | 3 | 2 | a | Ration composition application (5), Automatic concentrate dispenser (5), Ration composition software (4), Fodder analysis (2), Fodder balance (2), Milk (Milk Committee) analysis application (1) |
| Pasture | 7 | 31 | 21 | 2 | 2 | ab | Plate meter (9), Pasture management software (6), Pasture calendar (1) |
| Grassland | 7 | 32 | 22 | 0 | 2 | ab | Fertilisation software (5), Species mixture (2), Soil analysis (1) |
| Techno-economic | 9 | 34 | 17 | 1 | 2 | b | Stock management software (1), Work-monitoring software (1) |

Results

Types of DST user

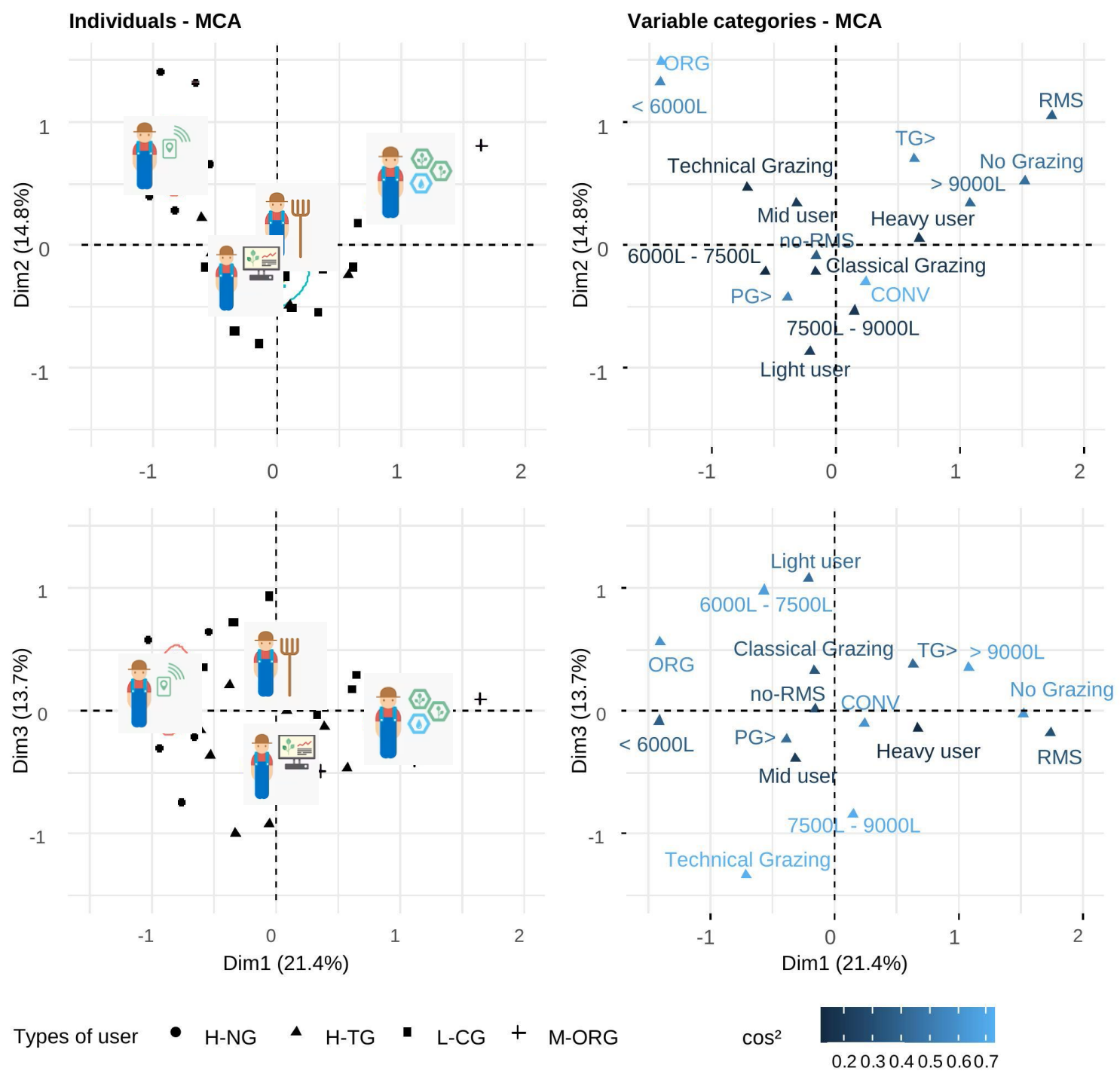


M-ORG : Moderate user – Organic

H-NG : High user – no grazing

H-T/TG : High user – Technical and Traditionnal Grazing

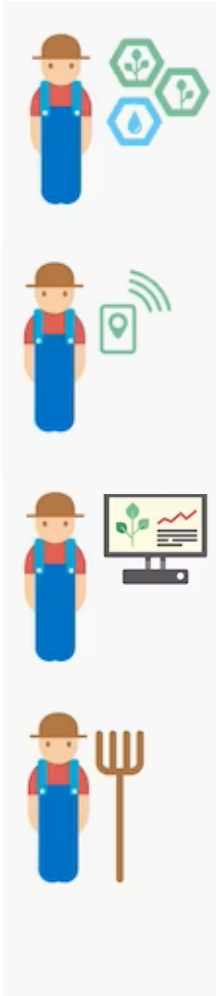
L-TG : Low user – Traditionnal grazing



Kmeans clustering on euclidean distances on the significant axis of an MCA

Results

Types of DST user



M-ORG : Moderate user – Organic

< 6000 l, No RMS, Technical and Traditional grazing , *pasture calendar*

H-NG : High user – no grazing

> 9000 l, high percentage of TG, RMS, *automatic concentrate dispenser*

H-T/TG : High user – Technical and Traditionnal Grazing

7500-9000 l, low percentage of TG, *ration composition SW, fodder balance*

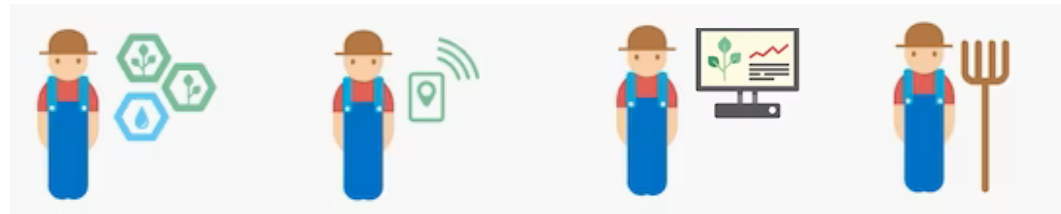
L-TG : Low user – Traditionnal grazing

6000-7500 l, *least impressed about time savings and the help in meeting regulatory obligations + least satisfied about the informations given on the internet and trough farmers' meeting*

Discussion

Types of DST user

- Low capital investment of grass-based farms (Shalloo et al., 2018) ? → more knowledge-intensive technical grazing could help increase both milk production and income (Hanrahan et al., 2018)
- Shalloo et al. (2018) → Indoor systems uses the most DSTs ~ Non-grazing intensive farms (**H-NG**)
- However : **H-T/TG** & **M-ORG** are grazing types also using DSTs
- Preferred DST ~ DST user type
- **L-TG** in a state of “unconscious incompetence” (Turner et al., 2020) ? Lowest DST use, lowest milk production among the conventional farms ~ Creighton et al. (2011)



Conclusion

- Dairy farmers mainly used **simple indicators** as DSTs to manage grass-based fodder
- As indicators are already present and used on the farm, their effectiveness would likely improve by **increasing communication about how to interpret them** → low-cost DSTs for farmers and developers.
- DSTs that support **pasture management** were used the least, but farmers had the **most interest** in them, especially in plate meters.
- The **type of user influences the perception of DSTs**, their adoption rate, as well as the type of DSTs considered interesting.
- There is **no one-fits-all DST**.

“Unless the researcher is involved in and concerned with implementation, we shall succeed only in amassing technical successes and practical failures.” (Ackoff, 1960).



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Contact

Caroline Battheu-Noirfalise c.battheu@cra.wallonie.be

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