# EXPERIMENTIERFELD AGRO-NORDWEST

AgroNW DSS

A support tool for pasture harvesting and fertilization

Agricultural decision-support

- Collaborative approach to current challenges
  - Worker shortages
  - Specialized labor
  - Degrees of automation

- Based on well-understood AI approaches
  - Knowledge representation
  - Logical inference

- Opportunity for Ag-Tech innovations
  - System usability
  - Explainable AI

condition1 and **condition2** → **conclusion**

Domain/Expert knowledge

- **Grass height**
- **Clover rate**
- ...

Input data

Inference engine

- **Weather forecast**
- **Soil conditions**

External sources and services

Recommendations

Example

Silage harvest if:

Plant height ≥ 25 cm   or   **Growth stage** of grass: before "ear emerging" or after "tillering"   or   **Crude fibre ≤ 22 %**
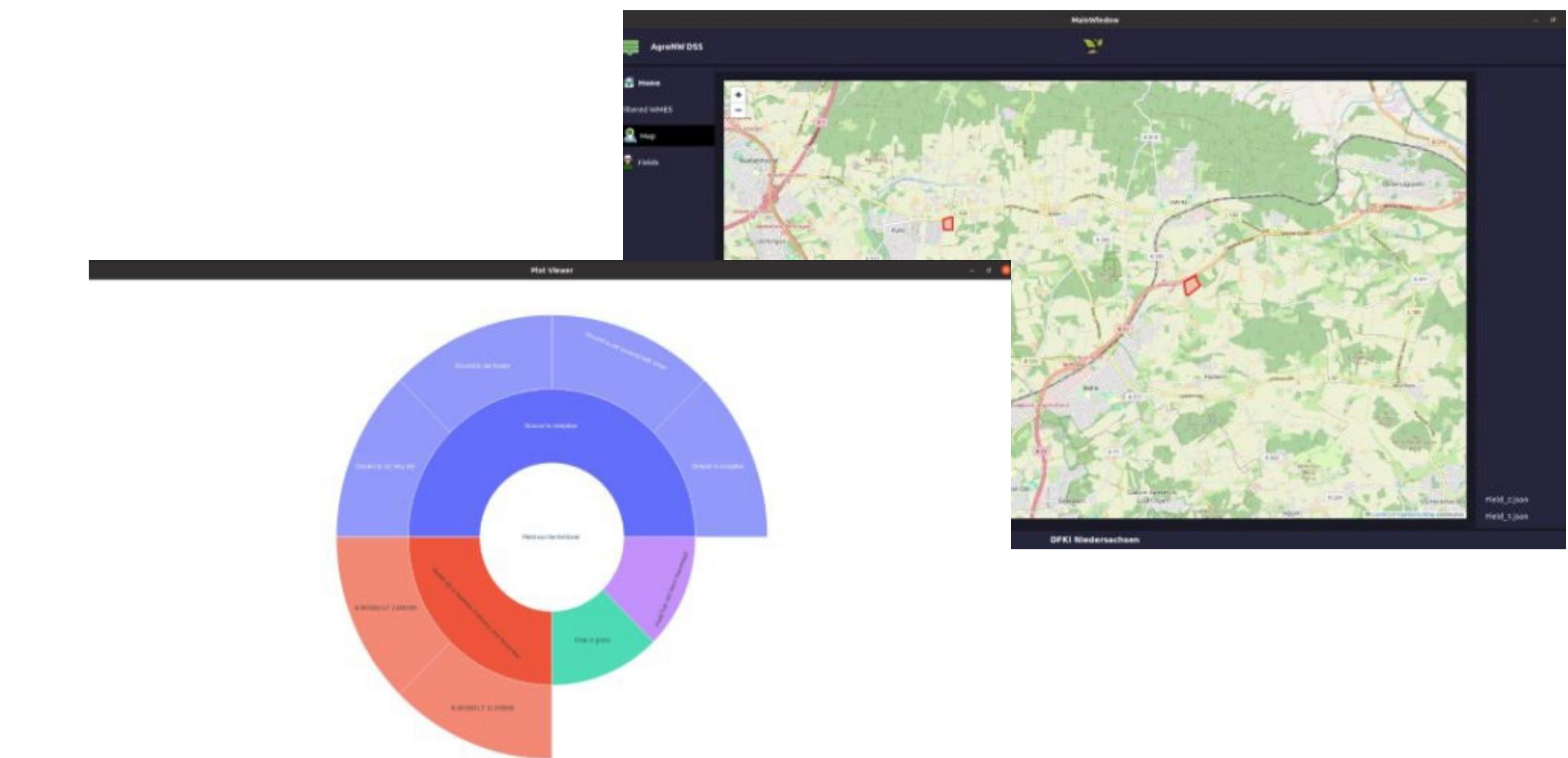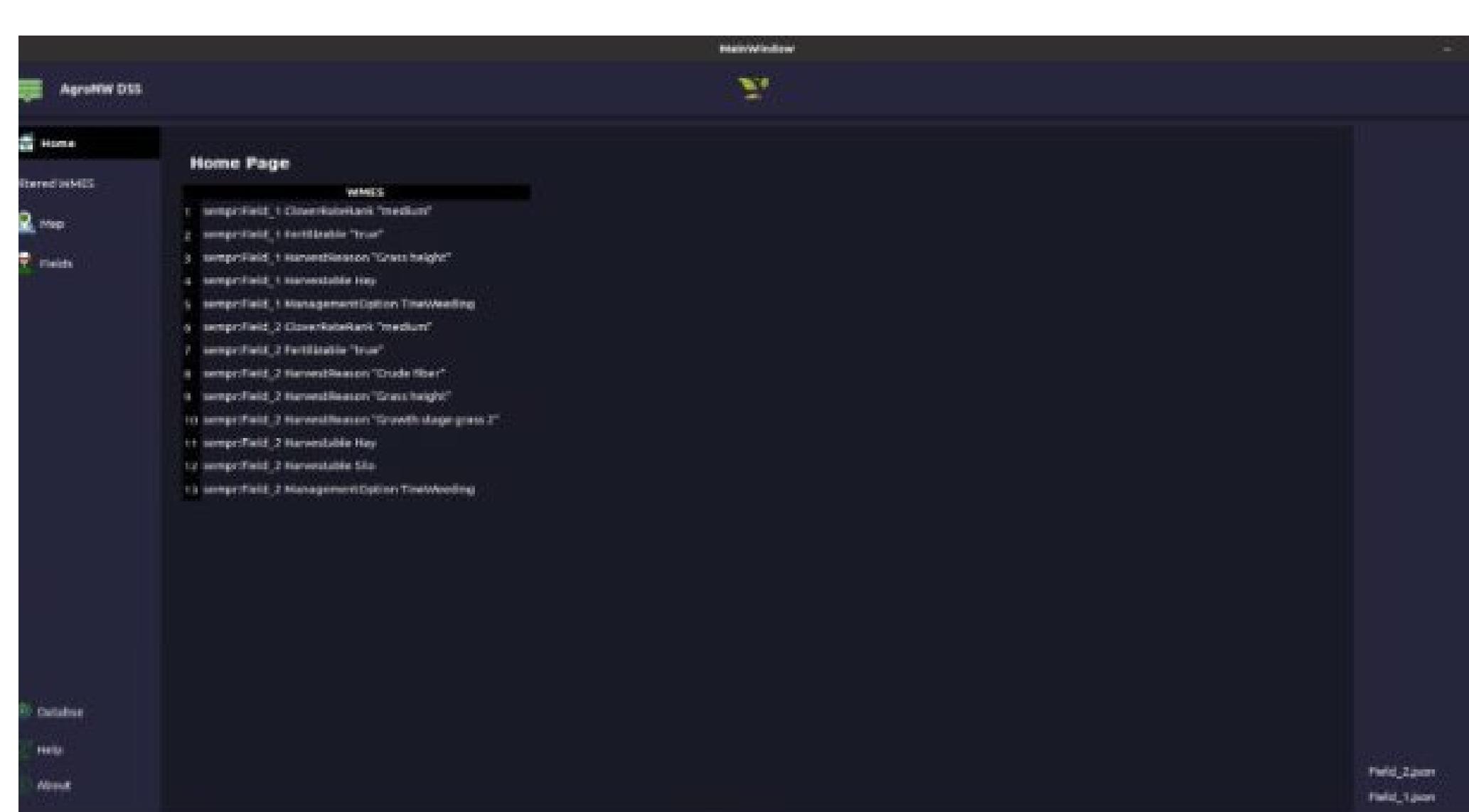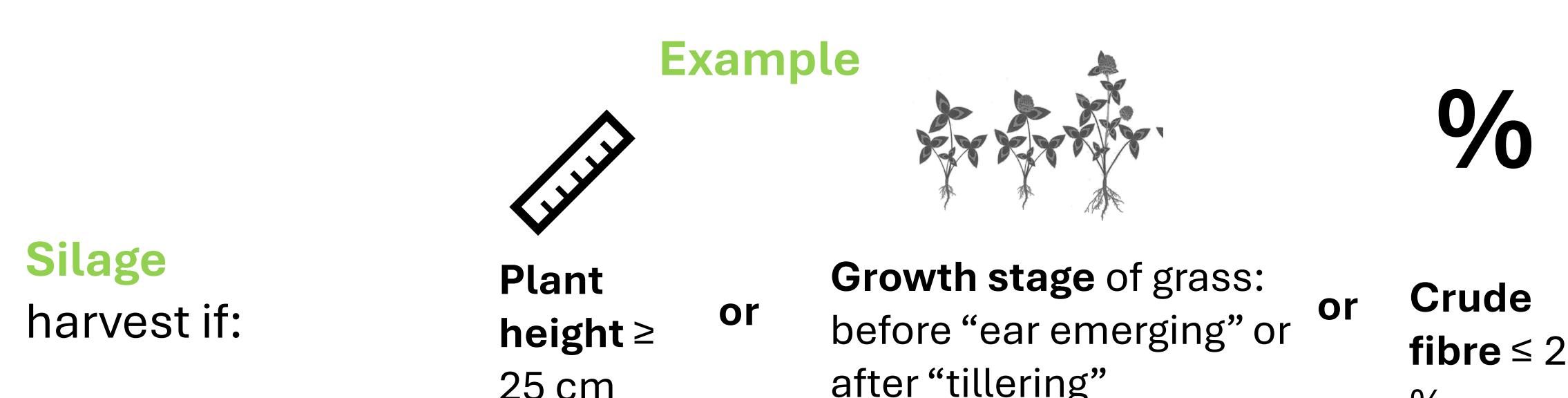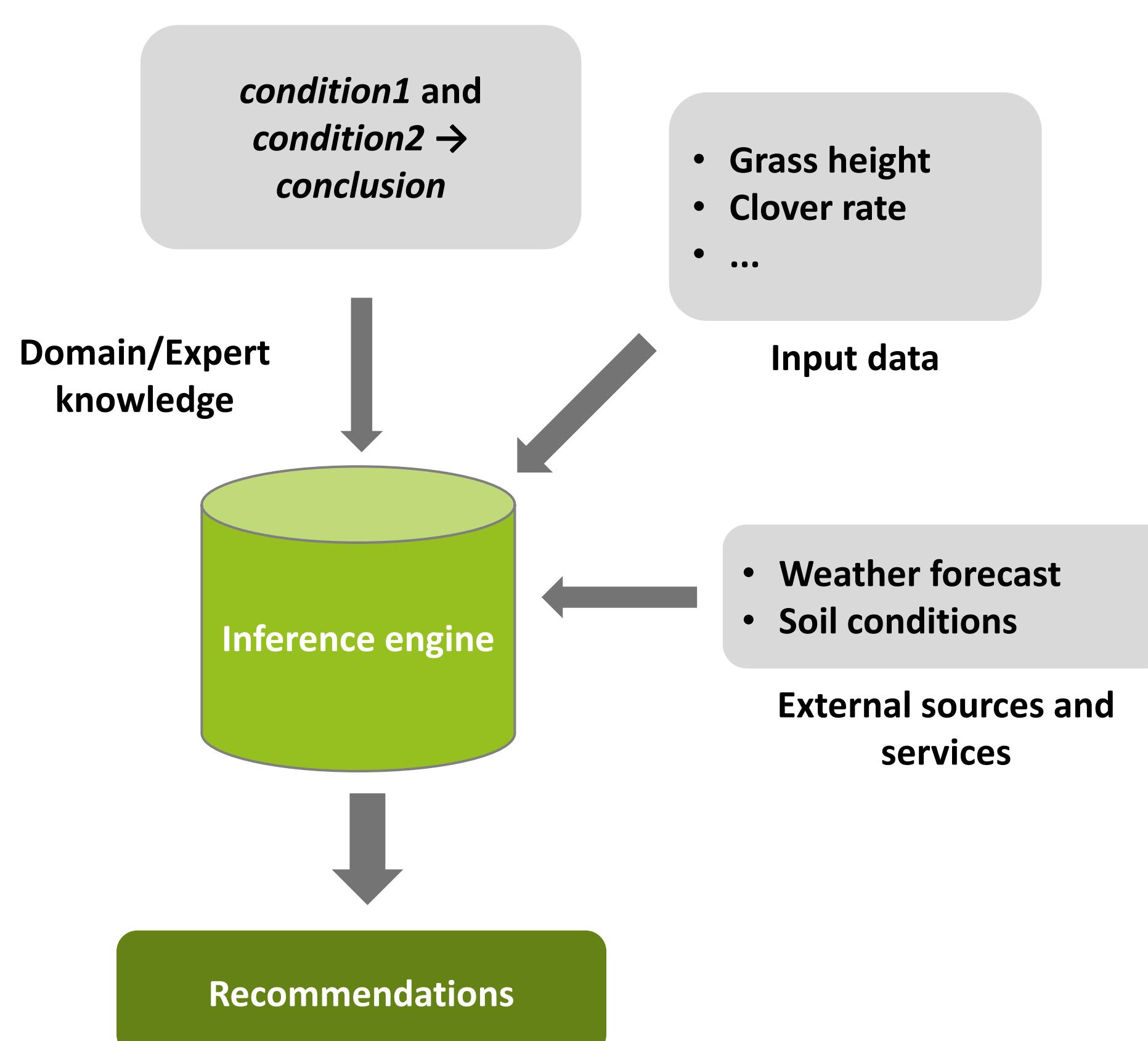
System features

- Expert domain knowledge in rules
- Forward-chaining logical inference
- Semantic web technologies
- Simple and technical results:
  - Filtered view of recommendations
  - Full view of RDF triples
- Geographic information on map
- Recommendations supported by plots

Next Steps

- Promising result evaluation

- System is a **prototype**, additional *transfer* steps include:
  - Stability, distribution, installation, maintenance, etc.

- Template for similar support tools
  - May transfer to other domains
  - Rules, data etc. can be adapted

- Support optimization, scheduling, planning, etc.:
  - *How much* X is needed? *When* to do Y? Are implicit
 - Results are valid input to other tools

R² = 0.747
RMSE = 7.83 days
CCC = 0.81

Harvest date recomended

Harvest date farmer

Management: Extensive, Intensive
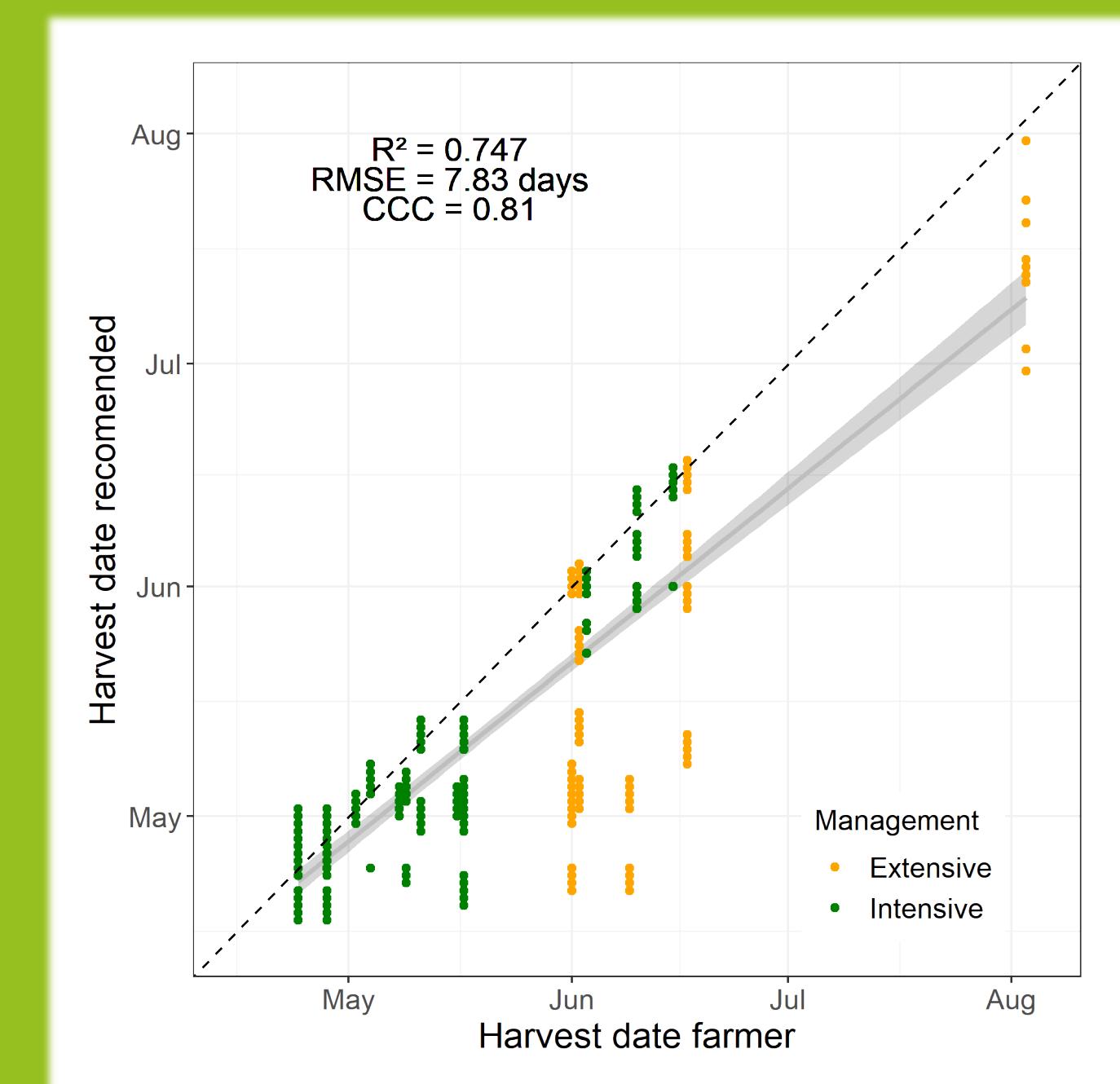
(Reuter et al., 2023)

Related publications

Niemann N. et al.: Wissensverarbeitung in der Landwirtschaft mit regelbasierten Inferenzsystemen und Begründungsverwaltung, in Meyer-Aurich et al.: Informations- und Kommunikationstechnologien in kritischen Zeiten, LNI, 2021, Vol. P-309, pp. 229–234.

Tieben C. et al.: Auf dem Weg zu einem Entscheidungsunterstützungssystem zur Pflege und Ernte von Grünlandflächen, in Gandorferet al: Künstliche Intelligenz in der Agrar-undErnährungswirtschaft, LNI, 2022, Vol. P-317, pp. 289–294.

Reuter, T., Saborio, J.C., et Al. Evaluation of a decision support system for the recommendation of pasture harvest date and form. In: Hoffmann, C., Stein, A., et Al. 43. GIL-Jahrestagung (GIL-2023), Resiliente Agri-Food-Systeme. Pp. 489-494, ISBN 978-3-88579-724-1, Gesellschaft für Informatik e.V. Bonn, 2/2023.
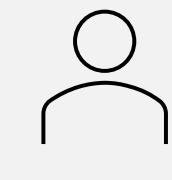
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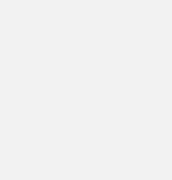
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