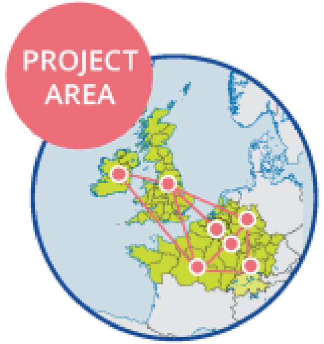

HappyMoo project - using milk mid-infrared spectrum to predict dairy cows' welfare status

J. Leblois[1], M. Calmels[2], L. Dale[3], C. Grelet[4], C. Lecomte[5], M-N Tran[1], V. Wolf[6], F. Dehareng[4] and HappyMoo consortium

[1]Elevéo asbl by awé groupe, [2]Seenovia, [3]LKV Baden-Württemberg, [4]Walloon Agricultural Research Centre, [5]France Conseil Elevages, [6]CEL25-90

http://www.happymoo.eu

@HappyMooProject

Avec le soutien de la Wallonie

Interreg North-West Europe HappyMoo
European Regional Development Fund
EUROPEAN UNION

EAAP 2023, session 95, 31/08/2023

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INNOVATION

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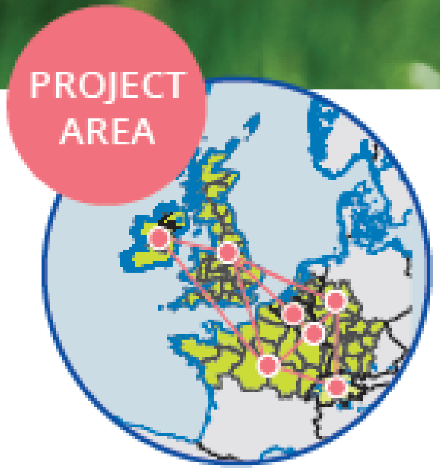


Precision milk analysis, an innovative tool to improve cows' welfare

- 12 partners
- 7 countries
- 8 milk recording organisations
- 3 research centres
- 1 IT centre

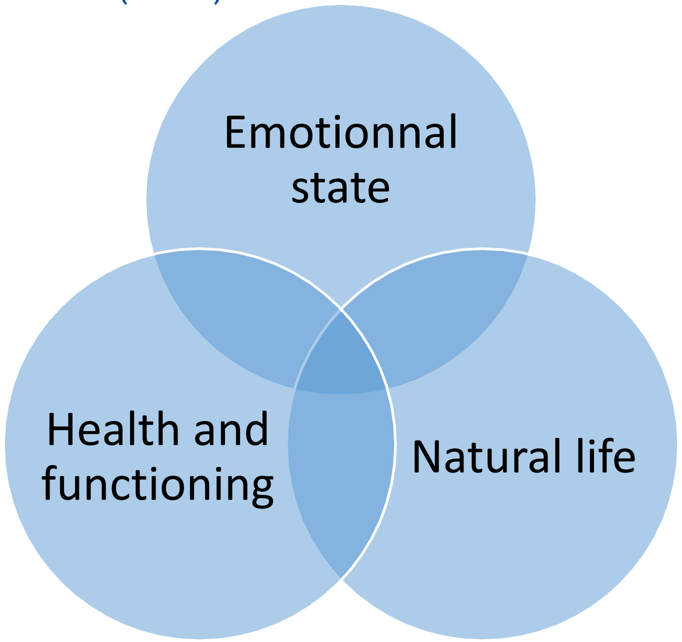
Project budget: 4.1 M €

Project duration: 50 months (ended on 24/12/2022)

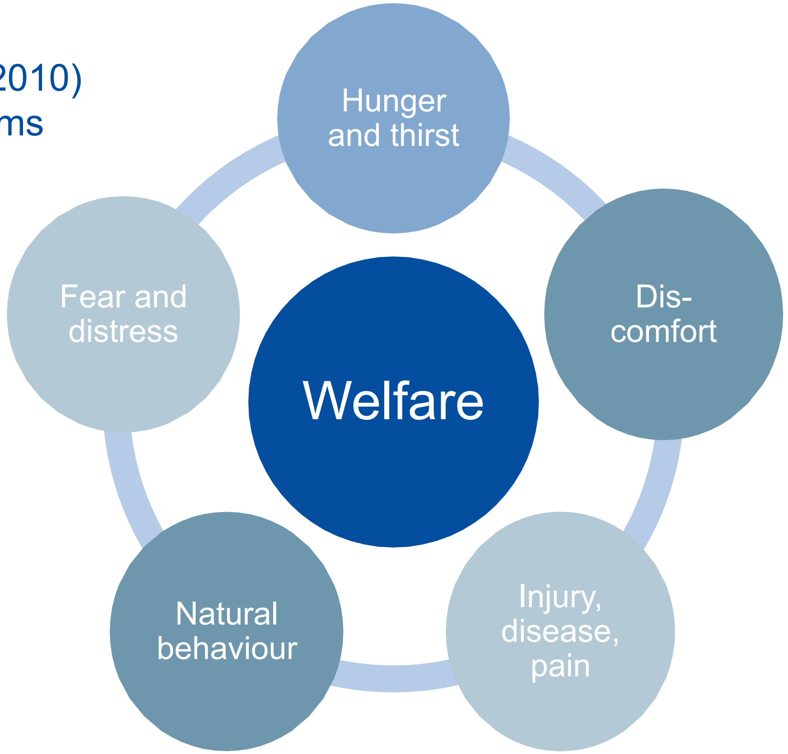
Animal welfare?

Several definitions

Fraser et al. (2008)



FAWC (2010)
5 freedoms



Animal welfare – state of art

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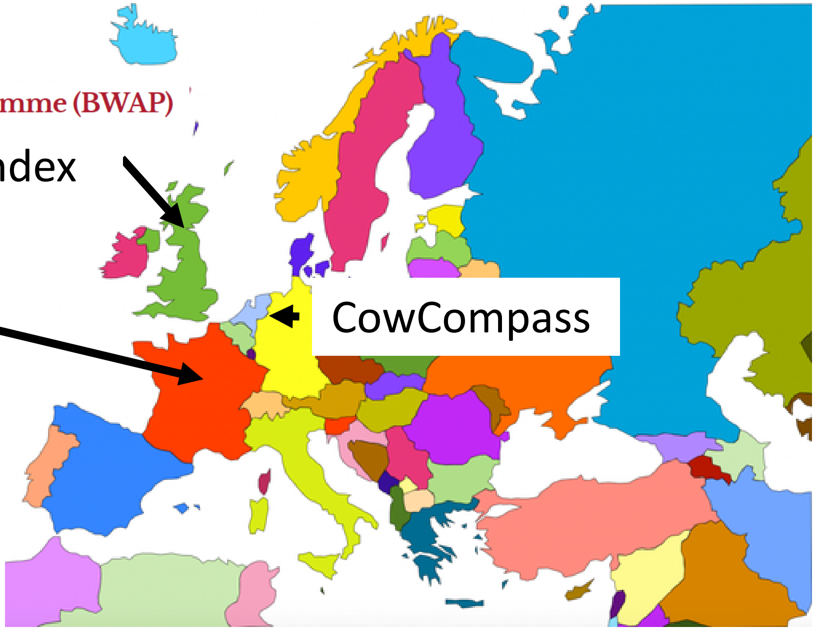
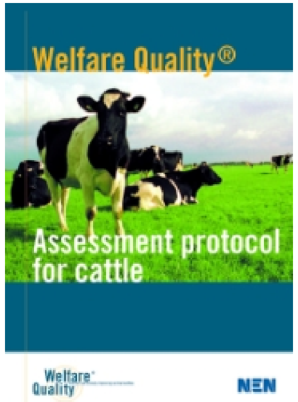
- Objective indicators to assess the animal welfare are scarce
- Existing: protocols to assess welfare on-farm



BoviWell
TIBENA©
TERRENA INDICATEURS BIEN-ÊTRE NOUVELLE AGRICULTURE ©



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Animal welfare – state of art

Existing protocols

- Need a farm visit
  - ➢ Not regular (once/year maximum)
  - ➢ Costly
- Can assess herd welfare level but not individual problems

➔Need a fast, recurrent and cheap alternative

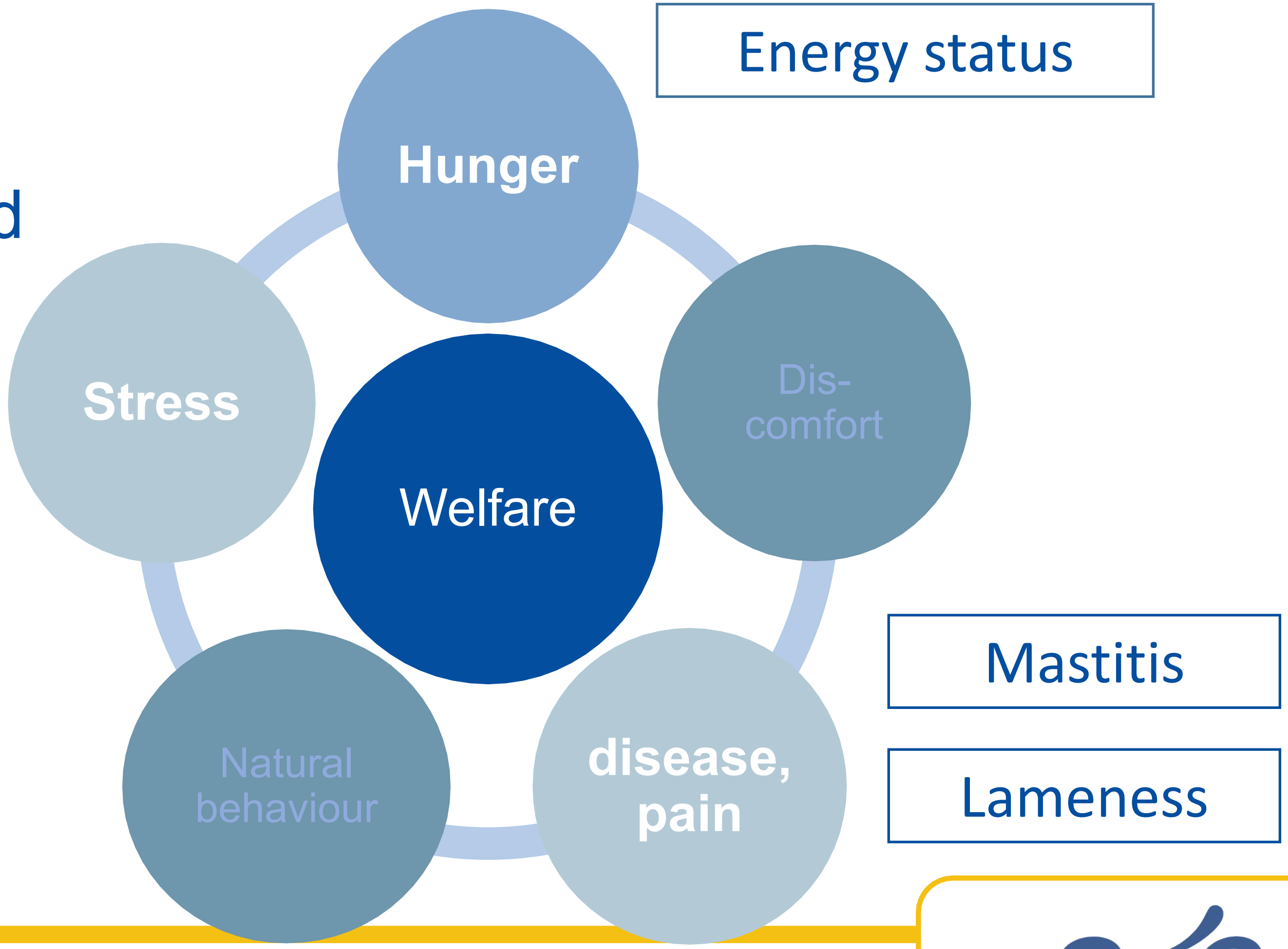
➔ **Milk recording samples**

HappyMoo – objective

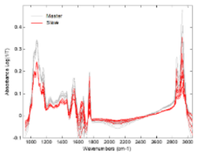
Use milk mid-infrared spectral analysis to **predict** welfare-related traits (molecules, phenotypes)

In particular:

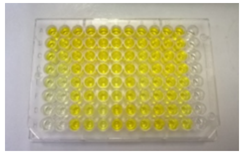
→ Roll-out monitoring tools for the farmers, vets and extension workers



HappyMoo – how to predict?

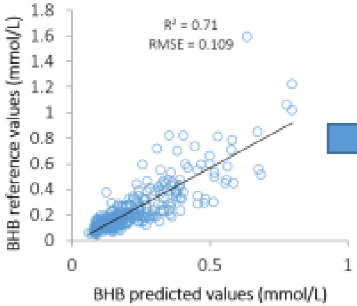




Mid-infrared (MIR) spectroscopy




Reference values (lab analysis, phenotype)

Models



Prediction of new biomarkers

- Stress
- Mastitis
- Lameness
- Energy balance

HappyMoo – building models

Construction of models through **european collaboration** is essential:

Building robust models requires a lot of variability in the dataset:
- Breeds
- Feeding systems
- Climate
- Management etc.

➔ Necessity to share data

HappyMoo – building models

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European collaboration dependent on data harmonization

- Reference data
  - ➢ Phenotypes: ICAR codes
- Spectral data
  - ➢ Dependent on the analyzer brand, model etc
  - ➢ OptiMIR project allowed to create a method to standardize the spectra (Grelet et al., 2015)

EMR OptiMIR
Wallonie recherche CRA-W

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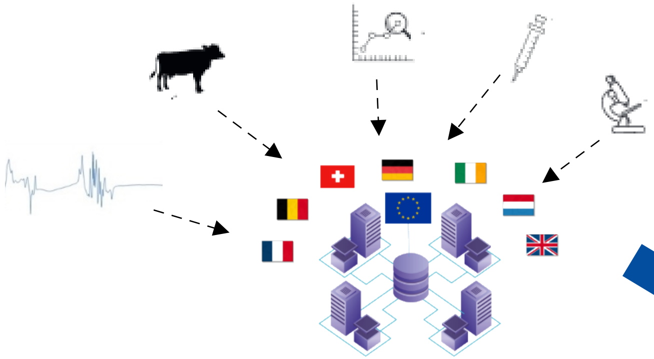
Working plan

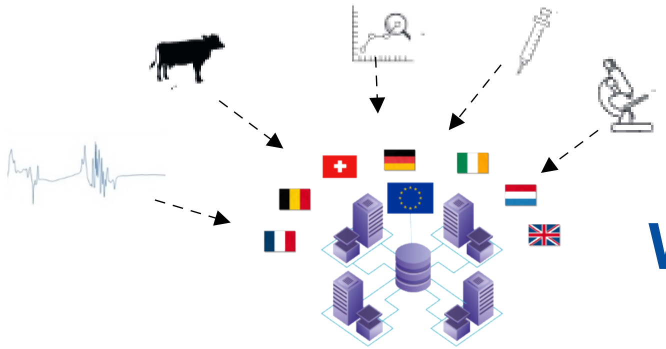


WP T1 – Data acquisition

WP T2 – Processing of data through machine learning approaches

WP T3 – Production of screening index and dashboard (welfare and €)

Working plan



WP T1 – Data acquisition

Transnational database

- Milk recording data
- Phenotypes (lameness, BCS, diseases, trimming animal data etc)

Lab reference values

- Blood samples → fructosamin
- Hair samples → cortisol
- Milk samples → NAGase, LDH, haptoglobin

Working plan

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WP T2 – Processing of data through machine learning approaches

Prediction models

- Welfare related molecules
- Phenotypes

PLS-DA

GLMNET

Neural networks

Random Forest

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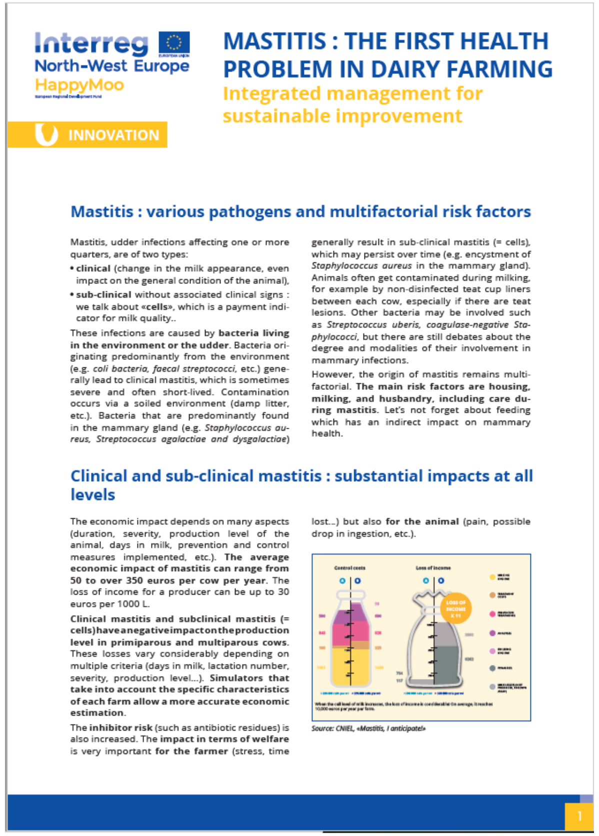
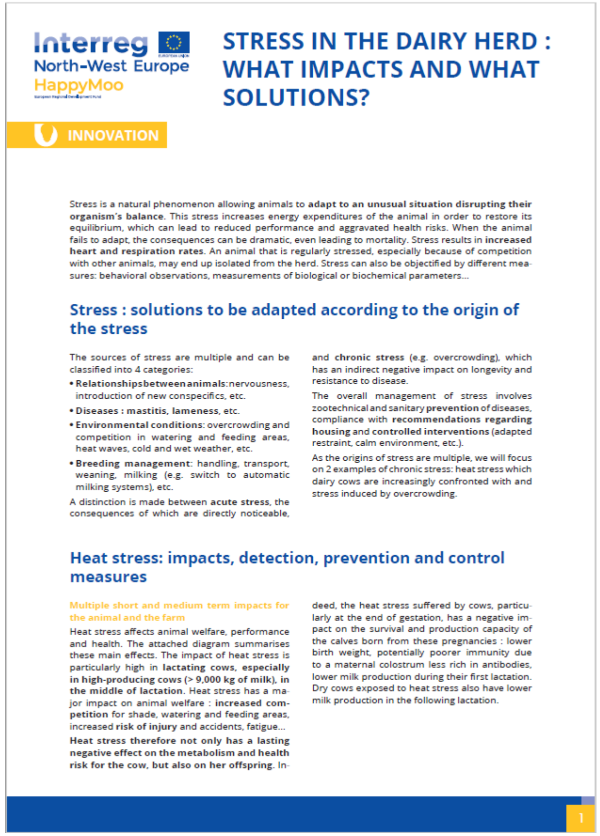
Working plan

WP T3 – Production of screening index and dashboard (welfare and €)

Implementation of these new equations into milk recording organizations' platforms

Good practices manuals





English, French, German and Dutch

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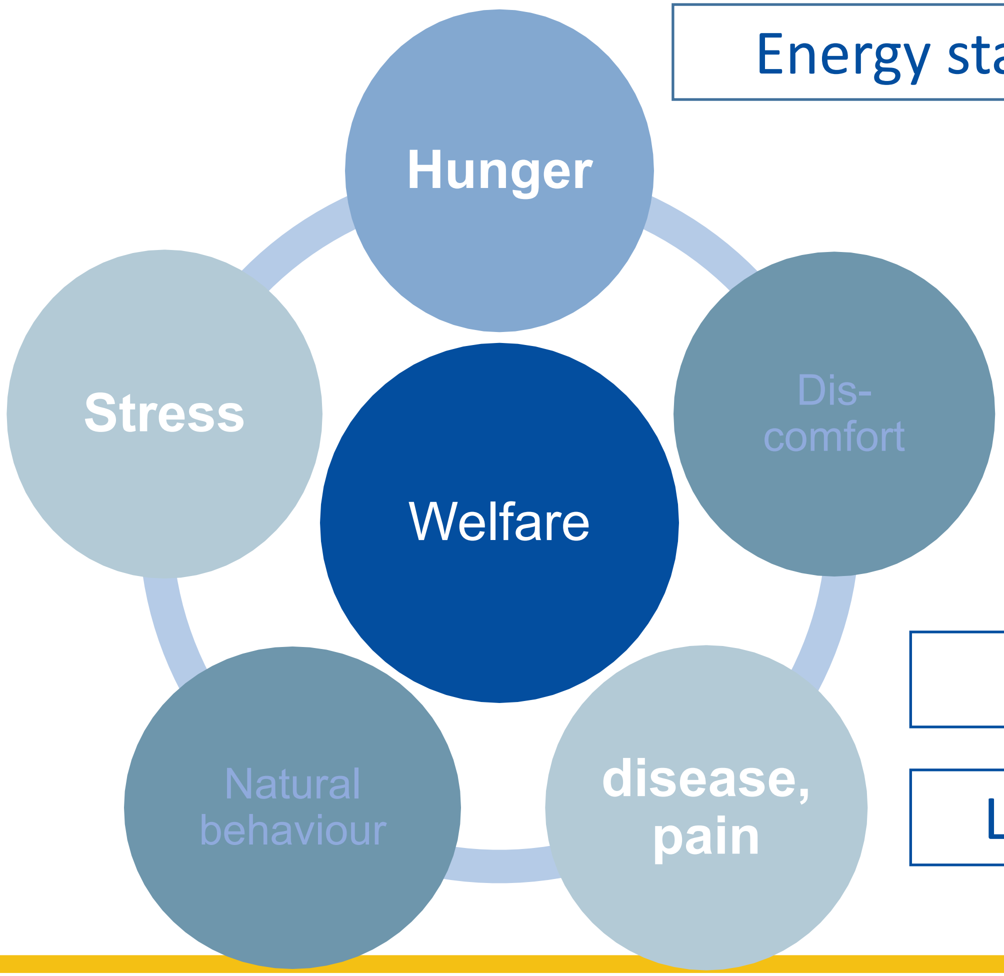
Details

Presentations:
- Grelet
- Simon
- Dale
- Lemal



Energy status

Presentations:
- Calmels
- Wolf

Mastitis

Lameness

Presentations:
- Dale
- Jattiot

Next steps

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European Regional Development Fund

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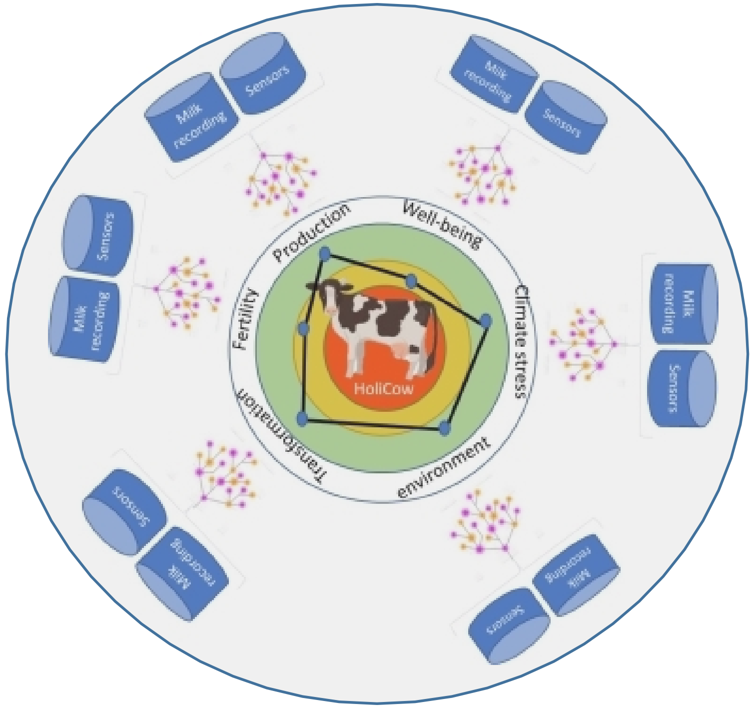
Co-funded by the European Union

HoliCow

Start date 01/07/2023

End date: 30/06/2026

Objective

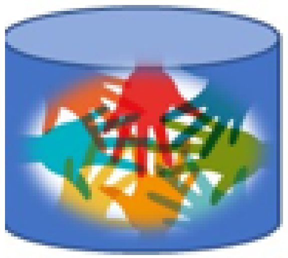


Use

- Results from previous projects (prediciton equations)
- Other routinely collected data (sensors, diagnoses)

➔ Production of an easy-to-understand single indicator to assess the cows and herd health

Objective



Community database

Possibility for a farmer to

- Provide feedback and improve the tool
- Provide information on the solutions taken up at his farm to improve his results

➔ « Forum » for farmers

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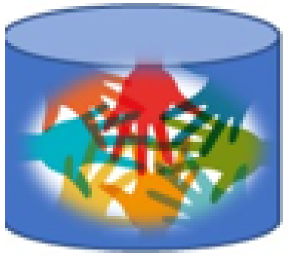
Objective



Community database

Possibility for a farmer to

- Provide feedback and improve the tool
- Provide information on the solutions taken up at his farm to improve his results

➔Forum for farmers

- Anchoring the farmer in its community
- Image development of small farms in rural areas

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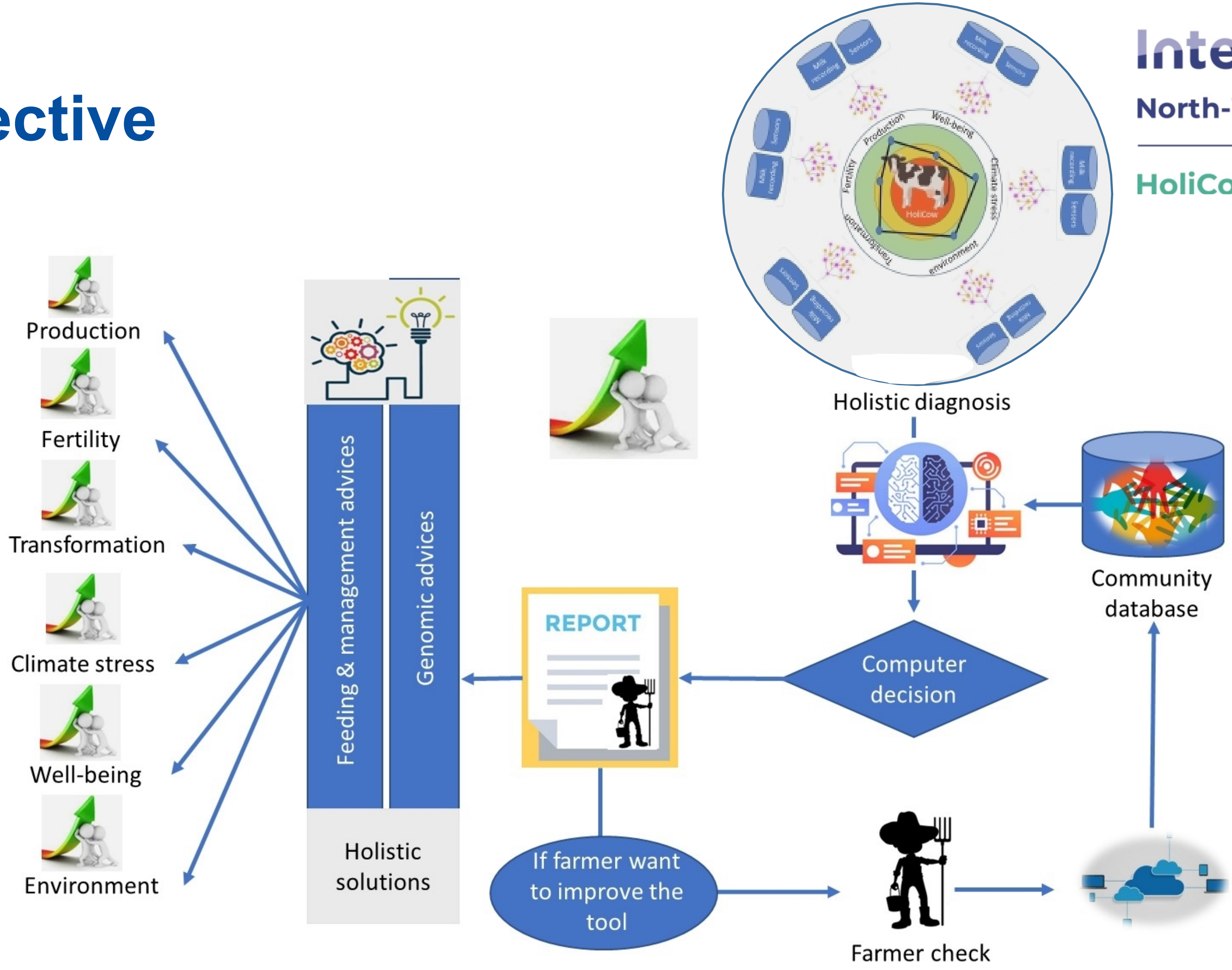
Objective


Production
Fertility
Transformation
Climate stress
Well-being
Environment
Feeding & management advices
Genomic advices
Holistic solutions
REPORT
If farmer want to improve the tool
Holistic diagnosis
Computer decision
Community database
Farmer check

Thank you!

Contact:

Julie LEBLOIS (jleblois@awegroupe.be)

http://www.happymoo.eu

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