Session #4

New knowledge and innovation solutions for sustainable farming

FARM TO FORK 2020 CONFERENCE

15 - 16 October 2020
Let's meet each other
Who is today with us in the audience?

a. a farmer
b. a representative of producer organisation / cooperative
c. an farm advisor
d. an input supplier
e. a food chain operator (processor, retailer, HoReCa, etc.)
f. a researcher / innovator
g. a policymaker (at regional, national or international level)
h. a representative of a civil society organisation
i. other
Setting the scene
European Green Deal
Reduce by 50% the overall use and risk of chemical pesticides and reduce use by 50% of more hazardous pesticides.

Reduce sales of antimicrobials for farmed animals and in aquaculture by 50%.

Reduce nutrient losses by at least 50% while ensuring no deterioration in soil fertility; this will reduce use of fertilisers by at least 20%.

Achieve at least 25% of the EU’s agricultural land under organic farming.
R&I as key enablers for sustainable food systems…

FARM TO FORK
What has been achieved so far?
Long-term strategic approach to EU agricultural R&I
From strategy to action…

Distribution of budget over priorities
(EUR million - 2014-2020)

- Human and social capital: 143
- Rural growth (inc. policy support): 630
- Integrated ecological approaches: 164
- Resource management: 558
- Healthy plants and livestock: 357

315 projects – 1,9 billion € under Horizon 2020
From strategy to action…

- 190 H2020 multi-actor projects (€1 billion), including 29 thematic networks; 50% newcomers
- 27 Member States implementing the EIP; over 2000 out of 3200 OGs already running
- A growing and thriving network and increasing volume of practice-oriented knowledge and innovations
Showcasing innovative solutions
Let’s meet our speakers

Øyvind Overskeid  Frederik Leen  Víctor Riau Arenas  Bram Moeskops
Øyvind Overskeid
OUR EXPERTISE
Design of dynamic mechanics, servo systems, electronics and embedded software

Industrial design + machine + cybernetics
THE ADIGO TEAM

design & mechanics

robotics & AI

prototypes & piloting
PROJECT ASTERIX

Revolutionizing vegetable production
The vegetable fields of Europe are blanket sprayed with herbicides appx. four times per season. Weeding is **time consuming** and **expensive** in all vegetable fields. Herbicide **resistance emerge quickly** in weeds.
We «print» herbicide droplets only on weeds, avoiding crops!

Patented technology
Emerging rutabaga

Nice timing for weed handling
Emerging rutabaga

Nice timing for weed handling

Conventional spraying
Emerging rutabaga

Nice timing for weed handling

Conventional spraying

With Asterix tech.
Emerging rutabaga

Nice timing for weed handling

Conventional spraying

With Asterix tech.
Emerging rutabaga

Nice timing for weed handling

Conventional spraying

With Asterix tech.

-95%
The Asterix Project
Robotic drop-on-demand intra-row weeding in seeded row crops: Results from one field trial in Parsley root in 2018

Summary and conclusions
Comparing the first robotic drop-on-demand glyphosate application in June with the blanket application of Fenix showed that the robot was better than the blanket application in controlling the total number of weeds (p= 0.001) and the dominating weed species, *Solanum nigrum* (p= 0.001), whereas the number of crop plants (p= 0.468) were indifferent.

In conclusion, the robotic drop-on-demand application of glyphosate did not accidently kill crop plants, which indicates high precision and accuracy of this novel robotic weeding implement. Depending on the time in season, robotic weeding strategies controlled the weeds better than (July 3) or equal to (August) ordinary blanket application of Centium and/or Fenix.
Asterix with Finalsan in post-emerge Parsley root

Farmers practice
Field test - 2019

Asterix with Finalsan in post-emerge Parsley root

Farmers practice VS Asterix
Fig. 3 Sellable crop yield in Experiment 2. The mean crop yield in weeding strategy Robot (12.03 kg ha$^{-1}$) was significantly higher (paired t-test, $p = 0.042$) than the mean yield of Farmer strategy (8.11 kg ha$^{-1}$). The number of sellable roots of strategy Robot (120 486 roots per ha) was significantly higher ($p = 0.025$) than the strategy Farmer (86 806 roots per ha).
Species, so far...

- Carrots
- Onion
- Black beetroot
- Parsley root
- Cabbage
- Corn salad
- Beetroot
- Spinach
- Ruccola
- Rutabaga
- Cylinder radish
- Strawberry
Value Proposition – Conventional farming

- Drastic reduction in herbicide use
- Works in sown and planted cultures
- Increased yields
- Reduced soil compaction
- Eliminates herbicide drift
- Large weather window
- Attractive investment, ROI < 2 years
Asterix – Adigo spin-off

Currently: Department in Adigo AS

From 2021: A separate company: Kilter AS
Our partners

Project Asterix is supported by the European Union’s Horizon 2020 SME instrument phase 2
Farm Health Action plans: translating R&I to the farm-specific context to tackle AMR

Farm to fork conference 16/10/2020

Frederik Leen Ph.D.
Why reducing AMU?

“Keeping the shine on the silver bullet.”

Preserving the efficacy of antibiotics for future generations of both humans and animals
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under Grant Agreement No 817591.
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- Linking stakeholders
- Collecting
- Disseminating and promoting
- Showcasing farm health teams
Farm Health Teams

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under Grant Agreement No 817591.
FHT from science to practice

Scientific studies on Farm health teams & Farm health planning

Implementation in daily practice

Wider promotion in EU livestock industry

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Disseminating Innovative Solutions for Antibiotic Resistance Management

Toolbox for FHT underway

Plan-Do-Check-Act

Assess farm status

Engage team and team collaboration

Actions

Improve

Data

Brainstorm

Plan

Do

Check

Act
Keep the shine on the bullet!

Try the Farm Health Team approach!
• for the benefit of your farm or that of your clients
• for the sake of safeguarding antibiotics for future generations

Thank you for listening!
Víctor Riau Arenas
This project has received funding from the European Union’s Horizon 2020 Research and Innovation Programme, under Grant Agreement No 773649
CASE STUDIES

1) Catalonia, Spain
2) Brandenburg, Germany
3) Lungau, Austria
4) Emilia-Romagna, Italy
5) Gelderland, Netherlands
6) South Moravia, Czech Republic
Scientific Experiment: Respiration Chamber
Application: Feeding strategies on 70 farms

GHG
Animal
Plant+Soil
Feedstuff
Forage+Concentrates
Animal
Ruminant Farm - Fertilizer
Soil
Mineral Fertilizer
N-Losses
Groundwater
Milk + Meat
Farm boundary
System boundary
SPANISH CASE STUDY (CATALONIA)

• **Mixed farming system** – Ruminant Production + fodder crops production. Precision feeding, bedding strategies.

• **Pig manure valorisation, bioenergy and fertilizer production from manure.** Anaerobic co-digestion, solid-liquid separation, solar drying and stripping, fertilization trials.

• **Long-term organic fertilization trials.** Application of organic amendments: C-sequestration, N and P assessment.
Mixed farming system – Ruminant Production + fodder crops production. Precision feeding, bedding strategies.
PRECISION FEEDING SYSTEM (CATALONIA)

**CONVENTIONAL**
- Urea 17.8 mg/dl
- Urea 15.1 mg/dl
- 674 g/d N intake
- 637 g/d N intake

**PRECISION**
- 194 g/d N total
- 130 mg/dl urea
- 183 g/d N total
- 77 mg/dl urea

**N BALANCE**
- 183 g N total/100 g milk
- 2.91 g N total/100 g milk
- 196 g N total/d urine
- 145 g N urea/d urine
- 142 g N total/d urine
- 85 g N urea/d urine

**FECES**
- 2.84 g N total/100 g feces

**URINE**
- 2.91 g N total/100 g urine
Pig manure valorisation, bioenergy and fertilizer production from manure. Anaerobic co-digestion, solid-liquid separation, solar drying and stripping, fertilization trials.
SPANISH CASE STUDY (CATALONIA)

NH₃ and GHG Emission monitoring and reduction

Precision feeding tools

Animal feeding

S/L separation

Solid fraction

Liquid fraction

**digestate**

Biogas plant

Electric energy

thermal energy

Solar drying (prototype)

acidiﬁcation

electricity

fertilization

fertilization
THANKS FOR YOUR ATTENTION

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Bram Moeskops
Research and innovation for achieving 25% organic farmland

Bram Moeskops, Research & Innovation Manager
Organic farmland in the EU: From 8% to 25%
Reaching 25% organic farmland requires R&I at all levels of the food system
Input supply
Organic seed from adapted cultivars
Farming methods
No-till system with cover crops
Farming methods
Better livestock management for less antibiotics
Food processing
Enhanced quality certification in organic wine
Consumption
Public procurement as a driver for regional, sustainable and organic food systems
Knowledge networks for accelerating adoption

Face-2-face knowledge exchange

On-line knowledge exchange

https://organic-farmknowledge.org/
Take home messages

• Building on dynamics of organic agriculture to create sustainable food systems is smart and reasonable

• Research & Innovation is needed at all levels of the organic food system

• A strong organic “Agricultural Knowledge and Innovation System” is crucial

• And... don’t forget the CAP. It should be fully aligned with Farm to Fork Strategy.

• Bram.Moeskops@organicseurope.bio
More Horizon 2020 projects…

https://ec.europa.eu/agriculture/research-innovation/documents-links_en
... and EIP-AGRI operational groups

What is planned for the future?
How to maximise the impact of research and innovation on the ground supporting farmers in the transition to sustainable food systems from farm to fork?
Investing in research and innovation

Around 9 billion € for food, bioeconomy, natural resources, agriculture and environment.
Boosting implementation & impact on the ground

Multi-actor R&I projects
EIP-AGRI Operational groups
EIP-AGRI Focus groups
Thematic networks
« Science only » R&I projects
CAP Horizon Europe
Boosting implementation & impact on the ground
Encouraging synergies

Accelerating farming systems transitions: agroecology living labs and research infrastructures

Safe and sustainable food systems for people, planet and climate

Agriculture of data

Animals and health
Leaving space for new approaches

R&I Mission

Caring for soil is caring for life

Ensure 75% of soils are healthy by 2030 for healthy food, people, nature and climate
SOIL HEALTH AND FOOD
Panel discussion
Let’s meet our panellist

Isabel Carvalhais

Anikó Juhász

Doris Letina

Monika Beck
Conclusions