Wallonie recherche CRA-W

CRA-W info

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Ewe-lambs on cover crop mainly made up of phacelia and oats.

CATCH CROPS GRAZING, A WAY OF BRINGING CROPS AND LIVESTOCK TOGETHER

THE MUTUALLY BENEFICIAL INTERACTION BETWEEN ARABLE CROPS AND LIVESTOCK IS REJUVENATED THROUGH THE NITRATES DIRECTIVE.

This complementarity has long been exploited by farmers, but the specialisation of a large number of farms in recent history has reduced the benefits derived from such combinations. The soil cover obligation imposed by the Nitrates Directive is now providing an opportunity to recreate the link between croplands and animals: partnerships between crop growers and sheep farmers are emerging, with the aim of grazing catch crops.

The results obtained over the past three years as part of the DiverImpacts project suggest that there are many advantages to grazing sheep on nitrates-catch crops, especially when carried out under partnerships between land users and sheep owners. For animal farmers, catch crops represent a high-quality, highly economical fodder, available at times of low productivity of permanent pasture. On the other hand, growers can save on the cost of cover seeds (depending on the agreement with the animal farmer) and benefit from the destruction of the cover. It is therefore in the economic interests of both parties.

But what are the agronomic consequences of this practice?

To find out, the SERVEAU project was launched by CRA-W in collaboration with UCLouvain and the Collège des Producteurs. The study is funded by the Société Publique de Gestion de l'Eau (SPGE) [Public Water Management Company], and aims to quantify the effects of grazing sheep on catch crops on the quality of groundwater in particular. The primary objective of catch crops is to protect these waters from nitrate pollution by capturing the leachable nitrogen remaining after a dominant crop. It is therefore essential to ensure that grazing does not threaten this environmental protection role. Six sites were monitored across Wallonia during the first year of the trial, which has just ended. Initial results suggest that the practice would have very little impact on nitrate leaching as compared to ungrazed catch crops, which is encouraging for the future. Moreover, the abundance of weeds and the yield of peas for canning, potatoes or sugar beet (crops sown after the grazing) would be unaffected by the presence of sheep. In this way, sheep would provide an opportunity to add value to catch crops without causing any subsequent environmental risk or loss of yield. The results must naturally be verified over several years, but the initial trends observed are very promising!

For further information

www.cra.wallonie.be/en/diverimpacts
www.cra.wallonie.be/fr/serveau

Projects involved: SERVEAU (SPGE funding, No. DF16), DiverImpacts (European Horizon 2020 funding, No. 727482)

Sophie Herremans
s.herremans@cra.wallonie.be

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Walloon Agricultural Research Center | rue de Liroux, 9 | B-5030 Gembloux | Tel: +32 81 87 40 01 | Fax: +32 81 87 40 11 | www.cra.wallonie.be

A B2 VITAMIN FOR THE BREEDING OF POULTRY IN ORGANIC FARMING

SINCE VITAMIN B2 IS ESSENTIAL TO THE GROWTH OF POULTRY, THE CRA-W IS SEEKING ALTERNATIVE FORMS FOR USE IN ORGANIC FARMING.

The CRA-W has been commissioned by the Walloon Minister in charge of Agriculture to experiment on alternative ways of supplying meat-producing and egg-laying chickens in the organic farming sector with vitamin B2 in accordance with European organic regulations.

In collaboration with Gembloux Agro-Bio Tech of ULiège, the CRA-W has experimented with diets intended to meet vitamin B2 requirements during each of the 3 stages involved in the organic rearing of meat-producing chickens: launch, transition, and growth. Five diets were compared with a reference diet using conventional vitamin B2 currently available on the market, but not compliant with organic farming regulations, for which an alternative had to be found. The diets compared contained no conventional vitamin B2. In the case of diet 1, the vitamin B2 was supplied in the form of alfalfa, yeast and milk powder, which are specific raw materials rich in natural vitamin B2. Diet 2 contained a product rich in vitamin B2 extracted from baker's yeast, supplied by a company not involved in the animal nutrition industry. Diet 3 contained a product rich in vitamin B2, also from baker's yeast, supplied by a company specialising in animal nutrition. Diets 4 and 5 contained a premix rich in vitamin B2 supplied by a world leader in animal nutrition. This premix was introduced at a low and high content, respectively.

The alternatives tested achieved a zootechnical performance similar to that of the reference diet, with no observable negative health impacts. In terms of manufacturing, diet 1 was much more expensive (additional cost of 37%). It also raises concerns in relation to the fluctuating price of milk powder and the fact that this ingredient could pose a problem in sectors that prefer 100% vegetable foodstuffs. Diets 2 and 3 presented an additional cost of less than 5% of the manufacturing cost of the reference diet. The additional cost of diets 4 and 5 was not known at the time, but can be estimated at 5%.

Thus, alternatives to conventional vitamin B2 have been found. They have a usage cost, but produce similar results to those of conventional vitamin B2. In terms of implementation, however, it remains necessary to obtain authorisation for use in animal feed from the European Authority on the risks associated with the food chain (EFSA), organic certification and then the assurance of availability to cover the entire European market.

Funding: CRA-W funds

José Wavreille
j.wavreille@cra.wallonie.be

TOWARDS THE SUSTAINABLE MANAGEMENT OF AGRICULTURAL SOILS

EJP-SOIL AIMS TO CREATE A RESEARCH ENVIRONMENT SUITABLE FOR INCREASING THE CONTRIBUTION MADE BY AGRICULTURAL SOILS TO MAJOR SOCIETAL CHALLENGES.

These societal challenges are associated with the adaptation to climate change and mitigation of its effects, sustainable agricultural production, the provision of ecosystem services and the protection and restoration of damaged agricultural land.

The European EJP Soil programme was set up in early February 2020 for a period of 5 years, with the collaboration of 26 institutions from 24 countries in Europe. The main leaders are the INRAE (National Research Institute for Agriculture, Food and Environment) in France, and Wageningen University and Research (WUR) in the Netherlands. Wallonia is represented by the CRA-W, with the support of the SPW [Wallonia Public Service].

With the active commitment of stakeholders, the «EJP SOIL» project hopes to create a trans-European platform for interactions between researchers and those involved in soil management, helping to:

- Identify what expertise is needed and encourage the harmonisation of information on soils,
- Develop a strategic research programme (roadmap) for the sustainable, climate-smart management of agricultural soils,
- Develop knowledge sharing processes regarding best practice adapted to the needs of farmers, scientists and policy makers,
- Produce practical, evidence-based recommendations that promote uptake by those involved in the agricultural sector and thereby contribute to the formulation of policy.

The project also includes plans to identify obstacles and opportunities at regional, national and European level, in order to propose realistic scenarios for the future of agricultural land use, to be carried out in conjunction with the various stakeholders. This information will also help define the research topics to be tendered internally and externally.

For further information
https://projects.au.dk/ejpsoil/
www.cra.wallonie.be/fr/ejp-soil

Bruno Huyghebaert
b.huyghebaert@cra.wallonie.be

PROTEIN AUTONOMY AS SEEN IN 217 DAIRY FARMS

THE INTERREG V AUTOPROT PROJECT ENDED 2020 WITH ADVANCES IN THE ANALYSIS OF THE PROTEIN AUTONOMY OF DAIRY FARMS!

This project, which addresses the problem of importing protein to dairy cattle, particularly in the form of soya, highlights the environmental benefits and economic status quo of farming with greater autonomy.

As part of this project, the year 2020 saw the collection, standardisation and validation of a dataset involving 217 farms from the four project catchment areas (Lorraine, Wallonia, Luxembourg, Rhineland-Palatinate, Saarland).

Two original methodologies for estimating protein autonomy, adapted from partner methods to make them applicable to agricultural accounting data, were adopted:

- the first is based on the protein intake of cattle,

- the second is based on the protein actually valorised.

The difference between these two methods enables an estimation of the amount of untapped or "surplus" protein. These calculations can now be automated in agricultural accounting, as will soon be the case at Elévéo, in the Walloon area.

The effect of management factors and the link with environmental and economic factors were also studied on the basis of this dataset.

The results show that protein autonomy is associated with better environmental performance related to the farm surface (nitrogen and carbon balance), without compromising economic performances. To improve their protein autonomy, farms can concentrate their efforts on reaching a compromise dairy productivity, by maximising the use of grass and reducing the use of concentrates.

In addition to these statistical approaches, a list of **31 promising innovations** has been finalised, in order to potentially improve protein autonomy based on an extensive literature review and interviews with farmers and experts.

13 innovations and 2 good practices were subsequently studied in detail. These will be illustrated in the form of **technical leaflets** for farmers. The project, which has been granted an extension until June 2022, also includes plans to model the impact of the selected innovations, to analyse protein autonomy as an indicator of ammonia emissions, and to study its relationship with the competition between human food and animal feed.

Financial support
Interreg Grande Région | Großregion AUTOPROT
Wallonie

For further information
www.cra.wallonie.be/fr/autoprot/

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

A SITUATIONAL ANALYSIS OF THE MANAGEMENT OF FERTILITY OF SOILS AND ORGANIC MATTER

AS PART OF THE "SOCLES DE CONNAISSANCES" (KNOWLEDGE BASE) APPROACH, A DOCUMENT COMPILING ALL ASPECTS OF THE «SOIL» THEME IS BEING DRAFTED.

This state of knowledge is based on an extensive scientific and technical bibliography and highlights the lessons learned from trials and the results of studies conducted during a 40-year career. It concerns all types of agriculture, both traditional and organic, although some sections pay particular attention to organic farming.

The first part of this document begins with a few references to the concept of physical and chemical fertility of soils, then goes on to detail the cycles of essential elements (C, N, P, S and K) and the biological fertility of soils.

The second part is dedicated to the characterisation of organic matter (OM): «classical» analysis, biochemical fractionation, organic matter stability index (SI), and the prospective mineralisation of carbon and nitrogen. This characterisation should enable the assessment and modelling (transition from laboratory to field) of the behaviour of these OM once embedded in the soil, and to predict their effectiveness by means of apparent recovery index (ARI), which reflect agronomic efficiency, and real use coefficients (CRU), which reflect physiological efficiency.

The third part describes the available OM: the residues and sub-products of crops, CIPAN intercropping and other types of intercrops, and farm fertilisers (manure and its composting, slurry, etc.).

The final section addresses the management of soil fertility and fertilisation, particularly in relation to organic farming. The importance of crop rotation, the introduction of legume crops and the use of farm fertilisers is emphasised before developing different strategies and case studies. This final section is largely based on the results of trials carried out at CRA-W, within Walloon facilities (Agra-Ost, UCLouvain, CPL-Végémar, CARAH, etc.), and elsewhere in Europe.

Bernard Godden
b.godden@cra.wallonie.be

THE CRA-W TRIALS «SPOT-SPRAYING» TO TARGET WEEDS

INNOVEAU, VIA PRECISION AGRICULTURE, AIMS TO LIMIT THE RISK OF GROUNDWATER CONTAMINATION CAUSED BY PLANT PROTECTION PRODUCTS (PPP).

As a new technology that promises enormous benefits, "spot-spraying" must nevertheless be tested.

The InnovEau project, which was launched in December 2019 and is funded by the SPGE, brings together the CRA-W and 3 partners from the sectors of agriculture and drinking water production (Apligeer, SWDE and CILE). It is part of an effort to reduce PPPs in an area covering the Hesbaye chalks, one of the main sources of drinking water in Belgium.

Using the spot-spraying method, the herbicide is only applied to surfaces contaminated with weeds. For this purpose, the CRA-W has sensors that enable an initial detection and mapping of weeds by drone or on-board sensors. All these solutions use artificial intelligence to differentiate between weeds and the desired crop. Next, the sprayer is fitted with a detection map, and thanks to a system of pulsating nozzles (each of which is activated independently of the others), only the areas thought to be covered with weeds are sprayed.

This means that the PPP is used in proportion to the area affected by weeds, thereby reducing the amount of product used.

In the course of 2020, the CRA-W was able to trial this on 5 different crops: corn, beet, beans, grassland and rapeseed. These trials involved the delineation of counting zones, in which each weed was georeferenced in order to validate the various sensors tested. Scores were also assigned to quantify the actual effectiveness of the spray applied. These initial trials have already demonstrated product reductions ranging from 65 to 95% compared with blanket spraying, with an efficiency of approximately 85%, as against 98% for traditional spraying.

Although these technologies are still in their infancy, they are developing very rapidly and the initial results, while yet to be confirmed in the 2021 and 2022 seasons, seem encouraging for the deployment of these technologies in the Walloon agricultural community.

Sprayer equipped with on-board sensors to enable spot-spraying

For further information
www.cra.wallonie.be/fr/innoveau

Project subsidised by SPGE

Bastien Notredame
b.notredame@cra.wallonie.be

THE SUSTAINABILITY OF SYSTEMS IS IMPROVED BY CROP DIVERSIFICATION

RESEARCHERS INVOLVED IN THE EUROPEAN DIVERIMPACTS PROJECT ARE COLLABORATING WITH FARMERS AND OTHER STAKEHOLDERS OF THE SECTOR IN THE STEP-BY-STEP DEVELOPMENT OF INNOVATIVE PRACTICES.

CRA-W teams are co-leading 3 case studies set up and monitored as part of this project.

The **"Cover crop grazing"** case study (in partnership with the Collège des Producteurs) [Agricultural College] brought together crop farmers and sheep breeders. Following discussions within the group, the management possibilities offered by grazing have been extended to other crops: early sown winter cereals, rapeseed, beets, etc. However, several legislative hurdles (unauthorised exchanges between organic and non-organic) or citizen-based obstacles (animal welfare) have emerged.

The **"pea-wheat intercropping"** case study (in partnership with Walagri) has illustrated the interest of this practice for manufacturers and consumers. The harvest is divided into 3 products: peas for human consumption (3/9), wheat for breadmaking (4/9) and a lower quality pea-wheat mixture for animal feed (2/9). This combination allows growers to produce almost twice as much protein per area unit as a pure crop grown for animal feed.

Finally, as part of the **"Reduction of plant protection products and soil tillage"** case study (in partnership with Greenotec), farmers allocated at least 1 hectare of their land to test innovative practices. These practices are not well-developed in our climate. Group meetings, training, and field visits are also organised, providing a forum for discussion that allows the co-construction and questioning of these new practices. Within the group, farmers do not face the same challenges depending on whether they avoid spraying or ploughing. However, all are seeking to improve the management of cover crops, a practice that is essential to the success of their systems.

Beyond the agronomic aspect, participatory research methods are implemented and developed. This project will lead to the establishment of recommendations for policy makers aimed at removing obstacles to crop diversification and thus increasing the sustainability of cropping systems.

For further information
www.cra.wallonie.be/en/diverimpacts

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Louise Legein
l.legein@cra.wallonie.be

Photo: Analysis of a soil profile during a field visit with farmers aimed at the simultaneous reduction of tillage and use of plant protection products.